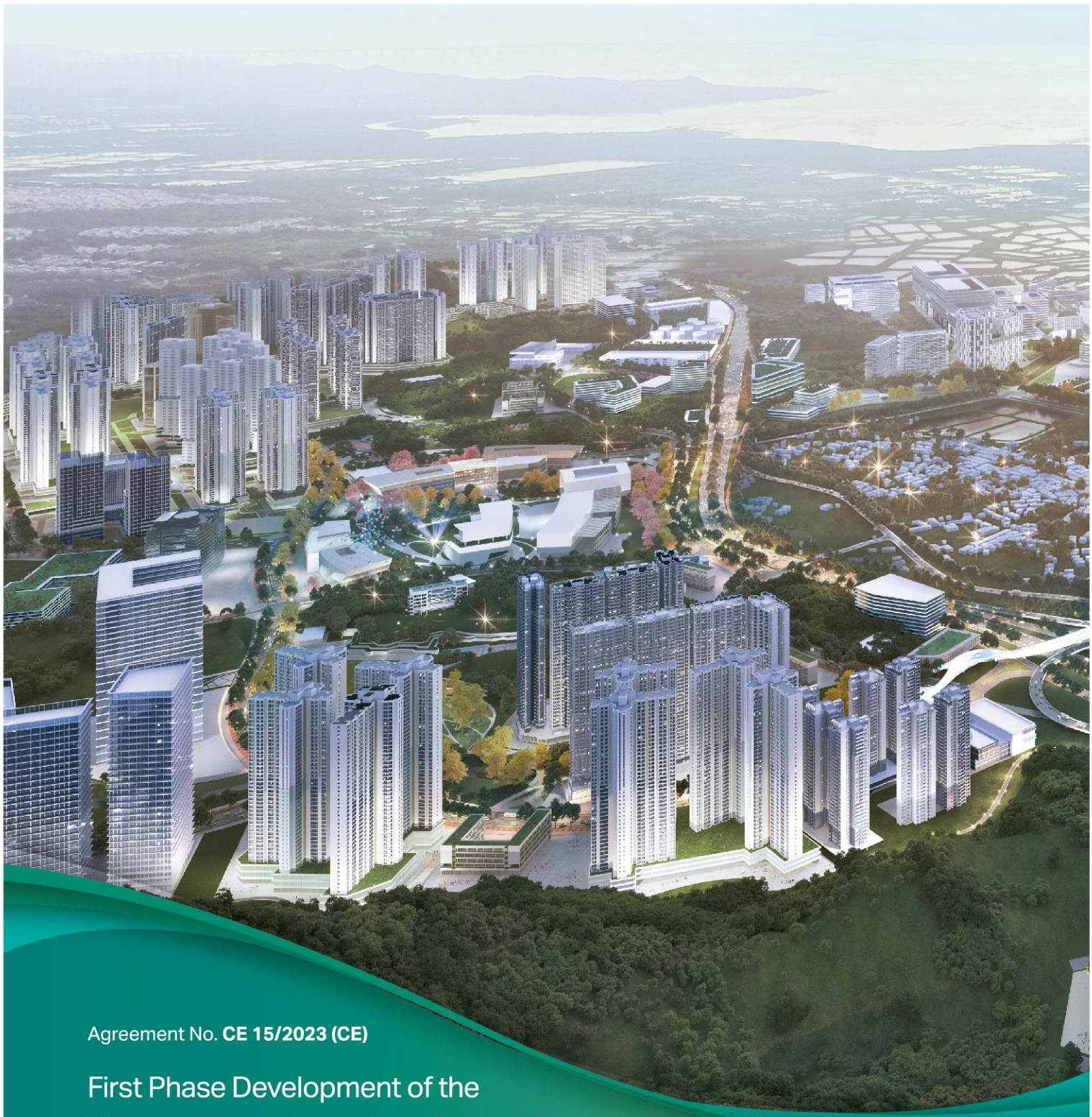


Agreement No. **CE 15/2023 (CE)**

First Phase Development of the

New Territories North – San Tin / Lok Ma Chau Development Node

Package 1 – Design and Construction

Detailed Habitat Creation and Management Plan (Ref. Z22-03)

August 2026

CEDD 土木工程拓展署 Civil Engineering and Development Department

AECOM Halcrow

土木工程拓展署
Civil Engineering and Development Department
North Development Office

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(Ref. Z22-03)

August 2026

Reviewed:	David Gallacher AECOM	6 August 2026
Approved for Issue:	Ivan Tsang AECOM	6 August 2026

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1 PROJECT BACKGROUND

1.1 San Tin Technopole Development

1.1.1.1 San Tin / Lok Ma Chau Development Node (STLMC DN) (hereafter referred to as the Project) has taken forward the San Tin Technopole (STT) initiative. Located at the heart of Northern Metropolis and in close proximity to Shenzhen's I&T zone in Huanggang and Futian, STT is strategically positioned to be a hub for clustered I&T development that creates synergy with Shenzhen I&T Zone. It will contribute to the development of the South-North dual engine (finance – I&T), and become a new community for quality, healthy and green living.

1.1.1.2 The EIA Report for San Tin / Lok Ma Chau Development Node was approved by the Director of Environmental Protection (DEP) (EIAO register no.: AEIAR-261/2024) with conditions in accordance with the EIAO on 17 May 2024 (hereinafter referred to as the EIA Report).

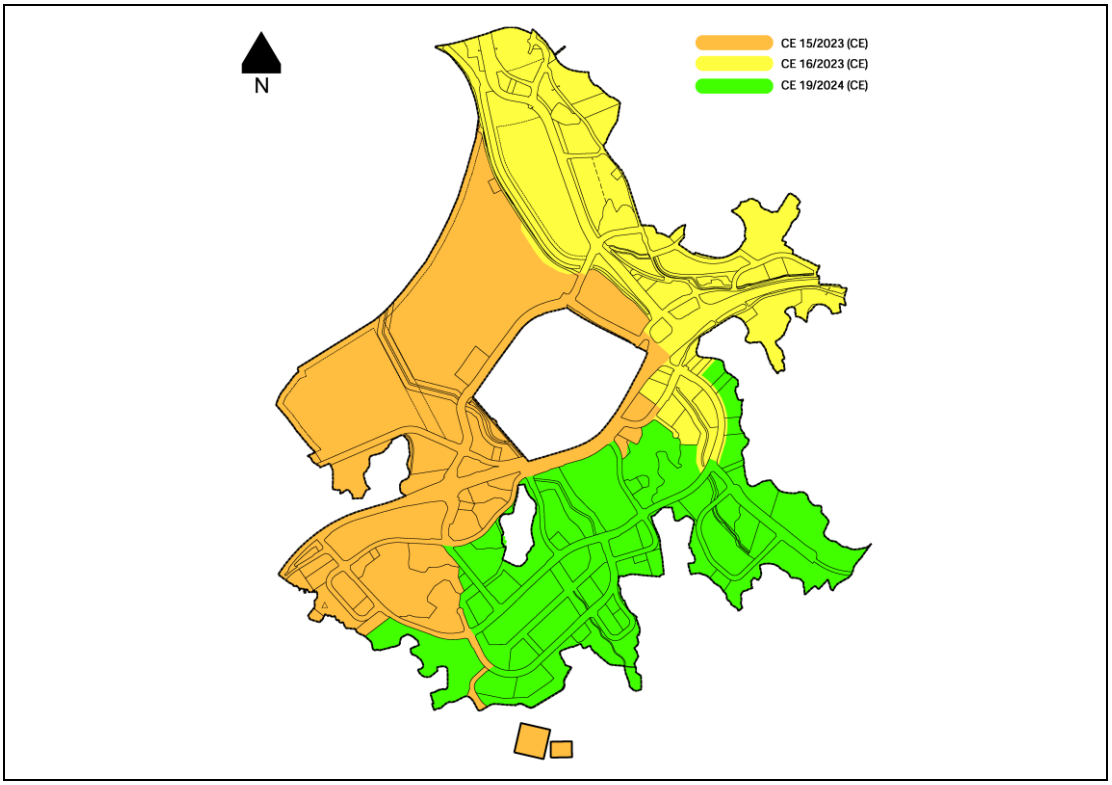
1.1.1.3 The STLMC DN (also referred to as "STT") is being developed in phases. The design and construction of first phase of the STT is diverted into three packages namely Package 1, Package 2 and Package 3 which are implemented under Agreement No. CE 15/2023 (CE), Agreement No. CE 16/2023 (CE) and Agreement No. CE 19/2024 (CE) respectively as illustrated in **Insert 1.1**. The construction contracts for the Phase 1 Stage 1 and Stage 2 of the STT would commence starting from December 2024 and tentatively in 2027 respectively.

(a) The STT covering site formation of land for innovation and technology development, housing, community, commercial and other developments as well as engineering infrastructure works, including widening of San Tin Highways, a new interchange and local roads, cycle tracks, drainage, sewerage, waterworks, a pumping station, fresh water and flushing water service reservoirs, Common Utility Enclosure (CUE) and landscaping works in STT , are to be undertaken under Package 1 (Agreement No. CE 15/2023 (CE)).

(b) The STT covering site formation of land for innovation and technology development, housing, community, commercial and other developments as well as engineering infrastructure works, including demolition of existing Lok Ma Chau BCP, construction of temporary roads connecting to the new Huanggang Port upon its commissioning, San Sham Road Viaduct and local roads, cycle tracks, drainage, sewerage, waterworks, a pumping station, CUE and landscaping works in STT, are undertaken under Package 2 (Agreement No. CE 16/2023 (CE)).

(c) The design and construction of remaining works of STT, mainly south of San Tin Highways, which are covering site formation of land for I&T development, housing, community, commercial and other developments as well as engineering infrastructure works, including district and local roads, cycle tracks, drainage, sewerage, waterworks, CUE and landscaping works in STT are to be implemented and undertaken under Package 3 (Agreement No. CE 19/2024 (CE)).

1.1.1.4 The target commencement date for proposed pond filling works is subject to the approval of the Detailed Habitat Creation and Management Plan (HCMP). No pond filling works of the Project will be carried out prior to the commencement of construction of ecologically enhanced fish ponds at the proposed SPS WCP according to Approval Condition (9) of the EIA report.

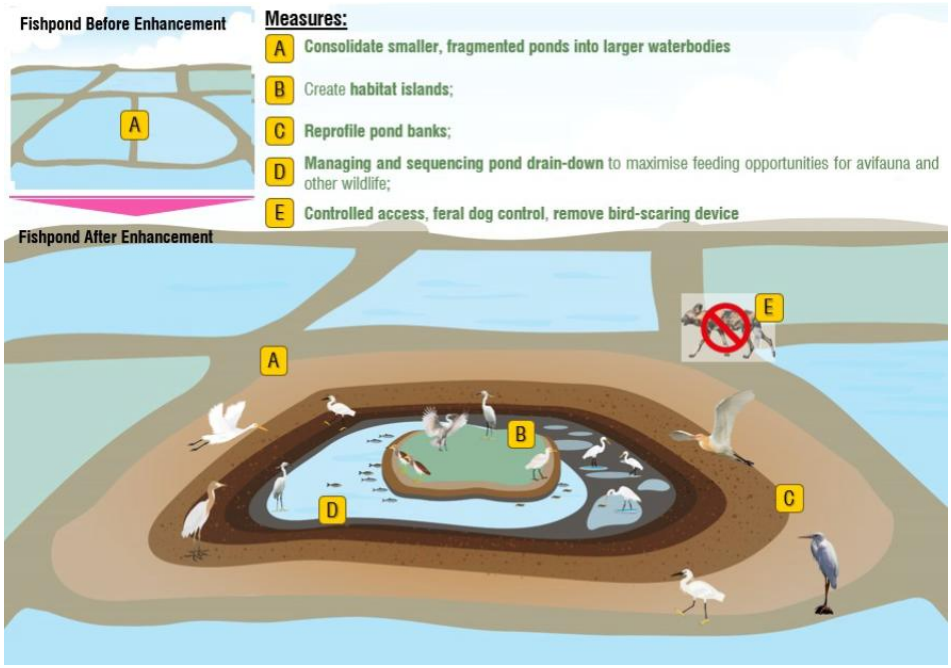


Insert 1.1 Consultancy Agreements for Design and Construction of First Phase of the STT

1.2 Summary of Ecological Impacts and Wetland Compensation Requirements of San Tin / Lok Ma Chau Development Node

1.2.1.1 As detailed in Section 10.11 of the EIA Report, about 89 ha of the largely contiguous area of ponds in the northern portion of the STT, which support high richness and abundance of avifauna species, will be permanently lost under the STT Project. Assumptions were made that the impacts could be greater than the directly lost wetlands and an Exclusion Zone (EZ) of approximately 32.39 ha (i.e. area close to source of disturbance, where disturbance levels are high enough to prevent sensitive species from using wetland habitats, even with the presence of suitable habitat) and a Reduced Density Zone (RDZ) of approximately 30.25 ha (i.e. area further from source of disturbance where the species will use the suitable wetland habitats but likely at a reduced density compared to undisturbed habitat) would be created up to 400m outside of the STT for large, disturbance sensitive avifauna species.

1.2.1.2 To compensate for the direct loss of the contiguous pond habitat and indirectly impacted wetlands of up to 400m outside of the Project boundary, which cover approximately 32.39 ha of EZ (no usage by disturbance sensitive avifauna due to proximity to the Project) and 30.25 ha of RDZ (supporting only 50% of the disturbance sensitive avifauna species), enhanced wetlands in the form of ecologically enhanced fishponds (EEF) at the proposed SPS WCP will be established (**Section 1.3** refers). Existing pond habitats and ponds converted from existing brownfield or wasteland areas ponds will be enhanced with various features to establish the EEF as illustrated in **Insert 1.2** to increase abundance of wildlife they are able to support, thereby compensating for the loss of the functional value by accommodating a higher abundance of wildlife. Enhancing the ecological function and capacity of these ponds would compensate for the loss or reduction of functional value (i.e., the abundance of wildlife species that the ponds are able to support) resulting from the Project. No pond filling works of the Project will be carried out prior to commencement of construction of the ecological enhanced fish ponds at the proposed SPS WCP.



Insert 1.2 Recommended Measures for Ecologically Enhanced Fishponds (Reproduced from Figure 3.1 of the Draft HCMP in Appendix 10.8 of the EIA Report)

1.2.1.3 Apart from the contiguous pond habitat as described in **Section 1.2.1.1**, other wetland habitats with "low" to "moderate" ecological values (including scattered ponds in the southern portion, mitigation wetland, marsh / reed, watercourse, seasonally wet grassland, and wet agricultural land) would also be subject to direct loss within the Project (including permanent loss upon site formation, and temporary loss of wetlands that would be later reinstated / revitalised) and indirect disturbance within the EZ and RDZ. Under the current wetland compensation strategy, enhanced freshwater wetland (EFW) will be established to compensate for impacts on these other wetland habitats with an area-based approach. Wetland habitats within the Project site would be subject to direct impact, hence would be compensated for on a 1:1 compensation. Habitats within both EZ and RDZ are anticipated to support lower density of wildlife due to disturbance, where disturbance sensitive avifauna species is estimated at 0% and 50% at EZ and RDZ respectively. As such, compensation ratios of 1:1 and 1:0.5 are proposed for wetland habitats within the EZ and RDZ respectively.

1.2.1.4 A draft HCMP was included as Appendix 10.8 of the EIA Report that provides initial framework on the management and monitoring requirements for the enhanced wetland habitats within the SPS WCP and to define the long-term management and monitoring requirements for these habitats in respect of wetland compensation for the STT Project, in order to achieve no-net-loss in ecological function and capacity of the wetland (including fishponds) concerned under the STT Project. According to S.10.11.3.26 of the EIA report, based on the estimated changes in functional values for indicator species, compensation could be provided through the provision of 253 ha of ecologically enhanced fishpond habitat within the proposed SPS WCP. The approximate area for compensation is shown in Figure 10.12A of the EIA Report, and extracted in **Appendix A**.

Establishment of Sam Po Shue Wetland Conservation Park

1.2.1.5 The Government will develop the SPS WCP with a proposed area of approximately 338 ha to create environmental capacity for the development of STT. Among the 338 ha, while up to about 10 ha is reserved for supporting facilities such as visitor center and other basic infrastructure, the Government will enhance the ecological function and capacity of 288 ha of wetlands and fisheries resources of 40 ha of fishponds by establishing the SPS WCP with active conservation management and modernised aquaculture to compensate for the loss of pond and other wetland habitats and fisheries resources arising from the development of STT and to achieve no-net-loss in ecological function and capacity of the wetlands concerned. Among the 288 ha, there will be 253 ha of "ecologically enhanced fishponds"

compensating for pond habitat loss, and 35 ha of "enhanced freshwater wetland habitat" compensating for other freshwater wetland habitat loss.

1.2.1.6 The 253 ha ecologically enhanced fishponds will be suitably transformed into an area serving dual nature conservation and eco-friendly aquaculture purposes. For the 35 ha enhanced freshwater wetland habitats, a mix of open water, marshes/reedbeds, seasonal wetlands and drainage channels shall be provided and managed to support specific wetland communities and species of conservation importance. Lastly, the 40 ha fisheries enhancement area will be designated for indoor high density fish farming and pond fish farming deploying with appropriate modernised aquaculture technologies[1].

1.2.1.7 The development of SPS WCP is established under the Government's New Proactive Conservation Policy, with a view to conserving habitats with ecological values, enhancing biodiversity and increasing the environmental capacity for the development of the Northern Metropolis. It will also support the development of modernised aquaculture and promotion of scientific research on aquaculture, as well as provide quality outdoor eco-education and eco-tourism facilities for public enjoyment.

1.3 Objectives and Scope of Habitat Creation and Management Plan (HCMP)

1.3.1.1 This HCMP is prepared in line with Section 10.11.3.35 of the EIA Report and Section 9.2.2.29 of the Environmental Monitoring and Audit Manual (EM&A) for STLMC DN (Register No.: AEIAR-261/2024) and Item (1) of the EIA Approval Conditions. As required under Item (1) of the EIA Approval Conditions, the HCMP should provide details on ecological impacts, specifications for the target habitats and species, mitigation and compensation measures including provision of birds' flight paths, wildlife corridors for non-flying mammals, wetlands compensation, protection of existing egretries, design and implementation methods, management strategy, monitoring requirements (e.g. location, frequency and parameters) and reporting requirements, Action / Limit Levels and Event / Action Plan, as well as overall implementation programme, with a view to ensuring no net loss in ecological function and capacity of the wetlands concerned under the Project. This Detailed HCMP is prepared with reference to the Draft Habitat Creation Management Plan (HCMP) of the EIA (Appendix 10.8 of AEIAR-261/2024) and in conjunction with the HCMP for the Establishment of SPS WCP prepared under Agreement No. CE 25/2024 (CE) commissioned by CEDD and AFCD.

1.3.1.2 As required under Item (5) of the EIA Approval Conditions, an Environmental Committee (EC) of STLMC DN (also referred to as "STT") has been established to advise on the preparation of the ecological mitigation and enhancement plans required under the EIA Approval Conditions and to monitor the effectiveness of the implementation of the proposed ecological mitigation / enhancement measures, including the HCMP. Details of the HCMP have been consulted with the AFCD and EC. Three EC meetings have been convened to date on 7 November 2024, 27 March 2025 and 12 January 2026. Recommendations on detailed design / operation of the enhanced wetland of the SPS WCP from the EC as summarised in **Table 1.1** have been incorporated in this HCMP accordingly, including bird island extent to accommodate a variety of waterbirds, vegetation management (e.g. exotic *Sonneratia* and other plant species management), habitat design considerations for other target species besides of waterbirds (e.g. plantings for fruit bats and insectivorous bats utilising existing fishpond bunds / wetland, additional habitats for bitterns), trash-fish stocking species.

1.3.1.3 As required under Items (1) and (6) of the EIA Approval Conditions, meeting with the Advisory Council on the Environment (ACE) was convened on 9 March 2026 (ACE Paper 1/2026) to consult the ACE on the detailed HCMP for its finalization and the subsequent submission to the DEP for approval, as well to report on the implementation progress of the Interim Wetland Enhancement Plan (IWEP), the Implementation Plan for Wetland Enhancement Measures at Mai Po (IPM), the Detailed Design Plan for Establishment of Wildlife Corridors (DDP), and the environmental monitoring results and effectiveness of ecological mitigation / enhancement measures for the STT. Recommendations on the implementation programme and operation

[1]Modernised aquaculture generally refers to intensive high-density aquaculture activities, indoor or outdoor, with the adoption of innovative green technologies, such as recirculating aquaculture system (RAS), compartmentalisation, remote real-time environmental monitoring, species selection, ecological polyculture, nutrition management, disease prevention and health management, etc., that create water bodies and environmental conditions suitable for fish growth under high-density stocking conditions. These services will determine the exact infrastructural and technological requirements for deployment at the 40 ha fisheries enhancement area.

of the SPS WCP from the AEC have been addressed / incorporated in this HCMP accordingly, including timely implementation of enhanced wetland, alignment with the updated Biodiversity Strategy and Action Plan (BSAP), climate resilience, hybrid management mode, collaboration and communication with nearby wetland and financing of the SPS WCP.

Table 1.1 Recommendations from the EC on Detailed Design and Operation of the Enhanced Wetland

Key Recommendations from the EC	Considerations in the HCMP
Habitat design considerations for wildlife other than the "target species" under the Draft HCMP under the STT EIA	A list of supplementary focus species, having been previously recorded within the SPS area, with some being of conservation importance and having significant opportunities to enhance habitats for them in the newly established SPS WCP, has been included in the HCMP as detailed in **Section 4.2**, in consultation with the EC. The supplementary focus species cover (covering ducks and grebes, shorebirds and gulls, freshwater wetland avifauna (e.g. bittern species), other wetland-associated avifauna, mammal (including bats), and firefly. Considerations have been given to latest site conditions of the San Tin and Sam Po Shue area in identification of the supplementary focus species and optimisation of relevant enhanced habitat designs. Specific habitat enhancement measures have been incorporated for these supplementary focus species (e.g. planting of fruit trees at EEF and EFW, installation of bat boxes for bats).
Eco-friendly Aquaculture Demonstration Zone – general support subject to further substantiation on ecological performance, visual impact and facility location	The Demonstration Zone is strategically located adjacent to other EEF, facilitating direct and comparable monitoring of its ecological effectiveness, which is crucial for future wider implementation. The site selection has taken full account of the surrounding environment. On the one hand, it is situated away from ecologically sensitive areas, thereby minimising potential impacts. On the other hand, natural topographical features are utilised to mitigate visual impacts. In addition, the Demonstration Zone is located close to Tam Kon Chau Road, providing convenient access for the transport of aquaculture equipment and products, as well as supporting daily operational logistics. The containers in the Demonstration Zone will incorporate greening design to minimise potential visual and ecological impacts. The Eco-friendly Aquaculture Demonstration Zone is proposed to be implemented under Phase 1 of the SPS WCP to further investigate the ecological performance of the aquaculture technologies. A comprehensive ongoing monitoring and adaptive management framework will be established to assess the effectiveness of these habitat enhancement measures. The findings will be used to inform the design of the remaining EEF and the configuration of the reprofiled ponds.

Key Recommendations from the EC	Considerations in the HCMP
Pond reprofiling – prioritisation of larger pond consolidation where technically feasible and ecologically suitable	Engineering feasibility, habitat suitability and diversity, management needs, and fisheries production requirements have been taken into account in developing the proposed pond configuration. Where feasible, approximately 2 to 5 existing ponds have been merged to form larger pond habitats. Ponds within the Low Intensity Management Area will also be further reviewed and combined where necessary.
Visitor access control – concern on effectiveness of soft measures and need for stronger restriction measures where necessary	Soft visitor control measures, including boardwalk design, signposts, screen planting and other low-impact design features, are proposed to manage visitor access while maintaining the natural character of the SPS WCP. Visitor movement within the SPS WCP has been carefully planned to concentrate activities primarily along boardwalk / wooden trails and designated areas. Sensitive ecological zones, such as fishponds and gei wai, are designated as low-disturbance areas, with access restrictions that can be adjusted seasonally. The effectiveness of these measures will be monitored during operation. If a higher level of disturbance is detected, additional or stronger visitor restriction measures will be reviewed and implemented as necessary.
Optimisation of vegetated wetland / freshwater habitat over open water habitat for potential otter habitats	Taking into account the findings of the 12-month baseline wetland monitoring and pre-construction survey for Eurasian Otter described in **Section 3.1.1.6** and recommendations from the EC, vegetated *gei wai* habitats have been designed accordingly for Eurasian Otter
Dog control within EEF – need for access control measures to exclude dogs and minimise disturbance to fishpond habitats	An outreach programme for the neutering and microchipping of feral animals, along with a rehoming programme, will be implemented prior to the relocation of villagers. During construction, a strict ban on keeping and / or feeding feral animals on site will be enforced. Sightings of feral animals will be recorded throughout the construction and operational phases.
Utilisation of existing structures and operational access for visitor / education uses	The potential use of existing houses or structures for visitor or education purposes will be subject to on-site evaluation and compliance with relevant local safety standards. The width of pond bunds within the SPS WCP will largely be retained. Road improvement works will be carried out only where necessary to provide vehicular access of approximately 3 to 3.5 m wide for small machinery, fisheries operation and maintenance vehicles.
Biodiversity Zone access control – provision of low-disturbance / restricted-access areas for wildlife use, with control measures comparable to MPNR where appropriate	The visitor management zoning has been updated. Visitor access in Zone 1 will be controlled through soft and/or physical measures, including signposts, boardwalk design at the fringe, screen planting, ditches and water-filled channels, to direct visitors towards other zones and reduce disturbance from visitor activities. If high disturbance pressure is observed due

Key Recommendations from the EC	Considerations in the HCMP
	to visitor density, management actions will be reviewed to ensure that the primary objective of ecological conservation in the zone can be achieved.

1.3.1.4 Apart from this introductory section, other sections of this Report are as follows:

- **Section 2** lists out the key wetland compensation and mitigation requirements of STT
- **Section 3** reviews the existing baseline ecological conditions of the SPS WCP;
- **Section 4** reviews the key and supplementary focus species and corresponding habitat requirements as well as habitat condition targets of the HCMP;
- **Section 5** describes the overall habitat planning in the SPS WCP;
- **Section 6** describes the design consideration, implementation methods and management actions of enhanced habitats in the SPS WCP to enhance ecological functions;
- **Section 7** discusses the monitoring, adaptive management and reporting requirements for the SPS WCP; and
- **Section 8** describes the overall implementation programme for the SPS WCP

2 KEY WETLAND COMPENSATION AND MITIGATION REQUIREMENTS

2.1 Key Design Objectives of Sam Po Shue Wetland Conservation Park

2.1.1 Wetland Compensation Strategy under the EIA Report

2.1.1.1 To compensate for the loss in wetland habitats arising from the development of STT and to achieve no-net-loss in ecological function and capacity of the wetlands (including fishponds) concerned, the SPS WCP will be established with active conservation management to enhance the ecological functions and capacity of 288 ha of wetland. Among the wetland areas, there will be 253 ha of EEF compensating for pond habitat loss, and 35 ha of EFW habitat compensating for other freshwater wetland habitat loss (**Figure 2.1** refers). Section 10.11.3.26 of the EIA Report notes that additional enhancement measures, such as trash-fish stocking, will be derived as needed to further enhance the functional value of the EEF ponds (to meet mitigation targets). The layout of the habitats, management zoning, and supporting infrastructure will be discussed in later sections of this Detailed HCMP.

2.1.2 Creation of Environmental Capacity in SPS WCP

2.1.2.1 As mentioned in the EIA report, a key aim of the SPS WCP is to create environmental capacity for the development of STT. The WCPs System also has four major functions, including (i) conserving the ecological value of the wetlands and safeguarding the integrity of the wetlands system; (ii) developing modernised aquaculture industry to create more job opportunities for the agriculture and fisheries industries; (iii) promoting scientific research on aquaculture to facilitate the upgrading and transformation of the agriculture and fisheries industries; and (iv) providing ecological education and recreational facilities for the public (AFCD, 2024). These objectives and functions shall be achieved through the establishment of a mixture of wetland habitats that are both biodiverse and productive, with effective and sustainable management, and the development of suitable eco-education facilities and programme.

2.1.2.2 Considering measurement of environmental capacity should reflect the overall environmental conditions, ecosystem functions and services, it can be considered that environmental capacity can broadly refers to the ecosystem services provided by wetland habitats that deliver the four major functions. Following the Millennium Ecosystem Assessment (MEA) (MEA, 2005), ecosystem services are “the benefits people obtain from ecosystems”, and can be separated into four main categories: Supporting Services, Provisioning Services, Regulating Services and Cultural Services. Evaluation of the level of ecosystem services provided by the SPS WCP can reflect the environmental capacity created.

2.2 Other Key Wetland Mitigation Strategies of San Tin / Lok Ma Chau Development Node

2.2.1 Overview

2.2.1.1 As outlined in Sections 3.4.12 to 3.4.21 of the Draft HCMP of the EIA Report (Appendix 10.8 of the EIA Report), apart from establishment of SPS WCP for wetland compensation, other wetland mitigation measures within the Project (i.e. STT) were also recommended under the EIA report, including provision of birds' flight paths, wildlife corridors for non-flying mammals including Eurasian Otters, and protection of existing egretries. Integration of the design of SPS WCP with these mitigation measures implemented within the STT has been duly considered in this Detailed HCMP to ensure ecological linkage.

2.2.2 Birds’ Flight Path

2.2.2.1 A 300m-wide bird flight corridor between the Lok Ma Chau Meander and Sam Po Shue in east-west direction will be preserved within the STT (covering majority of the recorded flight paths) by designation of non-building areas (NBA) at I&T sites, as well as by imposing building height control of +15 mPD for Government facilities within the flight corridor and +35 mPD for buildings adjacent to the flight corridor within STT to further minimise disturbance impact and encourage flight usage as detailed in Sections 2.9 and 10.11.6 and Figures 10.6C to 10.6D of the EIA report.

2.2.2.2 A 70m-wide NBA along the flight path connecting the Mai Po Lung Village (MPLV) Egretry to the wetland habitats on the north, as well as a 35m-wide NBA as “eco-interface” along the northwest of the Project boundary, with landscape buffer between the proposed development and the wetland habitats on the northwest, will be provided to preserve flight paths recorded

at the MPLV Egretry and Mai Po Village (MPV) Egretry respectively as detailed in Section 10.11.6 and Figure 10.6A of the EIA report.

2.2.2.3 Bird-friendly design (e.g. use of low reflective materials and appropriate architectural features) will be adopted for buildings within the STT adjacent to the 300m-wide bird flight corridor, the 70 m-wide flight path and the MPLV Egretry, as well as the buildings covered in the approved Bird-friendly Design Guideline, to minimise bird collision as recommended in the EIA. Further to the recommendations and proposed mitigation measures in the EIA Report, Item (7) of the EIA Approval Conditions has also required CEDD to submit a Bird-friendly Design Guideline for buildings within the STT, in consultation with the AFCD, to the DEP for approval within 12 months from commencement of construction of the Project, which should provide measures to minimise the risk of bird collisions and the impacts on birds. The bird-friendly design was submitted to the DEP for approval in December 2025. The endorsed Planning and Design Brief (PDB) for Innovation and Technology (I&T) Sites on the San Tin Technopole Outline Zoning Plan (OZP) [2] has reflected the relevant requirement under Item (7) of the Conditions of Approval of the approved EIA Report by drawing future project proponent(s) / developer(s)' attention to the need to ensure their development(s) would comply with relevant mitigation measures for minimising potential impacts on birds and the risk of bird collisions as recommended in the approved EIA Report and the Bird-friendly Design Guideline formulated under the approval conditions of the EIA Report, where applicable.

2.2.2.4 Integration of the design of SPS WCP with the 300m-wide bird flight corridor and 70m-wide bird flight path of MPLV egretry preserved within the STT, as well as relevant height restrictions and bird-friendly designs in vicinity of the flight path have been duly considered in this detailed HCMP to ensure ecological linkage.

2.2.3 Wildlife Corridors for Non-flying Mammals including Eurasian Otters

2.2.3.1 A wildlife corridor has been proposed in both the northern portion of the Project between Ha Wan Tsuen and San Eastern Main Drainage Channel (STEMDC) adjacent to the Lok Ma Chau Boundary Control Point (LMC BCP) and SPS WCP as detailed in Section 10.11.11 and Figures 10.10A to 10.10B of the EIA report to facilitate movement of non-flying mammals, including Eurasian Otters.

2.2.3.2 An existing wildlife corridor underneath San Sham Road, which is northeastern adjacent to the SPS WCP and constructed under the Sheung Shui to Lok Ma Chau Spur Line project (EPD, 2015), is within the footprint of the STT and will be lost upon the commencement of construction activities. In order to maintain the movement corridor of non-flying mammal species of conservation importance (such as East Asian Porcupine, Red Muntjac and Small Indian Civet) and promote potential usage by Eurasian Otter, the wildlife corridors will be provided in the form of underpasses (across Ha Wan Tsuen East Road and San Sham Road) and aboveground corridors within the AFCD Fisheries Research Centre adjacent to the Lok Ma Chau Meander, as well as adjacent to the STEMDC to facilitate free movement of Eurasian Otters across Lok Ma Chau, Sam Po Shue and the Inner Deep Bay area.

2.2.3.3 To further the implementation of the relevant recommendations in the EIA Report, Item (2) of the EIA Approval Conditions has required submission of a Detailed Design Plan for Establishment of Wildlife Corridors (DDP) for non-flying mammals and related measures to the DEP for approval three months before commencement of construction of relevant parts of the Project affecting the existing wildlife corridor(s). It is specified in the EIA Approval Conditions that aboveground wildlife corridors with water features and dimension of no less than 10m wide, and underpass wildlife corridors with cross-sectional area of no less than 6m² (2m high and 3m wide, subject to detailed design) with water features and natural lighting shall be provided. To facilitate movement of Eurasian Otters across Lok Ma Chau, Sam Po Shue and the Inner Deep Bay area, the DDP shall devise measures such as widening of the gaps in the grille of the water channel connecting the Shenzhen River, and modifying the inflatable dam at San Tin Main Eastern Drainage Channel (STEMDC) and the flap valve at

[2] The Planning and Design Brief (PDB) for Innovation and Technology Sites on San Tin Technopole Outline Zoning Plan is an administrative document which sets out the broad planning parameters, key development requirements and urban design considerations for guiding the design and implementation of the future developments at the I&T Sites; and for facilitating the preparation of Master Plan(s) by project proponent(s) of development(s) at the I&T Sites which will be considered by a Designated Committee set up under the Development Bureau.

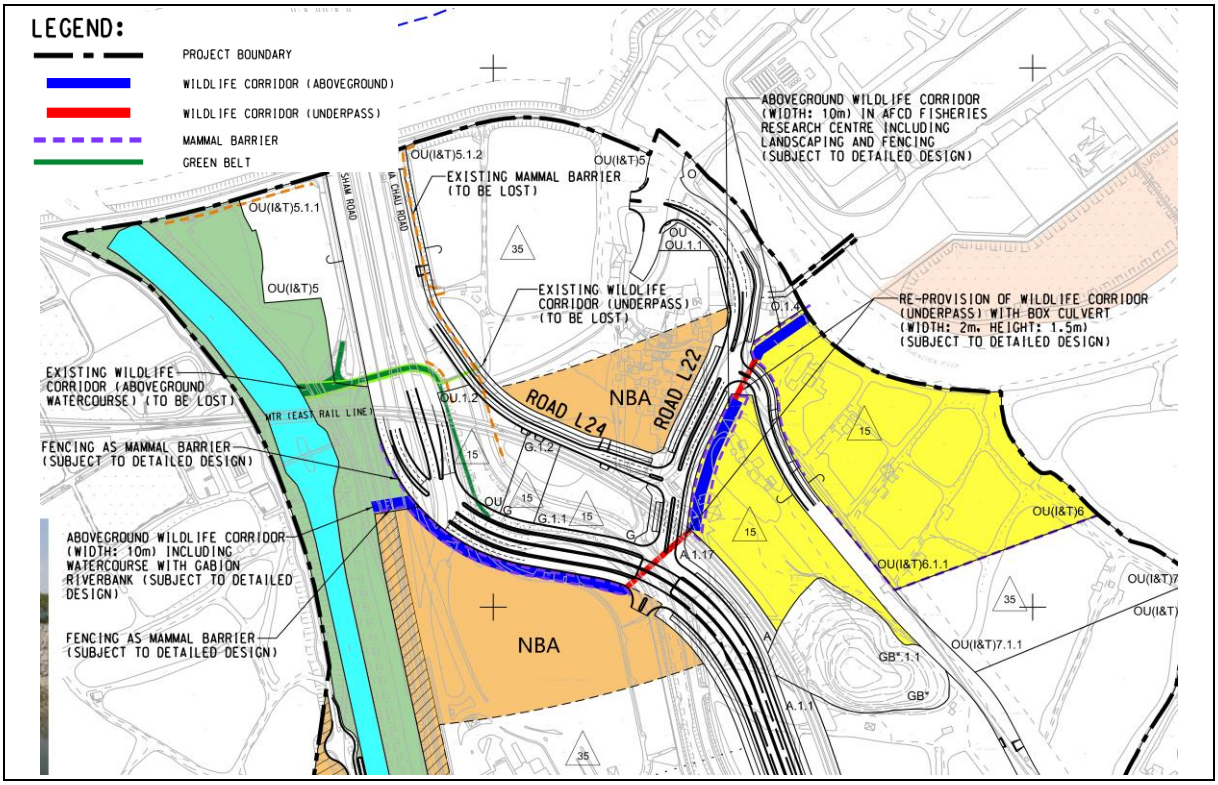
Lok Ma Chau Meander with provision of passages (e.g. ladder) across the flap valve and the inflatable dam.

2.2.3.4 As required under Item (5) of the EIA Approval Conditions, preparation of the DDP under Item (2) of the EIA Approval Conditions, also requires consultation with the EC. The recommendations from the EC on detailed design / operation of the wildlife corridors will be incorporated in the DDP.

2.2.3.5 As the wildlife corridors overlap partly with the footprint of the STEMDC, which is a designated project (DP), Clause 2.16 of the relevant Environmental Permit (EP) No. EP-664/2025 has also required submission of DDP no later than 3 months before the commencement of construction of the DPs under the EIAO. The DDP shall cover the design of Wildlife Corridors for non-flying mammals, including the related measures to facilitate movement of Eurasian Otters across Lok Ma Chau, Sam Po Shue and the Inner Deep Bay Area. The DDP shall include an implementation schedule in table form to clearly list out the mitigation measures to be implemented, and the implementation party, location, timing, and environmental performance required for implementation of the mitigation measures. The DDP will be prepared by the Qualified Ecologist(s) as appointed under Condition 2.5 of EP-664/2025 and shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations of the EIA Report (Register No. AEIAR-261/2024). All recommended measures and requirements specified in the DDP shall be fully implemented.

2.2.3.6 Detailed design and construction of the proposed wildlife corridor are undertaken under Package 2 of the design and construction of first phase of the STT, i.e. Agreement No. CE 16/2023 (CE). Under the latest design, the proposed wildlife corridor has a total length of approximately 700m and consists of open channel sections of 10m wide, including one section adjacent to the the non-building area within the I&T sites and another two sections running along the AFCD Fisheries Research Centre (FRC) near Lok Ma Chau, as well as connecting underpasses of 3m wide and 2m high (providing a cross-sectional area of $6m^2$) beneath the planned roads. The open channels will be provided with vegetation and water features and fenced off to minimise human disturbance to the non-flying animals, while the underpasses will have ledges on both sides to provide both wet and dry routes for wildlife movement, as well as light shafts to provide natural lighting conditions as much as possible. The proposed wildlife corridor would connect downstream of the existing inflatable dam at STEMDC and the LMC Meander. At the western end of the proposed wildlife corridor adjacent to STEMDC, a series of mammal passages would be designed at the fencing system such that wildlife movement to the upstream of the existing inflatable dam at STEMDC and further to SPS WCP is also allowed. Wildlife passages with a ladder-and-underpass system across the Border Road are proposed near the existing flap valve to enhance connectivity between LMC Meander and the Shenzhen River. Therefore, modification of the existing inflatable dam at STEMDC and the existing flap valve at LMC Meander is not necessary.

2.2.3.7 Members of the EC and ACE were briefed and consulted on the DDP. Stakeholder engagement sessions with various bureaux and departments, future management and maintenance parties, and green groups were conducted throughout 2025 and will be continued. This Detailed HCMP has covered the integration of designs of the SPS WCP, taking into consideration the proposed wildlife corridors within the STT. The designs and implementation schedule of the proposed wildlife corridors in the northern portion of the STT are detailed in the DDP to be submitted as required under Item (2) of the EIA Approval Conditions and Clause 2.16 of EP No. EP-664/2025.



Insert 2.1 Locations of Wildlife Corridors in Northern Portion of STT (Extracted from Figure 10.10A of the EIA Report)

2.2.4 Protection of Existing Egretries

2.2.4.1 Mai Po Lung Village (MPLV) Egretry were recorded within the Project while Mai Po Village (MPV) Egretry was recorded immediately adjacent to the west of the Project. An "Open Space" zoning is adopted in the Approved San Tin Technopole OZP No. S/STT/2 to retain and protect the core area of the MPLV Egretry; and the future development of STT will not encroach onto the MPV Egretry. Both egretries are located outside of the SPS WCP.

2.2.4.2 As detailed in Section 10.11.4 of EIA Report, preservation of trees currently within the core area of the MPLV Egretry and provision of appropriate enhancement measures will be incorporated in the detailed design of the "Open Space" to enhance usage and connectivity of the MPLV Egretry preserved within STT. An Egretry Habitat Enhancement and Management Plan including the details of design plan, site preparation works, works schedule and management plan should be prepared for approval from relevant Government departments (including EPD and AFCD) before the commencement of construction works. The EIA Report has also recommended seasonal control of construction activities during ardeid breeding season within 100 m buffer area of the egretries to minimise construction disturbance on the MPLV and MPV Egretries.

2.2.4.3 Clause 2.15 of EP No. EP-665/2025 has also required the submission of Monthly Ardeid Monitoring Plan (MAMP) for MPLV and MPV Egretry to the DEP within 3 months before the commencement of construction works. The MAMP shall provide details of monthly ardeid monitoring to be carried out during the construction of the concerned works area including but not limited to the programme, methodology and location(s) of the monitoring. The MAMP shall be prepared by the Qualified Ecologist(s), certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations of the approved EIA Report (Register No. AEIAR-261/2024). Monthly ardeid monitoring shall be conducted in accordance with the approved MAMP and include the monitoring data in the monthly EM&A reports.

2.2.4.4 Recreational development ("Open Space") at Mai Po Lung Village within Deep Bay Buffer Zone 2 is a DP and governed by relevant EP No. EP-665/2025. Clause 2.16 of EP-665/2025 has also required submission of Implementation Plan for Ecological Enhancement Features Design (IPEEFD) no later than 3 months before the commencement of construction of the DP to DEP for approval. The IPEEFD shall specify the ecological enhancement features for open

space at MPLV. The IPEEFD shall be prepared by the Qualified Ecologist(s), certified by the ET Leader, and verified by the IEC as conforming to the relevant information and recommendations on ecological enhancement features in the EIA Report (Register No. AEIAR-261/2024). The IPEEFD and any updated IPEEFD(s) shall be fully implemented.

2.2.4.5 Detailed design and construction of the “Open Space” at Mai Po Lung Village are undertaken under Package 1 of the design and construction of first phase of the STT, i.e. Agreement No. CE 15/2023 (CE). The designs of the ecological enhancement features for the MPLV Egretry within STT are detailed in the IPEEFD to be submitted as required under Clause 2.16 of EP No. EP-665/2025. Stakeholder engagement sessions with various bureaux and departments, future management and maintenance parties, and green groups were conducted throughout 2025 and 2026 on the “Open Space” design and will be continued.

2.2.4.6 While both MPLV egretry and MPV egretry are located outside of the SPS WCP, this Detailed HCMP has covered design of enhanced wetland of the SPS WCP to maintain ecological linkage with the flight path from the egretries as described in **Section 2.2.2.4** and to provide suitable foraging grounds for breeding ardeids, taking into consideration protection of the existing egretries within the STT.

3 EXISTING BASELINE CONDITIONS

3.1 Site Location and General Site Description

3.1.1.1 The SPS WCP was proposed as part of the NMDS, serving several major functions, including the conservation of ecological value of wetlands, developing modernised aquaculture industry, promoting scientific research on aquaculture, and providing ecological education and recreational facilities. Aside from these key functions, the proposed SPS WCP will also provide ecological and fisheries compensation for the San Tin / Lok Ma Chau Development Node (also referred to as the San Tin Technopole, STT, Development). Upon the establishment of EEF and EFW, ecological function and capacity of the wetland habitats is anticipated to increase (CEDD and PlanD, 2024). As such, no significant ecological impacts are anticipated from the proposed enhancement works under SPS WCP.

3.1.1.2 The indicative location of SPS WCP was identified and studied under the EIA Report and the Strategic Feasibility Study on the Development of WCPs System (the Strategic Feasibility Study). The delineated boundary of SPS WCP abuts Shenzhen River to the north, with Mai Po Nature Reserve (MPNR) adjoining at the west and San Sham Road to the east (**Figure 3.1** refers). Various residential developments are located to the southwestern of the SPS WCP, namely Fairview Park, Palm Springs and Royal Palms. Some village settlements are located along the southeast and southern of the SPS WCP, including Mai Po Lo Wai, Mai Po San Tsuen and Yau Mei San Tsuen.

3.1.1.3 The delineated SPS WCP overlaps with multiple recognised sites of conservation importance, including Mai Po Inner Deep Bay Ramsar Site, Priority Site for Enhanced Conservation (Ramsar Site and Deep Bay Wetland outside Ramsar Site), Conservation Area (“CA”), Wetland Buffer Area (WBA) and Wetland Conservation Area (WCA), as well as Inner Deep Bay and Shenzhen River Catchment Important Bird Area (IBA) (**Figure 3.2** refers). Other sites of conservation importance are also identified in close proximity to the proposed SPS WCP, such as Inner Deep Bay Sites of Special Scientific Interest (SSSI), Mai Po Marshes SSSI and Mai Po Village SSSI. The core zone and the biodiversity management zone of the Mai Po Inner Deep Bay Ramsar Site as well as the ecological mitigation wetlands currently maintained by AFCD detailed in **Section 3.3** will be avoided, while precautionary measures and good site practices will be adopted to avoid/minimise disturbance impacts on the foregoing ecologically sensitive wetlands during both the construction and operation stages of the SPS WCP.

3.1.1.4 The STT will be located to the east and southeast of the SPS WCP (**Figure 2.1** refers). An “eco-interface” area with width of about 35m is proposed along the northwestern boundary of the STT Project, between the STT and the wider area of pond habitats in SPS WCP (**Figure 3.1** refers), is proposed in the approved EIA Report, and incorporated as a particular (with remarks) for Cluster 3 – Area 19B under the Planning and Design Brief (PDB) for sites zoned “OU(I&T)” on San Tin Technopole OZP. The “eco-interface” will be established in the form of a landscape buffer via landscape planting, comprising native tree species, shrub mix and riparian vegetation, and incorporating a gentle slope interface, with an aim to minimise disturbance from the STT Project by providing a buffer between the development and the adjacent wetland habitats and associated fauna in the SPS WCP. As detailed in Appendix 3 Item D8 of the endorsed PDB for sites zoned “OU(I&T)” on San Tin Technopole OZP, for a more natural interface and better wetland connectivity, some of the existing ponds along the boundary of the SPS WCP and I&T Sites under STT are recommended to be retained (**Figure 3.1** refers). These retained ponds will be incorporated with the management of adjacent ponds in the SPS WCP but do not contribute to compensation requirements stipulated under the EIA Report.

3.1.1.5 Another “eco-interface” area with width of about 20m is also proposed along the east of the STEMDC, as proposed in the approved EIA Report, which together with the existing STEMDC will be revitalised and established as a landscape buffer area under the STT Project, and adjoining the SPS WCP on the east (**Figure 3.1** refers). The revitalisation work is governed under Environmental Permit for Revitalisation of San Tin Eastern Main Drainage Channel (EP no.: EP-664/2025). In addition, small area of the existing STEMDC mitigation wetland that are subjected to permanent loss under the STT Project, will be reprovisioned within the SPS WCP.

3.1.1.6 As part of the EM&A requirements described in Section 10.13 of the EIA Report, a 12-month baseline wetland monitoring and pre-construction survey for Eurasian Otter, covering the Project and its 500m assessment area, as well as the proposed SPS WCP area were conducted from December 2024 to November 2025 to collect up-to-date baseline ecological data. Moreover, a 12-month baseline monitoring for the 300m-wide flight corridor from December 2024 to November 2025 and pre-construction surveys of the MPV Egretry and MPLV Egretry were also conducted. The EM&A baseline findings provide a robust and up-to-date reference for formulation of this Detailed HCMP, inform detailed planning of the SPS WCP and as reference for subsequent monitoring work. They also support the adaptive implementation of ecological mitigation and enhancement measures under the Project, including the HCMP and DDP, by enhancing the overall ecological value, biodiversity and connectivity in the Deep Bay area through proactive conservation and management.

General Site Description

3.1.1.7 The area within the delineated SPS WCP boundary is currently dominated by fishponds and marshes / reedbeds. This large and dense patch of fishponds and marshes / reedbeds are in close proximity to each other, providing vital ecosystem services such as climate stabilisation, flood water retention, water purification, as well as economic values through aquaculture production. The wetland habitats also supported a diverse range of wetland fauna and providing an important ecological linkage connecting Hoo Hok Wai at the east to the intertidal areas at the west and foraging ground at the broader Deep Bay area.

3.1.1.8 Apart from the wetland habitats mentioned **Section 3.1.1.7**, other habitats were also identified under the Strategic Feasibility Study, including some small patches agricultural land and seasonal wet grassland, watercourses spanning across the delineated area connecting to the Shenzhen River [including the San Tin Western Main Drainage Channel (STWMDC)], as well as some developed area with land uses like village-type developments and brownfield operations.

3.2 Habitat Evaluation

3.2.1 General Habitat Evaluation

3.2.1.1 The SPS WCP comprises a mosaic of wetland and non-wetland habitats, an ecological evaluation of the existing habitat conditions of the SPS WCP is summarised in **Table 3.1** and further detailed in the following sections.

Table 3.1 Habitat Evaluation Table for Sam Po Shue Wetland Conservation Park

Criteria	Sam Po Shue Wetland Conservation Park
Habitat Diversity	A total of eight habitat types present. • Existing Wetland Compensation / Mitigation Wetland: High faunal and Low to Moderate floral diversity. Records of various species of conservation importance species at The Loop's OWCAs within the SPS WCP, including Eurasian Otter. • Pond: Moderate to High faunal and Low to Moderate floral diversity. Supported numerous waterbirds and wetland-dependent avifauna species, including various species of conservation importance. • Marsh / Reedbed: Low to Moderate faunal and floral diversity. Mostly dominated by *Phragmites* spp. and largely overgrown by other exotic herbaceous vegetation. • Mangrove: Moderate faunal and Low floral diversity. Dominated by native mangrove species as well as exotic *Sonneratia* spp. • Seasonally Wet Grassland: Very Low to Low faunal and floral diversity • Shrubland / Grassland: Low faunal and floral diversity • Watercourse: Low faunal and floral diversity at semi-natural / natural watercourses. • Developed Area: Very Low faunal and floral diversity in general.

Criteria	Sam Po Shue Wetland Conservation Park
	Overall: Low to High faunal diversity, Low to moderate flora diversity.
Naturalness	Low. The SPS WCP is dominated by fishponds which are man-made habitats subject to either active aquaculture management, conservation management or natural succession.
Size	Large
Ecological Linkage	The SPS WCP falls within and between multiple areas including the IBA, Mai Po Marshes SSSI and Deep Bay Wetland Outside Ramsar Site. Wetland habitats within the SPS WCP display high ecological connectivity with other local ecological resources.
Potential Value	High potential value to support high population of wetland fauna, especially passage and wintering birds.
Nursery / breeding ground	Breeding ground recorded for little ringed plover, black-winged stilt, little grebe, yellow bittern, common moorhen and white-breasted waterhen.
Abundance / richness of wildlife	High
Ecological Value	In consideration of the larger mosaic of wetland and pond habitat within the WCA, linkage with local ecological resources, presence of breeding ground and potential to support a range of species of conservation importance with regular occurrence identified within wetland habitats, areas and habitats within the SPS WCP is generally considered of High ecological value.

3.2.2 Habitat Diversity

3.2.2.1 A diverse mixture of habitats is present in the delineated SPS WCP. The dominant habitats of the SPS WCP are ponds and marsh, with other wetland habitats including mangrove, seasonal wet grassland, watercourses and non-wetland habitats including grassland / shrubland, developed area (**Figure 3.3** refers). These habitats are in close proximity to each other, providing high ecological connectivity, supporting a diverse community of wetland fauna and are ecologically linked to the wider areas in Deep Bay IBA.

3.2.2.2 Low to moderate flora diversity was observed in the SPS WCP. With fishponds being the dominant habitat, flora within the SPS WCP is mostly planted or weedy species on the bunds or edge of fishponds, and dominated by common grass species like *Brachiaria mutica, Panicum maximum and Pennisetum purpurem* and herbs species *Biden alba* (CEDD & PlanD, 2024, WWF-HK, 2021). Whereas some of the fishponds were abandoned or degraded, which transformed into marsh and seasonal wet grassland. These habitats are dominated by reed species such as *Phragmites australis* and *Phragmites karka*., and grass species like *Panicum maximum* and *Pennisetum alopecurodies,* respectively. Other flora recorded includes native mangrove species *Kandelia obovate*, *Avicennia marina* and *Acanthus ilicifolius* in the tidal area. Exotic species including *Typha angustifolia, Mikania micrantha* and *Sonneratia* spp. were also commonly observed in various habitats, including marsh, watercourse and mangrove.

3.2.3 Naturalness

3.2.3.1 The SPS WCP is dominated by fishponds, which are man-made habitats established for aquaculture, and vegetation is comprised of native and exotic species, including fruit trees at pond bunds. As most of the fishponds are still under active management by local fishermen, there is regular disturbance from aquaculture operations. Whereas ponds and marshes at the existing wetland compensation areas, LMC Terminus PTI Compensatory Pond and OWCA of The Loop are under conservation management by AFCD (refer to **Section 3.3.2** for more details), in which areas are mostly undisturbed.

3.2.3.2 Given some ponds were abandoned or inactive, natural succession into reedbed dominant habitat or terrestrial habitat with overgrown vegetation were observed over time. The combination of managed and undisturbed habitats provides feeding and roosting grounds for a variety of wetland fauna, especially birds.

3.2.4 Ecological Linkage

3.2.4.1 The SPS WCP falls within and between multiple areas of conservation importance, especially the IBA, Mai Po Marshes SSSI and Deep Bay Wetland Outside Ramsar Site. Wetland habitats within the SPS WCP display high ecological connectivity with other local ecological resources, which provided physical linkage between the Hoo Hok Wai area to the east and MPNR to the west, as well as to the wider Inner Deep Bay Area. Fauna including passage migrant and wintering birds as well as other species of conservation importance such as Eurasian otters were recorded utilising these habitats for purposes like roosting, breeding and/or foraging, as well as flight paths. As the IBA is also situated mid-way along the East Asia-Australasian Flyway, the SPS WCP therefore plays an important role supporting significant populations of migratory birds using the flyway.

3.2.5 Potential Value

3.2.5.1 The SPS WCP, situated between locally important ecological resources (e.g., LMC Terminus PTI Compensatory Pond and OWCA of The Loop), has potential value to support a high abundance of wetland fauna, especially passage and wintering birds. It was observed that the area already supports a high diversity and abundance of birds, acting as a feeding ground, as well as roosting and breeding site. Avifaunal species of conservation importance including black-faced spoonbill, great cormorant (*Phalacrocorax carbo*) and great egret (*Ardea alba*) have been recorded utilising the SPS WCP for foraging, whereas several roosting sites were also recorded supporting ardeids and great cormorants. Other species of conservation of importance including Eurasian otter, spotted narrow-mouthed frog (*Kalophrynus interlineatus*) (AFCD, unpublished data) and scarlet basker (*Urothemis signata signata*) were also observed to occur at fishpond and other wetland habitats within the SPS WCP.

3.2.5.2 Management practices like conducting regular pond drain-down have proven to be successful under the Hong Kong Got Fishpond – Eco-fishpond Management Agreement Scheme and the Fishpond Conservation Scheme in Ramsar Site by the Hong Kong Bird Watching Society (HKBWS), especially during dry season, in attracting more waterbirds by enhancing foraging opportunities. According to past studies under the HKBWS Fishpond Conservation Scheme in Ramsar Site, the number of birds in fishponds that have been drained down increases approximately 20 times compared to fishponds without drain-down (CCO, n.d.). Similar practices could be adopted to cover a larger portion of the SPS area, allowing the SPS WCP to have higher potential in increasing its ecological value.

3.2.6 Nursery / Breeding Ground

3.2.6.1 Within the SPS WCP, breeding and nesting behaviour of little ringed plover (*Charadrius dubius*) was recorded at a drained pond (CEDD & PlanD, 2024). Other breeding and nesting ground for ardeids outside of the SPS WCP were mostly recorded at Mai Po Village (MPV) Egretry and Mai Po Lung Village (MPLV) Egretry. The two breeding colonies have a maximum of 115 and 160 nests between 2020 to 2024, respectively. Both egretries supported little egret (*Egretta garzetta*) and Chinese pond heron (*Ardeola bacchus*).

3.2.6.2 Recent nesting and breeding records of six avifauna species were also recorded at “Duck Pond” created under the Management Agreement Scheme by the HKBWS, including black-winged stilt (*Himantopus Himantopus*), little ringed plover, little grebe (*Tachybaptus ruficollis*), yellow bittern (*Ixobrychus sinensis*), common moorhen (*Gallinula chloropus*) and white-breasted waterhen (*Amaurornis phoenicurus*) (HKBWS, 2024).

3.2.7 Abundance / Richness of Wildlife

3.2.7.1 A highly diverse community of wetland fauna species, especially passage migrant and wintering waterbirds, are supported by the wide range of habitats found in the SPS WCP. With reference to an updated literature review, the avifauna species recorded were mostly comprised of waterbirds and wetland-dependent species. Avifauna species of conservation importance such as black-faced spoonbill, great cormorant, red-billed starling (*Sturnus sericeus*) and zitting cisticola (*Cisticola juncidis*) were identified as regularly occurring within the wetland habitats of the SPS WCP. Former three species were target species identified under Section 10.11.3.17 of the EIA Report and Section 3.2 and 3.3 of the Draft HCMP (Appendix 10.8 of the EIA Report). Other fauna of conservation importance recorded previously included eight mammals, five butterflies, six herpetofauna, three odonate and two fireflies.

3.3 Existing Wetland Compensation / Mitigation Areas

3.3.1 Overview

3.3.1.1 Within and adjacent to the SPS WCP, several existing wetland enhancement / compensation areas were identified. The location of each existing wetland enhancement / compensation area is presented in **Figure 3.4**. Details of each of the existing wetland enhancement / compensation areas are described in sections below.

3.3.2 Within the Sam Po Shue Wetland Conservation Park

Offsite Wetland Compensation Areas for the Lok Ma Chau Loop Development (The Loop)

3.3.2.1 Three areas of existing fishpond habitat were designated as Offsite Wetland Compensation Areas (OWCAs) in order to mitigate the habitat loss and disturbance impact to species caused by the construction and operation of The Loop. Within the SPS WCP, two OWCAs (i.e., Area 7 and 9) are situated immediately west of LMC station along the border road with areas of 5.12 ha and 7.65 ha, respectively. Most ponds in Area 7 and 9 are currently managed as fishponds with enhanced management with three ponds as marshy habitats. The general vegetation covered at pond bunds included *Hibiscus tiliaceus and Melia azedarach*, depending on the pond bund vegetation management, while reedmarsh habitat included species of *Phragmites australis* and *Phragmites karka*. In general, management activities involved in the OWCAs (Area 7 and 9) are conservation-orientated targeting waterbirds and otters in the area. The wetland habitats in the OWCAs (Area 7 and 9) are ecologically connected to IBA and supported a wide range of waterbird species such as black-faced spoonbill, collared crow (*Corvus torquatus*) and greater spotted eagle (*Clanga clangal*) (CEDD, 2021). Eurasian otter was also recorded in the OWCAs in 2024 (AFCD, per comm, 2024). The OWCAs (Area 7 and 9) are located at the northeastern part of SPS WCP. Latest HCMP for the OWCAs are provided in **Appendix B1** for reference.

Lok Ma Chau Terminus Public Transport Interchange Compensatory Pond

3.3.2.2 A fishpond of 3.45 ha located adjacent to the Lok Ma Chau Ecological Enhancement Area (LMC EEA) has been designated to compensate the habitat loss due to the operation of Public Transport Interchange (PTI) at the LMC Spur Line Terminus and the station access road. This LMC PTI Compensatory Pond has been managed by AFCD since September 2006, and is currently managed as a fishpond with relatively low intensity management, in which water level is permitted to fluctuate naturally. Fish stocking may be considered in dry season. Part of the bund and the central island is wooded for starling species. Although it is small-sized and simple in habitat diversity, mammals of conservation importance such as Eurasian otter, Small Asian mongoose (*Herpestes javanicus*) and leopard cat (*Prionailurus bengalensis*) have been recorded from this habitat (AFCD, 2018). The compensatory pond is located at the northern part of the SPS WCP. Management Review and Management Manual for the LMC PTI Compensatory Pond is provided in **Appendix B2** for reference.

Fishponds Identified for Interim Wetland Enhancement under the STT Development

3.3.2.3 A total of four fishponds, all located within the SPS WCP, were identified to carry out interim wetland enhancement works to boost the ecological value and function of wetland habitats across the northern and northwestern New Territories under the STT Development (**Figure 3.4** refers). Works to be carried out at these ponds include the creation of EEF (*gei wai* included) and EFW. These ponds are expected to support a wide range of avifauna species including black-winged stilt and little ringed plover, as well as benefiting mammal species of conservation importance (i.e., Eurasian otter).

3.3.3 Adjacent to the Sam Po Shue Wetland Conservation Park

Lok Ma Chau Ecological Enhancement Area (LMC EEA)

3.3.3.1 The LMC EEA, of around 32 ha, has been operated since 2007 to compensate for impacts to fishpond, marsh and reedbed habitats resulting from the construction of Sheung Shui to LMC Spur Line (KCRC, 2006; MTRCL 2015). It is dominated by managed freshwater wetlands to provide suitable habitats for fauna recorded near the footprint of LMC Spur Line and Station. At the east of EEA, there is a 5 ha reedbed for polishing effluent from the MTR LMC Station. Other areas of the EEA are managed primarily for ecological enhancement, with fish stocking

and pest control since establishment (MTRCL, 2019). This compensatory area successfully attracted many species of conservation importance such as avifauna: black-faced spoonbill, falcated duck (*Anas falcata*) and yellow-breasted bunting (*Emberiza aureola*); and mammals such as Eurasian otter and leopard cat (MTRCL, 2021). Close to the LMC PTI Compensatory Pond, on the western side of the LMC EEA, two artificial otter holts have been constructed on the pond bund and island with woody vegetation to provide cover for Eurasian otter (KCRC, 2006) (**Figure 3.4** refers). There are also mammal passages of approximately 20 cm diameter installed at ground level of the fences to facilitate the movement of Eurasian otter (AFCD, 2019). The LMC EEA is located to the north of the SPS WCP.

Temporary Wetland Enhancement Area of the Yau Mei San Tsuen Public-Private Partnerships (PPP) Scheme Project

3.3.3.2 A temporary wetland enhancement area has been constructed prior to the YMST Wetland Restoration Area (YMST WRA) as part of the YMST PPP Scheme Project, under the EIA Report for Comprehensive Development and Wetland Protection near Yau Mei San Tsuen (Register No.: AEIAR-189/2015), to mitigate the temporary loss of wetland habitat within the PPP Scheme project area and during the construction of Wetland Restoration Area. It provides temporary habitat for bird species such as little egret, Chinese pond heron, red-throated pipit (*Anthus cervinus*) and greater painted-snipe (*Rostratula benghalensis*); and serves as a refuge site for amphibians. This temporary wetland enhancement area is located at the south-western corner of the PPP Scheme project site, comprising shallow ponds and marsh which is adapted from the existing farmland. This wetland will be operated during the construction period of the Wetland Restoration Area and will be fenced and maintained until completion of construction and planting works of the Wetland Restoration Area. Once the Wetland Restoration Area is in operation, the temporary wetland enhancement area will become part of the construction site of the residential portion, and will be filled to the proposed site formation level. This temporary wetland enhancement area is located adjacent to the southern tip of SPS WCP.

Wo Shang Wai Wetland Restoration Area

3.3.3.3 The Wo Shang Wai Wetland Restoration Area (WSW WRA) (~4.74 ha) was constructed under the EIA of the residential development of WSW and established in 2010 (Profit Point Enterprises Ltd., 2008). The wetlands provide a mitigation measure to compensate for the loss of seasonal wetland, and buffer wetland areas to the north of the project area from potential impacts created by the residential development of WSW (Profit Point Enterprises Ltd., 2008). This area is located to the south of fishponds at Tam Kon Chau, and is characterised by marsh, reeds, ponds, grass, shrubs and tall trees. The plant species *Phragmites australis, Ficus hispida, Macaranga tanarius* and *Rhaphiolepis indica* are dominant within the area. It has also been recorded as a breeding ground for some wetland dependent birds, e.g., little ringed plover (Profit Point Enterprises Ltd., 2018). This wetland restoration area is located adjacent to the southwestern part of SPS WCP.

San Tin Eastern Main Drainage Channel (STEMDC) Wetland

3.3.3.4 To compensate for the loss of fishponds and other wetlands in San Tin, about 11 ha of wetland habitats (constructed wetland in form of a Flood Storage Pond adjacent to San Tin Tsuen Road, constructed wetland along STEMDC, tidal channel and grasscrete-lined bottom of STEMDC) and about 5 ha of terrestrial habitats (grasscrete-lined sides and embankment planting of STEMDC) were created under the Main Drainage Channels and Poldered Village Protection Scheme for San Tin, NWNT EIA Report (TDD, 1999). STEMDC runs partially within and along the eastern edge of the SPS WCP boundary.

San Tin Constructed Wetland (Lotus Pond)

3.3.3.5 A lotus pond located adjacent to San Tin Tsuen Road was designed to mitigate the impacts to fishpond habitats resulting from drainage improvement works in San Tin Village (i.e., the establishment of flood protection embankments, floodwater pumping station and floodwater storage pond) under the project of Drainage Improvement at Northern New Territories. The lotus pond is located next to a vehicular road and is subject to regular human disturbance (DSD, 2020). Several wetland-dependent flora species have been planted in the pond, including *Nelumbo nucifera, Nymphaea* spp., *Scirpus erectus* and *Scirpus sublatus* (HyD,

2001). The pond is currently managed by AFCD with regular vegetation management and clearance.

Lok Ma Chau Loop Ecological Area

3.3.3.6 An ecological area (EA) of about 12.8 ha was constructed at the southern edge of the Loop, immediately adjacent to the LMC Meander, to compensate for the loss of reedbed and freshwater marsh and minimise impacts on bird flight paths connecting NWNT wetlands to the northeast and southwest (CEDD, 2021). Apart from minimising impacts on bird flight lines, otter enhancement was also provided on the internal and external embarkment of the EA, including construction of two types of otter holts (i.e., log pile holt, pipe and chamber holt), which are expected to be utilised by the Eurasian otter (CEDD, 2021).

3.4 Wildlife Recorded within the Sam Po Shue Wetland Conservation Park

3.4.1 General

3.4.1.1 The SPS WCP supports a high diversity and abundance of species, particularly avifauna, which is sustained by fishponds and other wetland habitats in the area. Meanwhile, the variety of wetland habitats also supports other faunal groups, including mammals, butterflies, odonates and herpetofauna, by providing essential ecological functions like movement corridors, feeding grounds, breeding sites and roosting grounds. The latest available baseline information of wildlife occurring in the SPS WCP has been collated through literature review, which is summarised in below sections.

3.4.2 Avifauna

3.4.2.1 The avifauna community within the SPS WCP is notable for the richness and abundance of migratory waterbirds and wetland-dependent species. Seasonal variation in this community was notable between the dry and wet seasons in the SPS WCP, in which avifauna species diversity and abundance are generally higher in the dry season (CEDD & PlanD, 2024). A range of avifauna species of conservation importance with regular occurrence were identified within wetland habitats (i.e., pond, reed marsh and watercourse) such as black-faced spoonbill, great cormorant, red-billed starling and zitting cisticola (KCRC, 2002).

3.4.2.2 High abundance and diversity of waterbirds and wetland-dependent species (e.g., waterfowl, waders, kingfishers, raptors) were recorded foraging at the contiguous commercial fishponds across the Mai Po, San Tin and SPS areas, and the mitigation wetlands in the area (e.g., OWCA of The Loop, LMC EEA). A total of 174 avifauna species were recorded under AFCD Biodiversity Survey in the SPS WCP since 2002, including 84 species of conservation importance (AFCD, unpublished data). Some scarce species recorded included Eurasian spoonbill (*Platalea leucorodia)*, pied harrier (*Circus melanoleucos*) and rare species like little stint (*Calidris minuta)*. Other species recorded in the area included Kingfisher species white-throated kingfisher (*Halcyon smyrnensis*); Raptors species Eastern imperial eagle (*Aquila heliacal*) and greater spotted eagle. Similar totals of 161 and 109 avifauna species were recorded at ponds engaged under Management Agreement Schemes and inactive fishponds by the HKBWS Waterbird monitoring survey within the area between 2021 and 2024, including scarce species Northern lapwing (*Vanellus Vanellus)* and rare species Oriental stork (*Ciconia boyciana)*, as well as wetland-associated species such as collared crow (HKBWS, unpublished data).

3.4.2.3 Five survey areas of the Waterbird Monitoring Programme were identified within SPS WCP, including San Tin (ST), Mai Po San Tsuen (MPST), SPS, Shenzhen River 'A' (SRA) and Tam Kon Chau (TKC). The cumulative abundance of all wetland avifauna in January (when winter migrant abundance is typically high) from 2020-2022 was highest in SRA (5,602), followed by SPS (2,390), TKC (1,749), MPST (1,354) and ST (955). It suggests that the contiguous fishponds lying on SRA and SPS especially provide an ecologically important foraging and roosting ground for overwintering waterbirds. In 2020, the abundance of cormorants was notably higher than other waterbird groups in SRA, with peak abundance of 2,410 individuals recorded, but it declined to the abundance of hundreds value in 2021 and 2022. Overall, the ranking in total abundance of waterbirds groups over the last three years was (1) cormorants, (2) ardeids and large wading birds, (3) wetland-dependent bird, (4) ducks, geese, and grebes & pelicans. The waterbird species with highest peak abundance were great cormorant, little

egret, red-billed starling, grey heron (*Ardea cinerea*), little grebe, black-winged stilt, tufted duck (*Aythya fuligula)*, and Chinese pond heron (Anon, 2020; 2021; 2022a).

3.4.2.4 Some avifauna breeding activities were observed across the SPS WCP. Breeding behaviours of ardeids (i.e., little egret and Chinese pond heron) were recorded at MPV Egretry and MPLV Egretry. Details of these egretries and ardeid numbers are summarised in **Section 3.6**. Roosting behaviour of ardeids and great cormorants were also recorded near LMC EEA and in the vicinity of MPNR (AFCD,2020; WWF-HK, 2021). In addition, winter visitors were recorded roosting and foraging along Shenzhen River during the winter season. They included waterfowl (e.g., Eurasian wigeon (*Mareca penelope)*) and ardeids (e.g., grey heron) (DSD, 2020). Furthermore, breeding behaviour and nesting of little ringed plover and greater painted-snipe were recorded in a drained pond and semi-natural watercourse in the San Tin area, respectively (CEDD & PlanD, 2024). Recent reporting on the "Duck Pond" created under the Management Agreement Scheme also recorded six avifauna species' breeding and nesting behaviours, including black-winged stilt, little ringed plover, little grebe, yellow bittern, common moorhen and white-breasted waterhen (HKBWS, 2024).

3.4.3 Mammal

3.4.3.1 A total of 16 mammal species were recorded within and close to the SPS WCP by AFCD (AFCD, unpublished data). These included bat species (e.g., Japanese pipistrelle, (*Pipistrellus abramus)*, Chinese pipistrelle (*Hypsugo pulveratus)*) and non-flying mammal species (e.g., leopard cat, Pallas's squirrel (*Callosciurus erythraeus*), small Asian mongoose, Eurasian otter, small Indian civet (*Viverricula indica)*, small-toothed ferret badger (*Melogale moschata)* and East Asian porcupine (*Hystrix brachyurya)* (Capital Chance Ltd., 2014; Profit Point Enterprises Ltd, 2018; CEDD, 2021; WWF-HK, 2021; CEDD & PlanD, 2024).

3.4.3.2 Bats were mostly recorded flying near watercourses and pond areas in San Tin. Individuals of Japanese pipistrelle and Chinese noctule (*Nyctalus plancyi*) were recorded to emerge from Koon Ying School (Mai Po Tsuen) during the wet season, likely using the abandoned school as roosting site (CEDD & PlanD, 2024).

3.4.3.3 Short-nosed fruit bats (*Cynopterus sphinx)* were also recorded in the area, including several individuals roosting in a Chinese fan-palm next to the public toilet near WWF Jockey Club Mai Po Peter Scott Visitor Centre. Evidence of short-nosed fruit bats (e.g., Some bite marks on the fronds of tree leaves) were observed on Chinese fan-palm trees along Castle Peak Road – San Tin section, however, no individual was directly recorded roosting from these trees (CEDD & PlanD, 2024).

3.4.3.4 Non-flying mammal species of conservation importance (e.g. leopard cat, Small Asian mongoose, Small Indian civet) were mainly recorded occurring in habitats like woodland, developed area, pond bund, mitigation wetland and watercourse within the SPS WCP (CEDD & PlanD, 2024). Eurasian otter was reported from a recent study that the San Tin – SPS area is part of the species' territory, and evidence such as spraints were recorded in SPS, Hoo Hok Wai, and mangroves in Mai Po during 2018 to 2019, revealed the species movement in the area and importance of wetland habitat connectivity (McMillan *et al*., 2023).

3.4.3.5 Near the SPS WCP, a wildlife corridor was constructed crossing beneath the station access road to connect STEMDC and Ha Wan Tsuen (EPD, 2015). To date, only domestic cats (*Felis catus)* have been recorded using this corridor (CEDD & PlanD,2024).

3.4.4 Butterfly

3.4.4.1 Previous records of butterfly species in the SPS WCP were mainly identified within vegetated habitats (e.g., agricultural land, grassland/shrubland, pond, marsh/reed, village/orchard and woodland/plantation). The majority of recorded species were generalists, which are common and widely distributed in Hong Kong, for instance, common mormon (*Papillio polytes polytes)* and great egg-fly (*Hypolimnas bolina Kezia)* (CEDD & PlanD, 2024). Ten species of conservation interest have been recorded at ponds and mitigation wetlands in the area, comprising: powdered oak blue (*Arhopala bazalus*), common awl (*Hasora badra*), colon swift (*Caltoris bromus*), dark swift (*Caltoris cahira*), small cabbage white (*Pieris rapae*), forget-me-not (*Catochrysops strabo*), danaid egg-fly (*Hypolimnas misippus*), lesser band dart (*Potanthus trachala*), plain hedge blue (*Celastrina lavendularis*) and grass demon (*Udaspes folus*) (AFCD, unpublished data; Asia King Development Limited, 2015; Profit Point Enterprises Ltd., 2018; WWF-HK, 2021; CEDD & PlanD, 2024).

3.4.5 Odonate

3.4.5.1 The majority of odonate species records in the SPS WCP have been made near lowland wetland habitats (e.g., agricultural land, marsh, pond, watercourses). Most recorded species were common and widespread in Hong Kong. According to AFCD unpublished data, a total of 33 odonate species have been identified, including four species of conservation importance, namely: blue sprite (*Pseudagrion microcephalum*), coastal glider (*Macrodiplax cora*), four-spot midget (*Mortonagrion hirosei*) and scarlet basker (AFCD, unpublished data). In LMC PTI Compensatory Pond, 10 species of dragonfly were recorded in 2023, mainly comprised common species such as Asian amberwing (*Brachythemis contaminata*), variegated flutterer (*Rhyothemis variegata arria*), saddlebag glider (*Tramea virginia*) and green skimmer (*Orthetrum sabina sabina*) (AFCD, unpublished data). Other species of conservation importance recorded include blue chaser (*Potamarcha congener*) and mangrove skimmer (*Orthetrum poecilops poecilops*) in the nearby LMC EEA and MPNR (MTRCL, 2009, WWF-HK, 2021).

3.4.6 Herpetofauna

3.4.6.1 Herpetofauna species previously recorded within and close to the SPS WCP were mostly identified in ponds and urbanised areas. Common species recorded in the area include Chinese gecko (*Gekko chinensis*), Bowring's gecko (*Hemidactylus bowringii*), common blind snake (*Indotyphlops braminus*), Reeves' smooth skink (*Scincella reevesii*), which were all recorded from pond habitats (AFCD, unpublished data). Species of conservation importance in the SPS WCP included amphibian species (spotted narrow-mouthed frog), and reptiles (four-clawed gecko (*Gehyra mutilate*), Burmese python (*Python bivittatus*), Indo-Chinese rat snake (*Ptyas korros*), Chinese cobra (*Naja atra*), many-banded krait (*Bungarus multicinctus*), Taiwan kukri snake (*Oligodon formosanus*) and Chinese soft-shelled turtle (*Pelodiscus sinensis*) which were previously identified in ponds and associated bunds (AFCD, unpublished data; AFCD, 2018; KCRC, 2002; Secretary for Security, 2009; WWF-HK, 2021).

3.4.7 Firefly

3.4.7.1 Within and in the vicinity of the SPS WCP, three firefly species have been previously recorded, comprising two firefly species of conservation importance: Mai Po bent-winged firefly (*Pteroptyx maipo*) and Motschulsky's starworm (*Rhagophthalmus motschulskyi),* and one common species: rimmed window firefly (*Pyrocoelia analis)*. Mai Po bent-winged firefly have been recorded at brackish marshes and a natural watercourse near MPNR, where the species is restricted to in the Deep Bay Area (WWF-HK, 2021). The endemic Motschulsky's starworm was recorded along STEMDC during recent on-site observations in 2024-2025. Rimmed Window Firefly have been recorded in the fishponds and natural watercourse within San Tin and urbanised areas near Tsing Lung Tsuen (DSD,2020).

3.5 Existing Birds' Flightlines

3.5.1.1 The Northwestern New Territories Wetland area provides a range of wetland habitats which are known to be utilised by waterbirds, from roosting and breeding sites to search for foraging grounds. Understanding the location of established and commonly used flightlines is important to ensure SPS WCP plays a major role in maintaining overall avifaunal connectivity in the area. The major flightline across the SPS WCP and adjacent areas is shown in **Figure 3.4**, which is taken from the Northern Metropolis Development Strategy Report (HKSAR Government, 2021a).

3.5.1.2 In the vicinity of the San Tin and SPS areas, two egretries (i.e. Mai Po Village Egretry and Mai Po Lung Village Egretry) and seven active day / night roosting sites (i.e., Sam Po Shue Night Roost, Lin Barn Tsuen Night Roost, San Tin Flood Storage Pond Day Roost, Mai Po San Tsuen Cormorant Roost, Tam Kon Chau Night Roost, Mai Po Nature Reserve Great Cormorant Night Roost and San Tin Tsuen Road North Night Roost) were identified and shown in **Figure 3.4**. Ardeids were recorded mainly travelling northwest and north towards the directions of fishponds of SPS and San Tin from MPLV Egretry, while at MPV Egretry, the majority of ardeids was recorded flying towards the direction of Mai Po, San Tin and possibly SPS (WWF-HK, 2021). Ardeids were favoured by the continuous fishponds in these areas which provide significant food sources.

3.5.1.3 Depending on the location of the night roosts, ardeids and cormorant were mainly recorded travelling towards San Tin, SPS, Mai Po and Shenzhen River Meander. For instance, ardeids and great cormorant from SPS Night Roost were observed flying towards San Tin, Shenzhen River and Mai Po direction. Whereas for Lin Barn Tsuen Night Roost, ardeids only travel towards the San Tin direction. Nearby STEMDC, flight paths utilised by waterbirds from Ha Wan Tsuen Night Roost towards The Loop and SPS Direction were also recorded (**Figure 3.4** refers).

3.6 Existing Egretries and Night Roosts

3.6.1 Egretries

3.6.1.1 As mentioned in **Section 3.2.6.1**, two existing egretries were identified adjacent to the SPS WCP boundary, namely MPLV Egretry and MPV Egretry. The MPLV Egretry is the third largest colony in Hong Kong (Anon, 2022c). Both egretries are located at the southern fringe of the SPS WCP, along Castle Peak Road (San Tin Section) (**Figure 3.4** refers). Ardeids recorded using these sites are dominated by little egret and Chinese pond heron, utilising mainly *Albizia lebbeck,* as well as *Ficus benjamina, Ficus macrocarpa, Ficus virens, Litchi chinensis and Melaleuca leucadendra* as nesting substrates (Anon,2022c).

3.6.1.2 Breeding activities were recorded between 2018 and 2024 at both egretries. The maximum number of nests recorded were 222 nests in 2018 and 160 in 2020, at MPV Egretry and MPLV Egretry, respectively (CEDD & PlanD, 2024). Fluctuations in the number of nests have been observed, and occasional decreases in the number of nests might be related to the decline of tree substrate conditions (CEDD & PlanD, 2024).

3.6.2 Day / Night Roosting Sites

3.6.2.1 Day and night avifauna roosting sites have been identified scattered across the SPS WCP, as shown in **Figure 3.4**. These roosting sites are primarily located in tree stands within the fishponds area of Mai Po, San Tin and SPS, with ardeids and great cormorant utilizing the fishponds for foraging.

Sam Po Shue Night Roost

3.6.2.2 The Sam Po Shue night roost is adjacent to the SPS WCP, to the southwest of LMC station. According to surveys conducted by AFCD during winter 2019/20, this night roost was the third largest roosting site in Hong Kong, with a total of 431 ardeid individuals being recorded at *Ficus microcarpa* and bare trees within the LMC EEA. The ardeids (i.e., great egret, little egret, Chinese pond heron, Eastern cattle egret (*Bubulcus coromandus*) and grey heron) mostly returned from fishponds and the Shenzhen River (AFCD, 2020).

3.6.2.3 A high abundance of great cormorants also utilised the roost in the dry season, first recorded in 2014. More than 2,000 individuals of great cormorant were recorded each month between November and February in 2020 (MTRCL, 2021), while a peak count of 795 great cormorants individuals were recorded in 2022 (CEDD & PlanD, 2024).

Mai Po Nature Reserve Great Cormorant Night Roost

3.6.2.4 A night roosting site of great cormorants located on the boundary of MPNR was identified in the study of MPNR infrastructure upgrade project. Great cormorants were observed roosting in groups of trees adjacent to the fishponds, in which up to 2,051 individuals were counted (WWF-HK, 2021). This night roost is adjacent to the southwestern boundary of SPS WCP and inside MPNR.

Tam Kon Chau Ardeid Night Roost

3.6.2.5 This roosting site was located within Ramsar Site in the vicinity of Pak Hok Chau Operational Base. This night roost was utilised by high numbers of little egret, and followed by Chinese pond heron, great egret and grey heron. 228 individual ardeids were recorded from this site in January 2020 (AFCD, 2020). This night roost is located within the SPS WCP.

Lin Barn Tsuen Night Roost

3.6.2.6 A small night roost in Lin Barn Tsuen was first identified in January 2022, with a peak count of 25 ardeids. The night roost was observed to be seasonal, only being active during the dry season (CEDD & PlanD, 2024). This night roost is located within the SPS WCP.

Ha Wan Tsuen Night Roost

3.6.2.7 This night roost of ardeids and great cormorants was recorded between San Shan Road and the Loop. The roost was active in dry season only, supporting great cormorants (a peak count of 143 individuals in January 2022) and ardeids (a peak count of 56 individuals in February 2022) (CEDD & PlanD, 2024). This night roost is located outside of the SPS WCP.

San Tin Flood Storage Pond Day Roost

3.6.2.8 The San Tin Flood Storage Pond Day Roost is located in the flood storage pond adjacent to the San Tin Tsuen Road, mainly utilised by black-crowned night herons (*Nycticorax nycticorax*). Day roosting of black-crowned night herons was observed on tree crowns of cuban bast (*Hibiscus tiliaceus*) and white popinac (*Lecucaena leucocephala*) along pond bunds and occasionally on the plastic floating platform in the centre of the flood storage pond. Other ardeid species (grey heron and great egret) were also sporadically recorded night roosting at the site, with very few individuals recorded.

Mai Po San Tsuen Cormorant Roost

3.6.2.9 The Mai Po San Tsuen Cormorant Roost is a recently formed roost occupied by great cormorants, nearby the border fence, within the SPS WCP. Up to 547 individuals were recorded during roost count in 2021 – 2022 winter, accounting for about 8% of the Deep Bay great cormorant population in both years (Nam Sang Wai Development Co. Ltd, 2025).

San Tin Tsuen Road North Night Roost

3.6.2.10 A potential new ardeid night roost, also referred to as San Tin Tsuen Road North Night Roost, was observed during site check in December 2024. The night roost is located at a pond bund in San Tin towards the southeast of the SPS WCP (**Figure 3.4** refers), which mainly comprises little egret and great egret, with some Chinese pond heron, grey heron and Eastern cattle egret. The potential night roost was only observed with a total of 49 individuals in December 2024, while no roosting behaviour was observed other months of the site check. Latest activity at the San Tin Tsuen Road North Night Roost will be verified upon further site visits in later stages for the Project.

3.6.3 Abandoned Egretry and Day / Night Roosting Site

3.6.3.1 The Abandoned Tam Kon Chau Egretry falls within the SPS WCP (**Figure 3.4** refers), which has supported 26 and 23 nests of Chinese pond heron in the breeding seasons of 2007 and 2008 respectively. The reason for the abandonment was most likely due to an increase in human activities beneath the banyan trees used for breeding, specifically the presence of a container dwelling (Anon 2007, 2008, 2009).

3.6.3.2 Both San Tin Open Storage Day Roost and Night Roost, are located outside of the SPS WCP. From recent site observations in 2024-2025, the roosting tree of the Day Roost was observed to be removed, whereas the Night Roost is currently abandoned and not in use by any ardeids or great cormorant. To the southwest of the LMC Meander, the Lok Ma Chau Loop Day Roost is also currently abandoned and not in use by any great cormorants (CEDD & PlanD, 2024).

3.7 Existing Wildlife Corridors for Non-flying Mammals

3.7.1.1 According to the EIA Report, one wildlife corridor is located adjacent to the northeast of the SPS WCP. The wildlife corridor was constructed under the development of Sheung Shui to LMC Spur Line, and is located underneath San Sham Road to allow free movement of mammals across San Sham Road and LMC Road, between STEMDC and Ha Wan Tsuen (EPD, 2015) (**Figure 3.4** refers). The wildlife corridor comprises a series of structures (culvert, ramps, and underpass), and associated mammal barriers to direct the animals to the corridor.

4 TARGET HABITATS / SPECIES

4.1 Key Target Species

4.1.1.1 Section 10.11.3.17 of the EIA Report and Section 3.2 and 3.3 of the Draft HCMP (Appendix 10.8 of the EIA Report) utilised four key indicator species and identified thirteen other target species / groups that will be substantially impacted by the STT Project and would therefore act as the focus of the planning and management for habitat compensation. These target species are species recorded in significant numbers under the EIA Report and are predicted to be potentially impacted by the proposed development disturbance impacts due to the construction and operation of the STT Project.

4.1.1.2 To estimate the compensation requirement for pond habitats, four larger wetland avifauna species that commonly occur in the impact / compensation areas (black-faced spoonbill, great cormorant, great egret, grey heron) were selected as indicator species in the EIA Report, as they are relatively disturbance sensitive and are considered key species using the pond habitat (e.g., CEDD, 2021 and KCRC, 2002). It is assumed that if mitigation targets can be achieved for these larger and disturbance sensitive species, similar or higher levels of enhancement can be achieved for other less sensitive piscivorous species.

4.1.1.3 In addition to the four indicator species, other target species for habitat enhancement within the SPS WCP shall also include other fish-eating / non-fish-eating avifauna and non-avifaunal species, which are relatively common in and/or restricted to the affected wetland habitats impacted by the STT Project. These target species are also species of conservation importance, in consideration of criteria provided by the IUCN Red List of Threatened Species (2025), List of State Key Protected Wild Animals (National Forestry and Grassland Administration and Ministry of Agriculture and Rural Affairs) and/or Fellowes *et al*. (2002) etc. Species with restricted occurrence in Hong Kong is also considered while recognising particular species as target species (e.g., Eurasian otter). The key target species of SPS WCP are summarised in **Table 4.1**.

Table 4.1 Key Target Species for Sam Po Shue Wetland Conservation Park

Piscivorous Avifauna	
Black-faced Spoonbill*	Great Cormorant*
Grey Heron*	Great Egret*
Ducks and Grebes	
Eurasian Teal (*Anas crecca*)	Little Grebe
Shorebirds and Gulls	
Little Ringed Plover	Black-headed Gull (*Chroicocephalus ridibundus*)
Freshwater Wetland Avifauna	
Black-winged Stilt	Red-throated Pipit
Other Wetland-associated Avifauna	
Collared Crow	Red-billed Starling
Raptor	
Greater Spotted Eagle	Eastern Imperial Eagle
Mammal	
Eurasian Otter	
Odonate	
Scarlet Basker	
Herpetofauna	
Chinese Bullfrog (*Hoplobatrachus rugulosus*)	

Note:
* key indicator species

4.2 Supplementary Focus Species

4.2.1.1 Aside from key target species identified under the EIA Report, several additional avifauna, mammal and firefly species have been identified as supplementary focus species. These species were selected in consultation with the STT Environmental Committee, having been previously recorded within the SPS area, with some being of conservation importance and having significant opportunities to enhance habitats for them in the newly established SPS WCP. The supplementary focus species of SPS WCP are summarised in **Table 4.2**.

Table 4.2 Supplementary Focus Species for Sam Po Shue Wetland Conservation Park

Ducks and Grebes	
Northern Shoveler (*Anas clypeata*)	Tufted Duck
Shorebirds and Gulls	
Stints (*Calidris* spp.)	Wood Sandpiper (*Tringa glareola*)
Freshwater Wetland Avifauna	
Black-crowned Night Heron	Bittern spp.
Chinese Pond Heron	Eurasian Coot (*Fulica atra*)
Intermediate Egret (*Ardea intermedia*)	Little Egret
Pheasant-tailed Jacana (*Hydrophasianus chirurgus*)	Snipes (*Gallinago* spp.)
Other Wetland-associated Avifauna	
White-cheeked Starling (*Spodiopsar cineraceus*)	White-shouldered Starling (*Sturnia sinensis*)
Zitting Cisticola	
Mammal	
Bat spp.	Leopard Cat
Firefly	
Mai Po Bent-winged Firefly (*Pteroptyx maipo*)	

4.3 Habitat Requirements for Target / Supplementary Species

4.3.1.1 Detailed habitat requirements of the key target species and supplementary focus species are provided in **Appendix C**. Diverse wetland habitats with different mix of vegetation (in both composition and structure) and open water, water levels and hydrological cycles will be created in the EEF (including *gei wai*) and EFW. These will be managed to provide optimal conditions for the target / supplementary species to forage, and for some to breed and roost, throughout the year. An outline of habitat enhancement features for each target / supplementary species is given below and a summary of the suitability of proposed habitats within the SPS WCP are shown in **Table 4.3** for key target species and **Table 4.4** for supplementary focus species respectively:

- **Piscivorous Avifauna (including Indicator Species and other Ardeids):** the EEF (including *gei wai*) will offer abundant prey, shallower pond margins, removal of bird-scaring devices, and generally lower levels of disturbance that will benefit larger piscivorous avifauna including ardeids, great cormorant and black-faced spoonbill. Moreover, these fishponds and *gei wai* will be drained down in sequence in the winter months to provide optimal foraging for the migratory ardeids and black-faced spoonbills during the period when they normally stay in Deep Bay. The standard operation of *gei wai* involves draining and re-filling that follows the tidal cycle, and there can be more than 10 cycles per month throughout the year. The draining of *gei wai* during the wet season will provide high-value foraging habitat for resident breeding ardeids (including great egret) in the Deep Bay Area. Overall, the extended pond drain-downs and greater area of drained ponds at any one time will increase the functional value for piscivorous avifauna. Additionally, EFW wetlands with shallow open water and the widened tidal channels will also support the piscivorous waterbirds.
- **Ducks and Grebes:** Areas of open water with shallow margins and deeper central areas (up to 1.5m) with some floating-leaf plants will be maintained as part of the EFW area. These will provide suitable foraging habitats for wading birds, as well as attracting ducks (e.g., Eurasian teal, tufted duck and northern shoveler) and other open water species (e.g., little grebe). The functional value of EEF including *gei wai* for duck species will also increase due to larger pond sizes, shallower pond margins, more emergent / floating vegetation, removal of bird-scaring devices and generally lower levels of disturbance.

- **Shorebirds and Gulls:** The functional value of EEF including *gei wai* for shorebirds (e.g., little ringed plover, wood sandpiper, stints) and gulls (e.g., black-headed gull) will increase due to larger pond sizes, shallower pond margins, removal of bird-scaring devices and generally lower levels of disturbance. The extended pond drain-downs and greater area of ponds drain-down at any one time will make the EEF more attractive to the shorebirds.
- **Freshwater Wetland Avifauna:** Shallow (100 – 300mm deep), permanently inundated areas with different vegetation types (such as reedbed, marshland) within the EFW will provide suitable habitat for black-winged stilt, rails, snipes, bitterns, herons, intermediate egret, Eurasian coot, and wetland associated passerines. The deep-water areas with floating plants in the Low Intensity Management Zone in EEF and in EFW will offer suitable habitat for pheasant-tailed jacana. The EFW habitats will also include seasonal wetlands that will become drier, open vegetated habitats in the dry season, providing suitable habitat for species such as eastern cattle egret and red-throated pipit. The functional value of EEF for avifaunal species commonly associated with freshwater wetlands will also increase due to shallower pond margins and more emergent / floating vegetation, and generally lower levels of disturbance.
- **Other Wetland-associated Avifauna Species:** The functional value of EEF for other wetland-associated avifauna species (e.g., collared crow, starlings) will increase due to larger pond sizes, shallower pond margins, extended pond drain-downs and greater area of ponds drawn-down at any one time and generally lower levels of disturbance. These species will also be expected to make use of the 35 ha of EFW habitats to be established in the SPS WCP.
- **Raptors:** Greater spotted eagle and eastern imperial eagle are both scarce winter visitors to Hong Kong. They will primarily benefit from habitat measures that will attract prey species (e.g., ducks), removal of bird-scaring devices as well as generally lower levels of disturbance.
- **Eurasian Otters:** The Deep Bay wetlands including the SPS WCP is a stronghold for the local Eurasian otter population (McMillan *et al*., 2023; Hui & Chan, 2024). The functional value of EEF including *gei wai* will increase for otters due to shallower pond margins, creation of islands and generally lower levels of disturbance. Otters will also utilise EFW habitats, including open waters, permanent and seasonal wetlands with patches of dense emergent vegetation and widened channels. In particular, the widened channels will be well vegetated and form an aquatic network linking the EEF and EFW. Dogs are known to cause mortality of otters in the Deep Bay area (e.g., KFBG, 2018) and their presence will deter otters from using otherwise suitable habitats. Hence, otters will benefit greatly from the better control of feral dogs across the entire SPS WCP. Specific enhancement measures for otters (e.g., provision artificial holts and floating platforms) can also be considered as part of the detailed planning of the SPS WCP.
- **Bats**: Frugivorous and insectivorous bats (e.g., short-nosed fruit bat, Japanese pipistrelle) are commonly found in the fishponds area, where fruit trees are planted along pond bunds, and insects thrive over water surfaces or under the tree line. The proposed EEF habitat will retain some fruit trees and native trees and create large open water habitat that will support these bat species in the SPS WCP. The mix of freshwater habitats in EFW will also have a diverse insect community that will in turn provide good foraging for the insectivorous bats. A variety of fruit trees and fan-palm will be used landscaping works of the SPS WCP, and bat boxes will also be provided, benefiting various bat species.
- **Leopard Cat**: This feline species is widely distributed in the countryside of Hong Kong, and occurs in a wide range of habitats, including fishpond and marsh habitats in the Deep Bay wetlands (Shek, 2006; AFCD, 2024). The enhanced fishponds in EEF and the freshwater habitats in EFW is anticipated to benefit the species by supporting prey items such as amphibians and birds (HKWP, 2024). Better control of feral dogs in the future SPS WCP will also benefit this species.
- **Chinese Bullfrog**: This large frog prefers moderate to large freshwater wetlands with some emergent vegetation (Lau, 1998). The wetlands in EFW with different vegetation and varying water depth shall provide suitable habitat.

- **Scarlet Basker**: This dragonfly inhabits weedy ponds and sluggish rivers (Wilson, 2003). The wetlands and channels in the EFW shall provide suitable habitat for this lowland species.
- **Mai Po Bent-winged Firefly**: This firefly species inhabits mangrove-fringed channels for its lifecycle and is commonly found at Mai Po area (AFCD, 2023; Yiu, 2020). The widened tidal channels in EFW and the channels to be created for *gei wai* in the EEF shall provide suitable habitats for this species.

Table 4.3 Habitat Requirements of Key Target Species Groups

	Ecologically Enhanced Fishpond				**Enhanced Freshwater Wetland**	
	Fishponds	**Low Intensity Management Zone**	***Gei wai* – Open water**	***Gei wai* – Vegetated**	**Seasonal Flooded Wetland (Freshwater Marsh)**	**Water Channels**
Piscivorous Avifauna						
Black-faced Spoonbill*	✓✓✓	✓✓	✓✓✓	✓✓✓		✓✓
Great Cormorant*	✓✓✓	✓	✓✓✓	✓✓✓		✓
Great Egret*	✓✓✓	✓✓	✓✓✓	✓✓✓	✓	✓✓
Grey Heron*	✓✓✓	✓✓	✓✓✓	✓✓✓	✓	✓✓
Ducks and Grebes						
Eurasian Teal	✓✓	✓✓✓	✓✓	✓✓	✓	✓✓
Little Grebe	✓✓	✓✓	✓✓	✓		✓
Shorebirds and Gulls						
Black-headed Gull	✓✓	✓✓	✓✓	✓		✓✓
Little Ringed Plover	✓✓✓	✓✓	✓✓✓	✓✓✓		✓
Freshwater Wetland Avifauna						
Black-winged Stilt	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓	✓✓
Red-throated Pipit	✓✓	✓✓			✓✓	✓
Other Wetland-associated Avifauna						
Collared Crow	✓✓✓	✓	✓✓✓	✓✓✓	✓✓	✓✓
Red-billed Starling	✓✓✓	✓	✓	✓✓	✓✓	✓
Raptor						
Eastern Imperial Eagle	✓✓✓	✓✓✓	✓✓✓	✓		✓
Greater Spotted Eagle	✓✓✓	✓✓✓	✓✓✓	✓		✓
Mammal						
Eurasian Otter	✓✓✓	✓✓	✓✓✓	✓✓✓	✓	✓✓
Odonate						
Scarlet Basker	✓	✓✓			✓✓	✓
Herpetofauna						
Chinese Bullfrog	✓	✓✓			✓	✓

Notes:
* key indicator species
✓ represents suitability of proposed habitat for each species, where level of suitability increases with number of ticks.

Table 4.4 Habitat Requirements of Supplementary Focus Species Groups

	Ecologically Enhanced Fishpond				Enhanced Freshwater Wetland	
	Fishponds	**Low Intensity Management Zone**	***Gei wai* – Open water**	***Gei wai* – Vegetated**	**Seasonal Flooded Wetland (Freshwater Marsh)**	**Water Channels**
Ducks and Grebes						
Northern Shoveler		✓	✓✓✓	✓✓✓	✓	✓✓
Tufted Duck	✓✓	✓✓✓	✓✓	✓✓	✓	✓
Shorebirds and Gulls						
Stints	✓✓✓	✓	✓✓✓	✓	✓✓	✓✓
Wood Sandpiper	✓✓	✓	✓✓✓	✓	✓✓✓	✓✓
Freshwater Wetland Avifauna						
Black-crowned Night Heron	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Bittern	✓✓✓	✓✓	✓	✓	✓✓✓	✓✓
Chinese Pond Heron	✓✓✓	✓✓	✓	✓	✓✓	✓✓
Eurasian Coot	✓✓	✓✓	✓✓	✓	✓✓	✓
Intermediate Egret	✓	✓	✓	✓	✓✓✓	✓✓
Little Egret	✓✓✓	✓✓	✓✓✓	✓✓✓	✓	✓✓
Pheasant-tailed Jacana		✓✓✓			✓✓✓	
Snipes	✓	✓			✓✓✓	✓
Other Wetland-associated Avifauna						
White-cheeked Starling	✓✓	✓	✓	✓	✓✓✓	✓
White-shouldered Starling	✓✓	✓	✓	✓	✓✓✓	✓
Zitting Cisticola	✓✓	✓	✓	✓	✓✓✓	✓✓
Mammal						
Bat	✓✓	✓✓	✓	✓	✓✓	✓✓
Leopard Cat	✓✓	✓✓	✓	✓	✓	✓
Firefly						
Mai Po Bent-winged Firefly				✓	✓	✓✓

Notes:
✓ represents suitability of species, where level of suitability increases with number of ticks.

5 OVERALL HABITAT PLANNING OF THE SPS WCP

Wetland Compensation for the Project

5.1.1.1 As mentioned in **Section 2**, a key requirement of the SPS WCP is to achieve no net loss in the ecological function and capacity of the wetland to provide compensation for the loss of wetland habitats arising from the development of STT. The ecological mitigation requirement of the EIA Report outlined that 288 ha of wetland will be used to achieve the dual functions of providing ecological conservation and eco-friendly aquaculture in harmony. About 253 ha of EEF and 35 ha of EFW habitats will be created to compensate pond habitat and freshwater wetland habitat loss, respectively. In addition, 40 ha of FEA will be provided to compensate the loss of fisheries resources arising from the STT project. With reference to the basic requirements outlined in the Section 10.11.3 of the EIA Report and draft HCMP, a more detailed habitat conceptual plan has been developed (**Figure 5.1** refers) to illustrate the different planned habitats within the SPS WCP.

5.1.1.2 The majority of the SPS WCP will be managed as the 253 ha of EEF habitats, primarily consisting of active ponds that are still managed to support sustainable and eco-friendly aquaculture production. These ponds will be reprofiled to provide better habitat for wildlife, and subject to extended, sequenced drain-down. A small percentage of ponds at the northeastern part of the SPS WCP will be managed as low intensity fishponds with reduced production, limited drain-down and floating aquatic plants to be established. This will provide habitat for pheasant-tailed jacana which no longer breed in Hong Kong because of the disappearance of such habitat. Three new patches of *gei wai* habitat will also be created in the northwestern and southern part of the EEF habitat. These will be managed following the traditional style with regular draining and refilling to provide excellent feeding habitat for waterbirds and to restore productive tidal regime. These habitats are expected to support large numbers of ardeids, black-faced spoonbill, great cormorant, shorebirds and ducks and other wildlife including Eurasian otter. The high concentrations of these birds will also prove attractive for targeted raptor species.

5.1.1.3 The SPS WCP will also consist of 35 ha of EFW habitats, 40 ha FEA and up to about 10 ha is reserved for supporting facilities such as visitor center and other basic infrastructure. These areas will be located closer to the STT Project (within the EZ and RDZ, where if their functions align), which are expected to subject to higher levels of disturbance and therefore less attractive to disturbance sensitive species that will use the EEF in higher numbers. The EFW habitats are expected to support less disturbance sensitive species, and will mainly comprise a mix of open water, permanent and seasonal marsh habitat, lily ponds, and reedbeds. These habitats will attract wetland avifauna such as black-winged stilt, snipes, bitterns, as well as supporting diverse wetland plant communities, aquatic invertebrates and herpetofauna. The FEA will mainly comprise outdoor fishponds and indoor aquaculture facilities, with Bird-friendly Design Guideline measures adopted appropriately, such as use of low reflectance, opaque materials and appropriate architectural features like exterior screens and grilles, and Gateway to the Wetlands will provide various visitor facilities to enhance visitor experience. Details of the FEA shall refer to the ADP of the SPS WCP.

5.1.1.4 Fisheries research is one of the main functions of the SPS WCP. Fisheries research will primarily take place at the AFCD Fisheries Research Centre (FRC) near Lok Ma Chau, and shall be led by relevant Government Department (i.e., AFCD). By providing essential support and conducting research on modernised aquaculture practices, the FRC aims to promote modernised aquaculture, conduct aquaculture research, and transfer modernised aquaculture techniques to local fish farms, thus facilitating the transformation and upgrading of the industry through technological advancement and improving aquaculture activities in the area.

Existing Compensation Wetland Managed by the Government

5.1.1.5 As mentioned in **Section 3.3.2**, two existing compensation areas, both managed by the AFCD, are located within the SPS WCP, including the OWCAs of The Loop (Area 7 and 9) and the LMC PTI Compensatory Pond. These existing compensation areas will be included as part of the SPS WCP and the management regime of both compensation areas will continue to follow the corresponding EP: FEP-05/129/2002/F, EIA Report AEIAR-176/2013 and EP-477/2013/B, respectively.

5.1.1.6 Direct impact to these mitigation wetlands will be avoided and potential visitor facilities and activities under the SPS WCP will be located outside of these areas. Precautionary measures and good site practices will be adopted to avoid/minimise disturbance impacts on the foregoing ecologically sensitive wetlands during both the construction and operation stages of the SPS WCP.

5.1.1.7 With the establishment of the SPS WCP, the timing of drain-down of fishponds at these mitigation wetlands (if any) shall be aligned with other ponds in the SPS WCP so as to ensure an appropriate spread of drained ponds throughout the water bird migratory season. The holders of the concerned EPs for these two areas will be regularly consulted during the construction and operation of the SPS WCP.

6 DESIGN AND IMPLEMENTATION TO ENHANCE ECOLOGICAL FUNCTIONS

6.1 Overview

6.1.1.1 The planning and design of habitats in the SPS WCP aims to create diverse wetland habitats that will enhance biodiversity and environmental capacity in order to fulfil the EIA Report wetland compensation requirement while improving aquaculture production. The design considerations detailed in Section 4.1 of the Draft HCMP under the EIA report (e.g. engineering, hydrology and access etc.) have also been considered and incorporated into the design as detailed in below sections. The effectiveness of ecological enhancement measures would be assessed through monitoring the presence and abundance of key indicator species, and comparing them to reference data sets, as described in **Section 7**.

6.1.1.2 Long-term sustainability in terms of cost-effective management, climate resilience and low carbon operation of the SPS WCP is also a crucial consideration in the design of the wetlands. The eco-education potential of this large WCP shall be optimised without compromising the conservation and fisheries objectives through the provision of appropriate facilities at the right locations, regulating the visitor number / activities and the development of education programme.

6.1.1.3 The existing fishponds, channels and wetlands provide habitats for many wildlife and are of significant ecological value. Therefore, a light-touch approach is adopted when designing the new habitats in SPS WCP so that extensive earthworks and changes to management regimes are avoided as much as possible. In addition to having less disturbance to wildlife in the area when creating the new habitats, such an approach is also more economical in both cost and time. The principle of solely relying on the alluvial soil / mud on site shall be adopted so that there is no need to import nor dispose of pond mud when creating / modifying the wetlands. There are various constraints posed by the existing conditions such as the pond profile, hydrology, vegetation, acid sulphate soil which have been taken into account and addressed below.

6.1.1.4 Shallow water will be most suitable for large wading piscivorous birds to forage. By recreating wide tidal channels, installing sluice gates to control the water level in the EEF as well as draining *gei wai* and aquaculture ponds in sequence, there shall be shallow water in SPS WCP for the target species throughout the year.

6.1.1.5 The majority of the SPS WCP will be managed as EEF habitats. These EEF areas will primarily comprise active ponds managed with sustainable and ecofriendly aquaculture practices. They will be enhanced with various feature as detailed in Section 10.11.3.4 of the EIA Report to increase the abundance and diversity of wildlife, thereby compensating for the loss of the functional value due to the Project[3] . Overall, the EEF will be reprofiled to provide better habitats for wildlife, and subject to extended and sequenced drain-downs. These measures have been taken into account in the design and management of the enhanced habitats, as further detailed in **Section 6.1** to **Section 6.4**. According to the EIA report, it is expected that the functional value of the EEF can be increased by up to 45% compared to typical active / inactive fishponds based on monitoring data from other similar enhancement works upon the implementation of these ecological enhancement measures. The non-traditional fishpond zones will have the same ecological enhancement and management as the traditional fishpond areas. Active fisheries production will be maintained, physical enhancement works such as pond reprofiling for gently sloping gradient will be carried out, and these ponds will also be subjected to the same drain-down regime as those carried out under traditional fishpond management. Considering the same ecological enhancement and management measures will be carried out, the increase in ecological function by up to 45% or more is anticipated for the non-traditional fishpond zones (*gei wai*, low intensity management zone and Eco-friendly Aquaculture Demonstration Zone). A summary of enhanced habitats provided in the SPS WCP is provided in **Table 6.1.**

[3] Enhancement measures for the EEF could include increasing pond area and enhancing connectivity; physical modification of pond habitats to increase environmental carrying capacity; managing and sequencing pond drain-down across multiple ponds in the dry season to maximise feeding opportunities for avifauna and other wildlife; implementing access control to reduce disturbances and predation of wildlife by feral dogs; removing existing bird scaring devices at actively managed ponds, where appropriate; and stocking ponds with suitable prey items (i.e. trash-fish) for target wildlife species (as an enhancement measure to achieve higher enhancement value).

Table 6.1 Breakdown of Habitat Types within the Ecologically Enhanced Fishponds and Enhanced Freshwater Wetlands of the SPS WCP

Habitat Zoning	Habitat Type	Area (ha)
Ecologically Enhanced Fishponds (EEF)	*Gei Wai (Open Water)*	27.6
	Gei Wai (Vegetated)	43.3
	Traditional Fishponds	145.8
	Low Intensity Management Area	23.7
	Eco-friendly Aquaculture Demonstration Zone	12.6
	Total	**253.0**
Enhanced Freshwater Wetlands (EFW)	Freshwater Marshes	10.6
	Lily Pond	1.6
	Reedbed / Swamp Forest	3.3
	Proposed Otter Friendly Microhabitat	0.2
	Water Channels	19.6
	Total	**35.2**

Note: Total area might not add up due to rounding.

6.2 Design of Ecological Enhancement Works

6.2.1 Overview

6.2.1.1 The proposed wetland enhancement works within the SPS WCP are summarised in **Figure 5.1**, with typical sections and design layouts for each of the habitats to be created shown in **Appendix D** and **Appendix E** respectively**.** Each habitat type is discussed under corresponding sections below.

6.2.2 Ecologically Enhanced Fishponds (EEF)

6.2.2.1 Within the EEF area, existing fishponds shall be consolidated into larger ponds (around 1 ha or more) or *gei wai* (around 10 ha) to reduce the enclosed effect on larger water birds. Large water birds generally prefer bigger ponds as these provide further distance away from human disturbance along pond bunds and offer more space to evade potential disturbance / threats (Blumstein, 2003). Meanwhile, consolidating smaller ponds to larger ponds minimises the amount of earthmoving works required, as the existing perimeter bund will be retained, and reduce management effort required (i.e., less manpower needed to manage one large pond than several small ones). Internal bunds that need to be dismantled can be reprofiled to form habitat islands and/or used as materials to form gently sloping banks.

6.2.2.2 Four sub-habitats will be created within the EEF area, namely *gei wai* (Open Water and Vegetated), traditional fishponds and low intensity management area. In addition, an Eco-friendly Aquaculture Demonstration Zone (hereafter referred to as the Demonstration Zone) will be established to the north of Tam Kon Chau Road, with deployment of eco-friendly aquaculture systems including container eco-culture systems and pond eco-captive systems. As mentioned in **Section 6.1.1.4**, all sub-habitats within the EEF area, including *gei wai* (Open Water and Vegetated), traditional fishponds, low intensity management area and Demonstration Zone will have the same physical enhancement works, therefore the increase in ecological function by up to 45% or more is anticipated across the entire EEF. Location of the habitats are shown in **Figure 5.1** and details are discussed below. The conceptual layout design of the Demonstration Zone is shown in **Appendix F**.

Gei wai (Open Water and Vegetated)

6.2.2.3 Ponds along Shenzhen River within the Zone 1 and abandoned ponds located between Palm Springs and Fairview Park will be reprofiled and managed as *gei wai*. Vegetated *gei wai* (43.3ha) are proposed for ponds located to the immediate northeast of the MPNR and the area between Palm Springs and Fairview Park, whereas open water *gei wai* are proposed for two areas along the Shenzhen River (**Figure 5.1** refers). Vegetated *gei wai* will be created by reprofiling existing abandoned, vegetated ponds, removing terrestrial and exotic vegetation, and incorporating a mosaic of open water and patches of native mangrove and reedbeds with reference to traditional *gei wai* design (WWF-HK, n.d). The open water *gei wai* (27.6ha) will be created by reprofiling and combining ponds along the Shenzhen River, which will remain as an open water and mudflat habitats. Scattered unvegetated islands formed by partially

retaining pond bunds will be provided to increase the overall habitat complexity and for avifauna foraging.

6.2.2.4 Each of the *gei wai* will be reprofiled as a single compartment with gently sloping gradient, with indicative typical sections of both open water and vegetated *gei wai* presented in **Appendix D1**. Within the vegetated *gei wai*, a perimeter channel of about 2m depth will be dredged and running internally along the pond bund. Patches of native mangrove and reedbeds will be retained and levels graded gently upward towards the edge of mangrove patches. Whereas reprofiling of pond base as mudflat area and creation of some unvegetated islands will be sufficient for the open water *gei wai*. Both *gei wai* designs are anticipated to attract duck species to the large open water habitat provisioned during high water level period, and ardeids, black-faced spoonbills and other shorebird species attracted to forage at exposed mudflats during low water level period (Aspinwall, 1997). Raptor species are also expected to be attracted to the high density of prey.

6.2.2.5 Planting in the *gei wai* will mainly comprise native mangroves. Existing terrestrial vegetation and exotic species (e.g., mangrove *Sonneratia* spp.) will be removed, and existing native mangroves will be retained according to design. It is anticipated that relatively little additional planting will be required. Replacement planting with native mangrove species could be carried out as patches of existing terrestrial vegetation are removed where necessary. Recommended native mangrove species to be planted are summarised in **Appendix G**.

6.2.2.6 The normal operation of *gei wai* depends on the controlled draining and filling of the ponds with brackish water from tidal channels. Electric sluice gates will be installed in *gei wai* bund close to the existing outlets to the Shenzhen River (avoiding the existing Border Road) or adjacent channels for safe and easy operations. These sluice gates shall have sensors monitoring the water level inside and in the tidal channel. IoT shall be used to ensure real-time data access and the remote operation of the sluice gate in response to tidal levels and storm events, as well as ecological and aquaculture objectives (**Figure 6.1** refers).

Traditional Fishponds / Low Intensity Management Area

6.2.2.7 The remaining EEF will be reprofiled and combined to form larger traditional fishponds, with the northeast area of the SPS WCP to be designated as a Low Intensity Management Area (**Figure 5.1** refers). These traditional fishponds will continuously support aquaculture activities and pond fish culture in form of eco-friendly aquaculture to serve dual functions of ecological enhancement and aquaculture. Depending on the ecological performance of the ponds within the Demonstration Zone, the traditional fishponds can potentially be reconfigured to ponds that support eco-friendly aquaculture systems (see **Section 6.2.2.15** for more details). Fisheries production in these fishponds shall also be monitored to evaluate the adoption of more eco-friendly management practices on aquaculture in EEF. Indicative typical sections of pond bund for these fishponds are presented in **Appendix D2**.

6.2.2.8 Both traditional fishponds (145.8 ha) and Low Intensity Management Area (23.7 ha) will have the same basic pond configuration but with slightly different management regimes. These reconfigured EEF ponds will have a water depth of approximately 2 – 2.5m, and pond bunds graded with gentle slope of 1:8 ratio, gradually increasing water depth toward the centre, allowing progressive drain-down during dry season to attract wintering piscivorous avifauna. The existing bund height will remain similar to existing pond bunds, with modification using excavated materials when necessary. Where possible, the pond margins should be graded in an irregular configuration to increase the total length of the edge and provide greater habitat complexity. Perching poles can be installed along the pond margins of some EEF to support foraging of small waterbirds, whereas raptor perching poles can be installed on the bund of some EEF to support apex predators in the area. Bird nest boxes and bat boxes can also be installed on some large trees on the EEF pond bunds.

6.2.2.9 To facilitate pond drain-down across multiple ponds and to prevent water overflowing and the escape of fish during extreme rainfalls, adjustable weirs shall be installed at the EEF fishponds' pond bund to form connected clusters in which water can flow to adjacent ponds before finally discharging to the nearest river channel by gravity (**Figure 6.1** refers). Under normal conditions, the adjustable weir shall be set at 0.5m below pond bund to allow excess water from heavy rains to passively flow to adjacent ponds and eventually to water channels. The weirs in downstream ponds will be set at slightly lower levels to facilitate drainage. The

weirs shall be adjusted to 0.8 – 1.0m below bund levels in anticipation of heavy rainfalls or storm surge, improving water discharge rate and increase ponds' storm water storage capacity. Where ponds need to be actively drained / filled, submersible electric water pumps fitted with flexible hoses will be used to pump water from the draining pond to adjacent ponds during dry situations in order to conserve water for the next round of fish raising.

6.2.2.10 During the reprofiling process, some pond bunds to be dismantled will be retained and modified into habitat islands. Design of the islands will mostly be in kidney shape to create a "sheltered" effect for water birds from the northerly wind in the winter and most ponds will only have one large island to facilitate management (**Figure 5.1** refers). The indicative typical section of pond with habitat island is presented in **Appendix D3**. Both permanent vegetated island and inundated island in form of muddy islets will be created. Permanent vegetated islands shall be formed above the high-water level of the selected ponds, with suitable planting provided to encourage avifauna nesting and loafing. Inundated islands will be graded at about 200mm below the high-water levels. These islands will only be uncovered as muddy islets in dry season as water gradually drained.

6.2.2.11 Native vegetation will be retained along pond bunds, with clearance of exotic species (e.g., *Mikania*) along pond bunds undertaken to open up space for larger avifauna to utilise. A mixture of both short and tall emergent species shall be provided along the edge of permanent vegetated islands to provide nesting and shelter for waterbirds. Manual / mechanical cutting shall be carried out to keep vegetation in check. Recommended native species for planting are summarised in **Appendix G**.

Eco-friendly Aquaculture Demonstration Zone

6.2.2.12 The Demonstration Zone is approximately 12.6ha in area. Ponds within this area will have a similar configuration as traditional fishponds, with deployment of eco-friendly aquaculture systems (i.e. container eco-culture system and pond eco-captive system). Ecological enhancement measures will be implemented at water treatment ponds of the container eco-culture system and the remaining area of the pond eco-captive system to provide dual functions of wetland conservation and fisheries production. Drain-down in the dry season will also be carried out at both the water treatment ponds of the container eco-culture system and the remaining area of the pond eco-captive system, as described in **Section 6.4.1.20** below. During the drained down period, the pond bottom would be gradually exposed for avifauna to forage invertebrates to enhance feeding opportunities and overall ecological function of the ponds.

6.2.2.13 For the eco-captive culture ponds, the portion of the pond allocated for aquaculture production with barrels will be relatively deep (3.0 – 5.0m deep, depending on the barrel's size), with the remainder of the pond graded similar to other traditional fishponds in the EEF. The eco-captive culture ponds would also be provided with habitat enhancement features such as habitat islands (**Section 6.2.2.10** refers).

6.2.2.14 Ponds linked to the container eco-culture system will serve as the Three Ponds Two Dams (3P2D) System: an ecological tailwater treatment chain. The 3P2D System consists of sequentially arranged sedimentation ponds, aeration ponds, and ecological purification ponds interconnected by two filter dams. The ponds in this system can also provide ecological function by creating suitable habitats for some wetland species. The depth of the sedimentation and ecological purification ponds are similar to the traditional EEF ponds, with maximum water depth of approximately 2 – 2.5m. The aeration pond is set to have slightly shallower water, approximately 0.8 – 1.8m. The ecological purification ponds will support emergent and submergent plants to provide water purification functions (Liu *et al*., 2021).

6.2.2.15 The ponds in the Demonstration Zone will be monitored on the dual functions (e.g. monitoring of ecological performance through comparison of bird carrying capacity of the EEF and ponds within the Demonstration Zone upon construction of the STT), to further inform the design of EEF ponds. Should the ecological performance of the ponds within the Demonstration Zone be considered similar to those in the EEF traditional fishponds (i.e. have a similar environmental carrying capacity), EEF other than *gei wai* can potentially be reconfigured to ponds that support eco-friendly aquaculture systems in the later versions of the HCMP, with reference to ponds in the Demonstration Zone (**Figure 5.1** refers). More details of the eco-

friendly aquaculture systems in the Demonstration Zone are provided in the ADP for the SPS WCP.

6.2.3 Enhanced Freshwater Wetlands (EFW)

6.2.3.1 The EFW will consist of several categories of wetland enhancement. Similar to the EEF ponds, the EFW shall restore some overgrown, filled ponds and consolidate smaller ponds to larger seasonal and permanent wetlands (2ha or above). In addition, several existing small and degraded water channels would be widened and enhanced. Seasonal and permanent wetlands to be created include freshwater marsh and lily pond, located north to the Gateway to the Wetlands as well as reedbed and swamp forest, located west of Mai Po San Tsuen. Location of the micro-habitats are shown in **Figure 5.1** and details are discussed below.

Freshwater Marshes and Lily Pond

6.2.3.2 Existing ponds including overgrown and filled ponds shall be reinstated as freshwater marshes (10.6ha) and lily pond (1.6ha). Freshwater marsh habitat will be created to the north of the Gateway to the Wetlands, either side of and adjacent to the water channel at Lin Barn Tsuen (**Figure 5.1** refers). An indicative typical section provided in **Appendix D4**. Freshwater marshes will be created by converting existing ponds through reprofiling into three habitat sections, comprising seasonal marsh (~30%), permanent marsh (~30%) and open water (~40%), arranged sequentially, with the open water closest to the channel. The percentage area of each microhabitat will change as water levels fluctuate with season and climate. To facilitate water management, open water marsh habitat will be connected to the water channels by an adjustable weir. Water depth will be graded up to 0.5m in the seasonal marsh (including shallow area of 100 – 300mm deep and transitional inundated areas), up to 1.5m in the permanent marshes, and up to 1.75 – 2.25m in the open water marsh (supporting floating and submerged vegetation). The bank slopes will be graded gently with less than 1:8 ratio, from seasonal marsh (landward direction) to open water marsh (water channel direction) to create varying water levels to suit different plant and wildlife species. At the intersection of permanent marsh and open water, a bund of ~0.6m will be created to retain water in the permanent marsh throughout the dry season. Excavated materials from dismantling pond bunds shall be reused for re-profiling works.

6.2.3.3 As mentioned in **Section 6.2.3.2**, adjustable weirs will be provided along the marsh bunds to facilitate water management. The permanent and open water marshes are expected to retain water and remain inundated throughout the year, whereas the water level at seasonal marsh will drop and eventually dry over the dry season. Riparian and emergent vegetation will be planted in both seasonal and permanent marshes, and only floating and submerged vegetation will be planted in the open water.

6.2.3.4 Given riparian / marsh vegetations are sensitive to small changes in water levels, adjustable weir will be installed at connection of the freshwater marsh to the adjacent water channels, ensuring the seasonal flooded wetlands hold sufficient water capacity to prevent overgrowth of fast-growing marshes species (i.e., *Phragmites*) and succession to dry grassland. Manual / mechanical removal of vegetation may be carried out if necessary to maintain suitable height and amount of marsh coverage.

6.2.3.5 A lily pond (1.6ha) will be created to the immediate east of the Gateway to the Wetlands (**Figure 5.1** refers), it will be provisioned with floating species such as *Nymphaea* spp. and *Trapa*, creating suitable microhabitats for freshwater amphibians, avifauna and odonates. The pond would be permanently inundated, with water depth graded up to 1.5m. Recommended planting for freshwater marshes and lily pond is summarised in **Appendix G**.

Reedbeds / Swamp Forest

6.2.3.6 Located west of Mai Po San Tsuen, two EFW microhabitats will be created (**Figure 5.1** refers). A reedbed of 1.2ha will be created in an existing fishpond area by grading the pond to about 1m depth and maintaining permanent inundation. Recommended planting for reedbeds is summarised in **Appendix G**.

6.2.3.7 The patch of woodland south to the DSD Pumping Station was once a historical wetland habitat and will be reinstated into a swamp forest of 2.1ha. Existing exotic trees will be removed and native trees retained and/or translocated to nearby bund to provide potential

roosting sites for cormorant or ardeids. The area will be reprofiled and graded lower than average water level of adjacent channel, allowing water to flow into the area where Chinese swamp cypress and emergent vegetation will be planted, forming a swampy forest habitat. Recommended planting for swamp forest is summarised in **Appendix G**.

Widening of Existing Water Channels

6.2.3.8 There are approximately 19.6ha of existing water channels within the SPS WCP. Approximately 8.6ha of these will be enhanced by widening the channel banks, and regrading the channel bed and banks (**Figure 5.1** refers). Indicative typical section of the widened channel is presented in **Appendix D5**. Narrow sections of selected water channels shall be widened up to 40m to provide suitable habitats for different fauna, especially ardeids and other waterbirds. These channels will be tidally inundated, with short and tall marsh species along with mangroves planted along the upper intertidal areas, with the mid- and lower- intertidal areas maintained as mudflat habitats. Exotic vegetation (e.g., water hyacinth, *Sonneratia* spp., *Typha angustifolia*) shall be removed and replaced with native marsh species. Existing large native trees along the bank of water channels will be transplanted to the newly formed bankside to provide perching site for raptors or potential roosting sites for ardeids. Recommended planting for widened water channel is summarised in **Appendix G.**

6.2.4 Bird's Flight Corridors

6.2.4.1 A 300m-wide bird flight corridor covering the majority of the existing surveyed and recorded flightlines between the LMC Meander and SPS WCP in east-west direction will be preserved by designation of NBA at I&T sites and imposition of building height control of +15 mPD for Government facilities (**Figure 3.1** refers). The building height adjacent to this bird flight corridor will also be restricted to +35 mPD to further minimise disturbance impact and encourage its use by large birds.

6.2.4.2 The width of the flight corridor has made reference to the flight corridor further east, the surrounding topography and building structures (e.g., the LMC Spur Line viaduct). As a reference, the flight corridor at south of the Loop (the combined width of the Ecological Area within the Loop, LMC Meander, and the adjacent fishponds) is about 300 m wide.

6.2.4.3 SPS WCP comprises extensive aquaculture ponds, *gei wai*, water channels and wetlands. Aside from reprovisioned supporting facilities such as small storage and maintenance huts and aquaculture containers in the Demonstration Zone, the only built structures in the SPS WCP will have a small footprint, being less than +15 mPD in height, and located at the edge of the WCP next to the STT. In this regard, development of the SPS WCP is expected to have negligible impact on avifauna flying over the site and/or connecting with adjacent flight corridors.

6.2.4.4 A 70m-wide NBA along the flight path connecting the MPLV Egretry to SPS WCP, as well as a 35m-wide NBA along the northwest boundary of the STT will be provided to preserve flight paths recorded at the MPLV Egretry and MPV Egretry respectively (**Figure 3.1** refers). A landscaped area with planting of trees and native / suitable vegetation will be provided along the NBA to minimise disturbance from the STT.

6.2.4.5 SPS WCP will be adjacent to the MPV Egretry, allowing the breeding little egret and Chinese pond heron to fly to the foraging ground inside the SPS WCP and further in Deep Bay. The tidal water channels, *gei wai,* flooded wetlands and aquaculture ponds in SPS WCP shall provide shallow water suitable for the breeding egrets and herons and their young to forage.

6.2.4.6 Bird-friendly design with reference to the Bird-friendly Design Guideline that is currently under preparation by CEDD under Item (7) of EIA Approval Conditions (e.g., use of low reflectance, opaque materials and appropriate architectural features like exterior screens and grilles) will be adopted for buildings adjacent to the 300m-wide bird flight corridor, the 70 m-wide flight path and the MPLV Egretry to minimise bird collision. The FRC and the Indoor Aquaculture Facilities at the FEA which is adjacent to the flight corridor, the SPS WCP Visitor Centre which is close to the MPV Egretry, as well as the AFCD WCP Management Office will also adopt bird-friendly design. The adopted San Tin Technopole Outline Development Plan No. D/STT/1

(the ODP) [4] and the endorsed PDB for I&T Sites on the San Tin Technopole OZP have reflected the relevant requirement under Item (7) of the Conditions of Approval of the approved EIA Report by drawing future project proponent(s) / developer(s)' attention to the need to follow the Bird-friendly Design Guideline for buildings within the STLMC DN, where applicable.

6.2.5 Wildlife Corridors for Non-flying Mammals

6.2.5.1 As described in **Section 2.2.3**, a wildlife corridor will be provided in the northern portion of the STT Project area as detailed in Section 10.11.11 and Figure 10.10A of the EIA report, as well as Item (2) of the EIA Approval Conditions, to maintain the movement corridor of non-flying mammal species of conservation importance (such as East Asian Porcupine, Red Muntjac and Small Indian Civet) and promote potential usage by Eurasian Otter. This wildlife corridor will be provided through the STT project area in the form of in the form of underpasses (across Ha Wan Tsuen East Road and San Sham Road) and aboveground corridors within the AFCD Fisheries Research Centre adjacent to the Lok Ma Chau Meander, as well as adjacent to the STEMDC to facilitate free movement of Eurasian Otters across LMC, SPS and the Inner Deep Bay area. Reference was made to the Design Manual for Roads and Bridges by the United Kingdom National Highways (UKNH, 2020) in the design of this corridor.

6.2.5.2 A DDP is already required under the Item (2) of the EIA Approval Condition and EP No. EP-664/2025 to set out and agree the detailed design of the wildlife corridors. As detailed in **Section 2.2.3.6**, under the latest design, the proposed wildlife corridor has a total length of approximately 700m and consists of open channel sections of 10m wide, including one section adjacent to the non-building area within the I&T sites and another two sections running along the AFCD Fisheries Research Centre (FRC) near Lok Ma Chau, as well as connecting underpasses of 3m wide and 2m high (providing a cross-sectional area of $6m^2$) beneath the planned roads. The open channels will be provided with vegetation and water features and fenced off to minimise human disturbance to the non-flying animals, while the underpasses will have ledges on both sides to provide both wet and dry routes for wildlife movement, as well as light shafts to provide natural lighting conditions as much as possible. The proposed wildlife corridor would connect downstream of the existing inflatable dam at STEMDC and the LMC Meander. At the western end of the proposed wildlife corridor adjacent to STEMDC, a series of mammal passages would be designed at the fencing system such that wildlife movement to the upstream of the existing inflatable dam at STEMDC and further to SPS WCP is also allowed. Wildlife passages with a ladder-and-underpass system across the Border Road are proposed near the existing flap valve to enhance connectivity between LMC Meander and the Shenzhen River.

6.2.5.3 To maximise connectivity for non-flying mammals moving between the SPS WCP and the STEMDC, habitats at the northeastern corner of SPS WCP are designed to facilitate wildlife movement, comprising a corridor of EFW and an open water storage pond (**Figure 5.1** refers). The EFW would have a width of about 4 to 8m, with further design details provided in subsequent stages of the SPS WCP Project

6.2.5.4 The wildlife corridor running along the AFCD FRC will adopt designs as stated in **Section 6.2.5.2**, that are being prepared under the DDP. Two separate sections of the open channel wildlife corridor will be provisioned along the northern fringe of the AFCD FRC, with an underpass section provisioned underneath the proposed local road running between the eastern and western parcels of AFCD FRC (**Figure 3.1** refers).

6.2.5.5 The actual configuration (i.e., detailed alignment), design (e.g., water features and planting) and physical parameters (e.g., width) of the wildlife corridors will be subject to detailed design. As required under Item (2) of the EIA Approval Conditions and EP No. EP-664/2025, a Detailed Design Plan for Establishment of Wildlife Corridor and related measures will be prepared in consultation with AFCD and submitted to relevant Government Department (i.e., Environmental Protection Department (EPD)) for approval three months before commencement of construction of the relevant part of the STT affecting the existing wildlife corridor(s). The maintenance party shall also be identified separately under the Design Plan.

[4] The San Tin Technopole Outline Development Plan No. D/STT/1 (the ODP) is a departmental plan which serves to provide a comprehensive planning framework to guide the future development of the San Tin/Lok Ma Chau area in an integrated and co-ordinated manner by providing a comprehensive picture of the proposed land use patterns and major infrastructures within the area.

6.2.5.6 Additional measures will be implemented to create suitable habitat and facilitate the movement of Eurasian otters both within and between the SPS WCP and adjacent habitats, including:

- There are three river channels running through the SPS WCP discharging north into the Shenzhen River. The outlets of these channels (under the Border Road) are currently covered with narrow metal grilles. These grilles (**Figure 6.1** refers) will be reviewed to have a wider spacing to allow Eurasian otters to move through these outlets.
- Provision of habitat enhancement features (i.e. otter platform / artificial holts) at EEF habitat.
- Steps / ladders shall be added to both sides of the flap valve of LMC meander and the inflatable dam at STEMDC (**Figure 6.1** refers).

6.3 Construction and Implementation of Ecological Enhancement Works

6.3.1 Overview of Ecological Enhancement Works

6.3.1.1 With reference to the habitat planning discussed in **Section 6.1**, general approaches to construction are discussed in following sections. Construction works should commence outside of dry season (i.e. to commence in April to Oct) as far as possible when there is a lower abundance of avifauna to minimise disturbances. In case of necessary works during the dry season, agreement with relevant authorities (including EPD and AFCD) on the works methods to minimise disturbance impacts to the overwintering waterbirds should be sought.

6.3.1.2 Given the large area of SPS WCP, wetland enhancement works will be conducted in phases. The Phase 1 works will focus on the central area of the SPS WCP, which has a high ecological sensitivity and connection to other existing wetland managed for conservation. Further details of the Phase 1 development are provided in **Section 8.5.2**. Phase 1 of the SPS WCP covers the EEF areas (covering sub-habitats of traditional fishponds, both open water and vegetated *gei wai* and Demonstration Zone with eco-friendly aquaculture systems) and some EFW (covering freshwater marshes and water channels) while the wetland enhancement works under Remaining Phase covers the remaining EEF and EFW areas.

6.3.1.3 Non-intrusive pre-construction works, including topographic surveys for ponds and water channels to be desilted or recontoured, surveys on vegetation coverage, soil / mud conditions and site access, as well as ecological surveys focusing on collecting up-to-date baseline data, will be carried out by phases to formulate the design parameters of the proposed habitat enhancement works. The method and programme for these surveys should be submitted to AFCD for approval prior to commencement of the surveys, to minimise any potential disturbance impacts to sensitive ecological resources. Details of pre-construction surveys are discussed in **Section 6.3.5**.

6.3.2 General Infrastructure and Facilities for Enhanced Wetland

6.3.2.1 For the supporting infrastructures for the enhanced wetland located within the SPS WCP as described below, they will be provided on the existing / modified pond bunds. The key construction activities involved for these supporting infrastructures include excavation and foundation works, ground improvement works, superstructure works, construction of septic tank, utility and pipework, landscape works. Subject to site conditions, ground improvement works via installation of stone columns over the pond bunds might be required for the construction of the supporting infrastructure due to the potential ground settlement in the presence of alluvium or colluvium silt and clay.

Storage and Maintenance Facilities

6.3.2.2 To facilitate a range of essential habitat management and/or aquaculture activities, maintenance lodges and storage huts will be provided on pond bunds across the EEF area (**Figure 6.2** refers). These facilities can serve as equipment storage, workshop, as well as resting place for habitat management staff and/or fishpond operators.

Access

6.3.2.3 The SPS WCP is currently largely accessible by dirt roads and footpaths routed along pond bunds, and improved vehicular access is essential for the operation of the EEF and FEA.

Road improvement works are proposed to provide safe and reliable access to storage facilities in the EEF and indoor aquaculture facilities in the FEA (**Figure 6.2** refers). Access roads within the EEF will be routed along existing dirt tracks as far as practicable to minimise disturbance. The access roads shall be surfaced with gravel, with a minimum width of 3.5 meters, allowing for small machinery and maintenance vehicles (i.e. feeder machine).

6.3.2.4 Boardwalk / footpaths shall be provided throughout the SPS WCP for maintenance and visitor access (in Zone 2 and Zone 3). The footpaths shall be constructed with permeable materials to minimise soil compaction and hydrological disruption. Visitor access control is described in **Section 6.5**.

6.3.2.5 All future access to MPNR, existing managed wetlands and other restricted areas will be carefully considered and designed with soft measures to discourage / control human access.

Utilities

6.3.2.6 Much of the SPS WCP currently has little infrastructure for potable water, electricity, wastewater, or telecommunications. The normal operation of the EEF and staff needs will require provision of key utilities at the maintenance huts/storage facility clusters within the SPS WCP (**Figure 6.2** refers). Watermains and utility cables will be laid along boardwalks to connect most of the ponds and existing watermains and utilities network. Water demand and sewage generation can be catered by planned service reservoir and effluent polishing plant of STT and its planned network. No additional service reservoir and sewage treatment works are needed.

EEF Wetland and Aquaculture Management Equipment

6.3.2.7 To facilitate wetland management and aquaculture production at the EEF, various types of management equipment will be required. These items are detailed in the ADP, and would include photovoltaics, mechanical aeration systems, oxygenation and water circulation equipment, automatic feeding devices, electric pumps, water control facilities such as electric sluice gates and adjustable weirs, and fish harvesting/fish handling equipment.

6.3.3 Habitat Construction Methods

6.3.3.1 As detailed in **Section 6.1,** a light-touch approach is adopted when designing the new habitats in SPS WCP so that extensive earthworks and changes to management regimes are avoided as much as possible. The overall construction of wetland enhancement works under the Project mainly involves vegetation removal and site formation / excavation works for modification of ponds and channels conducted by machineries such as bulldozers and backhoe diggers. The key construction components of the wetland enhancement works are summarised in **Table 6.2** and detailed below.

Table 6.2 Summary of Construction Components of Wetland Enhancement Works

	Ecological Enhanced Fishpond – *Gei Wai*	Ecological Enhanced Fishpond – Traditional fishponds and eco-friendly aquaculture demonstration area	Enhanced Freshwater Wetland
Vegetation Removal	✓	✓	✓
Pond Draining / Drying	✓	✓	✓
Desilting / Excavation	✓	✓	✓
Pond Reprofiling	✓	✓	✓
Bank Modification	✓	✓	✓
Pond Bund Removal and Formation of Bird Island	✓	✓	✓
Geotextile Lining (Bird Island)(1)		✓	
Clay Lining(2)			✓
Infrastructure Installation	✓	✓	✓
Replanting	✓	✓	✓
Pond Refilling	✓	✓	✓

Notes:
(1) Geotextile lining will be adopted at bird islands in Ecological Enhanced Fishpond to provide creating a stable and long-lasting habitat.
(2) Clay lining will be applied at Enhanced Freshwater Wetlands to minimise seepage.

Ecologically Enhanced Fishponds (EEF)

Gei wai (Open Water and Vegetated)

6.3.3.2 As mentioned in **Section 6.2.2.3**, *gei wai* establishment will focus on long-abandoned ponds to the northeast of the MPNR and along Shenzhen River, and the area between Palm Springs and Fairview Park. The overall construction of *gei wai* habitat will mainly involve vegetation removal and excavation works by bulldozers / backhoe diggers within the confines of existing pond bunds. For the vegetated *gei wai*, existing native mangrove stands should be retained as much as possible, whereas most vegetation would be clear for open water *gei wai*. Given that the part of proposed *gei wai* immediate to the northeast of MPNR is within the Frontier Controlled Area (FCA), approval from the relevant authorities shall be obtained before works are conducted within the FCA or works area patrolled by border control authorities including the Hong Kong Police Force as well as those from Shenzhen border, as required.

6.3.3.3 Works areas within the ponds will be drained completely, or partly drained and using machineries on floating pontoon, whichever is most effective, to clear vegetation and recontour the ponds according to the habitat design and on-site conditions. Electric sluice gates will be installed at structurally stable bunds adjacent to tidal water channels (**Figure 6.1** refers) during the recontouring process to facilitate *gei wai* water management. After completion of earthworks, planting of suitable vegetation will be carried out when needed.

6.3.3.4 In the open water *gei wai*, proposed unvegetated islands will be formed from dismantled bunds and using excavated materials. These islands will be created by aggregating excavated materials around retained bunds to form a sloping bank. The centre of the island will be lined with a layer of impermeable geotextile, with a layer of sand/gravel on top to inhibit vegetation growth and provide resting area for birds.

6.3.3.5 Excavated materials from dismantled pond bunds shall be collected and reused on site for reprofiling in EEF and EFW as far as possible. In the unlikely event that excess excavated materials are generated from pond modification works, they shall be handled in accordance with DEVB TC(W) No. 6/2010 and Chapter 4 Section 4.1.3 of Project Administration Handbook for Civil and Engineering Works (2022 Edition). Disposal of excavated materials at the Public Fill Reception Facilities should be considered as the last resort. Desilted materials shall be handled in compliance with the Waste Disposal Ordinance (WDO).

Traditional Fishponds / Low Intensity Management Area

6.3.3.6 To minimise disturbance caused to wildlife and the environment, earthmoving work should be carried out in clusters of adjacent ponds / wetlands and shall be confined within one consolidated area at any one time. Complete drain-down and drying of existing fishponds will be carried out first, followed by vegetation clearance and partial removal of existing pond bunds to form larger EEF pond habitats. Pond beds will then be recontoured into different water depth profile and slope gradient with reference to habitat designs shown in **Appendix D2 and C3**. The excavation works and disposal requirements of excavated materials of traditional EEF fishponds and Low Intensity Management Area will be identical to *gei wai* habitat (**Section 6.3.3.3** refers).

6.3.3.7 Proposed bird / vegetated islands and inundated islands will be formed from dismantled bunds and using excavated materials. These islands will be created by aggregating excavated materials around retained bunds to form a sloping bank with a variety of habitat forms. For unvegetated islands, the centre of the island will be lined with a layer of impermeable geotextile, with a layer of sand/gravel on top to inhibit vegetation growth and provide resting area for birds. No impermeable geotextile required for inundated or vegetated islands. Vegetation shall be provisioned after completion of earthworks and refilling of water from rainwater and/or adjacent river channels will be carried out.

6.3.3.8 As mentioned in **Section 6.2.2.9**, adjustable weirs will be installed in pond bunds of EEF ponds to facilitate overflow by gravity. The re-profiled ponds should be structurally stable upon

completion of works. Portable submersible electric water pumps and hose will be used for active management of water levels and draining of pond during operation phase.

Eco-friendly Aquaculture Demonstration Zone

6.3.3.9 As mentioned in **Section 6.2.2.12**, ponds in the Demonstration Zone will be created in a similar way to the traditional fishponds. Provision of islands can be provided in the eco-captive system ponds outside of the aquaculture production areas. Construction of islands are detailed in **Section 6.3.3.7**, while construction of the remaining area for deployment of eco-friendly aquaculture systems in the Demonstration Zone is detailed in the ADP of the SPS WCP, and extracted under **Appendix F** for reference.

Enhanced Freshwater Wetlands (EFW)

Freshwater Marshes and Lily Pond

6.3.3.10 The reprofiling of freshwater marshes and lily pond will begin with draining of existing ponds and removing existing terrestrial vegetation. Excavation will then be carried out at designated area according to habitat design (**Appendix D4** refers), followed by reprofiling the pond base. Pond mud / clay on site will be used as much as possible. Adjustable weirs will be installed at structurally stable bunds adjacent to the water channels (**Figure 6.1** refers) during the reprofiling process to facilitate water management. Lastly, planting of suitable wetland vegetation and refilling of water from rainwater and / or adjacent river channels will be carried out.

6.3.3.11 The excavation works and disposal requirements of excavated materials, if any, of the freshwater marshes and lily pond will be identical to *gei wai* habitat (**Section 6.3.3.3** refers).

Reedbeds / Swamp Forest

6.3.3.12 Creation of reedbeds will begin with draining of existing ponds and removing existing terrestrial vegetations, followed by formation of new pond bund. The pond will then be reprofiled to create water depth of 1m to prevent rapid colonisation of reeds and drying up of the habitat. Reeds including rhizomes and substrates dug up in other parts of the site will be put into the pond for establishment, followed by refilling water from adjacent river channels.

6.3.3.13 The swamp forest area will first be cleared of exotic vegetation, followed by excavation to reprofile the area into a pond habitat. Native trees will be retained and/or translocated to nearby bunds to provide potential roosting sites for cormorant or ardeids where possible. The area will be reprofiled and graded lower than average water level of adjacent channel, allowing water to flow into the pond area. Vegetation including Chinese swamp cypress and emergent vegetation will be planted along the bunds, forming a swampy forest habitat.

6.3.3.14 The excavation works and disposal requirements of excavated materials, if any, of both reedbed and swampy forest habitat will be identical to *gei wai* habitat (**Section 6.3.3.3** refers).

Widening of Existing Water Channels

6.3.3.15 The widening of existing water channels shall be carried out in dewatered sections isolated with cofferdam. Vegetation clearance and desilting works with backhoe will be undertaken first, clearing contaminants and debris (i.e., tyres) to ensure good water flow. Creation of gentle slopes towards the landward sides and shallow water zones by excavation will follow habitat design shown in **Appendix D5**. Suitable planting will be provisioned upon completion of earthworks. Adjustable weir will be installed at connection with freshwater marsh to facilitate water management. Excess desilted materials should be used in other areas such as the construction of the freshwater marsh in EFW. The remaining excess materials, if any, shall be handled in compliance with the Waste Disposal Ordinance (**Section 6.3.3.3** refers).

6.3.4 Protection of Existing Egretries and Night Roosts

6.3.4.1 An “Open Space” zoning is adopted in the Approved STT OZP No. S/STT/2 to retain and protect the core area of the MPLV Egretry, and the future development of STT will not encroach onto the MPV Egretry. Enhancement measures include the preservation of trees currently within the core area of the MPLV Egretry. Whilst the MPV Egretry will not be encroached by the development of STT, a 35m wide NBA in the form of an “eco-interface”

and building height restriction of 2 storeys at the proposed AFCD WCP Management Office located nearby will be incorporated to minimise impacts on bird flight paths connecting the MPV Egretry.

6.3.4.2 Pre-construction monthly monitoring at the MPV and MPLV egretries was carried out during the ardeid breeding season of 2025 to confirm the latest boundary of the egretries and to verify the 100 m buffer area as recommended in the approved EIA report and required under the EP No. EP-665/2025. A Pre-construction Ardeid Survey Report (PASR) for MPLV Egretry and MPV Egretry has been prepared under EP No. EP-665/2025 to present details of the survey findings, as well as details of all mitigation measures to minimise impact on egretry and during construction of the Project. Potential construction impacts on the MPV and MPLV Egretries will be minimised through the adoption of good site practices, including the use of quiet and well-maintained equipment, noise barriers, silencers, appropriate plant positioning and shutdown arrangements, and the location of all temporary works areas outside the egretry footprints. During the construction stage, unless the egretries have been abandoned, above-ground construction works should be avoided from March to September and whenever active nests are present, unless AFCD's prior approval has been obtained for the proposed construction method and mitigation measures. Method Statements for works near the egretries should be submitted to AFCD in advance, with works scheduling informed by monthly egretry monitoring. Existing egretry and roosting substrata, particularly trees within the core areas, will be preserved as far as practicable, while the proposed open space at the MPLV Egretry will incorporate suitable enhancement features. Any necessary tree pruning will be minimised and subject to a Method Statement submitted to AFCD.

6.3.4.3 As the condition, location and extent of the night roosts may fluctuate naturally even without additional human disturbance, pre-construction night roost surveys will be conducted as recommended under the EIA Report to confirm the latest boundary, species, abundance, returning time and active period of the night roosts before commencement of the construction works. Two overwintering night roosts (Ha Wan Tsuen Night Roost and San Tin Open Storage Area Night Roost) would be directly lost due to the STT project as assessed in the EIA Report. Likewise, the San Tin Tsuen Road North Night Roost might also be affected by the STT project, subject to the findings of the pre-construction night roost surveys. As stated under Section 10.11.5.2 of the EIA Report, roosting substratum would be re-provided in the AFCD FRC and bank of the revitalised STWMDC of STT to provide opportunities for ardeids and great cormorants to occupy the new roosting sites naturally. Re-provision planting of roosting substratum for both night roosts shall be commenced as early as possible before commencement of construction activities that may result in loss of both night roost. During the construction stage, construction activities and tree felling for both roosting sites will only be allowed in wet season (April – October).

6.3.4.4 Specific management of egretries and night roosts within the SPS WCP are summarised in **Section 6.4.3**.

6.3.5 Construction Implementation

6.3.5.1 Prior to the ecological enhancement works, existing structures within the SPS WCP as well as obstacles within the area (i.e., car tyres in channels, junk cars on pond bunds etc.) shall be identified and removed.

Pre-construction Surveys

6.3.5.2 Lin Barn Tsuen night roost, Tam Kon Chau night roost, Mai Po Nature Reserve Cormorant Night Roost and Mai Po San Tsuen Cormorant Roost fall within / close to the footprint of proposed wetland enhancement works. Pre-construction survey shall be carried out prior to commencement of works to confirm / identify locations of the ardeid roosting sites (both day and night roosting sites) and any breeding behaviour (i.e. egretry). The duration of pre-construction survey for roosting sites shall be carried once per month between September to March, while pre-construction survey for any identified egretry shall be between March to August (breeding season), by qualified ecologist with at least ten years of relevant experience. A Pre-Construction Roosting Site / Egretry Survey Report shall be submitted to relevant authorities (including EPD and AFCD) for approval no later than two months before the commencement of works within the 100m buffer area. If felling of existing trees would be undertaken at identified roosting sites, the works should be conducted during the non-

overwintering season as far as possible. Monitoring of impacted roosts shall be conducted at the original roosting sites until commencement of tree felling works, and upon re-provision of roosting substratum, conducted in the night roost re-provision sites and nearby area to investigate the effect of night roost re-provision site and confirm the locations of roosting ardeid and Great Cormorant, if any, once monthly during dry season, in the first three years of the completion of re-provision. The monitoring results and evaluation of the usage of the night roosts should be reported in the monthly EM&A Reports. The habitat design and/or the extent of the construction works shall be adjusted according to the latest boundary of the egretries and night roosts as confirmed in the pre-construction survey.

6.3.5.3 Given that Lin Barn Tsuen night roost and Mai Po San Tsuen Cormorant Roost are currently located at the proposed open water *gei wai*, the trees used will be retained as far as possible. If that is not feasible, reprovision of suitable roosting substratum at adjacent EEF ponds prior to felling of existing trees will be undertaken, as suggested in **Section 6.3.4.3**.

6.3.5.4 All four roosting sites mentioned in **Section 6.3.5.2** will be potentially affected by disturbance from proposed enhancement works. Thus, noisy construction works and restoration works including desilting work at *gei wai* habitats and reprofiling of ponds within 100m of the night roosts, are recommended to cease at 1630 hours and shall commence after 0900 hours on all days during the period when the roost is in use to minimise disturbance to existing night roosts. Should any egretry be identified within the enhancement works area, construction works within 100m of the egretry shall be conducted outside of ardeid's breeding season (March to August).

6.3.5.5 Recent research on the distribution of Eurasian otters in Hong Kong suggests that the abandoned pond immediately northeast of MPNR (densely covered with mangroves and terrestrial vegetation) and ponds sandwiched between Fairview Park and Palm Springs (with mangroves, reeds, open water) are important habitats for the Deep Bay otter population (McMillan *et al.*, 2023). To minimise potential impacts on otters in the aforementioned areas, a targeted survey of otters and otter holt shall be carried prior to any works in these areas. Only essential works (e.g. bund strengthening, deepening side channel, installation of electric sluice gates, exotic vegetation clearance) shall be carried out in these areas, and the location / scale of the works will be adjusted based on the result of the survey.

6.3.5.6 A method statement should be prepared and submitted for construction and establishment of the SPS WCP by the contractor for approval with relevant authorities (including EPD and AFCD) prior to commencement of work on the works area, works method, logistic arrangements, estimated duration and implementation programme.

6.3.6 Environmental Protection and Pollution Control Measures during Construction

Air Quality

6.3.6.1 Dust suppression measures stipulated in *Air Pollution Control (Construction Dust) Regulation* and good site practices should be carried out to further minimise construction dust impact. Guidelines stipulated in EPD's Recommended Pollution Control Clauses for Construction Contracts should also be incorporated in the contract document to abate dust impacts.

6.3.6.2 In order to help reduce carbon emission and pollution, timely application of temporary electricity and water supply would be made and electric vehicles would be adopted in accordance with DEVB TC(W) No. 13/2020 – Timely Application of Temporary Electricity and Water Supply for Public Works Contracts and Wider Use of Electric Vehicles in Public Works Contracts in the Project.

6.3.6.3 To minimise the exhaust emission from NRMMs during the construction phase, construction plant and equipment should be connected to main electricity supply and avoid use of diesel generators and diesel-powered equipment. Exempted NRMMs should also be avoided and electrified NRMMS should be deployed as far as practicable.

Noise

6.3.6.4 Noise control requirements stipulated in *Recommended Pollution Control Clauses for Construction Contracts,* Contract Specifications for Imposition of Construction Noise Management Plan in Annex C of the PN 1/24*,* as well as the below mitigation measures should

be implemented in all work sites to ensure compliance of relevant noise criteria under the NCO and the PN 1/24. Construction noise management plan (CNMP), covering the detailed construction noise impact assessment (including construction works programme and construction methodology, PME list for the construction works, quantitative construction noise impact assessment; and list of noise mitigation measures to be adopted), implementation schedule of the recommended mitigation measures and any considerations / constraints that would hinder the use of these quieter construction methods and equipment, should be prepared by the Contractor before the commencement of construction works. An updated CNMP(s), if any, should be prepared by the Contractor to address any subsequent changes that would affect the effectiveness of the noise mitigation measures.

6.3.6.5 The recommend noise mitigation measures and the preparation and implementation of CNMP would be included in the contract document with reference to the *Sample Contract Specification for Noise Mitigation Measures* and *Sample Contract Specifications for Imposition of Construction Noise Management Plan* in *Annex B* and *Annex C* of the *PN 1/24*. With the implementation of recommended good site practices, noise mitigation measures, including use of QPME / quieter construction methods, use of movable noise barrier / enclosure / acoustic mat / purpose-built barrier and good site practices such as locating mobile plant as far away from NSRs as practicable, site hoarding with higher surface density and height, and noise control requirements stipulated in Recommended Pollution Control Clauses for Construction Contracts, no adverse construction noise impact would be anticipated.

Water Quality

6.3.6.6 During wetland enhancement works, ponds undergoing modification will be hydraulically isolated from surrounding ponds and dewatered to establish a dry or confined working area and prevent the spread of suspended solids. As a precautionary measure and to minimise potential water quality impacts, direct discharge of pond water into adjacent watercourses will be minimised or avoided as far as practicable. Pond water shall be pumped to adjacent ponds for temporary storage, or diverted to on-site sedimentation / treatment facilities prior to discharge to adjacent watercourses or return to the reprofiled pond upon completion of the reprofiling works.

6.3.6.7 The site practices as outlined in the ProPECC PN 2/24 “Construction Site Drainage” and the ETWB TC (Works) No. 5/2005 “*Protection of natural streams / rivers from adverse impacts arising from construction works*” are recommended to minimise the potential water quality impacts from the construction activities. Proper site management and good site practices are also recommended to ensure that construction waste and other construction-related materials would not enter the nearby watercourses. Sewage effluent arising from the construction workforce would be handled through provision of portable chemical toilets. A WPCO license should be obtained by the contractor for any construction site discharge, and monitoring of the discharge should be carried out in accordance with the WPCO license conditions. Regular weekly site inspection will be implemented for the construction works to ensure that the recommended mitigation measures are properly implemented.

Waste management

6.3.6.8 An Environmental Management Plan and trip-ticket system are recommended for monitoring management of waste. The Waste Management Plan will be submitted as part of EMP to Engineer for approval in accordance with ETWB TC(W) No. 19/2005. Specific measures targeting the mitigation of impacts in works areas and the transportation of waste off-site should be provided to minimise the potential impacts to the surrounding environment. Good site practices should also be included as part of the contract requirements to be addressed during the detailed design stage by the Contractor.

6.3.6.9 Careful design, planning together with good site management can reduce over-ordering and generation of C&D materials such as concrete, mortar and cement grouts. Formwork should be designed to minimise the use of standard wooden panels, so that high reuse levels can be achieved. Alternatives such as steel formwork or plastic facing to increase the potential for reuse and on-site reuse of yard waste as formworks should be considered.

6.3.6.10 The inert C&D materials with suitable characteristics / size should be reused on-site as fill or recycled as aggregate for other projects as far as practicable. When disposing C&D material at a public filling reception facility for beneficial reuse, the material should only consist of soil,

rock, concrete, brick, cement plaster / mortar, inert building debris, aggregates and asphalt. The material should be free from household refuse, plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be unsuitable by the Filling Supervisor.

6.3.6.11 Prior to disposal of non-inert C&D materials, wood and other yard waste, steel and other metals should also be separated for reuse and / or recycling where practicable so as to minimise the quantity of waste to be disposed of at landfill.

6.3.6.12 Where yard waste generation is unavoidable, sorting of yard waste for recycling and reuse on-site should be prioritised. Yard waste shall be separated from other non-inert C&D materials and various types of yard waste / shred wood should be segregated to facilitate reuse and recycling. Considerations should be given to on-site recycle and reuse of yard waste for a variety of purposes (e.g. decomposition and composting, recreational / decorative uses for site office or community uses, and mulching in planting areas, etc.). Offsite recycling options (e.g. delivery to yard waste recycling facilities such as Yard Waste Recycling Centre Y·PARK) should be explored for yard waste that cannot be reused on-site to minimise the quantity of yard waste to be disposed of at landfill. Where appropriate, the Contractor should be responsible to cut and shred the yard waste in order to meet the collection requirement of the recycling outlet for processing. Disposal of yard waste directly at landfills should only be regarded as the last resort, when no alternatives are available.

6.3.6.13 Suitable areas should be designated within the Project for sorting and providing temporary stockpiling of C&D materials. Within stockpile areas, the following measures should be taken to control potential environmental impacts or nuisance:

- Surface of stockpiled soil should be regularly wetted with water especially during dry season;
- Disturbance of stockpile soil should be minimised;
- Stockpiled soil should be properly covered with tarpaulin especially during heavy storms are predicted; and
- Stockpiling areas should be enclosed where space is available.

6.3.6.14 In order to monitor the delivery of C&D materials at the designated public fill reception facility and landfill and to control fly-tipping, a trip-ticket system should be included. A recording system for the amount of waste generated, recycled and disposed, including the disposal sites, should also be set up. Warning signs should be put up to remind the designated disposal sites. CCTV should also be installed at the vehicular entrance and exit of the construction site to monitor handling of C&D materials disposal. To prohibit illegal dumping and landfilling of C&D materials, as well as proper delivery to concurrent project sites for re-use, the dump trucks engaged on site should be equipped with GPS or equivalent automatic system for real time tracking and monitoring of their travel routings, parking locations and disposal activities.

6.3.6.15 If chemical waste is produced at the construction site, the Contractor will be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Waste*. Chemical waste should be stored in appropriate containers and collected by a licensed chemical waste contractor. Chemical waste (e.g. spent lubricant oil) should be recycled at an appropriate facility as far as possible, while chemical waste that cannot be recycled should be disposed of at either the CWTC, or another licensed facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

6.3.6.16 General refuse should be stored in enclosed bins or compaction units separate from C&D materials and chemical wastes. A reputable waste collector should be employed by the Contractor to remove general refuse from the construction site, separately from C&D materials and chemical wastes, on a daily basis to minimise odour, pest and litter impacts. The collected general refuse would be disposed of at designated landfill. Clearly labelled recycling bins should be provided on site in order to encourage segregation and recycling of aluminium and plastic wastes, and wastepaper in order to reduce general refuse production.

6.3.6.17 The Contractor should carry out an education programme for workers in avoiding, reducing, reusing and recycling of materials generation. Posters and leaflets advising on the use of the

bins should also be provided onsite as reminders. The recyclable waste materials should then be collected by reliable waste recycling agents on a regular basis.

Construction-phase Environmental Monitoring and Audit

6.3.6.18 During the construction of the enhanced wetland habitats and associated supporting infrastructure and ancillary works, regular weekly site inspection and audits will be undertaken to ensure proper implementation of the above-mentioned environmental protection and pollution control measures. The Contractor will also be required to conduct necessary environmental monitoring works (e.g. construction dust, noise and site discharge) to check compliance with the relevant environmental legislation, standards and guidelines.

6.4 Habitat Management

6.4.1 Specific Management for Ecologically Enhanced Fishponds

6.4.1.1 Habitat management for the EEF would largely include vegetation and desilting management, management of water regime and water quality, as well as pond conditioning and fish stocking in some of the EEF ponds. As mentioned in **Section 6.1.1.4**, all sub-habitats within the EEF area, including *gei wai* (Open Water and Vegetated), traditional fishponds, low intensity management area and Demonstration Zone will be subjected to similar habitat management measures and drain-down regime, therefore the increase in ecological function by up to 45% or more is anticipated across the entire EEF. Details of the habitat management measures are detailed in sections below.

Gei wai (Open water and Vegetated)

Vegetation and Desilting Management

6.4.1.2 Maintaining healthy stands of mangrove in the vegetated *gei wai*, and preventing establishment of wetland vegetation in the open *gei wai*, will be crucial to operation and retaining the ecological value of these habitats. In particular, regular monitoring and management (e.g., removal of *Sonneratia* spp. and *Mikania*) is required.

6.4.1.3 Because of the deposition of sediments from tidal waters, desilting of the *gei wai* will be necessary to prevent gradual filling of the habitats. This shall ensure open water and mudflats are available during drain-down for water birds and to maintain productivity. Based on the experience from MPNR, each *gei wai* will need to be desilted approximately every seven years, where desilting shall be carried out by backhoe digger and the sediments shall be put on the bund.

Water Regime

6.4.1.4 The *gei wai* water level will be controlled by electric sluice gates with smart sensor, following the tidal cycle and adjust according to operational needs. Indicative locations of the smart gates are shown in **Figure 6.1**. Water exchange and/or shrimp harvest (which is restricted to April – June and August – November) will be carried out when tidal difference is more than 2m. There may be as many as 10 – 16 draining cycles (around new moon and full moon) per month, which will provide suitable foraging habitat for piscivorous birds in these seasons. In anticipation of storm surge or heavy rainfalls, water inside the *gei wai* will be discharged by opening the sluice gate during the preceding low tide so as to increase the storm water storage capacity. When water level in the water channel connecting the Shenzhen River is detected to rise significantly above that inside the *gei wai* by the sensors, the sluice gate will be opened to absorb the storm water.

6.4.1.5 Villagers had long utilised the Deep Bay, a productive estuary, to harvest and/or to raise a wide diversity of fisheries products. By opening the gates of *gei wai* during high tide, nutrients, shrimp larvae and fish fry will be flushed into the *gei wai*. As such, no stocking is required in *gei wai,* and the operation of draining and filling shall largely follow the tidal cycle (Cheung *et al*., 1984; Leung, 1991). Full drain-down of *gei wai* shall be carried out during peak migrating season (i.e. December to February next year) to enhance migratory birds feeding opportunities. Specific drain-down groups and schedule are provided in **Figure 6.3** and **Appendix H** respectively. Clearing of large and predatory fishes during full drain-down shall be carried out to reduce predatory pressure on shrimps in the next season, which would also mean more food will be available for piscivorous avifauna in coming years (WWF-HK, 2024).

Overall, the water flow within the *gei wai* habitats will be maintained by water control structures and the natural tidal exchange.

Water Quality

6.4.1.6 Water quality in Deep Bay has improved in recent years (EPD, 2024a). Upon establishment of the *gei wai*, water quality parameters including temperature, *E. coli*, salinity, pH, dissolved oxygen, chlorophyll-a, nitrates and phosphates shall be monitored at multiple sampling locations in each of the *gei wai* as long-term monitoring. Should there be a sudden drop in water quality, no shrimp harvest shall be carried out and further investigation will be conducted. The *gei wai* shall still be operated as a tidal habitat purely for biodiversity conservation.

Traditional Fishponds / Low Intensity Management Area

Vegetation and Desilting Management

6.4.1.7 Regular vegetation management including grass cutting and weeding shall be undertaken to maintain optimal ecological performance at the SPS WCP. Monthly vegetation management will be required at EEF pond bunds to control vegetation height (i.e. less than 10 cm in height for open pond bunds) and control / remove exotic species such as *Mikania micrantha.* Vegetation clearance will be carried out manually. Longer grass should be retained as part of the pond bunds (about 15 – 20%) to provide refugia for small birds and herpetofauna. Following detailed habitat design, aquatic and emergent plants can be maintained along pond bunds and permanent vegetated islands to provide vegetation cover for birds and insects during the wet season. The cut grass can be used to feed the grass carp (*Ctenopharyngodon idella*) in the EEF.

6.4.1.8 The earthen bunds of EEF ponds can be weakened by rainstorms and wind-swept waves. Organic matter from fish waste / feed also accumulates in the pond mud. Hence it is usual practice to sunbake the fishpond mud after the pond is drained for harvesting so that the accumulated organic matter can be oxidised. Every one to two years, the pond is also deepened, where necessary, utilising the bulldozed mud to strengthen the bund.

Water Regime

6.4.1.9 In general, the main source of water for fishponds at the SPS WCP will be rainwater during the wet season. The water regime at EEF fishponds will be controlled through two systems: adjustable weirs and portable submersible electric water pumps. These fishponds will have a water depth of maximum 2 – 2.5m. Excess rainwater will overflow by gravity to the closest water channels through the adjustable weirs. Regular checking and maintenance of the adjustable weirs should be carried out. Indicative location of the adjustable weirs and the direction of water overflow by gravity are shown in **Figure 6.1**. SMART aquaculture technologies such as monitoring and control systems will also be adopted in these fishponds to balance between fisheries productivity and ecological functions.

6.4.1.10 Drain-down and fish harvesting in the EEF aquaculture ponds will be organised by clusters of ponds, with ponds in each cluster drained sequentially during the colder months from November to March. Water from the first pond to be drained shall be transfer between adjacent ponds using submersible pumps and hose at the start of the dry season. The subsequent drain-down of other ponds in the cluster will also be by submersible electric water pumps and hose to transfer water to adjacent ponds, to conserve freshwater.

6.4.1.11 The management of EEF shall ensure that 20% of the ponds are drained each month during main waterbird wintering period from November to March. Wintering waterbirds reach peak numbers between December and February (Anon, 2022a, 2023; Carey *et al.*, 2001). To facilitate drain-down, EEF within the SPS WCP have been divided into eight clusters (i.e. 1a, 1b, 1c, 1d, 2, 3, 4, 5 (*gei wai*) and 6 as shown in **Figure 6.3**) with reference to development phasing of the SPS WCP. 20% of ponds in each cluster will be drained each month to maximise the availability of feeding opportunities across the SPS WCP. Cluster 1a – c is created for drain-down in Phase 1, with arrangement of Cluster 1a – b being unchanged and Cluster 1c being incorporated to Cluster 4 under full operation of the SPS WCP. Ponds within the Eco-friendly Aquaculture Demonstration Zone will also be drained with details provided in **Section 6.4.1.20**. Detailed drain-down pond clusters and drain-down schedule are shown in **Figure 6.3** and **Appendix H** respectively.

Water Quality

6.4.1.12 Water quality in Deep Bay has improved in recent years (EPD, 2024a). Upon establishment of the EEF, water quality such as pH, dissolved oxygen, ammonia, nitrogen and suspended solids shall be monitored at representative ponds to ensure suitability for fisheries production and ecological functions. In case of significant unresolvable poor water quality issues at particular ponds (e.g. algal bloom), pond water should be pumped to portable water tanks and transported to the nearest wastewater treatment plant for processing before releasing into the environment. Water in the emptied pond should be replenished from adjacent ponds or water channels.

Pond Conditioning

6.4.1.13 The alluvial soils in the SPS WCP are generally impermeable clays suitable for wetland creation. However, when the pond mud is exposed to air for an extended period during sunbaking, oxidation will result in acidification, which will lower the water pH, affecting fish production and wildlife. This issue can be addressed by liming, with lime added during routine sunbaking and pond bund strengthening / repair when necessary. In case of pond water pH dropping below 5, lime shall be added to neutralise the water (AFCD, 2009). All EEF ponds are anticipated to adopt this treatment.

Trash-fish Stocking

6.4.1.14 Trash-fish stocking would be carried out at EEF ponds located to the immediate north of the Gateway to the Wetlands, and potentially other feasible locations (as required) at the EEF for more intensive habitat enhancement works if compensation targets are not being met. No artificial food will be used during trash fish stocking events. The frequency and scheduling of stocking can be coordinated with activities in the Gateway to the Wetlands to serve as an attraction, as well as to boost the overall ecological capacity.

6.4.1.15 Trash-fish species such as white carp (*Cirrhinus cirrhosus*), mud carp (*Cirrhinus molitorella*) and tilapia are proposed as they can be easily obtained and locally farmed. Highly invasive fish species such as catfish, snakehead and climbing perch shall be avoided. The suitable size of trash fish should have a mean length of 10cm or less and based on a standard length of a sample 50 fish per consignment, of which 95% should be smaller than 15cm. The stocking density should be 1000kg/ha (MTRCL, 2014) and the amount of trash-fish to be stocked will be based on the size of the aquaculture pond located to the immediate north of the Gateway to the Wetlands. The stocking would commence in the early morning, with water temperatures measured before stocking to prevent death of trash fish from sudden change in temperature or low temperature (i.e. <10°C) (FAO, 2006; WWF-HK, 2006). Close monitoring to the consumption of fish stocks and water quality shall be undertaken and adjusted for adaptive management.

6.4.1.16 The water regime of the trash-fish stocking pond shall be managed according to preference of targeted avifauna species, such as great cormorant, grey heron and great egret, which are expected to occur at earlier stages of the drain-down and stocking event, where the water level is generally higher (e.g., 0.5-1.5m water depth for great cormorant) (AEC, 2019). While other target species, for instance, black-faced spoonbills or shorter legged avifauna (e.g. little egret) will be attracted to the drained ponds with lower water level at later stages (AEC, 2019).

Eco-friendly Aquaculture Demonstration Zone

Vegetation and Desilting Management

6.4.1.17 General vegetation management of the ponds in the Demonstration Zone shall largely follow that of the other EEF (**Sections 6.4.1.7** and **6.4.1.8** refer). In particular, the ecological purification ponds of the 3P2D System will be planted with wetland vegetation to provide water purification functions (**Section 6.2.2.14** refers). Monthly vegetation management at the ecological purification ponds is therefore needed, while replacement of dead or injured wetland plants carried out in spring to maintain effective water purification and ecological function.

Water Regime

6.4.1.18 Water source for the eco-friendly aquaculture systems, including container eco-culture systems and pond eco-captive systems, would use natural sources of water, e.g. rainwater,

water from water wells where feasible etc. Potable water will be available to supply the eco-friendly aquaculture system for emergency or contingency purposes (e.g. natural disasters or disease outbreak). Similar to the EEF ponds, general water regime in the pond eco-captive culture ponds will also be controlled through two systems using adjustable weirs and submersible electric water pumps (**Section 6.4.1.9** refers). In addition, solid-liquid separation tower with biological treatment tanks system will be installed to treat the tailwater generated from the enclosed cultivation barrels in ponds.

6.4.1.19 As mentioned in **Section 6.2.2.14**, ponds for the container eco-culture will provide ecological tailwater treatment function as the 3P2D System. Tailwater from the container eco-culture system will be routed through the 3P2D System and be treated in the sequence of sedimentation ponds, aeration ponds, and ecological purification ponds, then recirculated back to the containers. The three types of treatment ponds are interconnected by filter dams made up of permeable materials such as gravel, sand and activated carbon.

6.4.1.20 Both the pond-eco-captive culture ponds and the 3P2D System ponds of the container eco-culture system will be drained along with the other EEF ponds during dry season to maximise avifauna feeding opportunities (**Sections 6.4.1.10** and **6.4.1.11** refer). Drain-down arrangement of these ponds will be similar to the traditional fishponds, carried out by submersible electric water pumps. For pond-eco-captive culture, pond area without the barrels will be gradually drained to reveal pond bottom, while pond area with the barrels installed will retain sufficient water in the deeper profile to ensure the barrels will float during drain-down. Drain-down of the 3P2D System ponds will be carried out in rotation, with only one of the two 3P2D System drained at any one time throughout dry season. During drain-down of the 3P2D System, no tailwater treatment can be carried out. The drain-down period for both the pond eco-captive culture ponds and 3P2D System ponds shall therefore coordinate with fish harvesting, and carried out upon fish harvested or when the containers and/or ponds are under maintenance. Maintenance for the 3P2D System ponds, shall also be carried out where necessary, including removal of sediments prior to replenishment of water as necessary.

Water Quality

6.4.1.21 General water quality management in the Demonstration Zone shall largely follow that of the other EEF (**Section 6.4.1.12** refers).

6.4.2 Specific Management for Enhanced Freshwater Wetland

Freshwater Marshes, Lily Pond, Reedbed / Swamp Forest

Vegetation and Desilting Management

6.4.2.1 Vegetation control will be needed to maintain a heterogenous habitat as the more robust plants will grow prolifically and may cover the smaller aquatic plants and invade into shallow open water. Different height of vegetation will be maintained, depending on the type of habitat created, through vegetation clearance works manually and mechanically according to the habitat design, creating a variety range of microhabitats.

6.4.2.2 To prevent spreading of reeds to other areas, confinement into specific planting areas by a trench of over 3m wide and 1m deep is needed at the reedbed habitat. No particular vegetation management of Chinese swamp cypress is required at swamp forest. Removal for invasive plant species such as water hyacinth (*Eichhornia crassipes*) and *Typha angustifolia* will be carried out regularly if necessary.

6.4.2.3 While it is expected that a variety of grasses, sedges and rushes will colonise the newly created EFW habitats quickly, selected aquatic plants (see **Appendix G** for suitable species) shall be planted during the wet season from April to October (depending on their availability) to increase plant diversity, structure and micro-habitat. Plants in soil / mud shall be quarantined if possible or carefully checked for Invasive Alien Species (IAS) such as apple snail (*Pomacea canaliculata*) and red imported fire ant (*Solenopsis invicta*). Only plants without IAS shall be used. Other species will be planted using corms / tubers / seeds.

Soil Management

6.4.2.4 The pond substrate within the SPS area consisted of clay and soil, which could retain sufficient water, and no additional lining is required to seal the ponds. If major seepage is identified

during the construction or operation phase, remodelling of the pond bottom with clay layer should be undertaken as necessary.

Water Regime

6.4.2.5 Water levels in the EFW freshwater marsh, lily pond and reedbed/swamp forest will increase naturally during the wet season and drop gradually through the dry season. The desired water levels will be maintained through habitat design and water control structures (i.e. adjustable weir connecting nearest water channel), which will ensure sufficient water is stored to prevent dry up of wetlands and succession of terrestrial vegetation. In the freshwater wetlands, open water, and permanent marshes will be inundated all year, and seasonal marsh will dry up naturally during the dry season. The lily pond and reedbeds would be inundated throughout the year, while the swamp forest will dry up through the dry season.

Water Quality

6.4.2.6 The water quality of the freshwater marshes, lily pond and reedbed will be affected by the upstream (i.e. STT) and the downstream (i.e. Shenzhen River) during high tide and flooding event. Close monitoring at representative locations and liaison with relevant government department to maintain acceptable water quality are required. Removal of litter and other debris shall be carried out after flooding or rainstorm event, if necessary.

Existing and Widened Water Channels

Vegetation and Desilting Management

6.4.2.7 Some riparian vegetation planting will be provisioned along the bank of the widened water channels. No active management is anticipated for the widened water channels apart from clearing of invasive alien plants (such as *Sonneratia*, *Mikania*, *Bracharia* etc.) and bund maintenance. Desilting of normal and widened water channel types shall be carried out if sediment accumulation results in encroachment of mudflat habitats by mangrove / other vegetation.

Water Regime

6.4.2.8 The water channels mainly receive influx of water from upstream (i.e. STT) and downstream (i.e. Shenzhen River), as well as from overflow discharge from adjacent ponds. Whereas the water will be controlled by tidal fluctuations and availability of water from upstream. Existing opening connection with Shenzhen River will be kept to ensure both normal and widened water channels could retain sufficient water according to historical records and proposed habitat modification, and support waterbirds and other wetland species.

Water Quality

6.4.2.9 Water quality in Deep Bay has largely improved (EPD, 2024a). Yet, it is anticipated that water quality parameters such as dissolved oxygen, pH, suspended solids will be affected by multiple sources, including the upstream (i.e. STT) and the downstream (i.e. Shenzhen River) during high tide and flooding event. Close monitoring at representative locations and liaison with relevant government department to maintain acceptable water quality whenever feasible are required. Removal of large debris (e.g. tyres) shall be carried out after flooding or rainstorm event, if necessary.

6.4.3 Specific Management for Existing Egretries and Night Roosts

6.4.3.1 With reference to **Section 3.6**, there are three existing active night roosts and an abandoned egretry located within the SPS WCP boundary. Potential management strategies for night roosts and any active egretries identified within the SPS WCP could include clearing of climbers after the active season of the site. The night roosts shall be checked in August / September to assess the condition of the trees and vegetation management (e.g. clearance of climbers affecting night roosts) shall be completed before October. Other appropriate measures such as pest control shall be provided if the trees are found in poor condition.

6.4.3.2 Given that egretries and ardeid roosting sites in Hong Kong are relatively mobile, in which some sites might be abandoned or shift to nearby areas after some years while new ones were established at new locations (Lee *et al.*, 2007; So and Yuen, 2020), it is expected that there can be changes in the existing egretries and/or roost sites in and/or near SPS WCP. If

new egretries and/or roost sites are formed within SPS WCP or nearby, similar management measures shall also be adopted.

6.4.4 Other Management

Undesired Animal Management

6.4.4.1 There are many free-roaming village dogs in the SPS area and have been known to have direct adverse impacts on other wildlife (e.g., disturbance and killing of wildlife), including killing of Eurasian otter (KCRC, 2017, KFBG, 2018). There is a high chance of these domesticated dogs being left behind upon the relocation of the villagers. Therefore, an outreach programme of dog neutering, microchipping should be planned and carried out prior to villagers being relocated. A re-homing programme for dogs currently living in the SPS WCP should also be planned and launched before the relocation of villagers.

6.4.4.2 During the construction phase, a strict ban on keeping and/or feeding dogs within construction sites should be implemented. During construction and operation phase, all sightings (including camera traps records) and locations of feral dogs on site shall be logged. Implementation of a trapping programme using baited dog traps may be adopted if dog populations become established within the SPS WCP, to reduce potential disturbance and mortality impacts to wildlife. The traps should be checked on a daily basis when baited and set over a deployment period (e.g., one week). Details and arrangements subjected to liaison with relevant government departments (e.g., AFCD).

Pest Management

6.4.4.3 Red imported fire ant (*Solenopsis invicta*) occurs in the Deep Bay area and is often imported along with plants, which have adverse impacts on wildlife, vegetation and people, including predation of ground-nesting birds and herpetofauna (KCRC, 2006). Regular routine check of red imported fire ant nests shall be undertaken from start of the dry season. If nests are located, appropriate treatment (e.g., bait, pesticide or hot water) should be used to destroy the nest. Chemical treatments should only be applied in dry spells with no rainfall. Fine mesh (with mesh size of approximately 1 – 2 mm) may be laid over treated nests to prevent accidental ingestion by birds and small mammals.

6.4.4.4 Apple snails (*Pomacea canaliculata*) are already present in SPS WCP, and can cause significant damage to soft aquatic plants. If unregulated, they can kill off the floating or floating-leaf plants such as water lilies and *Trapa.* Therefore, the snail-eating specialist black carp (*Mylopharyngodon piceus*) shall be stocked in the lily pond and seasonal flooded wetlands in the EFW and low-intensity aquaculture ponds in the EEF where these plants will be grown. If significant infestations of apple snail occur, these can be removed manually.

6.4.4.5 *Dimorphopterus spinolae* is known to cause massive dieback of reedbeds (AFCD, 2008). The bug mainly attacks on new shoots of reed, and are most active at or below 25°C and inactive above 34°C or in severe weather. Monthly close monitoring for the presence of this species shall be carried out from May to September (KCRC, 2019) and remove as appropriate if infestation identified.

6.5 Visitor Management

6.5.1.1 Controlling visitor access and activities in different parts of the SPS WCP is crucial in achieving the goals and objectives of different habitats. The SPS WCP is divided into three different but complementary visitor management zones according to the disturbance sensitivity. Visitor movement within the SPS WCP has been carefully planned to concentrate activities primarily along boardwalk / wooden trails and designated areas. Sensitive ecological zones, such as fishponds and gei wai, are designated as low-disturbance areas, with access restrictions that can be adjusted seasonally. A variety of soft and/or physical measures, including signpost, boardwalk design at the fringe, screen planting, ditches and water-filled channels, will be in place to control visitor access at different levels for each zone to reduce disturbance from human activities. Details for visitor management as well as corresponding monitoring measures in different visitor management zones are detailed as follows in **Table 6.2**.

Table 6.3 Visitor Management Zoning of the SPS WCP

Zone	Area (ha)	Location / Extent	Visitor Management Focus / Details	Monitoring
Zone 1	219.4 (EEF: 169.8; EFW: 18.5)	• Existing managed ponds in the compensation / mitigated areas (i.e. Offsite Wetland Compensation Areas (OWCAs) of The Loop (Area 7 and 9) and the LMC PTI Compensatory Pond) • EEF Low Intensity Management Area and the EEF ponds connecting to the existing compensation / mitigated areas • EEF ponds along the Shenzhen River that will be managed as *gei wai* • Most of the EEF / EFW habitats to the south of the Tam Kon Chau Road	Focus • EEF / EFW area under this zone will focus on ecological conservation by providing designated habitats for target species and supporting sustainable, eco-friendly aquaculture management, with fisheries production as a secondary objective operating at a lower density to not conflict with biodiversity conservation with the utilisation of eco-friendly aquaculture systems. Management Details • Visitor access in Zone 1 will be controlled with soft and/or physical measures (i.e. signpost, boardwalk design at the fringe, screen planting, ditches and water-filled channels) to direct visitors to other zonings, thus reducing the disturbance impacts of visitor density. • Only essential visitor facilities, such as footpaths / boardwalks, bird-watching hides will be strategically provided along the edge of Zone 1 EEF area. • In-depth, small group guided visits and experiential programme such as *gei wai* harvest at night shall be organised in the outskirts of Zone 1. • Technology such as real-time, high-definition CCTV, portable video cameras and audio units will be used to take real-time videos of this zone, which can be shown to visitors in the Gateway to the Wetlands. • Considering adjacent existing mitigation wetlands are managed by different parties in accordance with different Environment Permit(s), liaison with relevant parties would be needed in the detailed design and construction stage (**Section 8.2.4.2** refers) to coordinate treatment of fencing, drain-down schedule and other management issues upon the establishment of the SPS WCP.	Monitoring • Monitoring of EEF / EFW area under this zone shall focus on the effectiveness of wetlands design and management actions in (1) enhancing the target species and taxon groups, and (2) creating the environmental capacity. • Should high disturbance pressure be observed within the zone due to visitors, management actions will be reviewed to ensure the primary objective can be achieved.
Zone 2	85.5 (EEF: 83.2; EFW: 1.9)	• EEF Eco-friendly Aquaculture Demonstration Zone • Remaining EEF area that are not part of Zone 1	Focus • This multifunctional zone is intended to integrate ecological conservation, public education and demonstration of modern outdoor aquaculture facilities, including both pond fish culture and educational fish farming experience. Management Details • Visitor access in Zone 2 will be regulated through infrastructure design (e.g. boardwalk) and soft measures (e.g. signposts and screens) to ensure accessibility and while minimising ecological disturbance. • Outdoor eco-education facilities, such as outdoor classroom, boardwalk and pavilion will be provided within Zone 2. • Majority of the guided visits, school tours and eco-education programme, as well as other activities such as volunteers work and experiential programme to explore the more sensitive areas or during sensitive time (such as night-time) shall be organised within Zone 2 to enrich the visitor experience, and can be catered for larger groups compared to those in Zone 1.	Monitoring • Monitoring in this shall focus on assessing the effectiveness of wetlands design and management actions in (1) enhancing the target species and taxon groups, and (2) creating the environmental capacity. • If the target species and taxon groups are found to be affected by the visitor activities / number, soft measures shall be adopted to ensure the biodiversity carrying capacity is not compromised by the eco-education component. • By adopting adaptive management in regulating the visitor number and/or activities, it can be ensured that the ecological targets will not be compromised.
Zone 3	42.1 (EFW: 14.9; FEA: 40.0)	• Gateway to the Wetlands • EFW to the north of the Gateway to the Wetlands	Focus • EFW area under this zone will focus on creation of a diverse freshwater habitats and providing designated habitats for target species that are less disturbance sensitive.	Monitoring • Monitoring at the EFW can assess the effectiveness of wetlands design and

Zone	Area (ha)	Location / Extent	Visitor Management Focus / Details	Monitoring
		• Entire FEA	• FEA will focus on supporting high yield, high density of aquaculture activities to enhance production efficiency. • A small exhibition area will serve ancillary function in the FEA to showcase traditional and modern aquaculture technologies. <u>Management Details</u> • Visitor shall be able to roam freely in different areas of Zone 3 using provided boardwalk / footpaths. • Appropriate visitor facilities such as boardwalk / footpaths, signs and displays / exhibits will be provided in the EFW and FEA. • Some facilities in the Zone may involve private management bodies to establish visitor control within the area. • A good mix of nectar / pollen plants, fruit-bearing plants, host plants and bat roosting plants (e.g. Chinese fan-palm (*Livistona chinensis*) and large bamboo (*Bambusa* spp.)) in landscaping, as well as erecting bird nest boxes, bat boxes and insect hotels shall be used at the Gateway to the Wetlands to attract diverse groups of wildlife throughout the season for visitors to see at close range. • The major visitor centre will be located in the Gateway to the Wetlands with displays, exhibits, live feeds of interesting areas / scenes in the Zone 1, public toilet and souvenir shop, as well as other visitor facilities include carpark, boardwalk / footpath, birdwatching hide, signs, deck, platform etc, which is intended to accommodate ecological education, aquaculture display and visitor engagement.	management actions in (1) enhancing the target species and taxon groups, and (2) creating the environmental capacity, while taking into account that the disturbance level within the EFW will be higher than Zone 1 and 2. • Monitoring in the Gateway to the Wetlands shall focus on visitor usage. In addition to the visitor number, visitor satisfaction shall also be captured so as to gauge the attractiveness of SPS WCP through time. Suggestions on facilities, activities and programme should also be gathered so as to provide insights for improvement. • Monitoring in the FEA shall focus on the effectiveness of area utilised for aquaculture activities (as an enhancement of fisheries resources), and water quality for fisheries resources enhancement.

Note:

Total area might not add up due to exclusion of existing road, DSD facilities and mitigation wetlands, as well as rounding.

7 ECOLOGICAL MONITORING, ADAPTIVE MANAGEMENT AND REPORTING REQUIREMENTS FOR THE ENHANCED WETLAND AT THE SPSWCP

7.1 Introduction

7.1.1.1 Ecological monitoring works for SPSWCP are required to ensure that the ecological impacts resulting from the STT Project are adequately mitigated for through the enhanced wetland. Additionally, the ecological monitoring works will also inform adaptive management of SPS WCP to ensure other key design objectives of the WCP are being met (**Section 2.1.2** refers). The ecological monitoring shall focus on the indicator and target species using standard methods so that the results can be compared with those of baseline and between different years. Details of the monitoring requirements (e.g., monitoring location, frequency, parameters) will be discussed in the following sections.

7.2 Monitoring Parameters

7.2.1.1 Monitoring shall focus on the target species outlined in **Section 4**. The monitoring approach will depend on the characteristics of each species occurring in the EEF / EFW: for secretive or rare species such as Eurasian otter and eagles, presence / absence and distribution data shall be collected. Aquatic fauna including aquatic invasive alien species will also be monitored to better reflect the overall habitat quality. Biodiversity indicators and its assessment methods are summarised in below **Table 7.1**.

Table 7.1 Biodiversity Indicators to Assess Habitat Value

Biodiversity Indicator	Unit Measured	Assessment Method
Habitat Diversity	Types and coverage of different habitats	Compared with baseline and HCMP
Fish Fauna	Species richness	Compared with baseline
Aquatic Invertebrates in channels	Species richness	Compared with baseline
Avifauna (excluding vagrant)	Species richness and abundance	Relative to those in Deep Bay and compared with baseline
Mammal	Species richness and relative abundance index (calculated from camera trap records)	Compared with baseline
Amphibian	Species richness and abundance	Compared with baseline
Dragonfly	Species richness and abundance	Compared with baseline
Aquatic Invasive Alien Species (Apple Snail, *Sonneratia* spp.)	Abundance and distribution	Compared with baseline

7.3 Pre-construction Baseline Monitoring

7.3.1.1 As mentioned in Section 10.13 of the EIA Report, ecological monitoring for the SPS WCP is required to ensure that the HCMP requirements are met, with particular focus on the target indicator waterbird species. A 12-month baseline ecological monitoring (December 2024 to November 2025) covering representative locations within the entire impacted and enhancement area have been undertaken in accordance with Section 9.3.2 of the EM&A Manual of the STT Project (AEIAR-261/2024) to collect up-to-date baseline data that can be used as a reference for subsequent monitoring work. Other available ongoing datasets on avifauna shall also be reviewed to reflect the broader regional trends. Details of the methodology of baseline monitoring are detailed as follows.

Habitats

7.3.1.2 Observations within the SPS WCP, including updates in habitat composition, pond status, weather condition, presence of aquaculture activities, and other notable activities such as construction or disturbance are recorded during the bird count survey of the baseline ecological monitoring.

Avifauna

7.3.1.3 Bird count surveys should be carried out twice a month during dry season and monthly during wet season in the early morning, covering all individual ponds/wetland habitats in the SPS WCP. The surveys should cover all wetland-associated birds, including fish-eating birds, ducks, grebes, shorebirds, gulls and terns, freshwater species such as bitterns, and wetland associated passerines, with a particular focus on the target species and supplementary focus species identified in **Section 4**.

7.3.1.4 Apart from bird count surveys, night-time line transect count surveys are also conducted monthly for nocturnal birds. The presence and abundance of all bird species seen or heard during the survey are recorded.

Mammals

7.3.1.5 Daytime and nighttime transect count surveys of mammals are conducted monthly. All direct sightings, tracks, and signs of mammal species (e.g., scats / spraints, footprints and feeding signs), particularly otter holts and dens are observed or actively searched along the survey transects and recorded. Bat detectors are used for bat identification.

7.3.1.6 Apart from transect count surveys, camera traps are used to record mammals, particularly Eurasian otter, considering mammals in Hong Kong are generally sensitive and often crepuscular / nocturnal. At least 40 camera traps are set up across the SPS WCP in locations with high potential of mammal occurrence, including important habitats for otters such as fishponds, reedbeds watercourses and open area.

Herpetofauna

7.3.1.7 Daytime and nighttime transect count surveys of herpetofauna are conducted monthly across both terrestrial and aquatic habitats. The presence and abundance of herpetofauna actively searched, or encountered visually or aurally through detection of mating calls, are recorded.

Butterflies and Odonates

7.3.1.8 Daytime transect count surveys of butterflies and odonates are conducted monthly. The presence and abundance of butterflies and odonates directly observed along the transect and associated with different habitats are recorded.

Firefly

7.3.1.9 Transect count surveys of firefly are conducted monthly, shortly after dusk. Surveys will be conducted by direct observation with help of binoculars, or active searching for flightless adults and larvae on ground, with any lighting devices switched off when possible or at sufficient intervals. The presence, abundance and habitat association of fireflies found are recorded.

Freshwater Communities

7.3.1.10 The presence and abundance of freshwater community species (e.g., fish, aquatic invertebrate) are recorded monthly through direct observation from bankside, active searching and kick-sampling at water channels. Direct observation from bankside is conducted at six sampling points which are watercourse with shallower, slow-moving water and minimal vegetation. 30-minute hand netting is also carried out at sampling points. Where condition allows, kick sampling is conducted twice at each sampling point for approximately 30 seconds each time to collect samples of fish and aquatic invertebrates.

7.3.1.11 Summary of baseline ecological monitoring survey methodologies are shown in **Table 7.2**.

Table 7.2 Baseline Ecological Monitoring Survey Methodologies

Fauna Group	Methodology	Frequency
Habitat / Vegetation	Line-transect, drone survey	Half-yearly
Avifauna	Bird Count Survey	Twice a month during dry season and monthly during wet season
	Transect Count Survey	Monthly
Mammals	Transect Count Survey	Monthly
	Camera Trapping	/
Herpetofauna	Transect Count Survey	Monthly
Butterflies and Odonates	Transect Count Survey	Monthly
Firefly	Transect Count Survey	Monthly
Freshwater Communities	Bankside Count, Kick Sampling, Netting	Monthly

7.3.1.12 Additional review of available literature and monitoring data across the entire Inner Deep Bay area will be conducted to understand broader changes in target species abundance that may result from external factors (i.e., changes to the habitats of migratory species outside Hong Kong, changes in regional population, climate change).

7.4 Operational Stage Monitoring Programme

7.4.1.1 An outline monitoring programme for enhanced habitats (both EEF and EFW habitats) within the SPS WCP during the operational stage is summarised in **Table 7.3.** Survey transects for ecological monitoring would largely follow that for the pre-construction ecological environmental monitoring and audit works for STT, as shown in **Figure 7.1**. The monitoring programme will be further reviewed and updated in the later versions of the HCMP.

Table 7.3 Outline Monitoring Programme

Parameter	Methodology	Frequency	Optimal Survey Time of the Day
Habitats and Vegetation cover (including alien invasive species)	Line-transect, drone survey	Half-yearly, to be conducted at representative month of wet and dry season	Daytime
Avifauna (including target species) abundance and distribution	Transect count (day and night)	Throughout the year; Twice a month during dry season and monthly during wet season	Early morning and dusk. Night-time for nocturnal species.
Mammals (except bats) (including target species) presence and distribution	Transect count (day and night); camera traps; otter spraint search	Throughout the year; Monthly	Daytime for diurnal species. Night-time for nocturnal species.
Bats presence and distribution	Transect count; Bat detectors	Throughout the year; Monthly	Dusk
Herpetofauna (including target species)	Transect count (day and night)	Monthly (from March to October)	Daytime for diurnal reptile species. Night-time for amphibian and nocturnal reptile species.
Fish communities	Direct observation; netting and during harvest	Monthly (from March to November) for netting	Daytime for diurnal species. Night-time for nocturnal species.
Butterflies	Transect count (day)	Monthly (from March to November)	Daytime.
Dragonfly (including target species) abundance and distribution	Transect count (day)	Monthly (from April to October)	Daytime.

Parameter	Methodology	Frequency	Optimal Survey Time of the Day
Aquatic Invertebrate communities (including invasive alien species)	Bankside count, kick sampling, netting	Monthly (from March to November)	Daytime.
Firefly	Transect count	Monthly (from March to October, with particular attention to peak activity of *P. maipo* in May and September)	Dusk and night-time
Water Quality	Smart sensors	Real-time	N/A
Water Level	Smart sensors	Real-time	N/A
Performance of specific habitat enhancement features (e.g., raptor perching pole, bird / vegetated island)	Visual inspection / deployment of camera traps	Real-time	N/A

7.4.1.2 In addition to the overall ecological monitoring, the ecological performance of ponds within the Demonstration Zone will also be monitored in phase 1. Bird carrying capacity within the Demonstration Zone shall be monitored and compared to representative areas of EEF. As mentioned in **Section 6.2.2.15**, should the ecological performance of the ponds within the Demonstration Zone be considered similar to those in the EEF traditional fishponds (i.e. have a similar environmental carrying capacity), EEF other than *gei wai* can be reconfigured to ponds that support eco-friendly aquaculture systems, with reference to ponds in the Demonstration Zone.

7.5 Adaptive Management

7.5.1.1 Adaptive management can be defined as a six-step cycle of assessing, designing, implementing, monitoring, evaluating and adjusting that allows managers to work iteratively toward improved understanding and management over time (Williams *et al.*, 2009). This approach is now often used in conservation planning and programme (e.g., IUCN, 2017).

7.5.1.2 The creation and management of a mixture of wetland habitats in SPS WCP to achieve the biodiversity conservation, aquaculture production and eco-education goals are unprecedented in Hong Kong. The wealth of knowledge from the experience of conserving and managing wetlands in MPNR, LMC EEA and HKWP has been drawn upon in formulating this HCMP. However, some elements such as restoring seasonal flooded wetlands and increasing the storm water carrying capacity of the *gei wai* and ponds are new. On top of that, changes in weather pattern caused by a changing climate add further uncertainties. Hence, it is important to adopt adaptive management to cope with the complex, uncertain and changing environments.

7.5.1.3 Management party of the SPS WCP shall regularly review the monitoring data, site situation and other important observations / incidence with the staff. Urgent or important matters shall be reported to the supervising Department (i.e., AFCD) and notified to the EC so that timely effective actions can be formulated and undertaken.

7.5.1.4 The monitoring data will be valuable in assessing not only the success of the SPS WCP in mitigating the negative impacts from the STT Project, but also to evaluate the effectiveness of different habitats and the management actions. The knowledge learnt will then be used to adjust and enhance the management interventions in SPS WCP.

7.6 Action / Limit Levels and Event / Action Plan

7.6.1.1 The results of the ecological monitoring shall be compared with the baseline data (**Section 7.3** refers). Action and limit levels with reference to the baseline ecological conditions are shown in **Table 7.4** and **Table 7.5**.

7.6.1.2 Action and limit levels and event action plan have been set for key target species as detailed under **Table 4.1**. The action and limit levels have made reference to local case studies, including the LMC EEA, Lut Chau Nature Reserve (LCNR) and the Nam Sang Wai Wetland Enhancement Area (NSW WEA) (Nam Sang Wai Development Co. Limited *et al.*, 2025) and

taken into account the natural variability in abundance of these species, including year to year variations from historical monitoring data. Should there be any changes in migratory pattern / abundance of key target species, action / limit levels and plans shall be further reviewed and updated accordingly.

7.6.1.3 The supplementary focus species detailed under **Table 4.2** will be monitored under the ecological survey to review their presence / absence within the SPS WCP.

Table 7.4 Action / Limit Level and Event Action Plan during Establishment Stage

	Action Level	Action	Limit Level	Action
Planting Stage				
Plant species				
Survival and health of plant species planted	< 50% survival of planted species after one year	Check water conditions and pests; replace dead material; carry out control measures against identified pests.	0% survival of any planted species	Record the findings; stop using the species in similar settings; and replace with other suitable species as required.
	> 20% fungal or disease infestation of any species after one year	Remove dead and infected material; identify disease.	> 50% fungal or disease infestation of any species	Record the findings; remove the infected material and stop using the species in similar settings; replace with other suitable species as required.

Table 7.5 Action / Limit Level and Event Action Plan during Operation Stage

	Action level	Action	Limit Level	Action
Habitat Creation Completion Stage				
Plant species				
Plant cover	<75% of intended plant cover in the seasonal and permanent marshes in EFW with reference to previous comparable season	• Notify AFCD; • Check water conditions, growth cycle, and pests; and • If due to pests carry out control measures as required.	<50% of intended plant cover in the seasonal and permanent marshes in EFW. with reference to previous comparable season.	• Notify AFCD; • Check water conditions, growth cycle, and pests; • If due to pests step up control measures; and • Consider replacement planting using other suitable species.
Cover of aquatic invasive plant species	Invasive species >20% of total cover in unplanned wetland habitats with reference to previous comparable season	• Physical removal.	Invasive species >40% of total cover in unplanned wetland habitats with reference to previous comparable season	• Discuss with AFCD and EC, consider re-profiling, stepped up physical removal or chemical measures.
Animal species				
Avifauna: Functional Value (i.e., abundance) of Indicator Species (Black-faced spoonbill, great egret, grey heron, greater cormorant) and other key target species (except Greater Spotted Eagle and Eastern Imperial Eagle)	Overall abundance of the species^ within the SPS WCP is less than the mean number of the reference data (i.e., abundance data collected by the ET covering both the impact and compensation areas) for two consecutive months	• Notify AFCD; • Review and confirm the accuracy of data; • Check other monitoring data sets (i.e., AFCD / HKBWS winter waterbird monitoring) to confirm consistency of data reporting under the monitoring programme; • Investigate potential external causes of trigger level exceedance (e.g., if there are declines in the overall population of the species across the entire Deep Bay); • Review management practices to determine if management follows HCMP (if no, rectify practices); and • Investigate and rectify potential internal causes of trigger level exceedance (e.g. pollution incidents).	Overall abundance of the species within the SPS WCP is less than the mean number of the reference data (i.e., abundance data collected by the ET covering both the impact and compensation areas) for four consecutive months	• Repeat Action Level actions; • Implement short-term management actions (e.g. prolonging drain-down in *gei wai* / more frequent drain-down at EEF / trash fish stocking) that will benefit species that have triggered limit level; • Consider reducing number of visitors to EEF and/or closing part of the EEF to public if visitor disturbance is identified as potential cause of limit level trigger; and • Review and update HCMP to further enhance value of SPS WCP for species that have triggered limit level.
Avifauna: Key Target Species with Non-numerical Targets (Greater Spotted Eagle, Eastern Imperial Eagle)[#]: occurrence	Post-project zero occurrence for two consecutive winter months	• Notify AFCD; • Review and confirm the accuracy of data; • Check other monitoring data sets (i.e., AFCD / HKBWS winter waterbird monitoring) to	Post-project zero occurrence for four consecutive winter months	• Repeat Action Level actions; • Implement short-term management actions (e.g. prolonging drain-down in *gei wai* / more frequent drain-down at EEF / trash fish stocking)

	Action level	Action	Limit Level	Action
Habitat Creation Completion Stage				
		confirm consistency of data reporting under the monitoring programme; • Investigate potential external causes of trigger level exceedance (e.g., if there are declines in the overall population of the species across the entire Deep Bay); • Review management practices to determine if management follows HCMP (if no, rectify practices); and • Investigate and rectify potential internal causes of trigger level exceedance (e.g. pollution incidents).		that will benefit species that have triggered limit level; • Consider reducing number of visitors to EEF and/or closing part of the EEF to public if visitor disturbance is identified as potential cause of limit level trigger; and • Review and update HCMP to further enhance value of SPS WCP for species that have triggered limit level.
Mammals: Rare Target Species (Eurasian Otter)	Post-project zero occurrence for four consecutive months	• Check and re-analyse data; • Investigate causes of not meeting the target level, e.g., reference to monitoring data from the entire Deep Bay to see if there is a decline in occurrence; • Review management practices particularly the dog control measures to determine if management follows HCMP (if no rectify practices); • Check monitoring data to see if there is a substantial population of feral dogs, if yes launch targeted control measures; and • Adding more camera traps and/or shifting camera traps to likely otter habitats.	Post-project zero occurrence for six consecutive months	• Check and re-analyse data; • Investigate causes of not meeting the target level, e.g., reference to monitoring data from the entire Deep Bay to see if there is a decline in occurrence; • Review management practices particularly the dog control measures to determine if management follows HCMP (if no rectify practices); • Check monitoring data to see if a substantial population of feral dogs remains, if yes strength targeted control measures; and • Adding more camera traps and/or shifting camera traps to likely otter habitats; and • Notify AFCD and consider other enhancement measures, like installing otter holts.
Amphibians: Target Species (Chinese Bullfrog) abundance	Post-project zero occurrence for three consecutive summer months	• Check and re-analyse data; • Investigate causes of not meeting the target level, if caused by on-site/off site impacts (e.g., presence of exotic predatory fish in breeding sites), rectify; • Review management practices to determine if management follows HCMP (if no rectify practices); and	Post-project zero occurrence for six consecutive summer months	• Check and re-analyse data; • Investigate causes of not meeting the target level, if caused by on-site/off-site impacts (e.g., presence of exotic predatory fish in breeding sites), rectify; • Review management practices to determine if management follows HCMP (if no rectify practices); and

	Action level	Action	Limit Level	Action
Habitat Creation Completion Stage				
		• If causes not clear, carry out additional monitoring to see if that is an occasional event.		• Notify AFCD and if causes not clear, carry out additional monitoring to see if that is an occasional event.
Dragonflies: Target species (Scarlet Basker): abundance	Post-project zero occurrence for three consecutive summer months	• Check and re-analyse data; • Investigate causes of not meeting the target level, if caused by on-site/off-site impacts (e.g., presence of exotic predatory fish in habitats), rectify; • Review management practices to determine if management follows HCMP (if no rectify practices); and • If causes not clear, carry out additional monitoring to see if that is an occasional event.	Post-project zero occurrence for six consecutive summer months	• Check and re-analyse data; • Investigate causes of not meeting the target level, if caused by on-site/off-site impacts (e.g., presence of exotic predatory fish in habitats or habitat has degraded), rectify; • Review management practices to determine if management follows HCMP (if no rectify practices); and • Notify AFCD and if causes not clear, carry out additional monitoring to see if that is an occasional event.
Water Quality				
pH	Outside range 5.5 – 8.5	• Double water quality monitoring; and • Investigate causes and implement plan to rectify such as adding lime, turning aerator on etc.	Outside range 5 – 9	• Double water quality monitoring; • Investigate causes and implement plan to rectify, e.g., adding more lime, using more aerators, reduce/stop feeding, reduce stocking density, change water, etc.; and • Notify AFCD and if water quality remains poor after the rectification actions, drain-down the pond, sunbake and earthmove the top sediment to the bank.
DO	Below 3mg/l		Below 2mg/l	
Ammonia concentration	>1mg/l		>3mg/l	
Nitrite	>2mg/l		>5mg/l	
Orthophosphate concentration	>0.1mg/l		>1mg/l	
Visitor Management				
Visitor disturbance impact on target species (i.e. Abundance)	Isolated occurrence of unplanned visitor access to Zone 1	• Check and reanalyse data; and • Carry out visitor management with use of soft measures (i.e. signpost) to redirect visitors away from ecologically sensitive areas.	Frequent and repeated occurrence of unplanned visitor access to Zone 1.	• Check and reanalyse data; and • Control visitor access in the ecologically sensitive area (i.e. Zone 1).

Note:
Action levels and limits stated in the table are all subjected to further review and analysis of the baseline surveys' findings.
^ Rolling mean for a twelve-month period using the monitoring data will be adopted as each species' overall abundance
# These species adopt presence / absence as a threshold considering their abundance recorded in the HKBWS Waterbirds Monitoring Surveys in the past five years are too low or highly variable across different months and years

7.7 Reporting and Communication for SPS WCP

7.7.1.1 Bi-annual reports for SPS WCP will be prepared and submitted to AFCD, EPD and EC every six months. The management activities (including but not limited to desilting and vegetation management), monitoring data, analysis, evaluation, proposed management adjustment (if any) as well as any measures implemented in response to action or limit levels being triggered during the reporting period will be included.

7.7.1.2 The wetlands in Deep Bay belong to one ecosystem and they are connected both ecologically and hydrologically. Indeed, many water birds are not bound to one site or one habitat, but will use different habitats/sites according to the tide or season (Wong *et al.*, 2009).

7.7.1.3 A working / liaison group for SPS WCP shall be set up with adjacent wetlands (e.g., HKWP, MPNR, LMC EEA, potentially with existing nature reserves / wetlands in Shenzhen and wetlands to be established in the larger Deep Bay Area) to maintain communication and explore collaboration upon commencement of construction of the SPS WCP. Major findings and monitoring results may be shared within this working / liaison group during the annual meeting to enhance collaboration (such as coordinate pond drain-down) and knowledge transfer which often would create new knowledge. The regular exchange would be invaluable to improve the conservation and management of Deep Bay wetlands.

7.7.1.4 Important findings, experiences and successes should be published whenever appropriate so as to share the knowledge with the wider network of wetland managers, researchers and conservationists. These should also be turned into communication and/or education materials so as to engage the general public. Opportunities for collaboration should also be explored with tertiary institutions and/or Green Groups, such as the University of Hong Kong and WWF Hong Kong. An example will be the DNA testing of fresh spraints found in SPS WCP for individual identification that can help to understand the population size, movement and diet of Eurasian otter in Deep Bay.

8 OVERALL MANAGEMENT AND IMPLEMENTATION STRATEGY FOR SPSWCP

8.1 General Staffing Requirements

8.1.1.1 Upon the establishment of the SPS WCP, the operation and maintenance works of the enhanced wetland habitats as well as the fisheries production in traditional fishponds and eco-friendly aquaculture systems at EEF in Phase 1 and remaining phases shall be carried out by local fish farmers and field staff and/or contractors working at the SPS WCP, subjected to the operation mode selected for the entire SPS WCP or different zones as discussed in **Section 8.2** below.

8.1.1.2 With advance technologies, such as automatic feeders, electric sluice gates and sensors, installed across the SPS WCP, and the aid of appropriate infrastructures and machines for efficient operation, labour input required for normal operation of the SPS WCP can be greatly reduced. Overall anticipated hierarchy for operation and management of the SPS WCP are shown in **Exhibit 8.1** below, which makes reference to existing wetlands under conservation management, and with consideration of the technological usage for habitat management and maintenance throughout the SPS WCP.

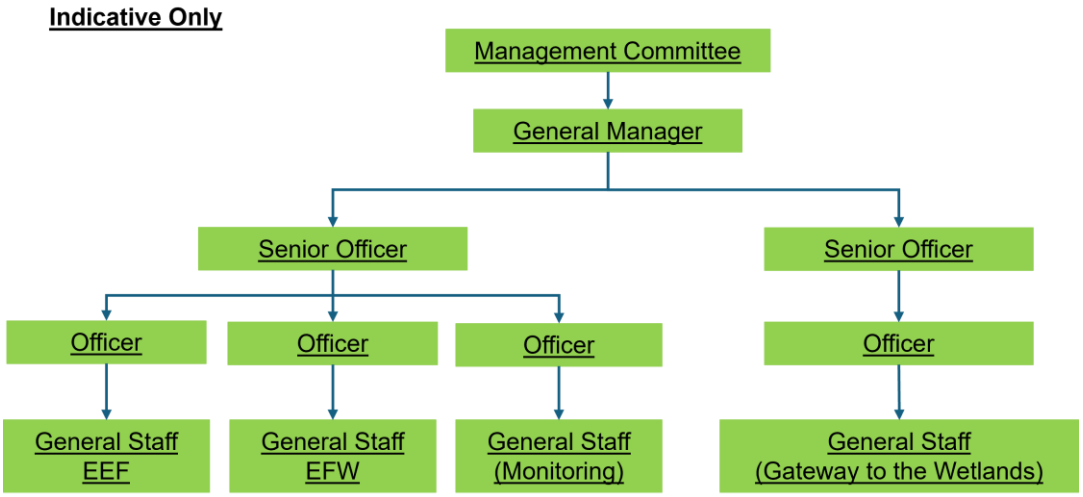


Exhibit 8.1 Full-time Staff Management Hierarchy of the Sam Po Shue Wetland Conservation Park

8.1.1.3 It is anticipated that vegetation management at EEF and EFW (freshwater marsh) habitats will primarily be carried out by manual cutting using machines.

8.1.1.4 Staffing requirement for the Gateway to the Wetlands and visitor areas within the SPS WCP are subjected to the design of visitor facilities and education programme / activities to be provided. The number of full-time staff required for these visitor experience, together with consideration of security requirements will be developed further when more information is available.

8.1.1.5 Minor maintenance of facilities such as footpaths, boardwalks, hides, screens etc. shall be handled by the field staff. Additional manpower shall be needed during the fish harvest in EEF from November to March. This can be arranged through hiring appropriate number of short-term workers on a need basis.

8.1.1.6 Earthmoving work to strengthen pond bunds and to desilt *gei wai* shall be required as part of regular maintenance. These shall be arranged through hiring experienced contractors.

8.1.1.7 Major maintenance of the Gateway to the Wetlands, display and exhibits shall be carried out by qualified contractor when there is a need.

8.2 Mode of Operation

8.2.1.1 The Strategic Feasibility Study has identified three potential management options for the management of the SPS WCP, namely direct management by Government department(s); collaboration with organisations with relevant experience and expertise; and public-private

partnership. In addition, transitional management under existing Management Agreements shall also be considered. Depending on the functions and operational needs of the different zones in the SPS WCPs, a mixed use of different management modes may also be considered.

8.2.2 General Management Recommendations

Direct Management by Government Departments

8.2.2.1 Government department (i.e., AFCD) oversees the management of the SPS WCP directly and employ contractor(s) to assist in carrying out management and/or maintenance works. This management option was currently adopted in the Hong Kong Wetland Park (HKWP), and provide full and close control over management of the SPS WCP. However, there will be significant resource implications for Government and the expertise on managing fishponds and *gei wai* for both conservation and production are very limited.

Collaboration with Organisations with Relevant Experience and Expertise

8.2.2.2 The Government could formulate a park regulatory framework and collaborate with different organisations with experience and expertise relevant to the objectives and functions of the SPS WCP, such as NGOs, agriculture and fisheries associations and local communities for the management of the SPS WCP according to the said framework.

8.2.2.3 Under this management option, the Government will take up the overall supervision and coordination role of the management of the SPS WCP, and will delegate the direct management role to NGOs, agriculture and fisheries associations and local communities and hence have less control over the direct management of the SPS WCP. However, the entities in local communities having expertise for implementing ecological conservation management measures could be limited.

Transitional Management under Existing Management Agreements

8.2.2.4 Large area of the fishponds in the Deep Bay area is currently managed under Management Agreement Schemes funded by the Countryside Conservation Funding Scheme (CCFS) for conservation, which the durations of these schemes to be completed by February 2027. Potential transitional issues may arise as the establishment of the SPS WCP will begin in 2026/2027 according to the EIA Report. Further liaisons between relevant parties and authorities (e.g., CEDD, CCO and AFCD) shall be undertaken in coordination for arrangements over works and habitat management.

Public-Private Partnership

8.2.2.5 Through public private partnership, the Government could explore collaborating with private sector / company in managing the SPS WCPs. This option could allow advantage of streamlining Government's manpower at the SPS WCP, however, potential disadvantages could include lower level of control over management by the Government, the lack of experience / expertise in implementing ecological conservation management measures or management of fishponds habitats from the private partnership. Taking into account these limitations, the current design and management needs, it is considered that this option is not suitable to be adopted in the SPS WCP.

8.2.3 Recommendation of Management Options in Different Zones

8.2.3.1 While there are three different potential management options for consideration, for the better management of the SPS WCP, the Government could engage different parties and adopt different management options at different zones of the SPS WCP. Whereas the Government shall be responsible for overseeing the overall management of the SPS WCP, providing guidance to and coordinating the management of different zones by different parties. The potential adoption of management options at various zones are as follows:

(a) Direct management by Government Departments (e.g., in Zone 1) and Gateway to the Wetlands (e.g., eco-education facilities);

(b) Collaborations with NGOs (e.g., in Zone 1 and Zone 2), agriculture and fisheries associations (e.g., in Zone 2 and Zone 3), local communities (e.g., in Zone 2 for aquaculture practices and in Gateway to the Wetlands for eco-education facilities); and

(c) Public-Private Partnerships in Gateway to the Wetlands (e.g., collaboration with private

sector in providing specific eco-education facilities).

8.2.3.2 With the potential adoption of different management options in different zones within the SPS WCP, the Government could have close control over the management of the SPS WCP, while leveraging the expertise of NGOs, local communities and agriculture and fisheries associations in managing fishpond and wetland habitats through collaboration, as well as reducing government staffing requirements.

8.2.4 Overall Management of SPS WCP

8.2.4.1 With the potential to adopt different management options in the different zones within the SPS WCP, a management committee shall be formed to oversee the different management parties, daily operation and management of the SPS WCP, including habitat management, visitor experience and regular maintenance.

8.2.4.2 As mentioned in **Section 7.7.1.3**, to facilitate conservation activities within the Deep Bay area, an additional working / liaison group with adjacent wetlands (e.g. HKWP, MPNR and LMC EEA, potentially with existing nature reserves / wetlands in Shenzhen and wetlands to be established in the larger Deep Bay Area) shall also be set up to maintain communication, exploring collaboration opportunities and handling interfacing issues across the larger area.

8.3 Working Group on Wetland Conservation for San Tin Technopole

8.3.1.1 According to Item (9) of the EIA Approval Conditions, a working group is formed between CEDD (as STT's works agent) and AFCD (as SPS WCP's sponsoring department) to monitor the effectiveness of the enhancement measures and coordinate the progress of pond filling under the STT and SPS WCP implementation amongst others, namely Working Group on Wetland Conservation for San Tin Technopole. In addition to CEDD and AFCD, the working group also comprises representatives from EPD, Environment and Ecology Bureau (EEB) and Development Bureau (DEVB).

8.3.1.2 The working group shall consult and regularly report to the EPD on the environmental monitoring results and the implementation of mitigation measures set out in the later version of the HCMP. Relevant stakeholders such as the ACE will be involved as appropriate. Further enhancement measures shall be implemented under the coordination of the working group, where necessary, such as when the proposed ecological function enhancement measures bring lower abundance and/or density of target species than the mitigation performance targets proposed in **Section 6** of the HCMP. The intended follow-up actions associated with the ecological monitoring shall be provided in detail in the later version of the HCMP (see **Section 7** above).

8.4 Environmental Committee

8.4.1.1 An EC is established with reference to Item (5) of the EIA Approval Conditions, to advise the working group on the implementation and monitoring of the proposed ecological mitigation / enhancement measures of the Project, including wetland enhancement and monitoring works at the SPS WCP, according to the EIA Report and the approved HCMP. The EC has wide representation, including representatives of government departments as well as green groups and academics.

8.5 Phased Development of the Sam Po Shue Wetland Conservation Park

8.5.1 Phased Development of the SPS WCP

8.5.1.1 Given the large size of the SPS WCP to be established alongside the development of the STT, a phased approach to construction is required. The northern and northwestern portions of the SPS WCP have been identified as the first phase to be established since most of the area are located on Government land (**Figure 8.1** refers), followed by the land spanning the eastern and southern portions of the SPS WCP.

8.5.1.2 This phased approach also prioritises the conservation of the major avifauna flightline corridor connecting the Deep Bay wetlands to the Hoo Hok Wai area, creating synergy with the MPNR. Construction of Phase 1 of the SPS WCP is targeted to commence in 2026/2027 the earliest for completion by 2031. The construction works for the entire SPS WCP is scheduled for completion by 2039 or earlier to align with the estimated time for full operation of STT.

8.5.2 Phase One Development

8.5.2.1 Phase 1 of the SPS WCP covers areas of EEF traditional fishponds, both open water and vegetated *gei wai* and Demonstration Zone as well as some EFW freshwater marshes, encompassing all three visitor management zones (i.e. Zone 1, Zone 2 and Zone 3).

8.5.2.2 Considering Phase 1 development will already be providing all types of habitats within the SPS WCP, the target species for SPS WCP Phase 1 will be the same as discussed under **Section 4**, including both key target species and supplementary focus species (**Table 4.1** and **Table 4.2** refer).

8.5.2.3 As mentioned under **Section 6.2.2.15**, the Demonstration Zone will carry out fisheries production using the eco-friendly aquaculture systems. The ponds within the Demonstration Zone will be monitored on the dual functions of wetland conservation and fisheries production. The monitoring results will be reviewed over a certain period of time (i.e. one year) to have a better understanding of the relationship between eco-friendly aquaculture systems and its ecological functions, which would further inform the design of other EEF ponds.

8.5.3 Development Priorities

8.5.3.1 Under the phased development of the SPS WCP, development priorities have been proposed for Phase 1 and the remaining phases (**Figure 8.2** refers). Given that *gei wai* are known to provide habitats for a range of wildlife and hence enhance environmental capacity, the three *gei wai* along the Shenzhen River are proposed to have the highest development priority, followed by the Demonstration Zone and EEF ponds to the northeast of the Demonstration Zone. Whereas the strip of EEF ponds to the southeast of the MPNR and the freshwater wetland at the Lin Barn Tsuen area will be developed last under Phase 1.

8.5.3.2 It has been proposed that land spanning the eastern and southern portions of the SPS WCP could be developed with priority under the remaining phase. As the development plan for the remaining phase has yet to be established, it is suggested that development priorities can be given to the FEA located along the eastern edge of the SPS WCP, as well as the *gei wai* habitat sandwiched between the Palm Springs and Fairview Park (**Figure 8.2** refers).

8.5.4 Overall Management

8.5.4.1 As mentioned in **Sections 8.2.4.2** and **8.4**, an inter-departmental working group has been formed between CEDD (as STT's works agent) and AFCD (as SPS WCP's sponsoring department) to monitor the effectiveness of the enhancement measures and coordinate the progress of pond filling under the STT Project and SPS WCP implementation amongst others. An EC has also been established to advise the working group on the implementation and monitoring of the proposed ecological mitigation / enhancement measures, including wetland enhancement measures and monitoring works at the SPS WCP, according to the EIA Report and HCMP approved by EPD.

8.5.4.2 For overall management of the SPS WCP, it is recommended that a management committee shall be formed to oversee the management parties and daily operation of the SPS WCP (**Section 8.2.4.1** refers). This management committee shall include representatives of relevant Government Departments and all management parties involved under daily operations. The management committee shall also be responsible in chairing the working / liaison group with adjacent wetlands mentioned under **Section 8.2.4.2**, to facilitate communication between adjacent wetlands (i.e., MPNR and LMC EEA) and SPS WCP.

8.5.4.3 CEDD will be responsible for the implementation and management of SPS WCP (including the management measures outlined in

8.5.4.4 **Table** 8.2) until the completion of works and establishment of the enhanced wetland habitats within SPS WCP. Future operation and maintenance of the established enhanced wetland habitats that are handed over to AFCD will be undertaken by AFCD. For avoidance of doubt, the establishment stage for each phased area will end following completion of the relevant enhancement works, establishment of the enhanced wetland habitats and their handover for operation and maintenance. The entire SPS WCP is scheduled for completion by 2039 or earlier. Subsequent management and monitoring will be undertaken as part of the operational stage under the adaptive management framework.

8.6 Overall Implementation Schedule

8.6.1.1 The overall implementation schedule of the recommended mitigations measures under this HCMP for the STT Project and the recommended habitat management measures are summarised in **Table 8.1** and

8.6.1.2 **Table** 8.2 respectively.

Table 8.1 Overall Implementation Schedule of Recommended Mitigation Measures

Recommended Mitigation Measures	Objective of Measure	Location of Measure (Figure 5.1 refers)	Responsible Parties	Implementation Schedule	Reference in HCMP
Habitat Creation					
Ecologically Enhanced Fishpond – *Gei Wai*	Creation of *gei wai* to create suitable habitats for different fauna, particularly waterbirds.	Ponds along Shenzhen River within the Zone 1 and abandoned ponds located between of Palm Springs and Fairview Park.	Contractor of CEDD on construction works and interim management during establishment period. Management will be handed over to AFCD after establishment.	Phase 1 of the SPS WCP is targeted to be completed by 2031 and the full completion of the whole SPS WCP is expected on or before 2039. Area covered in phase 1 and the development priorities are detailed in **Section 8.5.2** and **8.5.3**.	Section 6.2.2.3 – 6.2.2.6
Ecologically Enhanced Fishpond – Traditional Fishponds / Low Intensity Management Area	Creation of fishpond to create suitable habitats for different fauna, while continuously supporting some aquaculture activities to serve the dual functions of wetland conservation and fisheries production.	Spanning across the entire SPS WCP, with low intensity management area at the northeast area of the SPS WCP			Section 6.2.2.7 – 6.2.2.11
Ecologically Enhanced Fishpond - Eco-friendly Aquaculture Demonstration Zone	Deployment of eco-friendly aquaculture systems to provide dual functions of wetland conservation and fisheries production, while monitored to understand the ecological performance and inform design of other EEF ponds.	Ponds to the north of Tam Kon Chau Road and west of the Gateway to the Wetlands			Section 6.2.2.12 – 6.2.2.15
Enhanced Freshwater Wetland – Freshwater Marshes and Lily Pond	Creation of freshwater marsh to create suitable habitats for different fauna. Creation of Lily Pond provisioned with floating species such as *Nymphaea* spp. and *Trapa*, creating suitable microhabitats for freshwater amphibians, avifauna and odonates	Freshwater marsh habitat will be created to the north of the Gateway to the Wetlands, either side of and adjacent to the water channel at Lin Barn Tsuen. A lily pond will be created to the immediate east of the Gateway to the Wetlands			Section 6.2.3.2 – 6.2.3.5
Enhanced Freshwater Wetland – Reedbeds / Swamp Forest	Creation of reedbed and swamp forest to create suitable habitats for different fauna.	Ponds located west of Mai Po San Tsuen, with swamp forest to be created at the patch of woodland south to the DSD Pumping Station.			Section 6.2.3.6 – 6.2.3.7
Enhanced Freshwater Wetland – Widening of Existing Channels	Widening of existing channels to provide suitable habitats for different fauna, especially ardeids and other waterbirds.	Scattered across the entire SPS WCP			Section 6.2.3.8
Other Mitigation Measures					
Preservation of Existing Egretry	Avoiding encroachment into the MPV Egretry and preserve the core area of the egretry and the vegetation of the MPLV egretry	Existing MPLV egretry and MPV egretry at the southern fringe of the SPS WCP, along Castle Peak Road (San Tin Section).	Contractor of CEDD on construction works and interim management	MPV Egretry has been avoided under the STT Project and an “Open Space” to preserve the MPLV egretry have been	Section 6.2.4.1 – 6.2.4.6

Recommended Mitigation Measures	Objective of Measure	Location of Measure (Figure 5.1 refers)	Responsible Parties	Implementation Schedule	Reference in HCMP
			during establishment period. The implementation schedule, including maintenance and management, of the mitigation measure are detailed in the IPEEFD to be submitted as required under Clause 2.16 of EP No. EP-665/2025.	adopted in the Approved San Tin Technopole OZP No. S/STT/2.	
Preservation of Bird's Flight Corridors	Setting NBA and building height controls near existing egretry and bird's flight corridor to minimize disturbance impact and preserve flightlines recorded in the area.	Existing flight paths connecting the MPLV Egretry to SPS WCP and along northwest boundary of the STT; and Existing bird flight corridor between LMC Meander and SPS WCP.	NBA and building height controls have been incorporated into the design of the STT. Project Proponents of the sites near existing egretry and bird's flight corridor to observe the NBA and building height controls during detailed design.	NBA and building height controls have been incorporated into the design of the STT.	
Wildlife Corridors for Non-flying Mammals	Provision of wildlife corridor to facilitate movement of non-flying mammals, particularly Eurasian otter, between the SPS WCP and LMC meander.	In the northern portion of the STT project area adjacent to the AFCD FRC	Contractor of CEDD on construction works and interim management during establishment period. The implementation schedule, including maintenance and management, of the mitigation measure are detailed in the DDP to be submitted as required under Item (2) of the EIA Approval Conditions and Clause 2.16 of EP No. EP-664/2025.	To be confirmed in later detailed design stage	Section 6.2.5.1 – 6.2.5.6

Table 8.2 Overall Implementation Schedule of Recommended Habitat Management Measures for Wetland Compensation

Location	Objectives and Details of Management Measures	Responsible Parties	Implementation Schedule	Reference in HCMP
Ecologically Enhanced Fishpond (EEF) – *Gei Wai*	Vegetation Management • Maintaining healthy stands of mangrove in the vegetated *gei wai*, and preventing establishment of wetland vegetation in the open *gei wai*, will be crucial to operation and retaining the ecological value of the *gei wai.* • Regular monitoring and management. Desilting • Desilting is necessary to prevent gradual filling of the habitats, ensuring open water and mudflats are available during drain-down for water birds and maintaining productivity. Water Regime • Control of *gei wai* water level by electric sluice gates with smart sensors, following tidal cycle and adjust according to operational needs. This provides suitable foraging habitat for piscivorous birds and allows for better adjustment of water level during storm surge or heavy rainfalls. • Full drain-down of *gei wai* shall be carried out to enhance migratory birds feeding opportunities. • Clearing of large and predatory fishes during full drain-down to reduce predatory pressure on shrimps in the next season, providing more food for piscivorous avifauna in coming years. Water Quality • Water quality parameters shall be monitored as long-term monitoring data to ensure suitable habitat conditions for wildlife. Should there be a sudden drop in water quality, no shrimp harvest shall be carried out and further investigation will be conducted	Contractor of CEDD on construction works and interim management during establishment period. Management will be handed over to AFCD after establishment.	Vegetation Management • Regular monitoring and management Desilting • Every seven years (subject to operation requirements / on-site condition) Water Regime • Water exchange and/or shrimp harvest (which is restricted to April – June and August – November) will be carried out when tidal difference is more than 2m. There may be as many as 10 – 16 draining cycles (around new moon and full moon) per month • Full drain-down of *gei wai* shall be carried out during peak migrating season (i.e. December to February next year) Water Quality • Regular monitoring and management	Section 6.4.1.2, – 6.4.1.6
EFF – Traditional Fishponds / Low Intensity Management Area	Vegetation Management • Regular vegetation management including grass cutting and weeding to maintain optimal ecological performance at the SPS WCP Desilting • sunbake the fishpond mud after the pond is drained for harvesting so that the accumulated organic matter can be oxidized • The ponds shall be deepened to strengthen the bund Water Regime • Water to be controlled by adjustable weirs and portable submersible electric water pumps • Regular checking and maintenance of adjustable weirs to ensure normal operation		Vegetation Management • Monthly vegetation management will be required at EEF pond bunds Desilting • Sunbake of fishpond mud after drain-down • Fishpond shall be deepened every one to two years Water Regime • Regular checking of adjustable weirs • Sequenced drain-down between November and March based on the	Section 6.4.1.7 – 6.4.1.16

Location	Objectives and Details of Management Measures	Responsible Parties	Implementation Schedule	Reference in HCMP
	• Sequenced drain-down during main waterbird wintering period from November to March. 20% of ponds in each cluster will be drained each month to maximise the availability of feeding opportunities across the SPS WCP. <u>Water Quality</u> • Water quality parameters shall be monitored as long-term monitoring data to ensure suitable habitat conditions for wildlife. In case of significant unresolvable poor water quality at ponds, pond water should be pumped out and replenished from adjacent ponds or water channels. <u>Pond Conditioning</u> • Adding lime during routine sunbaking and pond bund strengthening / repair when necessary • Adding lime to water in case pond water pH drops below 5 <u>Trash-fish Stocking</u> • Trash-fish stocking would be carried out at EEF ponds located to the immediate north of the Gateway to the Wetlands, and potentially other feasible locations (as required) at the EEF for more intensive habitat enhancement works if compensation targets are not being met.		drain-down schedule shown in **Appendix H** <u>Water Quality</u> • Regular monitoring and management <u>Pond Conditioning</u> • Liming during routine sunbaking and pond bund strengthening / repair, and when pond water pH drops below 5 <u>Trash-fish Stocking</u> • The frequency and scheduling of stocking can be coordinated with activities in the Gateway to the Wetlands	
EEF – Eco-friendly Aquaculture Demonstration Zone	<u>Vegetation Management</u> • Regular vegetation management including grass cutting and weeding • Monthly vegetation management at ecological purification ponds of the 3P2D system • Replacement of dead or injured wetland plants to maintain effective water purification and ecological function <u>Water Regime</u> • Water will be controlled by adjustable weirs and submersible electric water pumps • Regular checking and maintenance of adjustable weirs to ensure normal operation • Solid-liquid separation tower with biological treatment tanks system will be installed to treat tailwater generated from the enclosed cultivation barrels in ponds • ponds for the container eco-culture will provide ecological tailwater treatment function as the 3P2D System • Both the pond-eco-captive culture ponds and the 3P2D System ponds of the container eco-culture system will be drained along with the other EEF ponds during dry season to maximise avifauna feeding opportunities <u>Water Quality</u> • Water quality parameters shall be monitored as long-term monitoring data to ensure suitable habitat conditions for wildlife. In case of significant unresolvable poor water quality at ponds, pond water should be pumped out and replenished from adjacent ponds or water channels. • Water quality should adhere to aquaculture standards		<u>Vegetation Management</u> • Monthly vegetation management will be required at EEF pond bunds • Monthly vegetation management at ecological purification ponds of the 3P2D system • Replacement of dead or injured wetland plants in spring <u>Water Regime</u> • Regular checking of adjustable weirs • Sequenced drain-down between November and March based on the drain-down schedule shown in **Appendix H** <u>Water Quality</u> • Regular monitoring and management	Section 6.4.1.17 – 6.4.1.21

Location	Objectives and Details of Management Measures	Responsible Parties	Implementation Schedule	Reference in HCMP
Enhanced Freshwater Wetland (EFW) – Freshwater Marshes, Lily Pond, Reedbeds / Swamp Forest	<u>Vegetation Management</u> • Different height of vegetation will be maintained, depending on the type of habitat created, through vegetation clearance works manually and mechanically according to the habitat design, creating a variety range of microhabitats • Confinement into specific planting areas by a trench of over 3m wide and 1m deep is needed at the reedbed habitat • No particular vegetation management of Chinese swamp cypress is required at swamp forest. • Removal for invasive plant species such as water hyacinth (*Eichhornia crassipes*) and *Typha angustifolia* will be carried out regularly if necessary. • Selected aquatic plants shall be planted during wet season from April to October to increase plant diversity, structure and micro-habitat. <u>Soil Management</u> • If major seepage is identified during the construction or operation phase, remodelling of the pond bottom with clay layer should be undertaken as necessary. <u>Water Regime</u> • The desired water levels will be maintained through habitat design and water control structures (i.e. adjustable weir connecting nearest water channel), which will ensure sufficient water is stored to prevent dry up of wetlands and succession of terrestrial vegetation. <u>Water Quality</u> • Close monitoring and liaison with relevant government department to maintain acceptable water quality are required. • Removal of litter and other debris shall be carried out after flooding or rainstorm event, if necessary. a		<u>Vegetation Management</u> • Regular monitoring and management <u>Soil Management</u> • Remodelling of pond bottom as necessary <u>Water Regime</u> • Regular checking of adjustable weirs <u>Water Quality</u> • Regular monitoring and management	Section 6.4.2.1 – 6.4.2.6
EFW – Widening of Existing Channels	<u>Vegetation Management</u> • No active management is anticipated for the widened water channels apart from clearing of invasive alien plants (such as *Sonneratia*, Mikania, *Bracharia* etc.) and bund maintenance. <u>Desilting</u> • Desilting of normal and widened water channel types shall be carried out if sediment accumulation results in encroachment of mudflat habitats by mangrove / other vegetation. <u>Water Regime</u> • Water will be controlled by tidal fluctuations and availability of water from upstream. <u>Water Quality</u> • Close monitoring and liaison with relevant government department to maintain acceptable water quality are required.		<u>Vegetation Management</u> • Regular management of invasive alien plants and bund maintenance <u>Desilting</u> • Desilting to be carried out as necessary <u>Water Regime</u> • N/A <u>Water Quality</u> • Regular monitoring and management	Section 6.4.2.7 – 6.4.2.9

Location	Objectives and Details of Management Measures	Responsible Parties	Implementation Schedule	Reference in HCMP
	• Removal of litter and other debris shall be carried out after flooding or rainstorm event, if necessary.			
Existing Egretries and Night Roost	• Clearing of climbers after the active season of the site • Night roosts shall be checked in August / September to assess the condition of the trees • Vegetation management (e.g. clearance of climbers affecting night roosts) shall be completed before October • Other appropriate measures such as pest control shall be provided if the trees are found in poor condition		• Checking of night roosts in August / September • Vegetation management shall be completed before October	Section 6.4.3.1 – 6.4.3.2
Other Relevant Management	<u>Undesired Animal Management</u> • Outreach programme of dog neutering and microchipping • Re-homing programme for dogs • Strict ban on keeping and/or feeding dogs within construction sites • All sightings (including camera traps records) and locations of feral dogs on site shall be logged. • Implementation of a trapping programme using baited dog traps may be adopted if dog populations become established within the SPS WCP, to reduce potential disturbance and mortality impacts to wildlife. <u>Pest Management</u> • **Red Imported Fire Ant**: Regular routine check of nests shall be undertaken from start of the dry season. If nests are located, appropriate treatment (e.g., bait, pesticide or hot water) should be used to destroy the nest. Chemical treatments should only be applied in dry spells with no rainfall. Fine mesh (with mesh size of approximately 1 – 2 mm) may be laid over treated nests to prevent accidental ingestion by birds and small mammals. • **Apple Snails**: Snail-eating specialist black carp (*Mylopharyngodon piceus*) shall be stocked in the lily pond and seasonal flooded wetlands in the EFW and low-intensity aquaculture ponds in the EEF where these plants will be grown. If significant infestations of apple snail occur, these can be removed manually. • ***Dimorphopterus spinolae***: Monthly close monitoring for the presence of this species and remove as appropriate if infestation identified.		<u>Undesired Animal Management</u> • Outreach programme of dog neutering and microchipping and re-homing programme: prior to villager relocation • Strict ban on keeping and/or feeding dogs within construction sites: during construction phase • Record of all sightings and implementation of trapping programme: during construction and operation phase <u>Pest Management</u> • Regular monitoring and management • Regular routine checks of red imported fire ant nests from start of dry season • Monthly close monitoring for the presence of *Dimorphopterus spinolae* shall be carried out from May to September <u>Water Quality</u> • Regular monitoring and management	Section 6.4.4.1 – 6.4.4.6

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FIGURES

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

822000 E

824000 E

826000 E

842000 N

840000 N

838000 N

N

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- EXISTING COMPENSATION WETLANDS MANAGED BY THE GOVERNMENT
- ECOLOGICALLY ENHANCED FISHPOND
- ENHANCED FRESHWATER WETLANDS
- FISHERIES ENHANCEMENT AREA
- GATEWAY TO THE WETLANDS
- PONDS TO BE RETAINED / RESTORED UNDER SAN TIN TECHNOPOLE

SHENZHEN

SHENZHEN RIVER

SAN TIN

MAI PO

LUT CHAU

AFCD FISHERIES RESEARCH CENTRE

AFCD MANAGEMENT OFFICE

SAN SHAM ROAD

HA WAN TSUEN EAST ROAD

CASTLE PEAK ROAD – CHAU TAU

KWU TUNG ROAD

SAN TIN HIGHWAY

FAIRVIEW PARK BOULEVARD

CASTLE PEAK ROAD – TAM MI

Frontier Closed Area Boundary

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PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT
業主

土木工程拓展署
Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 復核

STATUS
階段

SCALE 比例
A3 1 : 20000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60718076

AGREEMENT NO. 協議編號
CE 15/2023 (CE)

SHEET TITLE
圖紙名稱

STLMC DN EIA WETLAND COMPENSATION REQUIREMENT AT SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER
圖紙編號

60738497/512a/FIGURE 2.1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

- WILDLIFE CORRIDOR TO BE PROVISIONED
- REDUCED DENSITY ZONE
- EXCLUSION ZONE
- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- INDICATIVE EXTENT OF ECO-INTERFACE
- INDICATIVE EXTENT OF NON BUILDING AREA (NBA)
- MAI PO NATURE RESERVE
- SAN TIN TECHNOPOLE BOUNDARY
- EGRETRY 100m BUFFER AREA
- INDICATIVE LOCATION OF EXISTING EGRETRIES
- 300m FLIGHT CORRIDOR
- BUILDING HEIGHT RESTRICTION (mPD)

824000 E

826000 E

840000 N

838000 N

AFCD FISHERIES RESEARCH CENTRE

SAN TIN EAST MAIN DRAINAGE CHANNEL (STEMDC) TO BE REVITALISED AND ESTABLISHED AS A LANDSCAPE BUFFER AREA UNDER THE STT PROJECT

AFCD MANAGEMENT OFFICE

SHENZHEN

SHENZHEN RIVER

MAI PO

LUT CHAU

SAN TIN

SAN SHAM ROAD

HA WAN TSUEN EAST ROAD

CASTLE PEAK ROAD – CHAU TAU

KWU TUNG ROAD

SAN TIN HIGHWAY

FAIRVIEW PARK BOULEVARD

CASTLE PEAK ROAD – TAM MI

LOK MA CHAU

TAI LONG KEI

NGAU TAM MEI

N

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PROJECT 項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT 業主

土木工程拓展署 Civil Engineering and Development Department

CONSULTANT 工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS 分判工程顧問公司

ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS 階段

SCALE 比例: A3 1 : 20000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60718076

AGREEMENT NO. 協議編號: CE 15/2023 (CE)

SHEET TITLE 圖紙名稱

RELEVANT DEVELOPMENT ELEMENTS OF THE SAN TIN TECHNOPOLE

SHEET NUMBER 圖紙編號

60738497/512a/FIGURE 3.1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- WETLAND CONSERVATION AREA
- WETLAND BUFFER AREA
- SITE OF SPECIFIC SCIENTIFIC INTEREST (SSSI)
- CONSERVATION AREA" ZONE ("CA" ZONE)
- MAI PO MARSHES RESTRICTED AREA
- IMPORTANT BIRD AREA: INNER DEEP BAY AND SHENZHEN RIVER CATCHMENT AREA
- LAM TSUEN COUNTRY PARK
- MAI PO INNER DEEP BAY RAMSAR SITE & RAMSAR SITE PRIORITY SITE FOR ENHANCED CONSERVATION
- DEEP BAY WETLAND OUTSIDE RAMSAR SITE

824000 E

826000 E

840000 N

838000 N

SAN TIN TECHNOPOLE "CA"

LOK MA CHAU LOOP "CA"

SAN TIN TECHNOPOLE "CA"

AFCD FISHERIES RESEARCH CENTRE

SAN TIN TECHNOPOLE "CA"

MAI PO & FAIRVIEW PARK "CA"

SHENZHEN

SHENZHEN RIVER

SAN SHAM ROAD

SAN TIN

INNER DEEP BAY SSSI

Frontier Closed Area Boundary

GATEWAY TO THE WETLANDS

AFCD MANAGEMENT OFFICE

MAI PO VILLAGE SSSI

SAN TIN HIGHWAY

CASTLE PEAK ROAD – CHAU TAU

KWU TUNG ROAD

SAN TIN TECHNOPOLE "CA"

MAI PO MARSH SSSI

TAI LONG KEI

FAIRVIEW PARK BOULEVARD

MAI PO & FAIRVIEW PARK "CA"

NGAU TAM MEI "CA"

LUT CHAU

MAI PO & FAIRVIEW PARK "CA"

CASTLE PEAK ROAD – TAM MI

NGAU TAM MEI

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PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT
業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核核

STATUS
階段

SCALE 比例
A3 1 : 20000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60718076

AGREEMENT NO. 協議編號
CE 15/2023 (CE)

SHEET TITLE
圖紙名稱

RECOGNISED SITES OF CONSERVATION IMPORTANCE WITHIN AND IN THE VICINITY OF THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER
圖紙編號

60738497/512a/FIGURE 3.2

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

822000 E

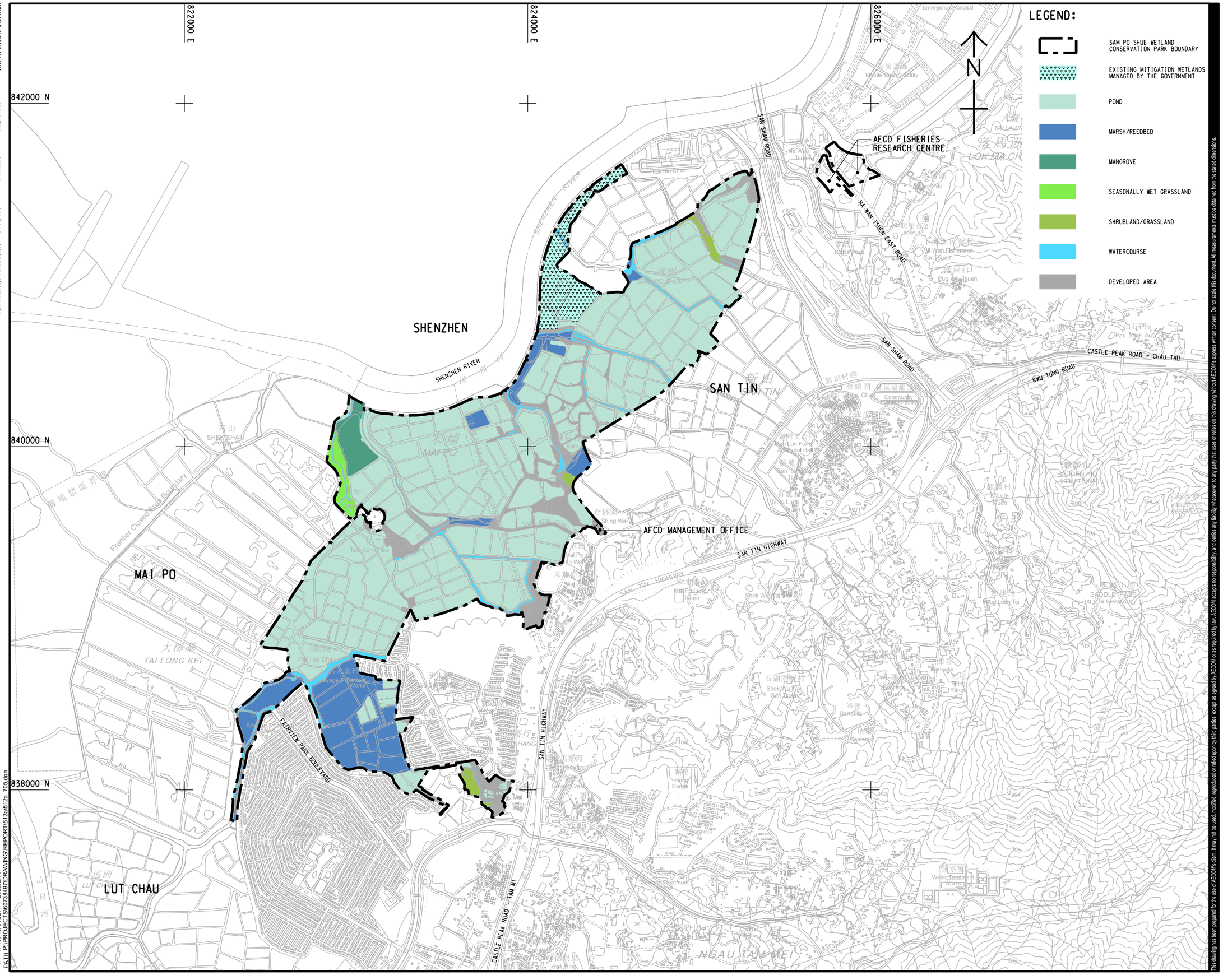
824000 E

826000 E

842000 N

840000 N

838000 N



AECOM Halcrow

PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT
業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對

STATUS
階段

SCALE 比例
A3 1 : 20000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60718076

AGREEMENT NO. 協議編號
CE 15/2023 (CE)

SHEET TITLE
圖紙名稱

HABITAT MAP OF THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER
圖紙編號

60738497/512a/FIGURE 3.3

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ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:

822000 E
824000 E
826000 E
842000 N
840000 N
838000 N

SHENZHEN
MAI PO
LUT CHAU
SHENZHEN RIVER
SAN TIN
NGAU TAM MEI

EXISTING WILDLIFE CORRIDOR
HA WAN TSUEN NIGHT ROOST
SAN SHAM ROAD
LOK MA CHAU MEANDER
AFCD FISHERIES RESEARCH CENTRE
THE LOK MA CHAU LOOP DAY ROOST
HA WAN TSUEN EAST ROAD
SAM PO SHUE NIGHT ROOST
STEMDC WETLAND
LIN BARN TSUEN NIGHT ROOST
MAI PO SAN TSUEN CORMORANT ROOST
SAN TIN TSEUN ROAD NORTH NIGHT ROOST (DISCOVERED IN DEC2024)
CASTLE PEAK ROAD – CHAU TAU
KWU TUNG ROAD
SAN TIN OPEN STORAGE NIGHT ROOST (ABANDONED)
SAN TIN FLOOD STORAGE POND DAY ROOST
SAN TIN OPEN STORAGE DAY ROOST (ROOSTING TREES REMOVED)
GATEWAY TO THE WETLANDS
AFCD MANAGEMENT OFFICE
TAM KON CHAU EGRETRY (ABANDONED)
MAI PO LUNG VILLAGE EGRETRY
MAI PO VILLAGE EGRETRY
TAM KON CHAU NIGHT ROOST
SAN TIN HIGHWAY
MAI PO NATURE RESERVE GREAT CORMORANT NIGHT ROOST
FAIRVIEW PARK BOULEVARD
CASTLE PEAK ROAD – TAM MI

N

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- MAI PO INNER DEEP BAY RAMSAR SITE & RAMSAR SITE PRIORITY SITE FOR ENHANCED CONSERVATION
- ECOLOGICALLY SENSITIVE WATERCOURSE
- APPROXIMATE LOCATION OF ROOSTING SITE OF AVIFAUNA
- APPROXIMATE LOCATION OF ACTIVE EGRETRY
- APPROXIMATE LOCATION OF ABANDONED EGRETRY
- APPROXIMATE LOCATION OF BAT ROOST
- APPROXIMATE LOCATION OF COLLARED CROW ROOST
- ARTIFICIAL OTTER HOLT
- EXISTING WILDLIFE CORRIDOR
- INDICATIVE MAJOR FLIGHT LINES OF ARDEIDS AND CORMORANTS
- OFFSITE WETLAND COMPENSATION AREAS UNDER DEVELOPMENT OF LOK MA CHAU LOOP PROJECT (AREA 7)
- OFFSITE WETLAND COMPENSATION AREAS UNDER DEVELOPMENT OF LOK MA CHAU LOOP PROJECT (AREA 9)
- LOK MA CHAU TERMINUS PUBLIC TRANSPORT INTERCHANGE COMPENSATORY POND
- WO SHANG WAI WETLAND RESTORATION AREA
- LOK MA CHAU ECOLOGICAL ENHANCEMENT AREA
- ECOLOGICAL AREA IN LOK MA CHAU LOOP
- TEMPORARY WETLAND ENHANCEMENT AREA OF THE YAU MEI SAN TSUEN PPP PROJECT
- STEMDC WETLAND
- SAN TIN CONSTRUCTED WETLAND (LOTUS POND)
- PONDS IDENTIFIED UNDER INTERIM WETLAND ENHANCEMENT PLAN

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PROJECT 項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT 業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT 工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS 分判工程顧問公司

ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對

STATUS 階段

SCALE 比例 A3 1 : 20000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60718076

AGREEMENT NO. 協議編號 CE 15/2023 (CE)

SHEET TITLE 圖紙名稱

ECOLOGICAL SENSITIVE RESOURCES WITHIN THE VICINITY OF THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER 圖紙編號

60738497/512a/FIGURE 3.4

V:\BAK\US95-BAK\CSWP\plotdrv\Create Pit file\new\CSWP-75(color).plt
Plot File by: WANGDP 2026/2/6
PATH P:\PROJECTS\60738497\DRAWING\REPORT\512a\512a_706.dgn

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTE:

1. ALL DESIGN ARE INDICATIVE ONLY.

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- EXISTING COMPENSATION WETLANDS MANAGED BY THE GOVERNMENT
- ECOLOGICALLY ENHANCED FISHPOND (EEF)
- ENHANCED FRESHWATER WETLANDS (EFW)
- GATEWAY TO THE WETLANDS
- FISHERIES ENHANCEMENT AREA
- EXISTING ROAD
- PONDS TO BE RETAINED / RESTORED UNDER SAN TIN TECHNOPOLE

SUB-HABITAT OF EEF:

- EEF (SMART GEI WAI - OPEN WATER)
- EEF (SMART GEI WAI - VEGETATED)
- EEF (LOW INTENSITY MANAGEMENT AREA)
- PROPOSED POND CONFIGURATION OF EEF
- PROPOSED BIRD / VEGETATED ISLAND OF EEF
- EEF (ECO-FRIENDLY AQUACULTURE DEMONSTRATION ZONE)

SUB-HABITAT OF EFW:

- EFW (FRESHWATER MARSH)
- EFW (LILY POND)
- EFW (REEDBED/SWAMP FOREST)

824000 E

826000 E

840000 N

838000 N

N

SHENZHEN

SHENZHEN RIVER

SAN TIN

SAN SHAM ROAD

HA WAN TSUEN EAST ROAD

AFCD FISHERIES RESEARCH CENTRE

LOK MA CHAU

CASTLE PEAK ROAD - CHAU TAU

KWU TUNG ROAD

AFCD MANAGEMENT OFFICE

SAN TIN HIGHWAY

MAI PO

MAI PO SAN TSUEN

LUT CHAU

FAIRVIEW PARK BOULEVARD

CASTLE PEAK ROAD - TAM MI

NGAU TAM MEI

Frontier Closed Area Boundary

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PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT
業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS
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修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 復核

STATUS
階段

SCALE 比例
A3 1 : 20000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60718076

AGREEMENT NO. 協議編號
CE 15/2023 (CE)

SHEET TITLE
圖紙名稱

HABITAT CONCEPTUAL PLAN FOR THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER
圖紙編號

60738497/512a/FIGURE 5.1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

822000 E

824000 E

826000 E

842000 N

840000 N

838000 N

LEGEND:

SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY

ZONE 1

ZONE 2

ZONE 3

PONDS TO BE RETAINED / RESTORED UNDER SAN TIN TECHNOPOLE

N

SHENZHEN

SHENZHEN RIVER

SAN TIN

MAI PO

MAI PO SAN TSUEN

LUT CHAU

AFCD FISHERIES RESEARCH CENTRE

AFCD MANAGEMENT OFFICE

SAN SHAM ROAD

HA WAN TSUEN EAST ROAD

CASTLE PEAK ROAD – CHAU TAU

KWU TUNG ROAD

SAN TIN HIGHWAY

FAIRVIEW PARK BOULEVARD

CASTLE PEAK ROAD – TAM MI

Frontier Closed Area Boundary

V:\BAK\US95-BAK\CSWP\plotdir\Create Plt file\new\CSWP-75(color).plt
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PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT
業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT
工程顧問公司

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SUB-CONSULTANTS
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ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS
階段

SCALE 比例
A3 1 : 20000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60718076

AGREEMENT NO. 協議編號
CE 15/2023 (CE)

SHEET TITLE
圖紙名稱

OVERALL VISITOR MANAGEMENT ZONING PLAN FOR THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER
圖紙編號

60738497/512a/FIGURE 5.2

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTE:

1. ALL DESIGN AND LOCATION OF WATER CONTROL STRUCTURES ARE INDICATIVE ONLY.

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- EXISTING COMPENSATION WETLANDS MANAGED BY THE GOVERNMENT
- ECOLOGICAL ENHANCED FISHPOND (EEF)
- ENHANCED FRESHWATER WETLANDS (EFW)
- GATEWAY TO THE WETLANDS
- FISHERIES ENHANCEMENT AREA
- EXISTING ROAD
- PONDS TO BE RETAINED / RESTORED UNDER SAN TIN TECHNOPOLE

SUB-HABITAT OF EEF:

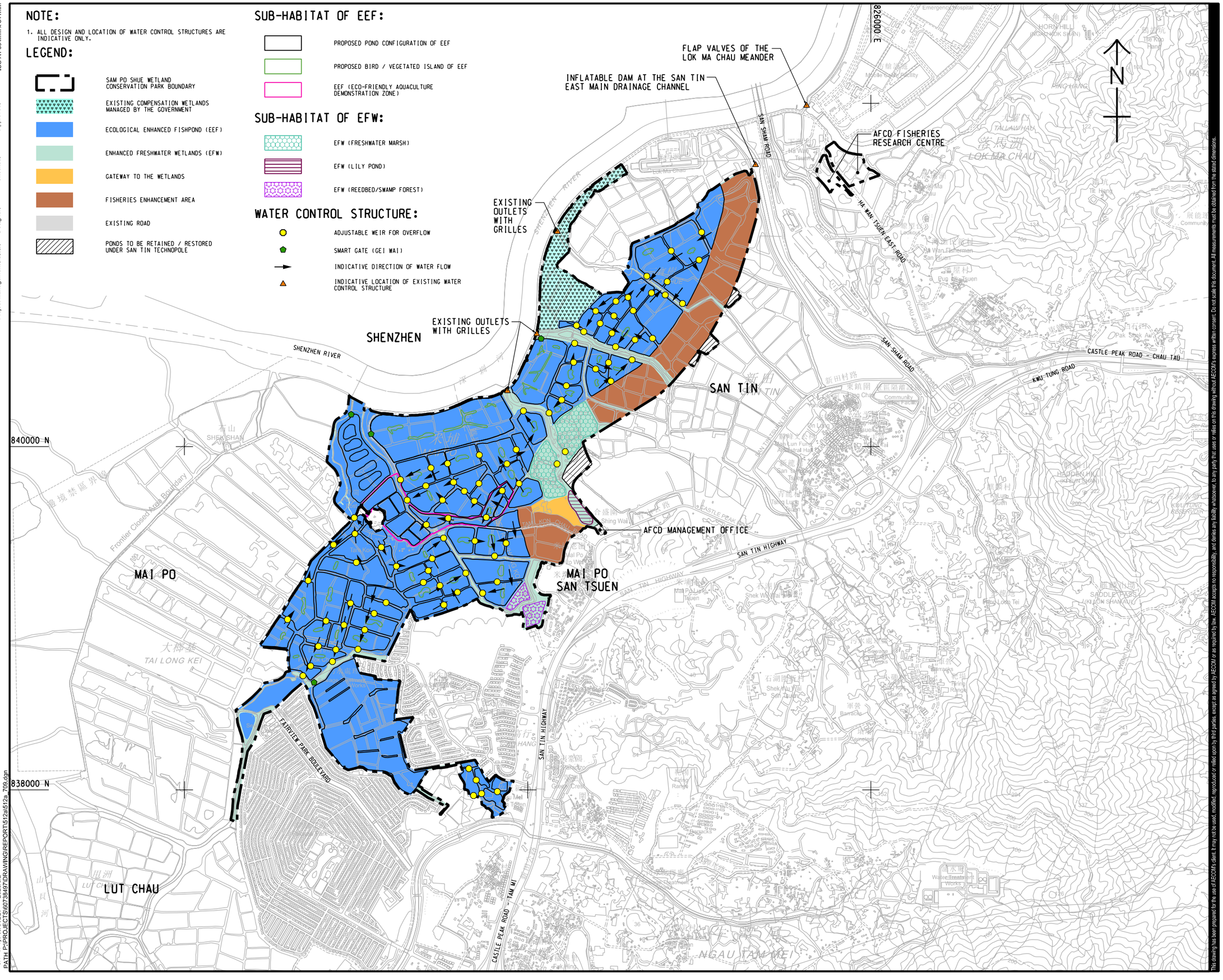
- PROPOSED POND CONFIGURATION OF EEF
- PROPOSED BIRD / VEGETATED ISLAND OF EEF
- EEF (ECO-FRIENDLY AQUACULTURE DEMONSTRATION ZONE)

SUB-HABITAT OF EFW:

- EFW (FRESHWATER MARSH)
- EFW (LILY POND)
- EFW (REEDBED/SWAMP FOREST)

WATER CONTROL STRUCTURE:

- ADJUSTABLE WEIR FOR OVERFLOW
- SMART GATE (GEI WAI)
- INDICATIVE DIRECTION OF WATER FLOW
- INDICATIVE LOCATION OF EXISTING WATER CONTROL STRUCTURE



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PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT
業主

土木工程拓展署
Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS
階段

SCALE 比例: A3 1 : 20000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60718076

AGREEMENT NO. 協議編號: CE 15/2023 (CE)

SHEET TITLE
圖紙名稱

OVERALL WATER FLOW ARRANGEMENT WITHIN THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER
圖紙編號

60738497/512a/FIGURE 6.1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTE:

1. ALL DESIGN AND INFRASTRUCTURE LOCATION ARE INDICATIVE ONLY.

LEGEND:

SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY

EXISTING COMPENSATION WETLANDS MANAGED BY THE GOVERNMENT

ZONE 1

ZONE 2

ZONE 3

PROPOSED POND CONFIGURATION

PROPOSED BIRD / VEGETATED ISLAND

PONDS TO BE RETAINED / RESTORED UNDER SAN TIN TECHNOPOLE

MAINTENANCE FACILITIES:

MAIN VEHICULAR ACCESS

BOARDWALK

CLUSTER OF MAINTENANCE LODGE AND STORAGE HUT

824000 E

826000 E

840000 N

838000 N

SHENZHEN

SHENZHEN RIVER

SAN TIN

MAI PO

MAI PO SAN TSUEN

LUT CHAU

AFCD FISHERIES RESEARCH CENTRE

AFCD MANAGEMENT OFFICE

SAN SHAM ROAD

HA WAN TSUEN EAST ROAD

CASTLE PEAK ROAD – CHAU TAU

KWU TUNG ROAD

SAN TIN HIGHWAY

FAIRVIEW PARK BOULEVARD

CASTLE PEAK ROAD – TAM MI

Frontier Closed Area Boundary

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PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT
業主

土木工程拓展署 Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS
階段

SCALE 比例
A3 1 : 20000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60718076

AGREEMENT NO. 協議編號
CE 15/2023 (CE)

SHEET TITLE
圖紙名稱

MANAGEMENT AND MAINTENANCE FACILITIES IN SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER
圖紙編號

60738497/512a/FIGURE 6.2

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTE:

1. ALL DESIGN ARE INDICATIVE ONLY.

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- EXISTING COMPENSATION WETLANDS MANAGED BY THE GOVERNMENT
- ECOLOGICAL ENHANCED FISHPOND (EEF)
- PROPOSED POND CONFIGURATION
- PROPOSED BIRD / VEGETATED ISLAND

CLUSTER GROUP OF PONDS

1a, 1b, 1c, 1d, 2, 3, 4, 5, 6

824000 E

826000 E

840000 N

838000 N

CLUSTER 1a

CLUSTER 1b

CLUSTER 1c

CLUSTER 1d

CLUSTER 2

CLUSTER 3

CLUSTER 4

CLUSTER 5

CLUSTER 6

AFCD MANAGEMENT OFFICE

AFCD FISHERIES RESEARCH CENTRE

SHENZHEN

SHENZHEN RIVER

SAN TIN

MAI PO

MAI PO SAN TSUEN

LUT CHAU

LOK MA CHAU

TAI LONG KEI

NGAU TAM MEI

SAN SHAM ROAD

HA WAN TSUEN EAST ROAD

CASTLE PEAK ROAD – CHAU TAU

KWU TUNG ROAD

SAN TIN HIGHWAY

CASTLE PEAK ROAD – TAM MI

FAIRVIEW PARK BOULEVARD

Frontier Closed Area Boundary

N

V:\BAKUS95-BAK\CSWP\plotdrv\Create Plt filenew\CSWP-75(color).pltPlot File by: WANGDF 2026/6/2PATH: P:\PROJECTS\60738497\DRAWING\REPORT\512a\512a_711.dgn

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AECOM Halcrow

PROJECT 項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT 業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT 工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS 分判工程顧問公司

ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS 階段

SCALE 比例 A3 1 : 20000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60718076

AGREEMENT NO. 協議編號 CE 15/2023 (CE)

SHEET TITLE 圖紙名稱

DRAIN DOWN CLUSTER OF THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER 圖紙編號

60738497/512a/FIGURE 6.3

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTE:

1. ALL DESIGN ARE INDICATIVE ONLY.

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- EXISTING COMPENSATION WETLANDS MANAGED BY THE GOVERNMENT
- ECOLOGICALLY ENHANCED FISHPOND (EEF)
- ENHANCED FRESHWATER WETLANDS (EFW)
- GATEWAY TO THE WETLANDS
- FISHERIES ENHANCEMENT AREA
- EXISTING ROAD
- PONDS TO BE RETAINED / RESTORED UNDER SAN TIN TECHNOPOLE

PROPOSED MONITORING SURVEYS LOCATION:

- FRESHWATER SAMPLINT POINT
- CAMERA TRAP LOCATION
- VANTAGE POINT FOR FLIGHT LINE
- SURVEY TRANSECT

SUB-HABITAT OF EEF:

- EEF (SMART GEI WAI - OPEN WATER)
- EEF (SMART GEI WAI - VEGETATED)
- EEF (LOW INTENSITY MANAGEMENT AREA)
- PROPOSED POND CONFIGURATION OF EEF
- PROPOSED BIRD / VEGETATED ISLAND OF EEF
- EEF (ECO-FRIENDLY AQUACULTURE DEMONSTRATION ZONE)

SUB-HABITAT OF EFW:

- EFW (FRESHWATER MARSH)
- EFW (LILY POND)
- EFW (REEDBED/SWAMP FOREST)

824000 E

826000 E

840000 N

838000 N

N

SHENZHEN

SHENZHEN RIVER

SAN TIN

MAI PO

MAI PO SAN TSUEN

LUT CHAU

AFCD FISHERIES RESEARCH CENTRE

AFCD MANAGEMENT OFFICE

HA WAN TSUEN EAST ROAD

SAM SHAM ROAD

CASTLE PEAK ROAD - CHAU TAU

KWU TUNG ROAD

SAN TIN HIGHWAY

FAIRVIEW PARK BOULEVARD

CASTLE PEAK ROAD - TAM MI

Frontier Closed Area Boundary

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PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT
業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM - HALCROW JOINT VENTURE

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS
階段

SCALE 比例: A3 1 : 20000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60718076

AGREEMENT NO. 協議編號: CE 15/2023 (CE)

SHEET TITLE
圖紙名稱

PROPOSED MONITORING SURVEYS LOCATION

SHEET NUMBER
圖紙編號

60738497/512a/FIGURE 7.1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTE:

1. THE AFCD FISHERIES RESEARCH CENTRE TO BE RESUMED / CLEARED UNDER THE STT PROJECT PHASE ONE.

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- PHASE ONE
- REMAINING PHASES
- PONDS TO BE RETAINED / RESTORED UNDER STT

822000 E

824000 E

826000 E

842000 N

840000 N

838000 N

N

SHENZHEN

SHENZHEN RIVER

SAN TIN

MAI PO

LUT CHAU

TAI LONG KEI

NGAU TAM MEI

LOK MA CHAU

AFCD FISHERIES RESEARCH CENTRE

AFCD MANAGEMENT OFFICE

SAN SHAM ROAD

HA WAN TSUEN EAST ROAD

CASTLE PEAK ROAD – CHAU TAU

KWU TUNG ROAD

SAN TIN HIGHWAY

CASTLE PEAK ROAD – TAM MI

FAIRVIEW PARK BOULEVARD

Frontier Closed Area Boundary

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PROJECT 項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

CLIENT 業主

土木工程拓展署 Civil Engineering and Development Department

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STATUS 階段

SCALE 比例 A3 1 : 20000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60718076

AGREEMENT NO. 協議編號 CE 15/2023 (CE)

SHEET TITLE 圖紙名稱

PHASING PLAN FOR THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER 圖紙編號

60738497/512a/FIGURE 8.1

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ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

822000 E

824000 E

826000 E

842000 N

840000 N

838000 N

SHENZHEN

SHENZHEN RIVER

SAN SHAM ROAD

AFCD FISHERIES RESEARCH CENTRE

HA WAN TSUEN EAST ROAD

SAN TIN

SAM SHAM ROAD

CASTLE PEAK ROAD – CHAU TAU

KWU TUNG ROAD

AFCD MANAGEMENT OFFICE

SAN TIN HIGHWAY

MAI PO

LUT CHAU

FAIRVIEW PARK BOULEVARD

CASTLE PEAK ROAD – TAM MI

NGAU TAM MEI

Frontier Closed Area Boundary

N

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- EXISTING COMPENSATION WETLANDS MANAGED BY THE GOVERNMENT
- PHASE ONE
- REMAINING PHASE

DEVELOPMENT PRIORITY:

- 1
- 2
- 3
- 4
- REMAINING PHASE WITH HIGHER DEVELOPMENT PRIORITY
- PONDS TO BE RETAINED / RESTORED UNDER SAN TIN TECHNOPOLE

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FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – PACKAGE 1 - DESIGN AND CONSTRUCTION

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STATUS 階段

SCALE 比例 A3 1 : 20000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60718076

AGREEMENT NO. 協議編號 CE 15/2023 (CE)

SHEET TITLE 圖紙名稱

DEVELOPMENT PRIORITY FOR AREAS IN THE SAM PO SHUE WETLAND CONSERVATION PARK

SHEET NUMBER 圖紙編號

60738497/512a/FIGURE 8.2

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APPENDICES

Appendix A

Indicative Location for Wetland and Fisheries Enhancement Recommended in EIA Report for San Tin / Lok Ma Chau Development Node

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

PROJECT BOUNDARY
項目範圍

MAI PO NATURE RESERVE
米埔自然護理區

RETAINED EXISTING COMPENSATORY WETLANDS AND CLEAN-UP REEDBEDS
保留現有補償性濕地和疊葦床

POTENTIAL AREA FOR WETLAND AND FISHERIES ENHANCEMENT
擬議濕地和漁業優化位置

822000 E

824000 E

826000 E

N

842000 N

840000 N

838000 N

THE LOOP
河套區

LOK MA CHAU
落馬洲

SAM PO SHUE
三寶樹

SAN TIN
新田

MAI PO
米埔

FAIRVIEW PARK
錦繡花園

SHENZHEN RIVER

KAM TIN RIVER

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PROJECT
項目

FIRST PHASE DEVELOPMENT OF THE NEW TERRITORIES NORTH – SAN TIN / LOK MA CHAU DEVELOPMENT NODE – INVESTIGATION

CLIENT
業主

土木工程拓展署
Civil Engineering and Development Department

規劃署
Planning Department

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I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS
階段

SCALE 比例	DIMENSION UNIT 尺寸單位
A3 1 : 25000	METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號	AGREEMENT NO. 合約編號
60670882	CE 20/2021

SHEET TITLE
圖紙名稱

INDICATIVE LOCATION FOR WETLAND AND FISHERIES ENHANCEMENT

SHEET NUMBER
圖紙編號

60670882/A34/FIGURE 11.2

Appendix B

Habitat Creation and Management Plans for Existing Wetland Compensation and Mitigation Areas within the SPS WCP

Appendix B1

Habitat Creation and Management Plan for the Offsite Wetland Compensation Areas for the Lok Ma Chau Loop Development

土木工程拓展署
Civil Engineering and Development Department

Agreement No. CE 5/2018 (CE)

Development of Lok Ma Chau Loop: Main Works Package 1 – Design and Construction

Ecological Mitigation/ Habitat Creation and Management Plan for Sub-package A and B (Final) – Issue 4

(Ref. B9a-05 & B9b-05)

November 2021



AECOM Imagine it. Delivered.

土木工程拓展署
Civil Engineering and Development Department
West Development Office

Agreement No. CE 5/2018 (CE)

Development of Lok Ma Chau Loop: Main Works Package 1 – Design and Construction

Ecological Mitigation/ Habitat Creation and Management Plan for Sub-package A and B (Final) – Issue 4

(Ref. B9a-05 & B9b-05)

November 2021

Reviewed: Kelvin Cheng 29 November 2021

Approved for Issue: Conrad Ng 29 November 2021

AECOM ASIA COMPANY LIMITED

Disclaimer:

This report is prepared for Civil Engineering and Development Department (CEDD) and is given for its sole benefit in relation to and pursuant to Agreement No. CE 5/2018 (CE) Development of Lok Ma Chau Loop: Main Works Package 1 – Design and Construction and may not be disclosed to, quoted to or relied upon by any person other than CEDD without our prior written consent. No person (other than CEDD) into whose possession a copy of this report comes may rely on this report without our express written consent and CEDD may not rely on it for any purpose other than as described above.

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1 INTRODUCTION

1.1 Background

1.1.1 As a result of the training of Shenzhen (SZ) River, which serves as the administrative boundary between Hong Kong Special Administrative Region (HKSAR) and SZ, an area of about 88 hectares, previously lying to the north of the river course, became situated to the south of the re-aligned river course and falls within the boundary of the HKSAR. The area, commonly known as the Loop, was once used as a dumping ground for mud dredged from the river regulation works.

1.1.2 The Loop is located near several major cross-boundary transport nodes including the Lok Ma Chau Boundary Control Point, the MTR Lok Ma Chau Station of the Lok Ma Chau Spur Line and the San Tin Interchange. To the north across SZ River is the Huanggang Control Point of SZ. To the southwest is the Mai Po Nature Reserve and to the east is Hoo Hok Wai, comprising fish ponds of high ecological value.

1.1.3 The Loop development is one of the ten major infrastructure projects announced in the 2007-08 Policy Address for economic growth. The Planning and Engineering Study (P&E Study), Agreement No. CE 53/2008 (CE) "Planning and Engineering Study on Development of Lok Ma Chau Loop – Investigation", funded under PWP Item No. 735CL, was completed in 2014. The P&E Study investigated the feasibility of and formulated a comprehensive development plan for the Loop taking into account the prevailing planning circumstances and public views collected through public engagement.

1.1.4 The P&E Study is a Designated Project under Schedule 3 of the Environmental Impact Assessment Ordinance (EIAO). In October 2013, the Environmental Impact Assessment Report (EIA Report) for the Loop development was approved by Director of Environmental Protection (DEP) pursuant to the EIAO. One of the EIA Report approval conditions is to exclude the proposed Eastern Connection Road (ECR) recommended with reference to the P&E Study, from the EIA Report. The Environmental Permit (EP) for the Loop to construct and operate the relevant Designated Projects (DP) was granted by DEP on 22 November 2013.

1.1.5 On 3 January 2017, the Government of Hong Kong Special Administrative Region (HKSARG) and Shenzhen Municipal People's Government (SZMPG) signed the Memorandum of Understanding on Jointly Developing the Lok Ma Chau Loop by Hong Kong and Shenzhen between the Hong Kong Special Administrative Region Government and Shenzhen Municipal People's Government, agreeing to, under the "one country, two systems" principle and in accordance with the Basic Law, jointly develop the Loop into the Hong Kong-Shenzhen Innovation and Technology Park (HSITP) and establish a key base for co-operation in scientific research with related higher education, cultural & creative and other complementary facilities in the HSITP. According to the Memorandum, HKSARG will be responsible for the construction of infrastructure within the Loop (including site formation and infrastructural facilities) and the provision of supporting infrastructural facilities outside the Loop which are necessary for the development of the Loop and its surrounding areas. HKSARG will lease the formed land within the Loop to Hong Kong Science and Technology Parks Corporation (HKSTPC) by appropriate land disposal means for the development of HSITP. The HKSTPC has set up a wholly-owned subsidiary company vested with the responsibility to develop the HSITP, as well as to operate, maintain and manage the HSITP. On 6 October 2017, the subsidiary company named Hong Kong Shenzhen Innovation and Technology Park Limited (HSITPL) was incorporated.

1.1.6 HSITP will be developed with Innovation and Technology (I&T) as the main focus, where a key base for cooperation in scientific research, and relevant higher education, culture & creative and other complementary facilities will be set up. HSITP will provide a maximum total gross floor area of 1.2 million square metres, which will be the largest I&T platform ever established in the history of Hong Kong and the most important infrastructure for driving research and development and "re-industrialization". The draft Lok Ma Chau Loop Outline Zoning Plan (OZP) was approved by Chief Executive in Council on 30 January 2018. The approved Lok Ma Chau Loop OZP was exhibited for public inspection on 9 February 2018. The old SZ River meander which has been included in the approved OZP as "CA" zone (Conservation Area zoned in statuary OZP).

1.1.7 The development of the Loop into the HSITP is being taken forward by the Innovation and Technology Bureau (ITB) as the lead policy bureau. The Development Bureau (DEVB) and the Civil Engineering and Development Department (CEDD) support the development by undertaking the associated site formation and infrastructure works to provide the formed land to ITB/ HKSTPC for development of the HSITP as well as the supporting infrastructural facilities. To take forward the HSITP development, HSITPL has commenced its preparatory work, among others, to study the positioning and business model of the subject development. A master plan with development phasing/ programme, detailed land uses and other relevant assessments would be submitted by HSITPL for HKSARG's approval.

Work Packaging

1.1.8 The Loop has been planned to be developed into a sustainable, environmentally friendly, energy efficient and people-oriented community. According to the recommendations in the P&E Study, the Loop development will be implemented in three works packages: Advance Works, Main Works Package 1 and Main Works Package 2. Advance Works, covered by PWP item No. 748CL – Development of Lok Ma Chau Loop – land decontamination and advance engineering works, is to pave way for the ensuing construction works within the Loop. Main Works Package 1 (pertinent to this Project), covered by PWP item No. 760CL – Development of Lok Ma Chau Loop – Main Works Package 1, is to form the site for the subsequent development of buildings and associated facilities for Phase 1 of HSITP, as well as providing the infrastructure and supporting facilities for Phase 1 of the Loop development. Main Works Package 2, to be covered by PWP item yet to be created, is to provide the infrastructure and supporting facilities for the remaining development of the Loop.

1.1.9 The project scope of the Advance Works mainly comprises provision of construction access to the Loop, carrying out land decontamination treatment, and creating and establishing an Ecological Area (EA) zone and other associated environmental mitigation measures within the Loop. According to the Project EIA Report, an existing reedbed within the Loop would be affected by the proposed development. Mitigation measures to compensate for the reedbed habitat loss need to be carried out in advance, prior to clearance of reed marsh in the Loop. In particular, the EA zone shall be largely established and functional under the Advance Works to meet the relevant EP requirements. The detailed design for the Advance Works has been completed under another consultancy with the construction works commenced on 22 June 2018.

1.1.10 Under the current Project (Main Works Package 1), some of the works involve time-demanding procedures such as land resumption, Vesting Deed modification and

legislative amendment procedures, and road works gazettal and authorization. To stream-line the project works have been split into two sub-packages. Works in Sub-package A do not involve time-demanding procedures, and comprise site formation and infrastructure works inside the Loop, fresh water service reservoir and associated waterworks, Sewage Treatment Works (STW), sediment treatment works in SZ River near the Loop, associated ecological compensation/ enhancement works outside the Loop and any other works. Works in Sub-package B involve such time-demanding procedures and comprise the Western Connection Road (WCR), the Lok Ma Chau Road/San Tin Highway Connection, the Direct Road Link (DRL), associated infrastructure works and any other works. Generally, the works in Sub-package A and the works in Sub-package B will start in 2020 and 2022 respectively for commissioning by phases. It is expected that Phase 1 of HSITP will start to implement with population intake gradually from 2023.

1.2 The Project

1.2.1 AECOM Asia Co Ltd (hereafter referred to as the *Consultant*) was commissioned by CEDD to undertake Agreement No. CE5/2018 (CE) – Development of Lok Ma Chau Loop: Main Works Package 1 – Design and Construction. The *starting date* of *services* is 14 September 2018 and the *completion date* for the whole of the *services* is the date of 101 months after the *starting date*.

1.2.2 The Project scope comprises the following principal works elements:

Sub-Package A

a) Site formation of the Loop;

b) Construction of internal roads, footpaths and cycle tracks, where appropriate in the Loop;

c) Provision of infrastructure/ supporting facilities for Phase 1 of the HSITP, including open spaces, sewage treatment works (Phase 1), water service reservoir and associated waterworks, combined utilities enclosure (CUE) as well as drainage and sewerage works;

d) Carrying out sediment treatment works in SZ River near the Loop;

e) Provision of landscape hard works and soft works;

f) Provision of offsite ecological compensation/ enhancement; and

g) Other works.

Sub-Package B

a) Construction of WCR comprising widening of existing Ha Wan Tsuen East Road/ Lok Ma Chau Road with footpaths and cycle tracks, as well as connection roads to Fanling/San Tin Highway;

b) Construction of a Direct Road Link (DRL) for environmentally friendly transport system (EFTS) connecting MTR Lok Ma Chau Station and the Loop and the associated modification works to the MTR Lok Ma Chau Station and the existing

structures including but not limited to the footbridges and public transport interchange (PTI);

c) Provision of noise mitigation works; and

d) Other works.

1.3 Objectives of the Habitat Creation and Management Plan

1.3.1 Mitigation measures for project components implemented under this project include the provision of Offsite Wetland Compensation Areas (OWCAs). These comprise permanent and temporary compensatory off-site wetland areas to be constructed prior to corresponding direct and indirect impacts to wetlands.

1.3.2 Under Environmental Permit (EP) number EP-477/2013, an Ecological Mitigation/ Habitat Creation and Management Plan (HCMP) is required for all habitat compensation measures required by the Project EIA. The HCMP is required to show the design details, locations, implementation programme, maintenance and management schedules, and drawings in the scale of 1:1000 or other appropriate scale of the ecological mitigation measures of the Project.

1.3.3 The current document provides HCMP for OWCAs only. An Offsite Woodland Compensatory Planting Plan will be submitted separately. The HCMP for on-site habitat creation (EA) has been undertaken under Agreement No. CE5/2014 (CE) Development of Lok Ma Chau Loop: Land Decontamination and Advance Engineering Works – Design and Construction.

1.4 Structure of this Report

1.4.1 The remainder of this Report is structured as follows:

- Chapter 2: Details key mitigation requirements required to be provided by the OWCAs.
- Chapter 3: Describes baseline environmental conditions at the OWCAs.
- Chapter 4: Outlines key management objectives for development of the OWCAs.
- Chapter 5: Describes design and construction methods for the OWCAs.
- Chapter 6: Describes management requirements for the OWCAs.
- Chapter 7: Details monitoring requirements for the OWCAs.

2 KEY MITIGATION REQUIREMENTS

2.1 Background

2.1.1 The EIA Report identified habitats and species of conservation importance potentially affected by the development of the Lok Ma Chau Loop (The Loop). Habitat loss and disturbance impacts are predicted for both construction and operation phase of the development. If these ecological impacts are left unmitigated, it is expected to cause impacts of high significance to the area's ecological resources. The EIA Report applied the mitigation hierarchy to avoid, minimize and compensate for identified impacts. After incorporating design elements to avoid and minimize impacts, there is still requirement for compensation to reduce adverse residual impacts to acceptable levels.

2.1.2 Impacts that require compensation include habitat loss and disturbance of existing habitats and species caused by the development. All these impacts are expected to be compensated both temporarily (during construction phase) and permanently (during operation phase). Among other measures, three areas of existing fishpond habitat (Areas 2, 7 and 9) were proposed in the EIA Report to provide off-site compensation wetland (**Figure 2.1**).

2.1.3 In the calculation of compensation requirements for habitat loss, the EIA Report adopted a basic principle to compensate the entire functional value of the lost habitat. Two more factors, the Exclusion Zone (EZ) and Reduced Density Zone (RDZ) were considered to calculate compensation requirements for disturbance impacts to large waterbirds. The EZ refers to wetland within an exclusion distance of 100m around the disturbance source, which is predicted not to be used by large waterbirds. The RDZ refers to the 100-150m around the EZ, where large waterbirds would occur at reduced densities. Compensation requirement for EZ would be on a 1:1 basis in terms of wetland area, while for RDZ would be on a 1:2 basis.

2.1.4 Specific off-site compensatory habitat enhancement requirements are detailed in the EIA Report and Environment Permit (EP) and are described below.

2.2 Requirements of the Environmental Permit

2.2.1 Section 2.7 of EP number EP-477/2013 stipulates measures that the permit holder shall implement to mitigate ecological impact during construction and operation stages of the Project. Condition 2.7 (f) states that the permit holder shall "provide (i) permanent compensatory off-site wetland areas; and (ii) construction stage temporary compensatory off-site wetland areas during various construction stages of the Project, in advance of any corresponding wetland loss." Such mitigation measure will be implemented throughout the Project's construction and operation stages when applicable.

2.2.2 Section 2.7 of the EP also states that "Four hard copies and two electronic copies of an Ecological Mitigation / Habitat Creation and Management Plan shall be, at least one month before the commencement of corresponding parts of the works of the Project, deposited with the Director. The Plan(s) shall show the design details, locations, implementation programme, maintenance and management schedules, and drawings in the scale of 1:1,000 or other appropriate scale of the ecological mitigation measures of the Project. Before submission to the Director, the Plan(s) shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report. All measures recommended in the finalized submission(s) under this Condition shall be fully and properly implemented."

2.2.3 Summary of follow-up actions of the Project related to the OWCAs in response to the EP under Section 2.7 are detailed in below **Table 2.1**.

Table 2.1 Ecological Mitigation Measures (EP-477/2013 Condition 2.7)

EP Requirements	Applicable for Main Works Package 1		
Submission and Measures to Mitigate Ecological Impact	**Yes**	**No**	**Remarks**
EP Condition 2.7 To reduce the ecological impact during construction and operation stages of the Project, a series of ecological mitigation measures shall be implemented as conforming to the relevant information and recommendations, including those described in Section 12.7 (Ecological Mitigation Measures), contained in the EIA Report. The key ecological mitigation measures shall include:	-	-	-
(a) conducting pre-construction search for any otter holts/dens and herpetofaunal species of conservation concern in construction sites, with remedial measures such as setting of no works area around otter holts/ den and translocation of important species identified, if any;	✓	-	The pre-construction search will be carried out before commencement of works in the OWCAs.
(f) providing (i) permanent compensatory off-site wetland areas; and (ii) construction stage temporary compensatory off-site wetland areas during various construction stages of the Project, in advance of any corresponding wetland loss;	✓	-	Compensatory off-site wetland areas required for both permanent and construction stage of Main Works Package 1 will be provided in advance of any corresponding wetland loss for the Project.
(i) using powered mechanical equipment for construction works only during the period 9am to 5pm at and near the old Shenzhen River meander and other identified important ecologically sensitive areas, if any;	✓	-	This will be implemented for works in the OWCAs.
(k) implementing measures to minimise magnitude of construction runoff and to avoid/minimise the potential impact of spillage events, if any; and	✓	-	This will be implemented for works in the OWCAs.

EP Requirements	Applicable for Main Works Package 1		
Submission and Measures to Mitigate Ecological Impact	**Yes**	**No**	**Remarks**
Four hard copies and two electronic copies of an Ecological Mitigation / Habitat Creation and Management Plan shall be, at least one month before the commencement of corresponding parts of the works of the Project, deposited with the Director. The Plan(s) shall show the design details, locations, implementation programme, maintenance and management schedules, and drawings in the scale of 1:1,000 or other appropriate scale of the ecological mitigation measures of the Project. Before submission to the Director, the Plan(s) shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report. All measures recommended in the finalised submission(s) under this Condition shall be fully and properly implemented.	✓	-	The first issue of HCMP detailing primarily the creation and establishment of the Ecological Area under the Advance Works was submitted in under EP condition 2.7. This HCMP, submitted in June 2021, is to provide the design details of the Offsite Wetland Compensation Areas under the Main Works Package 1.

Pre-construction Search Surveys

2.2.4 Pre-construction surveys for otter holts/ dens and herpetofaunal species of conservation concern within the construction sites required under EP condition 2.7 (a) have been carried out for OWCAs (Area 2, 7 and 9) in May/ June 2021 before works commence. No otter holts/ dens were identified. The detailed survey report is included in **Appendix A**.

2.2.5 Although no otter holts/ dens were found during pre-construction search survey, if any holts or dens are later found in use for breeding during construction, works in the area will cease. No works area with an access corridor will be set around the otter holts/ dens as buffer, in which no human activity will be allowed until breeding is completed. As recommended in the EIA Report (Table 12.82b), no works should be undertaken within 150m of any active natal den or within 30m of any holt. Mitigation measures should also be in place to restrict access. Further measures should be taken if required, in consultation with AFCD.

2.3 Requirements of the Environmental Impact Assessment

2.3.1 Offsite mitigation will be employed to compensate for direct and indirect impacts of infrastructural connections of Western Connection Road (WCR), Eastern Connection Road (ECR) and Direct Link Road to LMC Station (DRL) as well as indirect impacts caused by the Loop.

2.3.2 The ECR is not included under the current Project's scope, and it is not expected to be constructed until some years later. Therefore, temporary and permanent mitigation for ECR is not directly addressed under this HCMP. However, the EIA Report co-locates some off-site compensatory measures for the ECR together with those for the WCR, DRL and indirect impacts from the Loop. As stated in Section 12.7.10.6 of the EIA Report, compensation of marsh and seasonally wetland grassland for ECR will be provided together with the marsh compensation of WCR. In order to achieve complete functionality of the OWCAs, these co-located ECR mitigation measures will be considered together in this HCMP.

2.4 Habitat Compensation Requirements

2.4.1 Habitat compensation requirements estimated under the EIA Report and the actual area of compensation required for the Project are summarized in **Table 2.2** and **Table 2.3** respectively, and described in the following sections. Base on the latest design, there will be a small discrepancy in the permanent mitigation requirement (grey area in **Table 2.3**), which could still be catered for by the original OWCAs requirement.

Table 2.2 Estimated Offsite Compensation Requirements for Development Components as in EIA Report

Offsite Compensation Area		Lok Ma Chau Loop		Western Connection Road		Direct Link Road to LMC Station		Eastern Connection Road *		Total Minimum Required Area
		Temporary Mitigation	Permanent Mitigation	Temporary Mitigation	Permanent Mitigation	Temporary Mitigation	Permanent Mitigation	Temporary Mitigation	Permanent Mitigation	
2	Marsh (2.02ha)	-	-	-	0.07ha	-	-	-	1.95ha	2.02ha
	Fishpond (5.94ha)	-	4.51ha	-	0.92ha	-	-	-	-	5.43ha
7	Marsh	-	-	-	-	0.032ha	-	-	-	0.032ha
	Fishpond (3.45ha)	-	-	-	-		2.28ha	-	-	2.28ha
9	Fishpond (7.00ha)	-	-	4.11ha	-	-	-	-	-	4.11ha

Note: *Only permanent mitigation of marsh habitat is considered for Eastern Connection Road
Parentheses indicate total area of the Area

Table 2.3 Actual Offsite Compensation Requirements for Development Components under the Project

Offsite Compensation Area		Lok Ma Chau Loop		Western Connection Road		Direct Link Road to LMC Station		Eastern Connection Road *		Total Minimum Required Area
		Temporary Mitigation	Permanent Mitigation	Temporary Mitigation	Permanent Mitigation	Temporary Mitigation	Permanent Mitigation	Temporary Mitigation	Permanent Mitigation	
2	Marsh (2.02ha)	-	-	-	0.07ha	-	-	-	1.95ha	2.02ha
	Fishpond (5.94ha)	-	4.51ha	-	0.92ha	-	-	-	-	5.43ha
7	Marsh	-	-	-	-	0.032ha	-	-	-	0.032ha
	Fishpond (3.45ha)	-	-	-	0.85ha		2.28ha	-	-	3.13ha
9	Fishpond (7.00ha)	-	-	4.11ha	-	-	-	-	-	4.11ha

Note: *Only permanent mitigation of marsh habitat is considered for Eastern Connection Road
Parentheses indicate total area of the Area

Temporary Mitigation Requirements

Western Connection Road

2.4.2 As stipulated in the EIA Report, four fishponds with a total area of 3.51ha will be temporarily drained during construction phase of the WCR, and the loss of these habitats requires compensation (see **Appendix B**). Under the latest arrangement, only less than half of Pond 11 will be drained while the remaining area will be retained. At Pond 12, slope works along the bunds would extend by a few metres into the exclusion zone delineated in the EIA Report, resulting in a slight increase in disturbance impacts to the retained area. With total area drained for Pond 11 and 12 could not be larger than Pond 11's area and only less than half of Pond 12 could be drained, such disturbance impacts could be adequately offset by retention of approximately half of Pond 11 during the construction phase. No extra area would be required for temporary mitigation.

2.4.3 A small area of edge at Pond 6 – 9 will also be temporary affected under the latest WCR alignment due to slope stabilisation works on existing bunds. However, as mentioned in the EIA Report, given that most of the WCR's alignment (Pond 6 – 9 included) falls within the existing disturbance shadow of the LMC Spur Line Viaduct, plus the existing vehicular traffic on Ha Wan Tsuen Road, it is expected that such impacts are minor. While additional disturbance impacts to fishpond habitats during construction period will only affect Pond 12. The disturbed area of this Pond is 0.36ha in the EZ and 0.24ha in the RDZ, equaling to a mitigation requirement of 0.6ha. In total, 4.11ha of mitigation is required to compensate for temporary loss of ponds and disturbance impacts associated with WCR construction.

2.4.4 Such temporary mitigation for WCR construction phase impacts on fishponds (4.11ha) will be provided in Area 9 (7.00ha). The whole of Area 9 will be utilized as fishpond habitat and also provide a 10% contingency that allows extra habitat provision for little egret during construction of WCR.

Direct Link Road to Lok Ma Chau Station

2.4.5 There will be temporarily loss of part of a single reed cell (0.032ha) in the MTR Lok Ma Chau Spur Line Wetland Mitigation Area's (LMC WMA) wastewater reedbed area during construction phase of the DRL (see **Appendix C**). Such temporarily loss will be compensated in Area 7, where 0.032ha of reed marsh will be provided during the construction period.

2.4.6 No mitigation for disturbance impacts during both construction and operation phase of DRL is required. This is because the DRL alignment runs through an area of disturbed ponds which all lie in the disturbance shadow of the Spur Line, and disturbance impacts have already been mitigated by the Spur Line project.

Permanent Mitigation Requirements

Lok Ma Chau Loop

2.4.7 Indirect disturbance impacts to fishpond habitats adjacent to the Loop will be compensated offsite. 0.25ha of fishponds fall within the disturbance impact EZ, and 4.26ha in the RDZ, which results in requirement of 4.51ha fishpond habitat for permanent mitigation. This will be provided in Area 2.

Western Connection Road

2.4.8 According to EIA Report, WCR will result in a permanent loss of 0.92ha fishpond habitat (see **Appendix D**). In addition, there will also be a loss of 0.07ha marsh. The 0.92ha of fishpond loss will be compensated together with the 4.51ha disturbance impacts caused by the Loop providing 5.43ha fishpond habitat in Area 2 in total.

2.4.9 For provision of compensation marsh habitat, 0.07ha is too small to provide functional value of such habitat. The EIA Report therefore proposed that all full permanent compensatory marsh habitat creation associated with the Project is dealt with in one location at the beginning of the Project. This includes a much larger area of compensatory marsh (1.76ha marsh and 0.19ha seasonally wet grassland) as required to compensate for development of the ECR. A total 2.02ha of marsh habitat will therefore be provided in Area 2 to ensure the effectiveness of the habitat.

Review on Latest Western Connection Road Alignment

2.4.10 According to the latest design of WCR alignment, there will be small discrepancy for fishpond area loss from EIA Report Ecology Section. As stipulated in EIA Report, permanent loss of Pond 10 (0.89ha) plus very minor areas at the edge of other ponds (Pond 5 – 9, 11 and 12) constitutes 0.92ha will occur. From the latest WCR alignment design, permanent loss of Pond 10 remains unchanged but will be slightly increased for Pond 5 – 9, 11 and 12 as shown in below **Table 2.4**.

2.4.11 The slight increase in area loss for Pond 5 – 9, 11 and 12 is due to slope stabilisation works on existing bunds. These works will improve the existing poor, steep edge condition and stabilise the bunds for planting of trees, as required under EIA Report for landscape mitigation measure. Pond 13 will involve slope stabilisation works and construction of an amenity area as landscape mitigation measure.

2.4.12 Base on this review, apart from the 0.92ha fishpond loss estimated by the EIA Report, there will be an extra of 0.85ha fishpond loss under the Project by WCR that require permanent compensation. This 0.85ha can be fully compensated by the extra 1.17ha of Area 7 as only 2.28ha is required for permanent compensation for DRL (refer to **Table 2.3** and **Section 2.4.13**). As such, no extra area would be required for permanent mitigation.

Table 2.4 Comparison of Fishpond Area Loss for Western Connection Road Alignment

Pond	EIA Report (Ecology Section) (ha)	Estimated Area of Loss under Main Works Package 1 (ha)
10	0.89 (remain unchanged)	
5	0.03	0.07
6		0.02
7		0.02
8		0.02
9		0.07
11		0.24
12		0.07
13		0.37
Total	0.92	1.77

Direct Road Link to Lok Ma Chau Station

2.4.13 Five fishponds (totaling 2.28ha) lying below alignment of the DRL will be permanently lost (see **Appendix D**). Area 7 (3.45ha) will be used to compensate for the permanent loss of these Ponds. Area 7 is 1.17ha larger than the required wetland compensation area, yet, in order to provide a contingency for failure to meet targets in other areas, the whole of Area 7 will be utilized as pond habitat.

2.4.14 In summary, Area 2 and 7 will be utilized as permanent mitigation for the Project, with 0.032ha of Area 7 initially being used as reed marsh during construction phase of DRL. Area 9 will be utilized to compensate for temporary impacts associated with WCR construction. Upon completion of WCR's construction, Area 9 could be utilized as temporary and permanent compensation area for ECR.

2.5 Target Species for Offsite Wetland Compensation Areas

2.5.1 The EIA Report identified key species that would be impacted by the Loop development, and should be the focus of planning and management for habitat compensation. These species were selected based on two criteria as stated in the EIA Report Section 12.8.2:

(i) Any species of conservation importance based upon criteria provided by BirdLife International (2019) and Fellowes *et al*. (2002), which was recorded in the impacted areas/ habitats in numbers considered to be of significance during the baseline ecological surveys; or

(ii) Any species that, although not of conservation concern, was recorded in the impacted areas/ habitats in numbers sufficiently high to indicate that their distribution and abundance in Deep Bay or Hong Kong as a whole would be significantly impacted by the proposed development.

2.5.2 Eighteen species were considered to meet the above criteria, comprising eight avifauna, two mammal, three herpetofauna and five dragonfly species (**Table 2.5**). As the OWCAs mainly aim to create habitat of marsh and fishpond, species that utilize these two habitats are considered as primary species and those utilize reed marsh will be considered as secondary species. Detailed habitat requirements of these species are provided in **Appendix E**.

Table 2.5 Target Species for Offsite Wetland Compensation Areas

Species	Scientific Name	Preferred Habitat*			Primary/Secondary Species for Offsite Mitigation (P/S)
		Fish pond	Reed Marsh	Marsh	
Great Cormorant	*Phalacrocorax carbo*	✓			P
Little Egret	*Egretta garzetta*	✓	(✓)	(✓)	P
Chinese Penduline Tit	*Remiz consobrinus*		✓		S
Dusky Warbler	*Phylloscopus fuscatus*	(✓)	✓	✓	P
Oriental Reed Warbler	*Acrocephalus orientalis*	(✓)	✓	(✓)	S
Black-browed Reed Warbler	*Acrocephalus bistrigiceps*	(✓)	✓	✓	P
Pallas's Grasshopper Warbler	*Locustella certhiola*	(✓)	✓	✓	P
Bluethroat	*Luscinia svecica*	(✓)	✓	✓	P
Eurasian Otter	*Lutra lutra*	✓	✓	✓	P
Leopard Cat	*Prionailurus bengalensis*	✓	✓	(✓)	P
Two-striped Grass Frog	*Rana taipehensis*			✓	P
Chinese Bullfrog	*Hoplobatrachus chinensis*			✓	P
Common Rat Snake	*Ptyas mucosus*	✓	✓	✓	P
Scarlet Basker	*Urothemis signata*			✓	P
Ruby Darter	*Rhodothemis rufa*			✓	P
Common Evening Hawker	*Anaciaeschna jaspidea*			✓	P
Sapphire Flutterer	*Rhyothemis triangularis*			✓	P
Coastal Glider	*Macrodiplax cora*			✓	P

Note: *Reference to Table 12.81 of the EIA Report
Parentheses indicate that the habitat can support the species indicated, but is not the preferred habitat, and abundance are likely to be lower

2.6 Ecological Enhancement Measures for Offsite Wetland Compensation Areas

Fishpond

2.6.1 As stipulated in Section 12.8.6.2 of the EIA Report, existing commercially operated fishponds at OWCAs should be enhanced to provide foraging ground and food source for target species. Fishpond and pond bunds should also be enhanced through earth-moving activities to create suitable habitats for target species. Principal fishponds enhancement measures and activities include the following:

- extending the period during which drained ponds are available to birds by draining ponds sequentially throughout the winter period;
- draining ponds more slowly so that fish and other food is available over a longer period;
- maintaining some ponds with shallow water suitable for ardeids to wade for an extended period;
- maximising the usefulness of fish stocks to birds by stocking in a way that most fish are of a suitable size to be eaten by the target bird species;
- recontouring ponds so that the pond base has a shallow slope, thus providing a larger feeding area when ponds are full, as well as a progressive increase in the feeding area when ponds are drained;
- establishment and maintenance of bankside and emergent vegetation on some ponds to provide refuges for fish and appropriate conditions for invertebrates that will themselves provide food for birds;
- repeated stocking of some ponds with trash fish during the winter months to permit the same pond to be drained (or partially drained) more than once per season;
- fish stocking in ponds serving as potential foraging areas of otters;
- clearance of vegetation (including trees, shrubs, herbs and rank grass) from internal bunds to reduce the inhibitory effect that enclosure of ponds has on their use by some waterbirds and to provide suitable loafing and roosting areas;
- linking some smaller ponds, both to increase overall pond size (larger ponds are favoured by some of the target species) and to create island areas from former bund sections that will form roost areas free from ground predators and disturbance and provide undisturbed areas for otters.

Marsh

2.6.2 As stipulated in Section 12.8.7.2 of the EIA Report, marsh areas in OWCAs will be designed to provide a variety of microhabitats with permanently wet, seasonally wet and seasonally damp conditions, patched of open water, floating and emergent vegetation and bare mud. The areas will be reprofiled/ raised to maintain designed water levels and planted with suitable native semi-natural marsh species which are commercially available in Hong Kong.

2.7 Management and Maintenance for Offsite Wetland Compensation Areas

2.7.1 Hydrological and vegetation management for fishpond and marsh are stipulated in Section 12.8.6.3 and 12.8.7.3 of the EIA Report respectively, and detailed below.

Hydrological Management Measures

2.7.2 For fishponds, ponds will be approximately 2-2.5m deep, and will be drained on a rotational basis to ensure that a minimum number of ponds are drained at any one time to conserve water. Pond water levels will be replenished during the wet season with water levels permitted to reach the maximum operational level before water is discharged from the mitigation fishponds. In order to achieve this, a system of pipes will be installed, with uPVC pipes located within each internal bund to permit rapid distribution of water between the ponds and at discharge points to permit the discharge of water when the ponds are full or following heavy rainfall events.

2.7.3 For marsh, the marsh areas will rely primarily on rainwater as the sole source of water. The deepest parts will be approx. 1.5 m and the majority will be less than 1 m deep. This should be sufficiently deep to prevent the entire marsh drying out during the dry season. The need to sub-divide the marsh areas into smaller cells will be addressed at the detailed design stage. It will be important to ensure that during the wet season the marsh areas do not get inundated as this can kill marsh plants. To enable this water will be distributed between cells and discharged into adjacent water bodies through a series of water control structures (for example weirs/sluices/flap weirs/overflow pipes) and will circulate within the system through gravity flow. During periods of extreme drought water may be pumped into the marsh areas from adjacent water bodies which are also being managed as part of this Project. This would be avoided as far as possible however given that it brings the risk of importation of fish which are predators of amphibians and dragonflies.

Vegetation Management Measures

2.7.4 Vegetation management will be required to achieve two fundamental aims; to maintain a suitable wetland plant community and to prevent colonization of terrestrial plants and/or unwanted exotics. In general this will be achieved through careful maintenance of water levels and the removal of unwanted plant species as required. The control of vegetation on the bunds will be required on a routine basis to prevent the colonization of unwanted grasses, pantropical weeds and exotic creepers. One aim of the vegetation management will be for all cut vegetation to be recycled on site with none being sent to landfills.

2.8 Environmental Monitoring and Audit

2.8.1 According to Section 11.5 of the EM&A Manual, wetland mitigation shall be established prior to fishpond or reed marsh removal during the construction phase. Monitoring of the wetland compensation areas shall be conducted in implementation and establishment stages. The monitoring shall be conducted by the Environmental Team (ET) and supervised by the Project Ecologist. After establishment stage, AFCD will be responsible for the maintenance and the monitoring works, which is not covered in the manual.

3 EXISTING BASELINE CONDITIONS

3.1 Location of Offsite Wetland Compensation Areas

3.1.1 Potential OWCAs were identified and studied under the EIA Report. Three areas (Area 2, 7 and 9) were identified to compensate for both construction and operation phase development impacts addressed in this HCMP. The location and pond numbers of these three OWCAs are shown in **Figure 2.1**

3.1.2 Area 2 is the only compensation area on the eastern side of the Loop. It is located immediately to the northeast of the Loop, opposite to the LMC meander. The area is triangular in shape, with a narrow base at the south east broadening to the northwest. The total area of 7.96 ha comprises 6.99 ha of fishpond to the east, and a strip of 0.97 ha marsh habitat to the west.

3.1.3 Area 7 and 9 are situated to the west of the Loop. Area 7 is located to the west of Lok Ma Chau Station, between the Frontier Closed Area (FCA) fenced road and the LMC WMA. The area comprises five fishponds covering 3.45 ha connecting in linear direction and is fenced off on both northwest and southwest sides. Area 9 lies immediately to the south of Area 7, separated by a drainage channel, with the FCA fenced road on the west and LMC WMA on the east. The area covers five fishponds with a total area of 7.00 ha.

3.2 Existing Areas of Conservation Importance in the Vicinity of Lok Ma Chau Loop

3.2.1 Areas of conservation importance located in or near the three OWCAs are discussed as follow and the locations are all shown in **Figure 3.1**.

Inner Deep Bay and Shenzhen River Catchment Important Bird Area (IBA)

3.2.2 All OWCAs lie within the Inner Deep Bay and Shenzhen River Catchment Important Bird Area (IBA, Birdlife International, 2019), which covers the Mai Po Inner Deep Bay Ramsar Site, outer deep bay area up till Sheung Pak Lai, floodplain of Long Valley as well as Deep Bay wetland outside the Ramsar Site at San Tin, Hoo Hok Wai, Ma Tso Lung and Nam Sang Wai. The IBA includes a wide variety of habitats and support bird species of global and regional concern.

Wetland Conservation and Wetland Buffer Areas

3.2.3 The Study on Ecological Value of Fishponds in the Deep Bay Area (Aspinwall, 1997), demonstrated the regional and global ecological value of fishponds in the area and recommended to set up areas of wetlands and fishponds in northwest New Territories as buffer area. The recommendation was adopted into the Town Planning Board Guidelines (TPB PG-No. 12B), in which a Wetland Conservation Area (WCA) and Wetland Buffer Area (WBA) of 500m were established.

3.2.4 The boundary of the WCA and WBA was reviewed in 2013 based on an ecological field survey in Hoo Hok Wai, showing that fishponds and marshes in the area are also of high ecological value to waterbirds in the Deep Bay Area. The boundary of the WCA and WBA were therefore extended to cover fishponds of Ma Tso Lung and Hoo Hok Wai as in the updated Town Planning Board Guidelines (TPB PG-NO. 12C). With the update, all three OWCAs are within the boundary of the WCA.

3.2.5 A "no-net-loss in wetland" principle is adopted by the Planning Board to conserve both the area and function of continuous and adjoining fishponds in the Deep Bay Area. The principle is implemented through the designation of the WCA and WBA and the planning intentions for the two areas stated in the guidelines are as follows.

Wetland Conservation Area

3.2.6 The planning intention of the WCA is to conserve the ecological value of the fishponds which form an integral part of the wetland ecosystem in the Deep Bay Area. It comprises the existing and contiguous, active or abandoned fishponds in the Deep Bay Area, which should all be conserved. New development within the WCA would not be allowed unless it is required to support the conservation of the ecological value of the area or the development is an essential infrastructural project with overriding public interest. Any such development should be supported by an ecological impact assessment to demonstrate that the development would not result in a net loss in wetland function and negative disturbance impact. For any redevelopment which requires planning permission from the Board, an ecological impact assessment would also be required. Wetland compensation is required for any development involving pond filling and mitigation measures against disturbance would be necessary. They would be imposed as part of the planning approval conditions.

Wetland Buffer Area

3.2.7 The intention of the WBA is to protect the ecological integrity of the fishponds and wetland within the WCA and prevent development that would have a negative off-site disturbance impact on the ecological value of fish ponds. A buffer area of about 500m along the landward boundary of the WCA is thus designated as a WBA. As a substantial amount of the fish ponds within the WBA have already been lost over time through filling and certain areas have been degraded by the presence of open storage use, these degraded areas may be considered as target areas to allow an appropriate level of residential/recreational development so as to provide an incentive to remove the open storage use and/or to restore some of the fish ponds lost.

MTR Lok Ma Chau Spur Line Wetland Mitigation Area

3.2.8 The MTR LMC Spur Line Wetland Mitigation Area (LMC WMA) is located adjacent to the southeast of Area 7 and northeast of Area 9. The LMC WMA covers an area of approximately 37ha, providing enhanced wetland habitats of fishponds, marsh and wastewater treatment reedbed according to design of the HCMP (AEC, 2006) as a requirement of the Sheng Shui to LMC Spur Line project's EP. Ecological monitoring has been carried out to assess the mitigation effectiveness for target species and to record other species of conservation importance using the area. A review and update of the HCMP report was submitted in October 2019 according to the monitoring results (AEC, 2019).

Hoo Hok Wai

3.2.9 Hoo Hok Wai (HHW) is a large area of contiguous fishponds and marshy wetland habitat, which lies immediately northeast to Area 2. The undisturbed environment is functionally linked to the Mai Po Inner Deep Bay Ramsar site, and together with relatively large fishponds in the area, provides roosting and foraging sites for variety of wetland fauna, in particular large waterbirds like great cormorants and Eurasian otter. The area is within boundary of the WCA.

San Tin East Main Drainage Channel

3.2.10 The San Tin Main Drainage Channel (STEMDC) is a 2.2km long drainage channel running along west side of San Sham Road from Castle Peak Road to Shenzhen River. The Channel is also adjacent to the LMC WMA's wastewater treatment reedbed. Components of the STEMDC include an inflatable dam, a pumping station, associated roads and drainage works and a constructed compensation wetland located between the drainage channel and access road to LMC boundary control point. Ecological monitoring of the channel has recorded low number of waterbirds using the habitat (CEDD, 2008).

Conservation Area

3.2.11 All OWCAs were zoned under Conservation Areas (CA) under two Outline Zoning Plan (OZP), which are located in proximity to the Loop. Under the Approved Ma Tso Lung and Hoo Hok Wai OZP No. S/NE-MTL/3, northeast to eastern side of the Loop was zoned as CA. This CA included Hoo Hok Wai, northern parts of WCA (including Area 2) and WBA. Another CA was zoned under the Approved San Tin OZP No. S/YL-ST/8, located at southeast to southwestern side of the Loop, it. This CA included southern parts of WCA (including Area 7 and 9), WBA, MTR LMC WMA and STEMDC. The designation of these CAs was mainly aimed to conserve the ecological value and ecological integrity of the fishponds and wetlands within these areas.

3.3 Site Conditions of Offsite Wetland Compensation Areas

Area 2

3.3.1 Area 2 comprises of five active fishponds to the northeast and three abandoned ponds to the southwest. It has the highest degree of disturbance among the three OWCAs. The active fishponds are intensively managed, particularly Ponds 53, 54 and 57. Oxygen machines were switched on during most of the surveys, fishermen were seen patrolling on site and structures were being built at the edge of pond 54. Pond 54 and 57 was drained down between October and November, during which time it supported high densities of black-winged stilt. A pack of dogs was also frequently recorded from the area, posing a disturbance to wildlife and threat to land mammals and nesting avifauna.

3.3.2 All fishponds in the area have steep banks, typically 1.5 – 2.0m in depth above water level and are densely vegetated except Ponds 53 and 54. Edge and bund conditions of these two ponds are particularly poor with loose sandy soil. It is obvious that bunds on the east of Pond 53 and 54 are frequently cleared and used as main transport passage by fishermen. Other bunds in the area are well vegetated with herb species like *Panicum maximum* and occasional trees. Bunds near the border road at northeast side is overgrown with tree species like *Macaranga tanarius*. No emergent or floating vegetation observed in the active ponds.

3.3.3 No human activities or management were seen in abandoned ponds of Area 2. These ponds (particularly Pond 55 and western side of 56) have become overgrown with wetland marsh vegetation. Dominant species in marsh included *Panicum maximum* and *Brachiaria mutica*. Occasional trees are located on bunds next to the LMC Meander, forming cluster of microhabitats. Representative photos of site conditions and habitats in Area 2 are presented in **Appendix F** and habitat map for the area is shown in **Figure 3.2**.

Area 7

3.3.4 Area 7 covers five fishponds arranged in a linear fashion along the FCA fenced road. It is likely these ponds were once much larger, but were affected by Shenzhen River Training Works. None of the ponds are under active management, with some abandoned fish farmer sheds located at the bund between pond 7B and 7C. All fishponds in the area have steep banks, with the side abutting the FCA fenced road is a newly formed slope densely planted with trees like *Casuarina equisetifolia* and *Melia azedarach*. The edge near the LMC WMA is more lightly vegetated due to management under the WMA.

3.3.5 Pond 7A and 7B are relatively small in size with vegetation overgrown from the edge into water, covering part of the water surface. Some exotic vegetations like *Conyza canadensis* and *Calliandra haematocephala* were only recorded within these two ponds. Pond 7C is largest in the area with riparian plants like *Cyperus rotundus* and particularly *Lygodium japonicum* slightly overgrown at the edge. Recreational anglers were seen fishing at this pond. Pond 7A, 7B and 7C have similar water level throughout the year, while Pond 7D has more obvious water level changes. Pond 7D and 7E are drying out and succeeding to marshy habitat. Half of pond 7D is covered by marshy vegetation, leaving only a small area of open water. Water levels were extremely low in January and February exposing bottom soil, some waders were observed foraging on it. Pond 7E has no open water habitat, with dense woody vegetation at the edge. Pond 7D and 7E were dominant by exotic vegetation like *Ipomoea cairica*, *Kyllinga polyphylla*, *Bidens alba* and *Brachiaria mutica.* Representative photos of site conditions and habitats in Area 7 are presented in **Appendix F** and habitat map for the area is shown in **Figure 3.3**.

Area 9

3.3.6 Area 9 comprises of five fishponds, of which 9A, 9B and 9C are under active management by local fishermen, with water levels managed to be similar throughout the year. All fishponds in the area have steep edge of 1.5 – 2.0m above water level, with bare soil exposed in some areas. Most bunds in the area are lightly vegetated due to fishermen and LMC WMA's management, with occasional fruit trees such as *Artocarpus heterophyllus*. Bunds next to the FCA fenced road are densely vegetated by trees. Overgrown of vegetation were seen in pond 9D and 9E. 9D is a L-shaped pond filled with reed species like *Phragmites vallatorius* while 9E is a large pond dominant by species like *Cyclosorus interruptus* and *Panicum maximum*. Small trees were also seen in 9E, showing that the pond is undergoing succession into terrestrial habitat. Representative photos of site conditions and habitats in Area 9 are presented in **Appendix F** and habitat map for the area is shown in **Figure 3.4**.

3.4 Ecological Baseline of Offsite Wetland Compensation Areas

3.4.1 A literature review of previous studies was conducted to gather information of ecological resources in the OWCAs. This information was supplemented with additional baseline ecological surveys of the OWCAs conducted in 2018/2019 as part of the current Project.

Literature Review

Planning and Engineering Study on Development of Lok Ma Chau Loop – Investigation, Environmental Impact Assessment Report

3.4.2 Area 2 lies adjacent to the Loop and is within the EIA ecological assessment area. Area 7 is functionally separated from impacted areas, and Area 9 lies outside the ecological assessment area. Areas 7 and 9 were therefore not surveyed by the EIA Report. As such, no baseline data for Area 7 and 9 is available for review.

3.4.3 Area 2 was surveyed as part of the HHW wetland areas in the EIA Report, covering fishponds east of the LMC Boundary Control Point (BCP) to HHW. The survey data showed that Area 2 supported a wide range of waterbird species due to the mixture of marsh, fishpond and reed marsh habitats. The waterbirds recorded were mainly ardeids, raptors and waders with relatively few ducks. The low distribution of ducks might be due to the distance from the Inner Deep Bay. The most significant finding was that black-faced spoonbill, recognized by Bird Life International as globally threatened, were recorded foraging in the HHW area, although none were recorded in Area 2.

3.4.4 Highest count of waterbirds in the wet season were concentrated around fishponds to the northeast of the Loop, particularly for ardeids. Area 2 is within this area, and Pond 58 was one of the ponds with highest counts. In the dry season, the distribution of waterbirds spread slightly wider in HHW area due to draindown practice of ponds or presence of daytime roosting sites (although Pond 58 still had the highest waterbirds count within Area 2 in dry season). No daytime roosting site of great cormorants were observed within Area 2.

3.4.5 Marsh areas surveyed for HHW area in the Project EIA were adjacent to Area 2. In total, 22 wetland associated or wetland dependent species were recorded. Great cormorant was the second most abundant species recorded, which were seen at diurnal roost in trees around the marsh. Other target species, bluethroat, black-browed reed warbler, dusky warbler and Chinese penduline tit were also recorded in the area in low numbers.

3.4.6 Transect routes for mammals, dragonflies and herpetofauna surveys in the EIA Report covered the whole of Area 2. No target species for all mammal, dragonfly and herpetofauna were recorded within Area 2. But low numbers of two-striped grass frog, scarlet basker, sapphire flutterer and coastal glider were recorded in elsewhere HHW area. For Eurasian otter, sightings or reported sightings by local villagers were either within the Loop or along the LMC meander.

Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme

3.4.7 Located along the “East Asian – Australasian Flyway” of migratory birds, the Deep Bay Area plays an important role in providing stopover site and habitat for waterbirds. The Hong Kong Bird Watching Society (HKBWS) has been commissioned by the Agriculture, Fisheries and Conservation Department (AFCD) to conduct the Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme (WBMP) since 1997. All three OWCAs are covered under the WBMP, Area 2 is surveyed as Shenzhen River B whereas Area 7 and 9 are surveyed together as Shenzhen River A (HKBWS, 2018).

3.4.8 In the WBMP, survey area of Shenzhen River A covers approximately 32 ponds, including the LMC WMA, Area 7 and Area 9. The survey area of Shenzhen River B covers 111 ponds on average, including fishponds east of the LMC BCP to HHW. All the ponds are surveyed monthly, with the highest counts for waterbirds recorded in the winter months. Data from the most recent five years winter report were reviewed, the two highest counts of waterbirds for each area and percentage of Deep Bay fishpond count are shown in **Table 3.1**. The data shows that Area 7 and 9 have higher counts of waterbirds than Area 2 in general.

Table 3.1 Highest Two Counts of Waterbirds and corresponding percentage of Deep Bay Fishpond Count of Shenzhen River B (Area 2) and Shenzhen River A (Area 7 and 9) in past 5 Winters

Date	Count in Shenzhen River Area	Count in Deep Bay Fishpond Area	Percentage of Deep Bay Fishpond Count
Shenzhen River B (including Area 2)			
November 2014	996	6104	16.32%
November 2016	1319	10863	12.14%
Shenzhen River A (including Area 7 and 9)			
November 2015	2096	5452	38.44%
November 2016	2462	10863	22.66%

Notes:
Count in Deep Bay Fishpond Area refers to sum of waterbirds recorded in fishponds within the Deep Bay area, including Deep Bay 'F' (Tsim Bei Tsui fishpond), Lut Chau, Tai Sang Wai, Tam Kon Chau, Mai Po San Tsuen, Shenzhen River 'A', San Tin, Shenzhen River 'B', Sham Po Shue, Nam Sang Wai, Luen Hin Wai and Shan Pui River north as identified in the Mai Po Inner Deep Bay Ramsar Site Monthly Waterbird Monitoring Report

3.4.9 Two target species for the OWCAs, great cormorants and little egret were recorded in the WBMP. With the LMC WMA located within Shenzhen River A and closer to the Deep Bay area, it is more attractive to great cormorants, with average of 23.9% of the winter population in Deep Bay fishpond recorded in the past five years, while only average of 7.72% was recorded in Shenzhen River B. For little egret, Shenzhen River B has higher count than Shenzhen River A. The highest yearly count (from October to March next year) for Shenzhen River B was 1109 in 2016-2017 and only 184 for Shenzhen River A in 2015-2016.

Ecological Mitigation/ Habitat Creation and Management Plan (HCMP) for the Ecological Area of the Lok Ma Chau Loop

3.4.10 The pre-construction baseline survey of the HCMP for EA only covered the reed bed and marsh within the Loop but provides some useful reference and context for the current HCMP. Only three key species, dusky warbler, Oriental reed warbler and black-browed reed warbler were recorded with relatively high abundance in the Loop. Particularly for dusky warbler, the species had highest count for both transect count (25) and mist netting (182), showing that reed bed and marsh act as dominant habitat for the species. Oriental reed warbler was not recorded during transect count but only during mist netting. Other target avifauna recorded in low abundance included little egret, Chinese penduline tit, bluethroat and great cormorant. Four avifauna species of conservation importance were also recorded in the pre-construction survey in very low abundance, including great bittern, crested serpent eagle black-capped kingfisher and greater painted snipe.

3.4.11 Key species of mammals and herpetofauna were not recorded during the pre-construction baseline survey. Only two key dragonfly species, coastal glider and ruby darter were recorded but were of low abundance, where less than 10 individuals were observed. These show that existing marsh habitat within the Loop is not utilized by most of the key species.

Lok Ma Chau Spur line Wetland Mitigation Area Habitat Creation and Management Plan

3.4.12 The first HCMP for the LMC WMA was issued in 2006 and the latest review/update was in 2019. In the first HCMP, six target species identified for the LMC WMA were same as target species for OWCAs, comprising Eurasian otter, great cormorant, little egret, bluethroat, Pallas's grasshopper warbler and Chinese bullfrog. In the second updated report (2014), one of the newly added target species, leopard cat, is also target species of the OWCAs. In the latest report (2019), three more target species were added, which are yellow bittern, wood sandpiper and Reeves' turtle, none of which are target species for OWCAs.

3.4.13 The LMC WMA is divided into three compartments with different management practices and targets. Compartment A locates furthest from the LMC station, including two large ponds which aim to establish an egretry and provide habitat for Eurasian Otter. Compartment B consist of ten ponds, of which six are large with bunds in the middle. The compartment aims to provide foraging site for large waterbirds, including some species of international concern like black-faced spoonbill in the winter and migratory season. Compartment C comprises ten marsh or reed bed cells which are managed for amphibians, dragonflies and marsh-related bird species. Details of management practice adopted and primary target species for each compartment are summarized in **Table 3.2** below.

Table 3.2 Management Practice and Target Species for the Three Compartments in the Lok Ma Chau Wetland Mitigation Area

Compartment	General Management Practice	Highlight of Management Practice	Primary Target Species *
A	• Managed at a relatively low intensity • Water level allowed to fluctuate naturally	• Reduction of disturbance	• Eurasian Otter • Little Egret • Great Cormorant
B	• Managed relatively intensively • Regular draindown of ponds • Regular provision of fish during winter and migratory season	• Water level management	• Little Egret • Great Cormorant
C	• Ponds will be free of fish and invasive pest • Shallow water and exposed wet mud will be provided during winter, migratory season and breeding marsh species	• Vegetation management and fish-free ponds	• Pallas's Grasshopper Warbler • Bluethroat • Chinese Bullfrog

* Only species that are also target species for Offsite Wetland Compensation Areas are listed out

3.4.14 As mentioned above, seven species are target species for both the LMC WMA and OWCAs, comprising two mammals, four avifauna and one herpetofauna. Specific management measures for all these target species are listed in **Table 3.3** below. These measures were proven to be able to create suitable habitat for target species.

Table 3.3 Specific Management Practices for Target Species that are also Targeted for Lok Ma Chau Loop Offsite Wetland Compensation Areas

Species	Specific Management Practices
Eurasian Otter	• River channels within the WMA are managed according to the species' requirement • Only trees and shrubs will be retained on bank

Species	Specific Management Practices
	• 2 artificial holts are provided in Compartment A, one on bund and one on a vegetated island
Leopard Cat	• No specific management measures proposed as it is a newly added target species • The species was often seen on scarcely vegetated bunds or in lower branches on trees near water
Little Egret	• Regular stocking of ponds with small prey items • Create larger areas of islands and associated shallow waters • Establish marsh habitat • Using decoys to encourage roosting and breeding on-site
Great Cormorant	• Regular stocking of ponds • Provision of trees and bare bund for roosting • Water level management to depth that the species are known to utilize
Pallas's Grasshopper Warbler	• Provision of marsh areas and areas of long-grass along the bunds and reed bed
Bluethroat	• Provision of densely vegetated areas
Chinese Bullfrog	• Provision of marsh habitat and small seasonal ponds

Updated Ecological Surveys

Survey Methodology

3.4.15 According to Section 12.8 of the EIA Report, additional baseline survey for Area 7 and 9 are required to collect baseline levels of target species utilizing the existing habitats. While no specific surveys are required for Area 2, surveys were undertaken in this Area to confirm ecological conditions at these ponds remain unchanged. Survey methodology was discussed and agreed with AFCD before commencement of works. The survey programme is shown in **Table 3.4**, and survey methodologies described as follows:

Areas 7 and 9

- **Habitat/vegetation surveys:** General surveys to record habitat conditions, management regime, water conditions and dominant vegetation were conducted once in the dry season and once in the wet season along set transect lines (**Figure 3.6 – 3.7**).

- **Avifauna surveys:** Point count surveys were conducted at each pond on monthly basis during the dry season (October to March) and 2-3 times in the wet season. Special behaviors of avifauna i.e. foraging and roosting, were also recorded. Locations of point count for each pond in the two OWCAs are shown in **Figure 3.6 – 3.7**.

- **Mammal surveys:** Surveys were conducted through visual observation, identifying vocalization, active searching for signs of activities (footprints, scats, nest/holts etc.) and camera-trapping. Surveys were conducted once in the wet season and once in the dry season, covering both day and night along transect line. Six Bushnell camera traps were installed at suitable microhabitats believe to maximize the chance of recording as many mammal species as possible, locations of the camera traps are shown in **Figure 3.6 – 3.7**. Rodent species were captured by camera traps but cannot be identified with confidence due to the small size and were discarded in reporting. To avoid over-representation of repeated individuals, serial photographs taken for same species within 30 minutes were treated as a single record (Shek *et al.*, 2007).

- **Herpetofauna surveys:** Surveys were conducted through visual observation, identifying vocalization and active searching for signs of activities (footprints, scats, nest etc.) together with mammal survey. Surveys will be conducted once in the wet season and once in the dry season, covering both day and night along transect line.

- **Butterfly and Dragonfly surveys:** Transect count methods were used to record relative abundance of butterfly and dragonfly species. Surveys were conducted once in the wet season and once in the dry season.

Area 2

- General flora and fauna surveys were conducted once in the wet season and once in the dry season. Camera traps were also established in Area 2, using the same methodology described for Areas 7 and 9. Details of transect line, point count and camera trap locations for the area are shown in **Figure 3.5**.

Table 3.4 Survey Programme for Updated Baseline Survey 2018/2019

	2018			2019					
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Area 7 and 9									
Habitat/ vegetation			■						■
Avifauna	■	■	■	■	■	■	■		■
Mammal/ herpetofauna					■		■		
Butterfly and Dragonfly					■				■
Area 2									
Flora			■						■
Fauna			■						■

Survey Results

3.4.16 Species recorded during surveys for all three OWCAs are shown in **Appendix G** and sightings for target species are shown in **Figure 3.5 – 3.7**. Species of conservation importance recorded during the baseline surveys is also listed out in **Table 3.5**.

Habitats/Vegetation

3.4.17 A total of 83 plant species were recorded, of which one third were exotic. Two invasive species, *Bidens alba* and *Brachiaria mutica*, were seen at all ponds within the OWCAs. Area 7 and 9 have relatively higher numbers of exotic species, where Pond 7D and 7E have the highest abundance among all the ponds. Some fruits trees such as *Litchi chinensis* and *Mangifera indica* were recorded adjacent to the ponds planted by local villagers. No major changes to habitats in Area 2 were identified, and no plant species of conservation interest were recorded.

Avifauna

3.4.18 In total, 70 avifauna species were recorded during the baseline surveys, of which 32 were wetland dependent species. Among the OWCAs, Area 9 had the highest number of wetland dependent species (24), followed by Area 2 (19) then Area 7 (12). Three species of international conservation importance (IUCN, 2021), were recorded in Area 9, including black-faced spoonbill, collared crow and greater spotted eagle. Both collared crow and greater spotted eagle were seen perched on trees adjacent to ponds in Area 9, while black-faced spoonbill was seen foraging in shallow waters around the pond margin. Ardeids were seen roosting in high abundance at the OWCAs, including black-crowned night heron (Area 2 and 9), Chinese Pond Heron (Area 2 and 9) and grey heron (all three Areas).

3.4.19 28 species of conservation importance were recorded in the OWCAs, including black kite, black-crowned night heron, black-faced spoonbill, black-winged stilt, Chinese pond heron, cinnamon bittern, collared crow, common greenshank, Eurasian coot, Eurasian teal, great cormorant, great egret, greater coucal, greater spotted eagle, grey heron, intermediate egret, little egret, little grebe, marsh sandpiper, northern shoveler, pied avocet, pied kingfisher, purple heron, red-billed starling, tufted duck, white-cheeked starling, white-throated kingfisher and yellow bittern. Species with high numbers of records included, great cormorant (on trees of Area 2), red-billed starling (on trees of Area 2 and 9) and white-cheeked starling (on trees of Area 9).

3.4.20 Three target avifaunal species, dusky warbler, great cormorant and little egret were observed during the surveys. Dusky warbler was recorded in trees and shrubs in high abundance compared to other target species at all three Areas. Little egret was observed roosting on trees in all three areas and foraging in Ponds in Area 9. Great cormorant was recorded both in open water and on trees in all three areas, high abundance was particularly recorded roosting on trees in Area 2.

Mammal

3.4.21 Six mammal species were recorded by camera traps set up in the OWCAs, representative photographs of each species are shown in **Appendix H**. There were 369 mammal sightings in total, with nearly all sightings recorded in Area 2 (350). One of the cameras had particularly high number of sightings (253), as it was located along a path frequently used by small Asian mongoose. Sightings for small Asian mongoose was therefore extremely high, (199 records of which 178 were along the path). Small Indian civets were also recorded along same path during daytime in May. An adult civet was observed nursing its juveniles on the path, suggesting that the location serves as a nursery ground for the species.

3.4.22 Two target species, Eurasian otter and leopard cat, were recorded by camera traps. All sightings for Eurasian otter were in Area 2, which is consistent with analysis presented in the EIA study, which suggests all sightings and reported sightings by villagers were along the Loop meander or near HHW. However, previous records of Eurasian otter by Shek *et al.* (2007) in the area were only found at the western side of the Loop. This might be because the species is adaptable and can be found in various habitats as long as fish are abundant. Records of Eurasian otter in surrounding areas were also found from Mai Po, San Tin, Lok Ma Chau and Ho Hok Wai to Liu Pok (AFCD, unpublished data).

3.4.23 There was a total of seven camera trap records for Eurasian otter, all in March 2019. The only daytime sighting was an immature adult recorded from a vegetated tunnel connected to the LMC abandoned meander, suggesting the otter might be foraging in the Loop, or transiting between the Loop and HHW area using the LMC meander. Other sightings were all in the nighttime and from one location (a shallow muddy bank at the edge of a fishpond). As this pond is under active management, it is likely the otter is feeding in this area.

3.4.24 There were three camera trap records for leopard cat in Areas 7 and 9. The findings are consistent with reports from the LMC WMA, where the species is most often seen on scarcely vegetated bunds or in lower branches on trees near water.

3.4.25 Other species with camera trap records included Eurasian wild boar, small Indian civet and domestic dog. Eurasian wild boar was only recorded in Area 2, where additional records of droppings, footprints and digging signs by the species were also made. Domestic dog was recorded both by camera trapping and during surveys in all three OWCAs. Such abundance might pose a threat to the native mammalian fauna in the area.

Herpetofauna

3.4.26 A total of seven herpetofauna species were recorded during baseline survey, all are common species widely distributed in Hong Kong. Most of the herpetofauna recorded in the Project EIA Study were along natural streams in the area. As no natural streams are found in the OWCAs, the diversity and abundance of herpetofauna are relatively low.

Butterfly and Dragonfly

3.4.27 Ten and thirteen butterfly and dragonfly species were recorded during the baseline survey respectively. Most of the butterflies recorded are very common species in Hong Kong. Only one rare species, small cabbage white, which is also a species of conservation importance was recorded in Area 2. Most of the dragonflies were observed utilizing vegetation near fishponds. Only one target species, Scarlet basker was observed in Area 2 with low abundance. Area 2 had highest number of dragonflies recorded (10) due to the presence of marsh habitat. Variegated Flutterer was recorded with high abundance in both Area 2 and 9.

Table 3.5 Species of Conservation Importance Recorded during Baseline Surveys for the OWCAs

Common Name (Scientific Name)	Chinese Name	Distribution in Hong Kong [3]	Protection Status
Avifauna			
Eurasian Teal [10] (*Anas crecca*)	綠翅鴨	Common winter visitor	Cap. 170 [1] RC [4]
Great Egret [10] (*Ardea alba*)	大白鷺	Common resident and winter visitor	Cap. 170 [1] PRC (RC) [4]
Grey Heron [10] (*Ardea cinerea*)	蒼鷺	Common winter visitor	Cap. 170 [1] PRC [4]
Purple Heron [10] (*Ardea purpurea*)	草鷺	Uncommon passage migrant	Cap. 170 [1] RC [4]
Chinese Pond Heron [10] (*Ardeola bacchus*)	池鷺	Common resident	Cap. 170 [1] PRC (RC) [4]
Tufted Duck [10] (*Aythya fuligula*)	鳳頭潛鴨	Uncommon winter visitor	Cap. 170 [1] (LC) [4]
Pied Kingfisher [10] (*Ceryle rudis*)	斑魚狗	Uncommon resident	Cap. 170 [1] (LC) [4]
Greater Coucal (*Centropus sinensis*)	褐翅鴉鵑	Common resident	Cap. 170 [1] Class II [5] Vulnerable [6]
Greater Spotted Eagle (*Clanga clanga*)	烏鵰	Scarce winter visitor	Cap. 170 [1] Cap. 586 [2] GC [4] Class II [5] Rare [6] Endangered [8] Vulnerable [9]
Collared Crow [10] (*Corvus torquatus*)	白頸鴉	Uncommon resident	Cap. 170 [1] LC [4] Near Threatened [8] Vulnerable [9]

Common Name (Scientific Name)	Chinese Name	Distribution in Hong Kong [3]	Protection Status
Little Egret [10] (*Egretta garzetta*)	小白鷺	Common resident	Cap. 170 [1] PRC (RC) [4]
Intermediate Egret [10] (*Egretta intermedia*)	中白鷺	Common passage migrant	Cap. 170 [1] RC [4]
Eurasian Coot [10] (*Fulica atra*)	骨頂雞	Common winter visitor	Cap. 170 [1] RC [4]
White-throated Kingfisher [10] (*Halcyon smyrnensis*)	白胸翡翠	Common resident	Cap. 170 [1] (LC) [4]
Black-winged Stilt [10] (*Himantopus himantopus*)	黑翅長腳鷸	Common passage migrant	Cap. 170 [1] RC [4]
Cinnamon Bittern [10] (*Ixobrychus cinnamomeus*)	栗葦鳽	Scarce passage migrant	Cap. 170 [1] LC [4]
Yellow Bittern [10] (*Ixobrychus sinensis*)	黃葦鳽	Uncommon summer visitor and passage migrant	Cap. 170 [1] (LC) [4]
Black Kite [10] (*Milvus migrans*)	黑鳶	Common resident and winter visitor	Cap. 170 [1] Cap. 586 [2] (RC) [4] Class II [5]
Black-crowned Night Heron [10] (*Nycticorax nycticorax*)	夜鷺	Common resident and winter visitor	Cap. 170 [1] (LC) [4]
Great Cormorant [10] (*Phalacrocorax carbo*)	普通鸕鷀	Common winter visitor	Cap. 170 [1] PRC [4]
Black-faced Spoonbill [10] (*Platalea minor*)	黑臉琵鷺	Common winter visitor	Cap. 170 [1] PGC [4] Class II [5] Endangered [6] [8] [9]
Pied Avocet [10] (*Recurvirostra avosetta*)	反嘴鷸	Abundant winter visitor	Cap. 170 [1] RC [4]
Northern Shoveler [10] (*Spatula clypeata*)	琵嘴鴨	Abundant winter visitor	Cap. 170 [1] RC [4]
White-cheeked Starling (*Spodiopsar cineraceus*)	灰椋鳥	Common winter visitor	Cap. 170 [1] PRC [4]
Red-billed Starling [10] (*Spodiopsar sericeus*)	絲光椋鳥	Common winter visitor	Cap. 170 [1] GC [4]
Little Grebe [10] (*Tachybaptus ruficollis*)	小鸊鷉	Common resident	Cap. 170 [1] LC [4]
Common Greenshank [10] (*Tringa nebularia*)	青腳鷸	Abundant passage migrant and winter visitor	Cap. 170 [1] RC [4]
Marsh Sandpiper [10] (*Tringa stagnatilis)*	澤鷸	Common winter visitor and passage migrant	Cap. 170 [1] RC [4]
Lepidoptera			
Small Cabbage White (*Pieris rapae crucivora*)	菜粉蝶	Rare	-
Odonata			
Scarlet Basker (*Urothemis signata signata*)	赤斑曲鈎脈蜻	Common; Scattered	LC [4]
Mammal			
Small Asian Mongoose (*Herpestes javanicus rubrifrons*)	紅頰獴	Uncommon	Cap. 170 [1] Vulnerable [8]
Eurasian Otter (*Lutra lutra*)	歐亞水獺	Rare, Species of conservation concern	Cap. 170 [1] Cap. 586 [2] RC [4] Class II [5] Vulnerable [7] Endangered [8] Near Threatened [9]
Leopard Cat (*Prionailurus bengalensis*)	豹貓	Uncommon	Cap. 170 [1] Cap. 586 [2] Vulnerable [7][8]

Common Name (Scientific Name)	Chinese Name	Distribution in Hong Kong [3]	Protection Status
Small Indian Civet (*Viverricula indica*)	小靈貓	Very Common	Cap. 170 [1] Class II [5] Vulnerable [8]

Notes:
1. Protected under Wild Animals Protection Ordinance (Cap. 170).
2. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).
3. AFCD (2020). Hong Kong Biodiversity Database.
4. Fellowes, *et al*. (2002): LC=Local Concern; PRC=Potential Regional Concern; RC=Regional Concern; PGC=Potential Global Concern; GC=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.*
5. "List of Wild Animals Under State Protection" (promulgated by State Forestry Administration and Ministry of Agriculture on 14 January 1989).
6. Zheng & Wang (1998). China Red Data Book of Endangered Animals: Aves.
7. Wang (1998). China Red Data Book of Endangered Animals. Mammalia.
8. Jiang, *et al*. (2016). Red List of China's Vertebrates.
9. IUCN (2021). IUCN Red List Version 2021.1
10. Wetland-dependent species (including wetland-dependent species and waterbirds).

Additional Records

3.4.28 Consultation with local Green Groups indicate one more species of conservation interest, Chinese soft-shelled turtle (*Trionyx sinensis*), could potentially occur within the Project Area.

3.5 Site Evaluation

Habitat Diversity

3.5.1 Dominant habitats of the OWCAs are mainly fishponds and marsh. The fishponds are relatively large in size and are in proximity to each other, providing high ecological connectivity. These wetland habitats support a diverse community of wetland fauna species and are ecologically linked to the wider in Deep Bay IBA (BirdLife, 2019).

3.5.2 Low flora diversity was observed in the OWCAs. With fishponds as the major habitats, vegetation is mostly on bunds or edge of the fishponds. Some of the fishponds were dried up and being occupied by marshy vegetation. Plenty of invasive species, like *Brachiaria mutica* and *Mikania micrantha* were seen on site and one third of the plant species recorded were exotic.

Naturalness

3.5.3 Given that the OWCAs are located along the border, the areas are under low disturbance of human activities. Part of the fishponds are still under active management practices by local fishermen, especially Area 2 and southern part of Area 9. Inactive ponds in the areas show natural succession into reedbed dominant habitat or terrestrial habitat with overgrown of native plant species. The combination of managed and undisturbed habitats provides feeding and roosting grounds for a variety of wetland fauna, especially birds.

Ecological Linkage

3.5.4 The OWCAs wetland habitats are linked to local ecological resources. The areas physically lay in vicinity to HHW and Lok Ma Chau Spur Line Wetland Mitigation Area (LMC WMA). These areas are either managed with ecological practices or undisturbed, which provide large area of locally important wetland habitats. Area 2 was identified to fall within ardeids' flight line to and from LMC in the EIA Report. These show that habitats in the OWCAs demonstrate significant ecological linkage at a local scale.

3.5.5 All three OWCAs also exhibit ecological linkage in a larger scale as they all fall into part of the Inner Deep Bay and Shenzhen River Catchment Important Bird Area (IBA). High diversity of birds, including species recognized as globally threatened by BirdLife International (2019), has been recorded in the IBA. The IBA is also situated in mid-way of the East Asia-Australasian Flyway, which is home to over 50 million migratory waterbirds. The OWCAs therefore play an important role as part of the wetland habitat system in the flyway.

Potential Value

3.5.6 The OWCAs, located near locally important ecological resources, have potential value to support high population of wetland fauna, especially birds. It was observed during baseline survey that the LMC WMA supported a significantly higher abundance of birds than Area 7 and 9. By adapting similar management practice to the OWCAs, the areas have high potential to increase the ecological value.

Nursery/ Breeding Ground

3.5.7 The baseline surveys suggested that the OWCAs are being used as nursery/ breeding ground by various fauna species. Findings included records of herpetofauna nest with hatched eggs, juveniles of mammals (small Indian civet) and bird (white-breasted waterhen) species.

Richness of Wildlife

3.5.8 As part of the IBA, wetland habitats in the OWCAs mainly provide support to wetland fauna species, especially birds. In the baseline survey, nearly half of the bird species recorded were wetland dependent species. Some of these species have a restricted distribution in Hong Kong or are considered as of conservation interest. Other fauna, including 13 odonate, seven herpetofauna, ten butterfly and six mammal species were recorded during the baseline survey.

4 KEY DESIGN AND MANAGEMENT OBJECTIVES

4.1 Introduction

4.1.1 To set up design, management and maintenance objectives for the OWCAs, guidelines and requirements as stated in the EIA Report and EP will be considered. Based on findings from the updated baseline survey, the existing habitats that are currently utilizing by various species will also be conserved as far as possible.

4.2 EIA/EP Requirements

4.2.1 The fundamental management objectives for the project are to meet habitat area requirements as specified in the EIA/EP, as well as providing enhanced habitat for identified target species. The general approach to achieving these objectives follows recommendations of the EIA report for wetland reprofiling and improved management, as specified in **Section 2.6.1 - 2.6.2** of this HCMP.

Habitat Areas

4.2.2 The EIA Report provides specific requirements on the areas of different OWCAs required to compensate for identified impacts. These requirements should be met by the HCMP and are summarized in **Table 4.1** below.

Table 4.1 Habitat Areas Specified for Each Offsite Wetland Compensation Area

Location	Pond Habitat (ha)	Marsh Habitat (ha)	Total Area (ha)
Area 2	5.94	2.02	7.96
Area 7	3.45	-	3.45
Area 9	7.00	-	7.00

Target Species

4.2.3 The main objective of the OWCAs is to create enhanced compensatory habitat for target species. To assess effectiveness of the created habitats, data collected from previous records and updated surveys can be used as baseline data for comparison in the future. Key management objectives will be creating habitat according to requirements of the target species and to monitor presence of target species.

4.3 Minimize Impacts to Existing Ecological Resources

4.3.1 While the OWCAs should provide habitat enhancement for target species, it is important that the proposed enhancement works do not adversely impact existing ecological resources. Key records that need to be taken into consideration while planning the OWCAs include:

- Aside from key target species, several other species of conservation importance were recorded from the OWCAs areas (**Section 3.4.19** refers). Suitable habitat conditions for these species should be maintained.
- Existing trees and shrubs on the bunds of all three OWCAs are used by ardeids as roosting site.
- Trees and shrubs along the bund of Pond 58 and 96 in Area 2 are used as a roosting site by great cormorant.
- The bund separating Ponds 58 and 96 in Area 2 appears to be a mammal hotspot for various species.

4.4 Management and Maintenance Intensity

4.4.1 While some active management and maintenance activities will be required at all three OWCAs, these will be minimized as far as practicable to reduce disturbance impacts and also make best use of available resources.

5 DESIGN AND CONSTRUCTION METHODS

5.1 General Layout

5.1.1 The layout of habitat enhancement measures at Areas 2, 7 and 9 are shown in **Figures 5.1a – 5.1c** and proposed design details are shown in **Appendix I** and to be confirmed on site. These are consistent with mitigation requirements specified in the EIA Report and are described below. In summary, three broad categories of wetland habitat will be created:

- ***Managed Fishpond:*** Ponds are reprofiled to create areas of shallow water habitats, bunds partially removed to create larger ponds areas. Existing dense vegetation along the bunds is maintained. Water regime is passively managed.
- ***Intensively Managed Fishpond:*** Ponds are reprofiled to create areas of shallow water habitats, bunds partially removed to create larger ponds areas. Only short vegetation is maintained along the bunds. Water regime is actively managed to drain ponds sequentially in the dry season. Ponds are stocked with trash fish.
- ***Freshwater Marsh:*** Ponds are reprofiled to create areas of shallow water habitat of different depths suitable for planting of emergent and riparian vegetation. Water regime is passively managed.

5.1.2 Design proposed for the OWCAs was developed base on ecological enhancement requirements in EIA Report (**Section 2.6** refers) and habitat requirements of target species (**Section 2.5** and **Appendix E** refers). **Table 5.1** below has summarized enhancement measures for each OWCA.

Table 5.1 Offsite Wetland Compensation Area Components

EIA Requirements	Area 2							Area 7					Area 9				
	53	54	57	58	96	55	56	7A	7B	7C	7D	7E	9A	9B	9C	9D	9E
Section 12.8.6.2 Fishpond Enhancement Measures																	
extending the period during which drained ponds are available to birds by draining ponds sequentially throughout the winter period	✓	✓	✓	✓									✓				
draining ponds more slowly so that fish and other food is available over a longer period	✓	✓	✓	✓									✓				
maintaining some ponds with shallow water suitable for ardeids to wade for an extended period	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓
maximising the usefulness of fish stocks to birds by stocking in a way that most fish are of a suitable size to be eaten by the target bird species	✓	✓	✓	✓									✓				
recontouring ponds so that the pond base has a shallow slope, thus providing a larger feeding area when ponds are full, as well as a progressive increase in the feeding area when ponds are drained	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓
establishment and maintenance of bankside and emergent vegetation on some ponds to provide refuges for fish and appropriate conditions for invertebrates that will themselves provide food for birds			✓	✓										✓	✓		
repeated stocking of some ponds with trash fish during the winter months to permit the same pond to be drained (or partially drained) more than once per season	✓	✓	✓	✓									✓				

EIA Requirements	Area 2							Area 7					Area 9				
	53	54	57	58	96	55	56	7A	7B	7C	7D	7E	9A	9B	9C	9D	9E
fish stocking in ponds serving as potential foraging areas of otters			✓	✓									✓				
clearance of vegetation (including trees, shrubs, herbs and rank grass) from internal bunds to reduce the inhibitory effect that enclosure of ponds has on their use by some waterbirds and to provide suitable loafing and roosting areas				✓	✓										✓		✓
linking some smaller ponds, both to increase overall pond size (larger ponds are favoured by some of the target species) and to create island areas from former bund sections that will form roost areas free from ground predators and disturbance and provide undisturbed areas for otters	✓	✓		✓	✓			✓	✓		✓	✓	✓	✓	✓		
Section 12.8.7.2 Marsh Enhancement Measures																	
provide a variety of microhabitats with permanently wet, seasonally wet and seasonally damp conditions, patches of open water, floating and emergent vegetation and bare mud						✓	✓										
to be reprofiled and levels in these areas will need to be raised.						✓	✓										
following reprofiling they will need to be planted with suitable species						✓	✓									✓	

Area 2

5.1.3 Ponds 53, 54, 57, 58 and 96 will be fishponds with enhanced management. The bund between Ponds 53/54 will be partially removed to create larger ponds, and to provide material to reprofile pond edges. Pond bunds along southern edge of Area 2 and northern side of Ponds 58/96 will be kept densely vegetated while others will be maintained as open bunds with relatively short vegetation. The fishponds in Area 2, except Pond 96, will be intensively managed with regular dry season drain-down and restocking with trash fish to attract larger target waterbirds (little egret, great cormorant), as well as provide feeding opportunities for target mammal species (Eurasian otter, leopard cat). Drain-down of ponds in Area 2 (except Pond 96) will be managed sequentially to maximise the availability of feeding opportunities.

5.1.4 Islands with a diameter of 3m will be created in Pond 58 and 96, with dense vegetation, round and smooth peripheral with isolated design to provide potential safe refuge for otters.

5.1.5 Ponds 55 and 56 will be reprofiled and managed as marsh. An irregular profile will be created to provide a range of water depths supporting different vegetation communities. The marsh will provide suitable habitat for various target species, in particular amphibians and dragonflies.

Area 7

5.1.6 All ponds in Area 7 will be fishponds with enhanced management. To increase the value of the smaller ponds, bunds between ponds 7A/7B and ponds 7D/7E will be partially removed. Bund removal will be on the northern side only to avoid impacts to existing mature trees which are used by roosting great cormorant and other avifauna. Compared to Area 2, ponds will be managed with less intensity, with water levels permitted to fluctuate naturally and limited fish stocking. Existing dense vegetation on bunds will be retained and enhanced, maintaining roosting habitats as well as cover for smaller birds and target mammal species.

5.1.7 The small area (0.032ha) of reed marsh required for temporary mitigation of impacts to disturbed reedbed Direct Link Road to LMC Station will be provided in Pond 7E. The reed marsh will be established along south-western bank of Pond 7E. In order to avoid unnecessary reprofiling works, the reed marsh, will be retained as part of permanent mitigation design.

Area 9

5.1.8 Four ponds in Area 9 (9A-9C and 9E) will be fishponds with enhanced management. An island with 3m diameter will be created in Pond 9A, with gentle slope, round and smooth peripheral with isolated design to provide potential foraging habitats for water birds.

5.1.9 The bund between Ponds 9B and 9C will be partially removed to create a larger pond with three densely vegetated islands in the center (similar to the AFCD-managed compensation wetland to the east of Pond 9B). The existing dense vegetation in Pond 9D will largely be retained with some minor enhancement works to create deeper areas of open water within the marsh, and a larger area of open water habitat in the southern end of the pond. Pond bunds along southern edge of Pond 9B and eastern side of Pond 9A will be managed as open bunds with relatively short vegetation while others will be kept densely vegetated. The management regime for Ponds 9B-9E will be the same as for Area 7. Pond 9A will be more intensively managed, as in Area 2.

5.2 Detailed Design

Fishponds

Re-profiling Works

5.2.1 Ponds will be reprofiled to a maximum water depth of 2-2.5m, with 20-25% of overall fishpond area maintained as shallow water (<50cm) habitat. Pond base of all fishponds should be reprofiled to have a gentle gradient, allowing progressive increase in feeding area for birds when ponds are drained. The re-profiled ponds and bunds should be structurally stable upon completion of works. The nearby meander embankment also should not be affected by works related to the fishponds. Shallow areas can be created using material excavated from ponds that have dried up (e.g., Pond 9E), as well as material from bunds that have been removed. All excavated material should be reused within the three OWCAs and wetland soil could be imported if necessary.

5.2.2 A deep pond profile with a width of 3-4m will be provided around all three islands to create pool of deep water to keep islands isolated from disturbance/ threat of feral dogs. In Pond 58 and 96 of Area 2, the islands will be heavily vegetated with relatively steep banks (in gradient of 1 in 3) to provide a potential safe nursery ground for otters and maximise its ecological functions (Proposed design details shown in **Appendix I**). In Pond 9A of Area 9, the island will have shallow-sloping muddy edges (gradient of 1 in 8) around the water edge to provide avifaunal foraging habitat. Whereas the centre of the island will be lined with a layer of impermeable geotextile on top with a layer of 75% rocks with diameter of 150-250mm to inhibit vegetation growth and provide resting area for birds (Proposed design details shown in **Appendix I**).

Vegetation

Open Pond Bunds

5.2.3 Open pond bunds will be maintained with short herbaceous vegetation (less than 10 cm in height) by regular cutting. Shrubs and larger herbaceous vegetation will be removed, and overhanging trees pruned to provide clear lines of sight around the ponds, creating a secure habitat for larger wetland avifauna. Open pond bunds will incorporate some brassica planting (e.g., *Brassica oleracea var. alboglabra*) to provide host plants for *Pieris rapae*.

Vegetated Pond Bunds

5.2.4 On vegetated pond bunds, existing trees, shrubs and dense vegetation will be retained as they provide roosting habitat for birds as well as shelter for target mammal species. Low densities of additional *Hibiscus tiliaceus*, *Melia azedarach* and *Glyptostrobus pensilis* will be added to this habitat for further enhancement.

Emergent Vegetation

5.2.5 For intensively managed ponds (Ponds 53/54, 57 and 58 of Area 2 and Pond 9A of Area 9, emergent vegetation will be actively removed as required to maintain approximately 5-10% coverage of the pond area. This will maximize the open area of mud/shallow water available for feeding.

5.2.6 For less intensively managed ponds (Pond 96 of Area 2; Ponds 7A/7B, 7C and 7D/7E of Area 7; and Ponds 9B/9C and 9E of Area 9, emergent vegetation will be retained or planted over 15-20% of pond areas.

Marsh

Re-profiling Works

5.2.7 Ponds 55 and 56 in Area 2 (three individual cells) are designated as marsh areas that will be designed to provide a variety of microhabitats with permanently wet, seasonally wet and seasonally damp conditions, patches of open water, floating and emergent vegetation and bare mud. To ensure the created marsh has the ability to retain water, both ponds will be lined with clay liner on the bottom to help prevent water leakage. The ponds will then be reprofiled to create larger areas of shallow water (<1m deep) with small pockets of deeper water (up to 1.5m deep) (Proposed design details shown in **Appendix I**). The nearby meander embankment should not be affected by works related to the marsh and the re-profiled ponds and bunds should be structurally stable upon completion of works.

5.2.8 Marsh vegetation in Pond 9D of Area 9 will largely be retained and enhanced to create a range of microhabitats with 70-80% vegetation coverage. Deeper areas of open water will be created within the marsh with a larger area of open water habitat in the southern end of the pond. Retaining the high percentage cover will benefit otters, while opening up some small areas will increase edge conditions used by wetland birds (e.g., yellow bittern).

Vegetation

5.2.9 Vegetation coverage in Marsh habitat will be maintained at 70-80%. Species for marsh planting are listed in **Appendix J**.

Reedmarsh

Re-profiling Works

5.2.10 South-western bank of Pond 7E will be reprofiled to support planting of reedmarsh along the edge at-grade (0.032ha). Shallow depth can be created using material excavated from ponds that have dried up (e.g., Pond 9E), as well as material from bunds that have been removed.

Vegetation

5.2.11 Reedmarsh species of *Phragmites australis* and *P. karka* will be planted in the area.

Habitat Enhancement Features for Eurasian otters

Floating Platforms

5.2.12 The small islands created by partial removal of existing bunds will provide suitable resting sites for otters. Additional retreats for this species can be created by installing (1-2m^2) small artificial floating platforms. This management strategy has been shown to be successful at Mai Po, with platforms in both shallow and deep fishponds used as resting site and pathway by otters (Or, 2019). Platforms can be simply constructed using wooden pallets and polystyrene anchored to bottom of fishponds (**Figure 5.2**), proposed design details are shown in **Appendix I**. Platforms will be installed in Ponds 9A and 57 (**Figure 5.1a and 5.1c**).



Figure 5.2 Simple Floating Otter Platform

Jetties/Steps

5.2.13 Observations around Deep Bay show otters often spraint on unvegetated ground along the banks of rivers/ponds, presumably using these areas to exit/enter the water. Such areas are often found under wooden jetties or on concrete slabs next to fishponds (**Figure 5.3**).



Figure 5.3 Otter Spraint on Concrete Slab adjacent to an Active Fishpond in NNT (Feb, 2019)

5.2.14 Similar structures will be provided in all three areas of habitat enhancement and proposed design details are shown in **Appendix I**:

- There is an existing wooden jetty at Pond 7C which will be retained. Vegetation will be cleared from underneath/adjacent to this jetty.
- Additional jetties will be constructed at low disturbance locations of Ponds 7E and 58, as shown in **Figure 5.1a and 5.1b**.
- Additional jetties will be constructed of wood, extending outwards from the bund by 2m and at least 1.5m wide.

- Rock platforms will be provided along the banks of Pond 9A and 57 (**Figure 5.1a and 5.1c**). These will be preferably one piece of rock with approximately 3m x 1.5m in dimension. These rock platforms shall be provided at edge of fishpond, place on top of gabion basket to keep at least maximum 100mm above average water level (**Figure 5.4 and 5.5**).



Figure 5.4 Artificial Rock Platform



Figure 5.5 Gabion Basket

Otter Holts

5.2.15 The two islands created in Area 2 aims to provide safe nursery ground for otters. To increase the opportunities for otter breeding on the islands, artificial "pipe and chamber holts" (**Figure 5.6**) will be constructed by suitable materials, i.e. plastic, wood or concrete. The artificial holt will be covered and protected by dense vegetation such as *Ficus* spp., *Hibiscus tiliaceus*, *Celtis sinensis* and *Melia azedarach*. "Pipe and chamber holts" are buried in a steep bank next to the water edge, providing a large underground cavity with inner walls made of breeze block connected to an submerge entrance of large plastic pipes from the side of the bank (Shek, 2006). Proposed design details of otter holts are shown in **Appendix I**.



Figure 5.6 Simple Design Sketch of Artificial Otter Holt

Soil Management

5.2.16 Grant (1960, 1986) describes the soils around Lok Ma Chau as predominantly from the Mai Po Association, which are typically poorly drained marine clays, becoming coarser and richer in acid sulphates (pH can be as low as 2.6) with depth. According to Section 4.3.1 of the LMC WMA HCMP (2006), soils in the area are sufficiently impermeable to maintain wetland conditions or fishponds. Current fishpond and ecological management practices in the Lok Ma Chau Area also demonstrate that these soils could retain sufficient water, and no additional lining is required to seal the ponds. If any major seepage is identified in the ponds, normal practice for fishpond management in the LMC area, remodelling of pond bund and reinstatement of pond bund clay layer should be undertaken.

Water Management

5.2.17 On-going habitat management for other projects in the Lok Ma Chau area (e.g., LMC Spur Line) indicates that there is typically sufficient rainwater in the area to support the habitat types that will be created under this project (AEC,2006). Justification can be further provided by rainfall and evaporation data in recent years as shown in **Table 5.2**. Although there would likely be deficit during October to March next year, annual rainfall is higher than annual evaporation. Seasonal reductions in water levels could therefore be tolerated as the fishponds would be replenished during each wet season. In this regard, no external water supply system is required. However, some internal water management infrastructure is required to facilitate the following management practices and all proposed design details are shown in **Appendix I**.

Table 5.2 Rainfall and Evaporation Data for Lok Ma Chau Area from Recent Years (2003 – 2019)

Month	Rainfall (mm)	Evaporation (mm)	Surplus/ deficit (mm)
January	36.1	69.8	-33.7
February	29.1	61.5	-32.4
March	59.5	74.9	-15.4
April	123.3	87.3	36
May	267.9	108.3	159.6
June	412.1	114.5	297.6
July	321.9	147.4	174.5
August	355.0	131.2	223.8
September	210.7	127	83.7
October	87.7	122	-34.3

Month	Rainfall (mm)	Evaporation (mm)	Surplus/ deficit (mm)
November	38.6	92.7	-54.1
December	24.5	85.1	-60.6
Total	**1966.4**	**1221.7**	**744.7**

Interconnection Pipes and Sluice gates

5.2.18 Pipes will be installed between fishponds/ marsh interconnecting all ponds within the OWCAs to allow water to circulate within the system through gravity. Sluice gates will be set at outlet of the pipes to control water levels. This system can serve below functions:

- Marsh habitats in Area 2 will be relatively shallow and could dry out for periods during the dry season, leading to dieback of wetland vegetation. Piping will be provided to allow water from adjacent fishpond habitats to be pumped into marsh areas during extended dry periods.
- Piping will allow water to be quickly transferred between ponds to facilitate draw down practice in Area 2 and 9

uPVC pipes and Catchpits

5.2.19 uPVC pipes will be installed within each internal bunds of each compensatory area to facilitate rapid distribution of water between ponds/marshes and at discharge points to permit the discharge of water when the ponds are full or following heavy rainfall events. Catchpits will be provided at locations to service all water features. Portable electric pumps can be used to extract water from one pond, into the piping system, then pumped into a different pond.

Weirs

5.2.20 Weirs will be provided in each area to discharge excess water from the ponds/marsh areas into the abandoned meander at LMC (Area 2) and drainage channel (for Areas 7 and 9). This can prevent flooding of marsh areas during the wet season, as well as over-topping and damage pond bunds. The arrangement of weirs is shown in **Figure 5.1a – c**.

Water Level Gauges

5.2.21 Simple water level gauges that are durable enough for long term use should be installed on each pond/marsh embankments.



Figure 5.7 Typical Simple Water Level Gauges

Access and Fencing

5.2.22 Fencing is required to control public access to the three enhancement areas, preventing general disturbance, recreational angling and other activities. Moreover, fencing is required to prevent access to the areas by feral dogs, which pose a major threat to otters and other wildlife. Fencing will be 2.2m in height, and dull green/olive in colour with special features to prevent trespassing. The fence should be made of materials strong enough to prevent breaking in. Wildlife tunnels, 170-200mm in diameter, should be provided at 20m intervals along the fence to minimize fragmentation impacts for land mammals and other terrestrial fauna (**Figure 5.7**). The fence should be connected to the existing boundary fence, border fence and LMC WMA fence seamlessly to prevent unauthorized access.



Figure 5.8 Wildlife tunnel through fencing (Oct, 2018)

5.2.23 The proposed location of fencing for the enhancement areas is shown in **Figure 5. 1a – c**, and described below:

- Area 2 is bordered by the boundary fence and Shenzhen River to the north and LMC meander to the west, and no fencing is required in this area. Fencing is required along the eastern boundary of Area 2, extending from the border fence to the LMC meander south of Pond 53. Access will be provided by one gate in the fence at the corner of Pond 53 that adjoin unsurfaced roads along the fishpond bunds that connect to the Road at Ngau Kok Shan.
- Area 7 is bordered to the northwest by the boundary fence, the LMC border crossing to the northeast, and the LMC Spur Line Wetland Mitigation Area to the east/southeast. The only current access point is to the south, which is adjacent to Area 9. Given that access to Area 9 will be controlled, no additional fencing is required for Area 7. The main access to Area 7 will be through existing gates along the Boundary Road or through LMC WMA upon request and discussion with MTRC.
- Area 9 is bordered by the boundary fence to the west and the Lok Ma Chau Spur Line Wetland Mitigation Area to the northeast. However, areas to the east and south have unrestricted access and need to be fenced. It is also suggested to include the AFCD LMC WMA ponds located directly east to Pond 9B within the fencing area, this arrangement should be further discussed and confirmed with AFCD. Access will be provided by an existing gate along the Boundary Road. An additional gate will be located to the southeast that adjoins unsurfaced roads leading to Lin Barn Tsuen.

5.2.24 Areas 7 and 9 are adjacent to existing compensatory wetland habitats, and there would be ecological benefits to providing one fence around this whole area rather than separate fencing. This configuration will need further discussion and confirmation from relevant government departments and other stakeholders.

5.2.25 Indicative locations of the existing LMC WMA fence and boundary fence are shown in **Figure 5. 1a – c**, all fence for the OWCAs should be connected seamlessly to existing fence to prevent unauthorized access. To further deter trespassing, CCTVs could potentially be installed on fence around the OWCAs. Apart from CCTVs, infra-red cameras will also be installed at suitable locations for ecological monitoring of target species (for further details please refer to **Section 7.2.3**).

5.2.26 Internal access around the enhancement areas will be provided by existing footpaths along the bunds in Areas 2 and 9. In Area 7, new footpaths will need to be cleared along the southeastern bunds, taking care not to disturb existing mature trees (**Figure 5. 1a – c**). Additional suitable vehicular access can be through Boundary Road or the LMC WMA upon request and discussion with HKPF or MTRC respectively.

5.3 Works Program

5.3.1 Construction works for the OWCAs will be separated into 2 phases. Phase 1 is planned to commence tentatively in Q3 2021 at Area 7, Pond 9E of Area 9 and Ponds 55, 56, 58, 96 of Area 2. Phase 2 is planned to commence tentatively in Q3 2021 at remaining Area 2 (Ponds 53, 54, and 57) and Area 9 (Ponds, 9A, 9B, 9C and 9D). The works in these areas are expected to be completed in November 2021.

5.3.2 Construction works within the OWCAs would be restricted to daytime, from 9am to 5pm only. This can further reduce the anticipated low disturbance impacts of works to surrounding wetland habitats. A detailed anticipated works program for the OWCAs is provided in **Appendix K**.

5.4 Construction Implementation

5.4.1 The Project Proponent will be responsible for the creation and enhancement of the mitigation areas. Mitigation areas will be maintained and managed as a separate entity from the developed areas of the Project, and appropriately qualified ecologists with at least 5 years of wetland design and management experience will be responsible for supervising implementation of the mitigation areas.

5.4.2 A specialist contractor with at least 7 years of experience in wetland construction and planting in the Northwest New Territories will be appointed to carry out works for the construction and establishment of the mitigation areas.

5.4.3 All works carried out for construction of the OWCAs will be temporary and associated with common commercial fishponds management in the area (e.g. drain-down and re-profiling of ponds). Given the nature and the aims of the activities is to establish wetland compensation habitat, Section 12.7.9 of the EIA Report stated that no mitigation measures are required for construction of the OWCAs. Yet, it is suggested that good site practices and / or ecological mitigation measures should be implemented during the creation of OWCAs to avoid disturbance to water birds / migratory birds, including the followings:

- All works should be carried out at daytime (i.e. 9am to 5pm);
- Adoption of approved Quiet Powered Mechanical Equipment to minimize noise impact;
- Patrol check for presence of birds should be conducted before any construction works involving machinery, works should only commence when no birds are found;
- Ecologist should be on site to inspect the works and conduct regular counting during work time;
- Works should stop temporarily if large number of birds congregate within works area;
- Adjacent fishponds could be drained down to draw birds away from works area.

5.4.4 It should be noted that at the time of writing, certain details of the existing site conditions (i.e., pond depths) are not available. Collection of such information, along with development of detailed designs and construction drawings, will be incorporated into the Contractor's "Wetland Creation Proposal".

5.4.5 The "Wetland Creation Proposal" will be prepared and submitted by the contractor responsible for construction and establishment of the OWCAs for the engineer's and related authorities (e.g. AFCD) approval, well before commencement of any works within the OWCAs. Such separate proposal for the detailed design should at least cover the followings, including but not limit to baseline site conditions, design details, water management details etc., and should be approved by the engineer and related authorities (e.g. EPD, AFCD). The "Wetland Creation Proposal" will form an integral part of the HCMP.

5.4.6 Construction workers in Hong Kong often adopt stray dogs and it is not uncommon to find dogs kept on-site This practice will be strictly forbidden in the current project.

5.5 Definition of Completion for the Wetland Compensation Area

5.5.1 For the construction works in the OWCAs, the definition of completion of the works of relevant portion of site are considered as completed when they have been completed in accordance with this HCMP and met the specifications stated therein. Examples include the following:

- The reprofiling and pond lining works within the OWCAs had been completed;
- The internal water control structure including the interconnection pipes, sluice gates, uPVC pipes, catchpits and weirs are completed and functioning effectively in allowing the water to be distributed between each pond/ cell and discharged into the adjacent water bodies and to circulate within the system through gravity flow;
- The water levels and water quality of OWCAs ponds are established and could be maintained at the designated levels in both wet and dry seasons;
- The vegetation removal and planting as required within the OWCAs are completed;
- Habitat enhancement features for otters and habitats for key species had been created according to requirements set in the HCMP; and
- Fencing, gates and access paths had been completed.

5.5.2 Any construction works leading to any deviation from the requirements in EIA Report, EM&A Manual, EP and HCMP should seek agreement from related authorities (e.g. EPD, AFCD) in advance.

5.5.3 Upon completion of the construction works, contractor shall seek consent from related authorities (e.g. EPD, AFCD) on whether the OWCAs have been satisfactorily completed. AFCD should also be informed to conduct site inspection before completion of the OWCAs.

6 MANAGEMENT OF OFFSITE WETLAND COMPENSATION AREAS

6.1 General Management

6.1.1 Following the satisfactory completion of the OWCAs, there will be a minimum of one-year establishment period before handing over to AFCD. Careful revision should be carried out to evaluate the need to extend the establishment period upon completion of the one-year establishment period. The Contractor will be responsible for the management, maintenance and monitoring of the OWCAs until the end of the establishment period. The Contractor shall also test whether the hydrological regime of the OWCAs could function effectively.

6.1.2 A list of standard management actions is detailed in **Table 6.1**. The management programme is developed base on mitigation, management and maintenance requirements described in Section 12.8.6.2, 12.8.6.3 of the EIA Report for fishpond and Section 12.8.7.2, 12.8.7.3 for marsh. To minimize disturbance to wildlife, management activities should be undertaken after 9am to avoid peak bird activity period. Works should be restricted to small areas at any one time to avoid widespread disturbance.

6.1.3 Well before the end of the establishment period of the OWCAs, the contractor shall submit an Operation Manual providing details and recommendations about the operation of the OWCAs for their long-term management to AFCD for comment and agreement. AFCD should also be informed to conduct site inspection before the end of the establishment period.

6.1.4 Upon satisfactory completion of the establishment and effective functioning of the hydrological regime of the OWCAs as well as agreement on the Operation Manual, the OWCAs would be handed over to AFCD for management.

6.1.5 After the establishment period, AFCD will be responsible for management and maintenance of all vegetation and plantings, wetland habitats, as well as minor ancillary facilities within the OWCAs. These will also include all water control structures and habitat enhancement features. While LandsD will remain responsible for the OWCAs' land control/ administration. **Table 6.2** below has detailed components/ facilities within the OWCAs and specified the relevant responsible parties.

6.1.6 It should be noted that while relatively detailed management prescriptions are provided in this chapter, an adaptive approach to management should be adopted. The HCMP should be reviewed and updated annually to improve management approaches based on the management experience and monitoring results of the previous year.

Table 6.1 Offsite Wetland Compensation Areas Management Programme

Management Action	Frequency	Notes
Water Control		
Measure water levels and adjust sluice gates/pump accordingly to meet target levels	Weekly and/or within 24 hours of heavy rainfall events or during addition of water other than from rainfall.	Target water levels to be set and reviewed monthly in accordance with management regime.

Management Action	Frequency	Notes
Measure water quality to cover most critical concerns for short term management (pH, BOD, salinity, dissolved oxygen)	Monthly or more frequently if required.	More frequent measurements required when active steps to adjust water quality are being taken.
Clear sluice gates, weirs and uPVC pipes	Weekly or more frequently if required.	Also after flooding / heavy rainfall and lowering of Typhoon Signal No. 3 or Rainstorm Warning.
Inspect condition of water control structures and pumps. Repair/maintain as necessary	Every six months at start of wet and dry season or more frequently if required.	Also to be inspected after lowering of Typhoon Signal No. 3 or Rainstorm Warning.
Structural Maintenance		
Inspect condition of tracks / paths and repair / maintain as necessary	Every 6 months or more frequently if required.	Also after any flood events and lowering of Typhoon Signal No. 3 or Rainstorm Warning.
Inspect condition of bunds / meander embankment and repair / maintain as necessary	Monthly or more frequently if required.	Also after any flood events.
Vegetation Management		
Supplemental planting	Requirement to be assessed on a routine basis.	Planting to be restricted to the wet season.
Cutting or pruning and removal	Quarterly, or more frequently if required, grass cutting and weeding across the entire site.	
Removal of exotic / undesirable invasive plants (including algae)	Quarterly checking with removal to be scheduled for subsequent 30 days.	Aggressive exotics such as Water Hyacinth and Typha to be removed immediately.
De-silting works	To be reviewed annually	Most likely required in shallow marsh areas where organic matter will quickly accumulate.
Other Actions		
Pest control	Monthly checking for Red Fire Ants and Apple Snails with necessary treatment to be scheduled for subsequent 30 days. Control of domestic dogs required whenever noted on site.	Additional pests to be monitored and treated if required.
Monitoring of fish numbers and species	Quarterly, with sampling techniques to allow for different behaviour of large fish, small fish and crustaceans.	

Management Action	Frequency	Notes
Fish transfer, clearance and stocking	Annually or more frequently if required.	
Inspect for dumping rubbish and remove	On all visits	
Inspect/maintain signs, gates and fences	Monthly	
Check site for presence of sick or dead birds or mammals	On all visits	Systematic checks to be undertaken when high risk of disease outbreaks

Table 6.2 Components/ Facilities within OWCAs and Relevant Responsible Parties

Components/ Facilities	Responsible Party (ies)
All Offsite Wetland Compensation Areas	
Land Control/ Administration	LandsD
Water Control Structures • Interconnection pipes and sluice gates • uPVC pipes and catchpits • Weirs • Water level gauge	AFCD
Habitat Enhancement Features • Floating platform • Otter jetties/ steps • Artificial rock platform • Otter holt	AFCD
Access and Fencing • Access path • Fence • Gates • Wildlife tunnel • Infra-red cameras (for ecological monitoring) • CCTVs (if necessary)	AFCD
Area 2	
LMCL Meander Embankment	DSD
Area 7	
Channel Embankment near Pond 7A	DSD
Area 9	
Channel Embankment near Pond 9E	DSD

6.2 Specific Habitat Management

Fishponds

6.2.1 The fishponds in Area 2 (except Pond 96), as well as Pond 9A will be intensively managed with regular drain-down and restocking with trash fish. The water level of the other ponds in Areas 2, 7 and 9 will be allowed to fluctuate naturally, and stocking will be undertaken less frequently. The program for these activities covering target water levels, drain-down dates and stocking quantities and dates would depend on site condition and other factors (i.e. drawdown of adjacent ponds out of OWCAs), details should therefore be drawn up monthly on site as adaptive management practice.

6.2.2 Trash fish species to be restocked suggest to be locally farmed native species such as grey mullet (*Mugil cephalus*) and mud carp (*Cirrhinus molitorella*) or brackish water species like spotted scat (*Scatophagus argus*) and yellowfin seabream (*Acanthopagrus latus*). The trash fish should comprise fish of a mean length of 10cm or less based on standard length of a sample of 50 fish per consignment, of which 95% should be smaller than 15cm, and should not comprise any highly invasive fish species (such as catfish, snakehead and climbing perch).

6.2.3 Pond water levels will be replenished during the wet season with water levels permitted to reach the maximum operational level of 2-2.5m before water is discharged via sluice gates/weirs. Sluice gates can be open/ closed according to operational needs to prevent/allow water flow between adjacent ponds. Whereas weirs will be maintained at suitable levels (operational or maximum water levels) to allow overflow of water into the LMC meander or nearby channel. Overall water flow within the OWCAs will be maintained by water control structures and gravity in direction as follow:

- Area 2: Pond 96 → 58 → 56 → 57 and 55 → 54
- Area 7: Pond 7E → 7D → 7C → 7B → 7A
- Area 9: Pond 9E → 9D, 9C and 9B → 9A
- Area 2: Water overflow → LMC meander by weir at Pond 53/54
- Area 7: Water overflow → nearby channel by weir at Pond 7A
- Area 9: Water overflow → nearby channel by weir at Pond 9A

6.2.4 Due to the nature of soils around Lok Ma Chau, fishpond waters are likely to become more acidic over time. This trend is exacerbated by repeated draining and exposure of soils to the atmosphere. The following methods to manage pH can be adopted:

- Liming: liming is a traditional method adopted by farmers to reduce acidity after ponds have been drained, dried and recontoured. Lime is spread over the pond base prior to refilling. The amount of lime applied needs to be carefully gauged to avoid the death of fish and other aquatic organisms. FAO (2003) provides basic guidance on liming for fishponds, which should be considered if pond water and/or pond soils are consistently below pH 5.5 - 6.5. Finely ground calcium carbonate ($CaCO_3$) can be applied directly to the pond soils. The amount of $CaCO_3$ to be applied varies from 500kg/ha (sandy soil) to 1000kg/ha (heavy clay soils).

- Addition of organic matter: a variety of organic matter may be used to reduce acidity. The Lok Ma Chau Spur Line Wetlands HCMP (AEC, 2006) suggests suitable materials for use (avoiding the risk of transfer of pathogens to the site) are peanut residue and grass cuttings. Because the impact of introducing these materials can be variable, there are no set guidelines on the quantities that should be applied. It is therefore suggested small quantities are applied to the ponds, and pH tested daily over the next four weeks to assess the impact. More material can be added after this period if the desired pH has not been met.

Marsh Habitat

6.2.5 The management of water levels and vegetation in marsh habitats will require closer attention than for fishponds, with marsh vegetation being sensitive to small changes in water levels. If levels fall below specified action limits, water will need to be pumped in from adjacent ponds. Maintenance of correct levels in the marshes will take precedence over those in the ponds.

6.2.6 Without active management, plant communities within marsh habitats become less diverse over time, with species such as *Phragmites* sp. quickly coming to dominate. Furthermore, the build-up of organic matter in the marsh will eventually lead to it drying out and being invaded by terrestrial species (as can be seen in Pond 9E). Vegetation can be managed through maintenance of water levels, periodic de-silting, and the removal of unwanted plant species.

Reedbeds

6.2.7 Management issue for reedbed would be minimal, related only to vegetation management. Any failed planting should be replaced, and measures taken to control growth of any invasive species on the bank.

Otter Islands

6.2.8 Vegetation maintenance works on the otter island may be needed more frequently during early stage of establishment period to prevent growth of weeds. Upon establishment of the vegetation, maintenance works on the otter islands will be minimized to reduce disturbance impacts to Eurasian otter. Maintenance works would only be carried out in case of tree falls and excessive growth of exotic vegetation. Maintenance works on the islands can be conducted during low water level/ drain down period by boat or waders.

Other Management Actions

Invasive Species Control

Plants

6.2.9 There are numerous exotic plant species in the Lok Ma Chau Area, and almost a third of plant species recorded during baseline surveys of the OWCAs were exotic. Any substantial growth of exotic plant species should be removed manually within 30 days of observation. Two species of particular concern should be removed immediately if they are encountered on site:

Water Hyacinth: This species spreads rapidly over waters discourages use by many target species. It is already present in the LMC Loop Meander.

Narrow-leaved Cat-tail: This highly invasive species quickly colonizes shallow waters and accelerates succession to terrestrial habitats.

Animals

6.2.10 Agreed protocols for dealing with red imported fire ant nests at the LMC WMA can be adopted. Checks for nests are to be undertaken on a regular basis from the start of the dry season. If nests are located, bait ("Justice") is to be placed in immediate proximity to nests and covered with mesh to prevent accidental ingestion by small mammals or birds. Treatment is only to be undertaken at times when no rainfall is forecast for the subsequent four days. Following treatment, nests are to be checked after an interval of 2-3 weeks (or as per the manufacturer's instructions) and if necessary, bait should be reapplied.

6.2.11 Adult apple snails and eggs should be removed manually on a regular basis.

6.2.12 Any feral dogs recorded from the OWCAs should be humanely trapped and removed by AFCD.

6.3 Contingency Plan

6.3.1 Contingency actions should be implemented to deal with any of the following events when they occur at the OWCAs:

- Mass dieback of fish;
- Invasion by exotic or other undesirable plant or animal species;
- Damage of water control structures;
- Pollution of water bodies; and
- Flooding of OWCAs and other potential effects from rainstorm.

Mass dieback of fish

6.3.2 In case of mass dieback of fish is recorded, dead fish found should be removed immediately to prevent the outbreak of disease (i.e. botulism). Water condition of related fishpond should be closely monitored for at least one month, if situation does not improve, measures stated in below **Section 6.3.8** should be followed.

Invasion by exotic or other undesirable plant or animal species

6.3.3 When vegetation cover of exotic or other undesirable plant species (e.g Mikania and Water Hyacinth) exceeds 10% in the fishponds, cutting/ weeding will be carried out to remove or limit the coverage.

6.3.4 Red imported fire ant is a non-native, highly invasive and aggressive species that may impact on local habitats. Agreed protocols for dealing with red imported fire ant nests at the LMC WMA as stated in **Section 6.2.10** can be adopted. If large colony of the species is recorded, pest control companies should be hired to eradicate the pest. Pesticides will be applied in accordance with the amount indicated on the label of the pesticide product by staffs wearing appropriate protective clothing.

6.3.5 Feral dogs are known to prey on wildlife in Hong Kong (Dahmer 2001). During the baseline survey for the Project, groups of dogs were observed both on site and by camera trap, particularly in Area 2. During the operation phase, there will be fence along eastern side of Area 2 and southern side of Area 9 connecting to the LMC WMA, which could prevent feral dogs from entering the OWCAs. As contingency measure, in case that dogs are found inside the OWCAs in the future, they should be humanely trapped (e.g. baited dog trap) and removed by AFCD. Effectiveness of trapping method shall be reviewed by AFCD and subject to future operation.

Damage of water control structures

6.3.6 Damage of any water control structure will prevent the control of water flow and water level within the OWCAs. If damage prevents water being removed from pond/marsh at the required rate, portable pump will be utilized until the damage is fixed. If damage results in water entering pond/marsh, portable pump will be used to pump out water or manual means of temporarily blocking the ingress point will be adopted.

Pollution of water bodies in the OWCAs

6.3.7 If direct pollution is observed in the OWCAs, the polluted water body should be isolated from the rest of the system, i.e. no water exchange with adjacent water bodies. Pollutant and pollutant source should be identified. If the pollutant is still entering the water body, measures should be taken to stop further entry as far as possible in a safely manner. Appropriate measures, specific to nature and scale of pollution, to remove the pollutant and reverse any adverse ecological effects should then be initiated.

6.3.8 If the pollutant could not be readily and safely identified, i.e. effect on wildlife and /or flora suggests that a pollutant may be having an adverse effect within the OWCAs, in situ testing of water quality parameters should be carried out. Water samples should be collected for testing at a HOKLAS approved laboratory for parameters detailed in **Section 7.3.8**, for determination of appropriate control and remediation measures.

Flooding and other potential effects from rainstorm

6.3.9 In the event of a heavy rainfall event or typhoon is forecast by the Hong Kong Observatory (red or black rainstorm warning, special announcement on flooding in the Northern New Territories or typhoon signal no. 3 or above) the OWCAs should be checked to ensure that all water control structures are functional and there are no loose materials that may interfere with drainage on site. If appropriate, pre-empty measures of fishponds to lower water levels by pumping or opening of sluices/ weirs should be carried out.

6.3.10 After heavy rainstorm events, the OWCAs should be checked for any incidence of flooding or damages. Water levels in fishponds should be reinstated to pre- rainstorm levels by pumping or adjustment of sluices. If flooding has taken place, pond bunds, sluices and other water control structures should be checked for damage and repair if necessary. In event that typhoon signal no. 3 or above was hoisted, site check should extend to all structures and trees on site. If extreme flooding event has involved intrusion of water from out of the OWCAs, external bunds should be checked and repaired with priority. Materials brought in by such flooding, if any, (e.g. litter and Water Hyacinth) should be removed.

7 MONITORING OF OFFSITE WETLAND COMPENSATION AREAS

7.1 Introduction

7.1.1 Section 12.10 of the EIA Report requires ecological monitoring for OWCAs to ensure that HCMP requirements are met, particularly relating to target species. Duration of the monitoring shall cover till the end of establishment period. The main aspects of monitoring are:

- Target species monitoring;
- Monitoring general conditions in the OWCAs to maximize the habitat value for target wildlife species.

7.2 Target Species Monitoring

7.2.1 The bird communities in each OWCAs will be monitored. Point and/or transect count surveys will be conducted to determine the presence and abundance of all bird species encountered. As five of the six bird primary key species are passage migrants/ winter visitors, transect count surveys will be conducted twice a month between September and March, and once a month during other time of the year.

7.2.2 Utilization of OWCAs as breeding habitat by birds will also be studied. During the surveys, observed birds will be classified according to their behavior, as shown in **Table 7.1**.

Table 7.1 Criteria for Breeding Bird Survey Status Observations

Breeding Status	Observations
A. Present	Species observed in OWCAs during breeding season
B. Possible Breeding	Singing male(s) of species known to nest in fishpond area or marsh observed in breeding season
C. Probable Breeding	Nesting building, or singing males present on more than one date in same place, or display
D. Confirmed Breeding	Adults carrying food for juvenile birds or adult feeding juvenile birds or recently fledged juvenile birds or nest found

7.2.3 Utilization of the OWCAs by leopard cat and Eurasian otter will be determined by transect survey and infrared camera trapping. Transect count will be conducted monthly. All direct sightings, tracks, and signs of these species will be actively searched along the survey transects. Infrared cameras will be set up in the same locations used for the baseline surveys, as well as locations targeting at wildlife tunnels and additionally near enhancement features for Eurasian otters (rock platform, jetty and at entrance of otter holts). The cameras will be checked monthly (except cameras on otter island, which due to limited accessibility should be checked 2-3 times a year) to record appearance of target species and usage of habitat enhancement features. Other mammal species of conservation importance sighted will be reported.

7.2.4 Daytime and nighttime surveys of herpetofauna key species will be conducted monthly between April and October using transect count method. The presence and abundance of key species encountered visually or aurally on the transect will be recorded. Other herpetofauna species of conservation importance sighted will be reported.

7.2.5 Presence and abundance of adult dragonfly target species will be estimated using transect count method. Surveys will be conducted monthly between April and October, when the key species are more active (Tam *et al*. 2011). Other dragonfly species of conservation importance sighted will be reported.

7.3 Monitoring of Habitat Conditions

General

7.3.1 General monitoring and inspection of OWCAs infrastructure is described in **Table 6.1**. More specific requirements are described below.

Vegetation

7.3.2 Vegetation monitoring will focus on marsh habitats and areas (i.e. vegetation on bunds) where planting works will be implemented. Quarterly surveys recording vegetation composition, percentage coverage and plant health conditions will be conducted. Compensatory planting will be recommended when necessary.

7.3.3 Additional monitoring will be conducted to ensure correct coverage and height of vegetation is maintained in other habitats, these surveys will also be conducted on a half-yearly basis.

7.3.4 The presence and coverage of exotic plant species will be conducted quarterly.

Water Depths

7.3.5 Water depths in fishpond and marsh will be maintained to desired level. Weekly checks will be conducted. If levels are more than 25% more or less than desired levels, remedial measures will be undertaken. In Area, 2, priority will be given to maintaining levels in marsh habitats by pumping water from adjacent fishpond habitats.

7.3.6 It is expected that there will be sufficient rainfall in the area to maintain required levels throughout the year, especially as some water will be available in the dry season from drained-down ponds to supplement levels in marsh habitats.

7.3.7 However, if there are frequent issues with water levels during the dry season, potential options for supplementary water-sources, such as LMC meander for Area 2 and nearby drainage channels for Area 7 and 9, should be explored. Use of these water sources would not require additional water control hardware structures, as electric pumps used for internal OWCA's should be sufficient for this purpose. As stated in Fisheries Section 13.6.2.4 of the EIA Report and interviews with local fishermen, these water-sources have been used by commercial farmers in the area under normal practice as short-term management approach. Water quality monitoring results under the Project's EM&A Report (Ford Business International Ltd. 2020, 2021) have also shown that water quality in the meander and upstream of drainage channels meet the inland water objectives (i.e. pH in range of 6.0-9.0 and dissolved oxygen not less than 4mg/L) for Deep Bay water control zone as set under the Water Pollution Control Ordinance (Cap. 358).

Water Quality

7.3.8 Water quality in each pond/marsh across the OWCAs will be monitored monthly during establishment period. The following parameters will be measured:

- Temperature;
- pH;
- Salinity;
- Dissolved oxygen;
- BOD5;
- Nitrate and nitrite;
- Ammonia nitrogen; and
- Orthophosphate.

7.3.9 Sediment in each OWCAs will be monitored in early wet season yearly. Two to three sediment samples will be collected from each OWCAs and sent to a HOKLAS accredited laboratory for analysis during establishment period. The following parameters will be measures:

- pH;
- Redox potential;
- Total organic carbon;
- Total nitrogen;
- Total Phosphorus.

Table 7.2 Offsite Wetland Compensation Areas Monitoring Requirements

Item	Monitoring	Frequency	Action Levels	Management Actions
1. Target Species Monitoring				
Bird key species	Transect counts to record species presence and abundance.	Twice a month during between September to March, and once a month during other time of the year	Absence of the bird key species.	Review adaptive management regime.
Mammal key species	Transect survey and infra-red camera to record Eurasian otter and leopard cat. Records to be made of other species of conservation interest recorded.	Monthly transect count; Monthly check of photos taken by infrared camera	Absence of the mammal key species.	Review vegetation management; Review the necessity of food prey (e.g., fish) stocking; Review of other factors (e.g., disturbance/ dogs)
Herpetofauna key species	Daytime and night time transect count surveys to record the abundance of the key species. Records to be made of other species of conservation interest recorded.	Monthly between April and October	Absence of herpetofauna key species.	Review vegetation management Adjustment of water level if considered necessary.

Item	Monitoring	Frequency	Action Levels	Management Actions
Dragonfly key species	Transect count to record the occurrence of dragonfly key species. Records to be made of other species of conservation interest recorded.	Monthly between April and October	Absence of the dragonfly key species.	Review vegetation management Adjustment of water level if considered necessary.
2. Habitat Conditions				
Vegetation	1m belt transects of marsh vegetation in Ponds 55 and 56 to monitor species composition, coverage and plant health.	Half yearly	>30% dieback of wetland vegetation. < 60% of vegetation facultative or obligate wetland plants.	Review water management regime and/or water quality; Compensatory planting will be recommended when necessary.
	General surveys of vegetation coverage and height across different habitats within the OWCAs.	Half yearly	>50% of open bunds with vegetation cover > 10cm in height. Intensively managed ponds 5-10% emergent vegetation coverage Less intensively managed ponds 15-20% emergent vegetation coverage Emergent vegetation in Pond 9D 70-80% coverage.	Removal or planting of vegetation as necessary.
	Presence and coverage of exotic plant species	Quarterly	>10% coverage in any particular habitat type/location	Mechanical or manual removal
Water depths	Monitor the water depth in each pond/marsh	Weekly	> 25% variance in water depth from specified levels.	Short-term: re-distribute water between ponds. Medium-term: Desilting works. Long-term: review need for supplementary water supply.
Water quality	Temperature pH	Monthly	- pH outside 6.0-8.5;	Water quality will be monitored more

Item	Monitoring	Frequency	Action Levels	Management Actions
				closely if action levels exceed; Contingency plan will be developed to determine the cause of deterioration of water quality and determine remedial action.
	Salinity (ppt)		Salinity (ppt) >3	
	Dissolved oxygen (mg/L)		Dissolved oxygen (mg/L) <4	
	BOD_5 (mg/L)		BOD_5 (mg/L) > 20	
	Nitrate and Nitrite (mg/L)		Nitrate and Nitrite (mg/L) > 5	
	Ammonia nitrogen (mg/L)		Ammonia nitrogen (mg/L) >3	
	Orthophosphate (mg/L)		Orthophosphate (mg/L) >0.03	
Sediment quality	pH	Yearly	Surveillance only, no limit level	Surveillance only, no limit level
	Redox potential			
	Total organic carbon			
	Total nitrogen			
	Total phosphorus			

7.4 Reporting

7.4.1 A Monthly Monitoring and Management Report will be prepared for the OWCAs. This Report will include:

- A summary of the field data collected, performance in respect of species targets, interpretation of the data with respect to Action Levels for ecological attributes and recommendations for remedial or other action to be taken.
- Management activities undertaken during the previous month. This will include routine activities such as drain-down and refilling, stocking, fertilization, vegetation management. Additionally, response to events such as adverse weather, fires or other damage to habitats and equipment shall be documented.
- Any reportable incidents during the previous month: including human disturbance, adverse weather events, accidental or deliberate damage to mitigation areas, leakages and water quality problems.

7.4.2 In addition, the Monitoring and Management Report will detail recommendations for the forward programming of the management activities. This program will cover the current six-month wet or dry season period and will be rolled forward and/or modified as required, according to progress in meeting targets and management objectives.

7.4.3 At the end of the establishment period, the information collected from the ecological monitoring programme and wetland management actions will be reviewed and summarized in a Summary Report. The Report will also assess the degree of success of the active HCMP by assessing the habitat creation and species recorded. Extension of the establishment period and / or modifications to the HCMP will be proposed (as required) to improve the management of the OWCAs.

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https://www.info.gov.hk/tpb/en/forms/Guidelines/pg12c_e.pdf

Figures

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ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

LMC LOOP

AREA 2

AREA 7

AREA 9

824500 E

826000 E

827500 E

829000 E

843000 N

841500 N

840000 N

N

HOO HOK WAI

TA SHA LOK

LUCKY MAIS

MA TSO LUNG

PING HANG

TAI LAW HAU

LOK MA CHAU

FUNG KONG SHAN

SAM PO SHUE

SAN TIN

SAN TIN

NGAU TEI

SHENZHEN RIVER

SHAM CHUN RIVER

FANLING HIGHWAY

SAN TIN HIGHWAY

96

58

57

56

54

55

53

7E

7D

7C

7B

7A

9E

9D

9C

9B

9A

2019/9/6

Plot File by: YaoFB

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DEVELOPMENT OF
LOK MA CHAU LOOP
MAIN WORKS PACKAGE 1
DESIGN AND
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業主

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I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核實

STATUS
階段

SCALE
比例

A1 : 8000

DIMENSION UNIT
尺寸單位

METRES

KEY PLAN
索引圖

PROJECT NO.
項目編號

60588085

CONTRACT NO.
合約編號

CE 5/2018(CE)

SHEET TITLE
圖紙名稱

LOCATION OF OFF-SITE WETLAND COMPENSATION AREAS

SHEET NUMBER
圖紙編號

60588085/B9A/FIGURE 2.1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

- LMC LOOP
- BOUNDARY OF WETLAND CONSERVATION AREA
- BOUNDARY OF WETLAND BUFFER AREA
- INDICATIVE BOUNDARY OF IMPORTANT BIRD AREA
- AREA 2
- AREA 7
- AREA 9
- MTR LOK MA CHAU SPURLINE WETLAND MITIGATION AREA
- SAN TIN EAST MAIN DRAINAGE CHANNEL

N

829000 E

827500 E

826000 E

841500 N

840000 N

HOO HOK WAI

MA TSO LUNG

SAN TIN

NGAU TEI

SHENZHEN RIVER

FANLING HIGHWAY

SAN TIN HIGHWAY

96 58 57 56 54 55 53

7E 7D 7C 7B 7A 9E 9D 9C 9B 9A

Plot File by: Yihang.Qian
PATH P:\PROJECTS\60588085\DRAWING\REPORT\B9A\B9A_730.dgn
2021/5/20

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STATUS
階段

SCALE 比例: A1 1 : 8000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60588085

CONTRACT NO. 合約編號: CE 5/2018(CE)

SHEET TITLE
圖紙名稱

AREAS OF CONSERVATION IMPORTANCE NEAR OFF-SITE WETLAND COMPENSATION AREA

SHEET NUMBER
圖紙編號

60588085/B9A/FIGURE 3.1

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

826200 E

826400 E

826600 E

843200 N

843000 N

SHAM CHUN RIVER (SHENZHEN HE...

深圳河

96

58

57

56

55

54

53

LEGEND:

AREA 2 BOUNDARY

ACTIVELY MANAGED POND

ABANDONED POND

WELL VEGETATED BUNDS

LIGHTLY VEGETATED BUNDS

N

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STATUS
階段

SCALE 比例: A1 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖 A1 1 : 100000

PROJECT NO. 項目編號: 60588085

CONTRACT NO. 合約編號: CE 5/2018(CE)

SHEET TITLE
圖紙名稱

HABITAT MAP FOR AREA 2

SHEET 1 OF 3

SHEET NUMBER
圖紙編號

60588085/B9A/FIGURE 3.2

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Initials:

Project Management

LEGEND:

AREA 7 BOUNDARY

ABANDONED POND

WELL VEGETATED BUNDS

N

824200 E

824400 E

824600 E

841400 N

841200 N

7A

7B

7C

7D

7E

SHAM CHUN RIVER (SHENZHEN HE)

深圳河

Plot File by: Yangs2
PATH P:\PROJECTS\60588085\DRAWING\REPORT\B9A\B9A_757.dgn
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STATUS
階段

SCALE 比例
A1 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖 A1 1 : 100000

PROJECT NO. 項目編號
60588085

CONTRACT NO. 合約編號
CE 5/2018(CE)

SHEET TITLE
圖紙名稱

HABITAT MAP FOR AREA 7

SHEET 2 OF 3

SHEET NUMBER
圖紙編號

60588085/B9A/FIGURE 3.3

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

- AREA 9 BOUNDARY
- ACTIVELY MANAGED POND
- ABANDONED POND
- WELL VEGETATED BUNDS
- LIGHTLY VEGETATED BUNDS



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STATUS
階段

SCALE 比例
A1 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖 A1 1 : 100000

PROJECT NO. 項目編號
60588085

CONTRACT NO. 合約編號
CE 5/2018(CE)

SHEET TITLE 圖紙名稱
HABITAT MAP FOR AREA 9

SHEET 3 OF 3

SHEET NUMBER 圖紙編號
60588085/B9A/FIGURE 3.4

Plot File by: ou,y
PATH: P:\PROJECTS\60588085\DRAWING\REPORT\B9A\B9A_758.dgn
2021/5/17

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

826200 E

826400 E

826600 E

843200 N

843000 N

SHAM CHUN RIVER 深圳河

LEGEND:

TRANSECT ROUTE

AREA 2

CAMERA TRAPS

POINT COUNT LOCATION FOR BIRD SURVEY

OTTER SIGHTING

SMALL INDIAN CIVET SIGHTING

N

CAMERA 10

CAMERA 6

CAMERA 5

96

58

57

56

54

55

53

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狀況

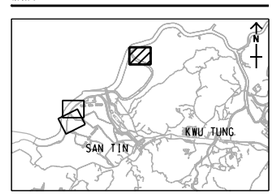
SCALE
比例

A1 1 : 1000

DIMENSION UNIT
尺寸單位

METRES

KEY PLAN A1 1 : 100000
索引圖



PROJECT NO.
項目編號

60588085

CONTRACT NO.
合約編號

CE 5/2018(CE)

SHEET TITLE
圖紙名稱

TRANSECT ROUTES, CAMERA TRAPS COUNT LOCATIONS AND KEY SIGHTINGS FOR VARIOUS ECOLOGICAL SURVEYS OF AREA 2

SHEET 1 OF 3

SHEET NUMBER
圖紙編號

60588085/B9A/FIGURE 3.5

Plot File by: Yangu2
PATH: P:\PROJECTS\60588085\DRAWING\REPORT\B9A\B9A_732.dgn
2021/5/17

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

TRANSECT ROUTE

AREA 7

CAMERA TRAPS

POINT COUNT LOCATION FOR BIRD SURVEY

LEOPARD CAT SIGHTING

N

824200 E

824400 E

824600 E

841400 N

841200 N

7A

7B

7C

7D

7E

CAMERA 7(WET SEASON)

CAMERA 7(DRY SEASON)

深圳河

SHAM CHUN RIVER (SHENZHEN HE)

Plot File by: Yangyl2
PATH: P:\PROJECTS\60588085\DRAWING\REPORT\B9A\B9A_733.dgn
2021/5/17

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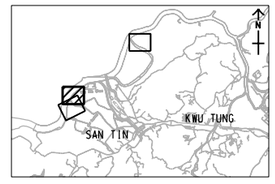
I/R 修訂	DATE 日期	DESCRIPTION 事件摘要	CHK. 校核

STATUS
狀況

SCALE 比例
A1 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖 A1 1 : 100000



PROJECT NO. 項目編號
60588085

CONTRACT NO. 合約編號
CE 5/2018(CE)

SHEET TITLE
頁紙名稱

TRANSECT ROUTES, CAMERA TRAPS
AND COUNT LOCATIONS FOR
VARIOUS ECOLOGICAL SURVEYS
OF AREA 7

SHEET 2 OF 3

SHEET NUMBER
頁紙號數

60588085/B9A/FIGURE 3.6

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: Yangu2
PATH: P:\PROJECTS\60588085\DRAWING\REPORT\B9A\B9A_734.dgn
2021/5/19

LEGEND:

- TRANSECT ROUTE
- AREA 9
- CAMERA TRAPS
- POINT COUNT LOCATION FOR BIRD SURVEY
- LEOPARD CAT SIGHTING

824000 E

824200 E

824400 E

840800 N

SHAM CHUN RIVER (SHENZHEN HE)

深圳河

CAMERA 9

CAMERA 4

9A

9B

9C

9D

9E

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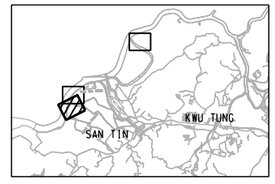
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STATUS
階段

SCALE 比例
A1 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖 A1 1 : 100000



PROJECT NO. 項目編號
60588085

CONTRACT NO. 合約編號
CE 5/2018(CE)

SHEET TITLE
圖紙名稱

TRANSECT ROUTES, CAMERA TRAPS
AND COUNT LOCATIONS FOR
VARIOUS ECOLOGICAL SURVEYS
OF AREA 9

SHEET 3 OF 3

SHEET NUMBER
圖紙編號

60588085/B9A/FIGURE 3.7

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

826200 E

826400 E

826600 E

843200 N

843000 N

SHAM CHUN RIVER 深圳河

96

58

57

56

55

54

53

OTTER ROCK

OTTER JETTY

FLOATING OTTER PLATFORM

N

NOTE:

1. * FENCE LOCATION ARE INDICATIVE ONLY.

LEGEND:

- AREA 2 BOUNDARY
- FRESH WATER MARSH
- MANAGED FISHPONDS
- INTENSIVELY MANAGED FISHPONDS
- OPEN/LIGHTLY VEGETATED BUNDS AND ISLANDS
- WELL VEGETATED BUNDS AND ISLANDS
- PIPE
- WEIR
- PROPOSED OWCAS FENCE
- PEDESTRIAN ACCESS PATH
- VEHICULAR ACCESS PATH
- ACCESS POINT
- UPVC PIPES
- CATCHPIT
- BOUNDARY FENCE *

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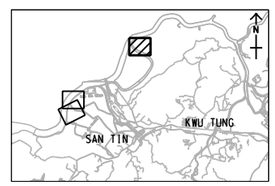
I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對

STATUS
階段

SCALE 比例: A1 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖 A1 1 : 100000



PROJECT NO. 項目編號: 60588085

CONTRACT NO. 合約編號: CE 5/2018(CE)

SHEET TITLE
圖紙名稱

HABITAT ENHANCEMENT MEASURES FOR AREA 2

SHEET 1 OF 3

SHEET NUMBER
圖紙編號

60588085/B9A/FIGURE 5.1a

Plot File by: Tsukwy
PATH: P:\PROJECTS\60588085\DRAWINGS\REPORT\B9A\B9A_751.dgn
2021/10/12

ISO A1 594mm x 841mm

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Checked:

Designer:

Project Management Initials:

NOTE:

1. * FENCE LOCATION ARE INDICATIVE ONLY.

LEGEND:

- AREA 7 BOUNDARY
- MANAGED FISHPONDS
- WELL VEGETATED BUNDS AND ISLANDS
- PIPE
- WEIR
- PEDESTRIAN ACCESS PATH
- VEHICULAR ACCESS PATH
- ACCESS POINT
- UPVC PIPES
- CATCHPIT
- BOUNDARY FENCE *
- LMC WMA FENCE *

N

824200 E

824400 E

824600 E

841400 N

841200 N

OTTER JETTY

7E

7D

TEMPORARY MITIGATION OF MARSH

7C

EXISTING JETTY

7B

7A

SHAM CHUN RIVER (SHENZHEN HE)

深圳河

Mainstream Blue Bank

排水口 Outlet

CUL

P0

3.6

3.5

4.4

Plot File by: Tsuiwy
PATH P:\PROJECTS\60588085\DRAWING\REPORT\B9A\B9A_752.dgn
2021/10/7

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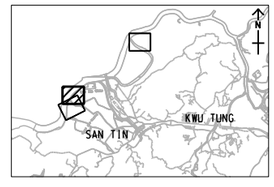
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STATUS
階段

SCALE 比例
A1 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖 A1 1 : 100000



PROJECT NO. 項目編號
60588085

CONTRACT NO. 合約編號
CE 5/2018(CE)

SHEET TITLE
圖紙名稱

HABITAT ENHANCEMENT
MEASURES FOR AREA 7

SHEET 2 OF 3

SHEET NUMBER
圖紙編號

60588085/B9A/FIGURE 5.1b

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

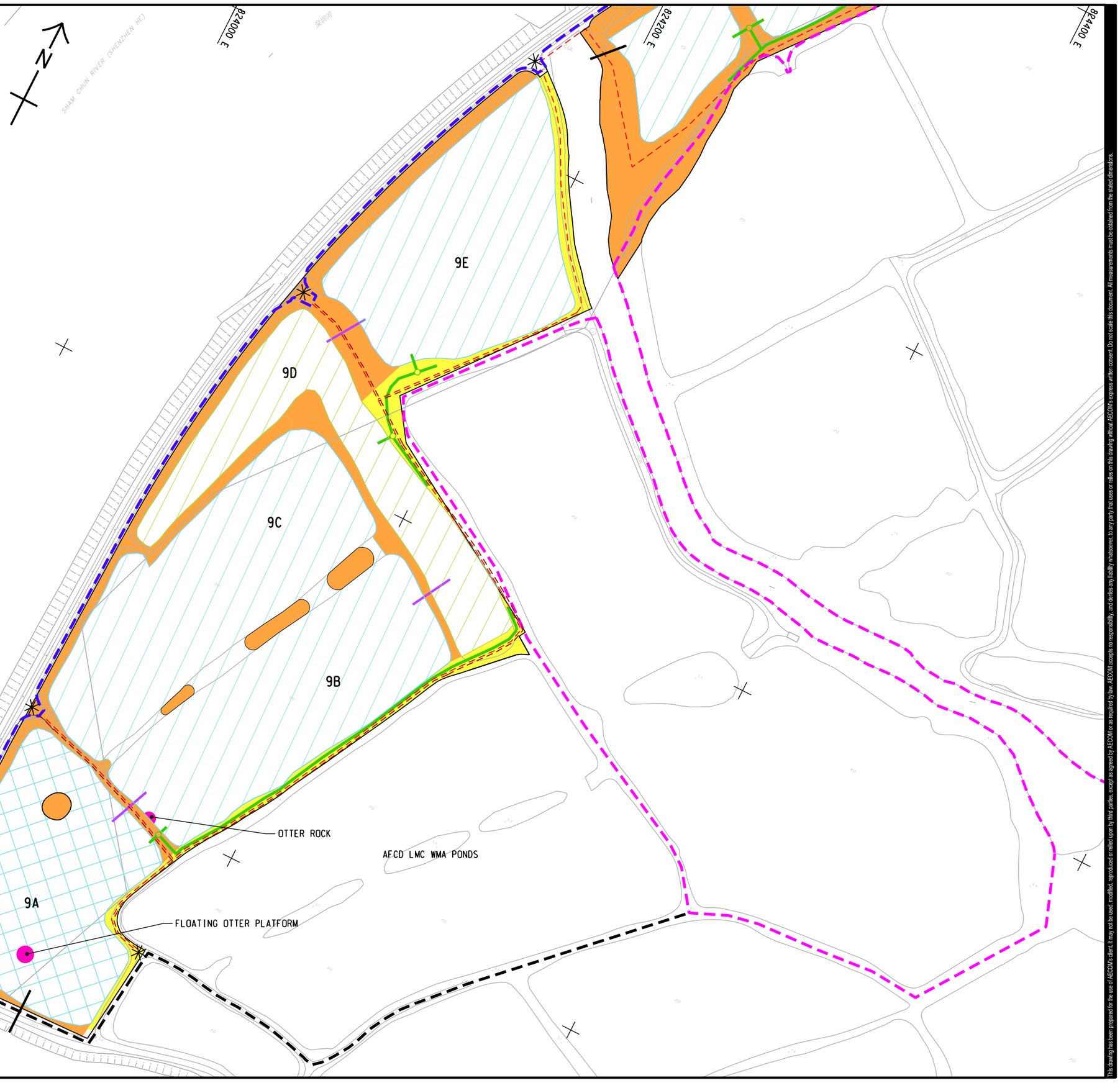
Project Management Initials:

NOTE:

1. * FENCE LOCATION ARE INDICATIVE ONLY.

LEGEND:

- AREA 9 BOUNDARY
- MANAGED FISHPONDS
- INTENSIVELY MANAGED FISHPONDS
- FRESH WATER MARSH
- WELL VEGETATED BUNDS AND ISLANDS
- OPEN/LIGHTLY VEGETATED BUNDS AND ISLANDS
- PIPE
- WEIR
- PROPOSED OWCAS FENCE
- PEDESTRIAN ACCESS PATH
- VEHICULAR ACCESS PATH
- ACCESS POINT
- UPVC PIPES
- CATCHPIT
- BOUNDARY FENCE *
- LMC WMA FENCE *



Plot File by: Tsukvy
PATH: P:\PROJECTS\60588085\DRAWING\REPORT\B9A\B9A_753.dgn
2021/10/7

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PROJECT 項目

DEVELOPMENT OF LOK MA CHAU LOOP MAIN WORKS PACKAGE 1 DESIGN AND CONSTRUCTION

CLIENT 業主

土木工程拓展署
CEDD Civil Engineering and Development Department

CONSULTANT 工程顧問公司

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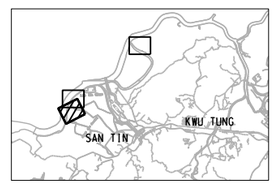
I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS 階段

SCALE 比例 A1 1 : 1000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖 A1 1 : 100000



PROJECT NO. 項目編號 60588085

CONTRACT NO. 合約編號 CE 5/2018(CE)

SHEET TITLE 圖紙名稱

HABITAT ENHANCEMENT MEASURES FOR AREA 9

SHEET 3 OF 3

SHEET NUMBER 圖紙編號

60588085/B9A/FIGURE 5.1c

Appendices

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Appendix A

Pre-construction Search Survey Report for Off-site Wetland Compensation Areas

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Civil Engineering and Development Department

Service Contract No. WD/04/2020
Development of Lok Ma Chau Loop:
Main Works Package 1 –
Environmental Team

Pre-construction Search Survey Report
(Off-site Wetland Compensation Areas)

(Version 2.0)

Certified By

(Environmental Team Leader)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

WELLAB accepts no responsibility for changes made to this report by third parties.

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1 INTRODUCTION

Project Background

1.1 The development at Lok Man Chau (LMC) Loop is one of the ten major infrastructure projects for economic growth of the Hong Kong Special Administrative Region (HKSAR). The HKSAR Government would work with the Shenzhen authorities to tap the land resources of the LMC Loop to meet future development needs and consolidate the strategic position of both cities in the Pan-Pearl River Delta region. The Project is to develop LMC Loop with higher education as the leading land use, complemented by high-tech research and development facilities and cultural and creative industries.

1.2 The planning and engineering study for the Loop development is a designated project (DP) classified under Item 1 Schedule 3 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499). In October 2013, the EIA Report (AEIAR-176/2013) of the Project was approved by the Director of Environmental Protection pursuant to the EIA Ordinance in accordance with the EIA Study Brief (No. ESB-201/2008 and ESB-238/2011) and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The Environmental Permit (EP) (EP no.: EP-477/2013) was also granted in November 2013.

1.3 The scope of works under the "Development of LMC Loop Main Work Package 1" (hereinafter called "the Project") include:-

- site clearance and formation for about 70 hectares of land within the Lok Ma Chau loop (the Loop) ;
- engineering infrastructure works supporting Phase 1 development of the Hong Kong-Shenzhen Innovation and Technology Park, including Western Connection Road (WCR) and Direct Road Link (DRL) for connection with the Loop, local roads, sewerage (including sewage treatment works), drainage, water supply and landscaping works; and
- environmental mitigation measures and the environmental monitoring and audit programme for the works mentioned above.

1.4 The site layout plan of the Project is shown in **Figure 1.**

1.5 Wellab Limited was commissioned by Civil Engineering and Development Department (CEDD) as the Environmental Team under "Service Contract No. WD/04/2020 Development of Lok Ma Chau Loop: Main Works Package 1" to undertake the Environmental Monitoring and Audit (EM&A) services for the Works Contracts involved in the implementation of the Development of Lok Ma Chau Loop: Main Work Package 1 to ensure that the environmental performance of the Project comply with the requirements specified in the EP, EM&A Manual, EIA Report of the Project and other relevant statutory requirements.

1.6 According to Condition 2.7(a) of EP-477/2013, pre-construction search for any otter holts/dens and herpetofaunal species of conservation concern in the construction site shall be conducted, with remedial measures such as setting of no works area around otter holts/ den and translocation of important species identified, if any.

1.7 In accordance with approved EIA Report, Clause 12.3.3.4 that wetland compensation is required for any development involving pond filling and mitigation measures against disturbance would be necessary. Therefore, Area 2 and 7 will be utilized as permanent mitigation for the Project, with 0.032ha of Area 7 initially being used as reed marsh during construction phase of DRL. Area 9 will be utilized to compensate for temporary impacts associated with WCR construction. Pre-construction search survey was conducted from 25th

May to 1st June, 2021 at Area 2, 7 and 9 of the Offsite Wetland Compensation Areas (OWCAs) in accordance with EP Condition 2.7(a) prior to the site activities at OWCAs.

Purpose of the Report

1.8 This Pre-construction Search Survey Report is prepared by Wellab to summarize the methodology and results of the pre-construction search survey.

Structure of the Report

1.9 The structure of the report is shown as follows:

Section 1: Introduction
Section 2: Pre-construction Search Survey Methodology
Section 3: Pre-construction Search Survey Results
Section 4: Conclusion

2 PRE-CONSTRUCTION SEARCH SURVEY METHODOLOGY

Monitoring Requirements

2.1 According to Condition 2.7(a) of EP-477/2013, pre-construction search for any otter holts/dens and herpetofaunal species of conservation concern in the construction site shall be conducted, with remedial measures such as setting of no works area around otter holts/ den and translocation of important species identified, if any.

General Descriptions of the Eurasian Otter and Herpetofauna Species of Conservation Concern according to EIA Report

Eurasian Otter (*Lutra lutra*)

2.2 Eurasian Otter is a largely nocturnal and crepuscular animal in Hong Kong. In addition, Eurasian Otter is of conservation significance ('Near Threatened' - IUCN; 'Endangered' - CSIS), and the Hong Kong distribution of this protected species appears to be confined to the northwest New Territories.

Herpetofaunal Species of Conservation Concern

2.3 Referring to Section 12.4.4.3 of the EIA Report, herpetofaunal species of conservation concern that inhabit the Ecological Assessment Area are listed in **Table 2.1** below:

Table 2.1 Herpetofauna Species of Conservation Concern

Species	Conservation Status	Areas / Habitats
Chinese Bull Frog 虎紋蛙 *Hoplobatrachus chinensis*	Class II Protected Animal in China[1], Potential Regional Concern[2].	Abandoned fish ponds and agricultural land at LMC Tsuen, marsh and agricultural land at Ma Tso Lung, also recorded in LMC WMA.
Two-striped Grass Frog 台北蛙 *Rana taipehensis*	Local Concern[2].	Abandoned fish ponds and marsh at LMC Tsuen and HHW, also recorded in LMC WMA recently.
Three-banded Box Terrapin 三線閉殼龜 *Cuora trifasciata*	Cap. 170 protected, Class II Protected Species in China[1], Global Concern[2], Critically Endangered[3, 4], Appendix II of CITES[5].	Recorded in a hill stream flowing to Ma Tso Lung.
Chinese Soft-shelled Turtle 鱉 *Pelodiscus sinensis*	Cap. 170 protected, Global Concern[2], Vulnerable[3, 4].	Recorded in LMC WMA and HHW fish ponds.
Many-banded Krait 銀環蛇 *Bungarus multicinctus*	Potential Regional Concern[2], Vulnerable[4].	Recorded along boundary fence road near LMC Tsuen, village area at Ma Tso Lung and at LMC WMA.
Copperhead Racer 三索錦蛇 *Elaphe radiata*	Potential Regional Concern[2], Vulnerable[4].	Recorded at Ha Wan Tsuen.
Chinese Water Snake 中國水蛇 *Enhydris chinensis*	Near Threatened[4].	Recorded at LMC WMA and stream near Ngau Kok Shan.
Chinese Cobra 眼鏡蛇 *Naja atra*	Potential Regional Concern[2], Vulnerable[4], Appendix II of CITES[5].	Recorded in shrubland and fish ponds close to Ngau Kok Shan, LMC.

Species	Conservation Status	Areas / Habitats
Indo-Chinese Rat Snake 灰鼠蛇 *Ptyas korros*	Potential Regional Concern[2], Vulnerable[4].	Recorded at LMC WMA.
Common Rat Snake 滑鼠蛇 *Ptyas mucosus*	Potential Regional Concern[2], Vulnerable[4], Appendix II of CITES[5].	Recorded at LMC WMA and a stream at LMC, village area in Ma Tso Lung and a stream at Tse Koo Hang.
Burmese Python 蟒蛇 *Python molurus*	Cap. 170 protected, Class I Protected Species in China[1], Potential Regional Concern[2], Lower Risk/Near Threatened[3], Critically Endangered[4], Appendix II of CITES[5].	Recorded in fish pond and shrubland next to boundary fence road, and at LMC WMA.

Notes:
[1] http://www.sepa.gov.cn
[2] Fellowes et al. (2002)
[3] IUCN (2010)
[4] CSIS (2010)
[5] UNEP-WCMC (2009).

Locations for Pre-construction Search

2.4 Pre-construction search was conducted at three areas of OWCAs (Area 2, 7 and 9). The locations of Area 2, 7 and 9 are shown in **Figure 2**. The locations of transects and infrared cameras in Area 2, 7 and 9 are shown in **Figure 3, 4 and 5** respectively.

Monitoring Method

Otter Holts/ Den Survey

2.5 One day-time survey for otter holts/dens was conducted in Area 2, 7 and 9. Other than otter holts/dens, all direct sightings, tracks, and signs of the target species were actively searched.

2.6 A total of 6 infrared cameras were set up to detect Eurasian Otter so that the location of otter holts/dens can be identified indirectly.

Herpetofauna Survey

2.7 One day-time and one night-time herpetofauna survey was conducted along the transects in Area 2, 7 and 9.

2.8 Identification of vocalisations and active searching for the presence of tadpoles, froglets, or adults in potential habitats (such as ditches, ponds, marshes and wet agricultural land) were also conducted both during day-time and night-time.

Monitoring Equipment

2.9 The following equipments were used for the pre-construction search survey:

- Remote-sensing (infra-red flash) cameras;
- Camera (one which can zoom and take macro shots) to take photo of the signs / mammals / Amphibians & Reptiles;

- Binoculars for checking the signs; and
- Small torch for looking in dark places.

3 PRE-CONSTRUCTION SEARCH SURVEY RESULTS

Monitoring Information

3.1 Pre-construction search survey was conducted on 25th May, 2021 at Area 2, 7 and 9. Day-time survey for herpetofauna was carried out after heavy rainfall in the morning of the survey day. Infrared cameras were deployed for a week from 25th May to 1st June, 2021 to capture images of mammals.

Otter Holts/ Den Survey

3.2 No otter holts/ den or otter was recorded in the pre-construction search survey. No other mammal was recorded in the daytime survey.

3.3 A total of 3 mammal species (Eurasian Wild Pig, Small Asian Mongoose and Small Indian Civet) were captured by the infrared cameras.

3.4 Photographic records of the species observed are presented in **Appendix A**. Mammal species captured by the infrared cameras are summarized in **Table 3.1** below:

Table 3.1 Mammal Species Recorded by Infrared Cameras in Pre-construction Search Survey

Common Name	Species Name	Chinese Name	Conservation Status	Abundance		
				Area 2	Area 7	Area 9
Eurasian Wild Pig	*Sus scrofa*	野豬	-	3 (Camera 6)	0	0
Small Asian Mongoose	*Herpestes javanicus*	紅頰獴	Cap. 170 (1) Vulnerable (2)	1 (Camera 10)	0	0
Small Indian Civet	*Viverricula indica*	小靈貓	Cap. 170 (1) Class II (3) Vulnerable (2)	1 (Camera 10)	0	1 (Camera 4)
Total No. of Species				3	0	1
Total No. of Conservation Interest Species				2	0	1

Note:
(1) Protected under Wild Animals Protection Ordinance (Cap. 170).
(2) Jiang, *et al*. (2016). Red List of China's Vertebrates.
(3) "List of Wild Animals Under State Protection" (promulgated by State Forestry Administration and Ministry of Agriculture on 14 January 1989)

Herpetofauna Survey

3.5 There was no herpetofauna species of conservation concern recorded during the pre-construction search survey.

3.6 A total of 5 amphibian species and 1 reptile species were recorded in the survey. No tadpoles or froglets was observed. All herpetofauna species recorded were common and widely distributed in Hong Kong.

3.7 A summary of the herpetofauna species recorded is shown in **Table 3.2**. Photographic records of the species observed are presented in **Appendix B**. Since *Kalophrynus interlineatus* was heard but not seen along the transect in Area 2, no photographic record for the species is available.

Table 3.2 Herpetofauna Species Recorded in Pre-construction Search Survey

Common Name	Species Name	Chinese Name	Conservation Status	Relative Abundance		
				Area 2	Area 7	Area 9
Amphibian						
Asian Painted Frog	*Kaloula pulchra*	花狹口蛙	-	+		+
Brown Tree Frog	*Polypedates megacephalus*	斑腿泛樹蛙	-	+		
Gunther's Frog	*Hylarana guentheri*	沼蛙	-	+++		++
Paddy Frog	*Fejervarya limnocharis*	澤蛙	-	+		
Spotted Narrow-mouthed Frog	*Kalophrynus interlineatus*	花細狹口蛙	-	++		
Reptile						
Bowring's Gecko	*Hemidactylus bowringii*	原尾蜥虎	-			+
Total No. of species				5	0	3
Total No. of Conservation Interest Species				0	0	0

Note:
+: species recorded within transect routes
++: species commonly recorded within transect routes
+++: dominant species within transect routes

4 CONCLUSIONS

4.1 This Pre-construction Search Survey Report presents the results of pre-construction search survey conducted in May and June 2021, in Area 2, 7 and 9 of the OWCAs.

4.2 One day-time survey for otter holts/dens was conducted on 25th May, 2021. There was no otter holt/den or otter recorded in the survey. No other species of mammal was observed in the daytime survey.

4.3 There were 6 infrared cameras deployed from 25th May to 1st June, 2021. A total of 3 mammal species were captured by the infrared cameras. They are Eurasian Wild Pig, Small Asian Mongoose and Small Indian Civet.

4.4 One day-time and one night-time survey was conducted on 25th May, 2021. There was no herpetofauna species of conservation concern recorded in the survey. All herpetofauna species recorded were common and widely distributed in Hong Kong.

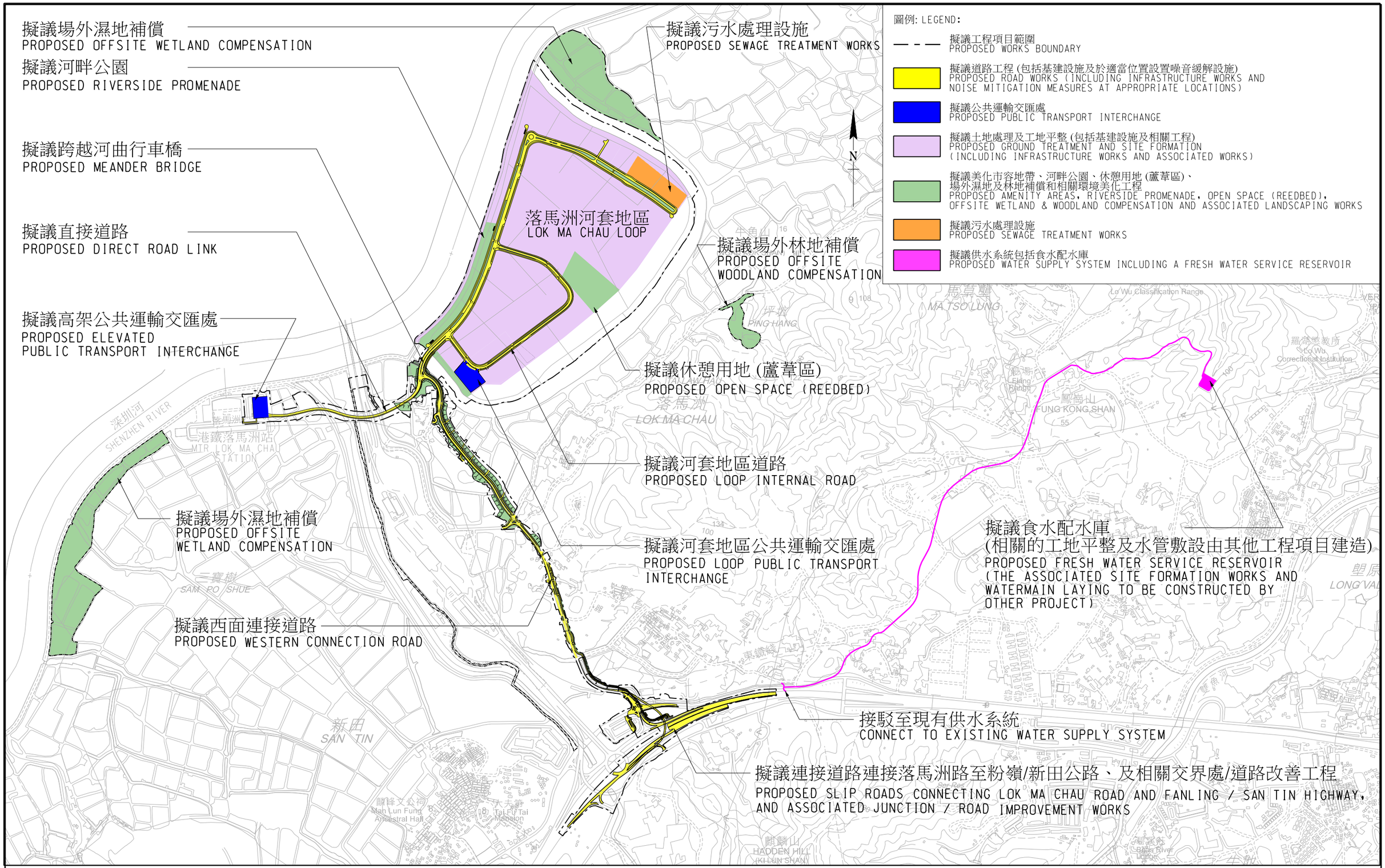
4.5 Although no otter holt/dens or herpetofaunal species of conservation concern were found in the Off-site Wetland Compensation Areas (OWCAs) during the pre-construction survey, the planning of works for OWCAs according to Section 5 of EMHCMP shall be followed.

5 RECOMMENDATION

5.1 In case of any otter holts/dens and herpetofauna species of conservation concern were found during the construction phase, the following remedial measures are recommended: -

- Setting of no works area around otter holts/ den; and
- Translocation of important species identified.

FIGURE(S)



圖則名稱 drawing title

工務工程計劃項目第7856CL號
落馬洲河套地區發展 - 第一期主體工程 - 土地平整及基礎設施工程 - 平面圖
PWP Item No. 7856CL
DEVELOPMENT OF LOK MA CHAU LOOP - MAIN WORKS PACKAGE 1 - SITE FORMATION AND INFRASTRUCTURE WORKS - LAYOUT PLAN

FIGURE 1

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27/11/2020

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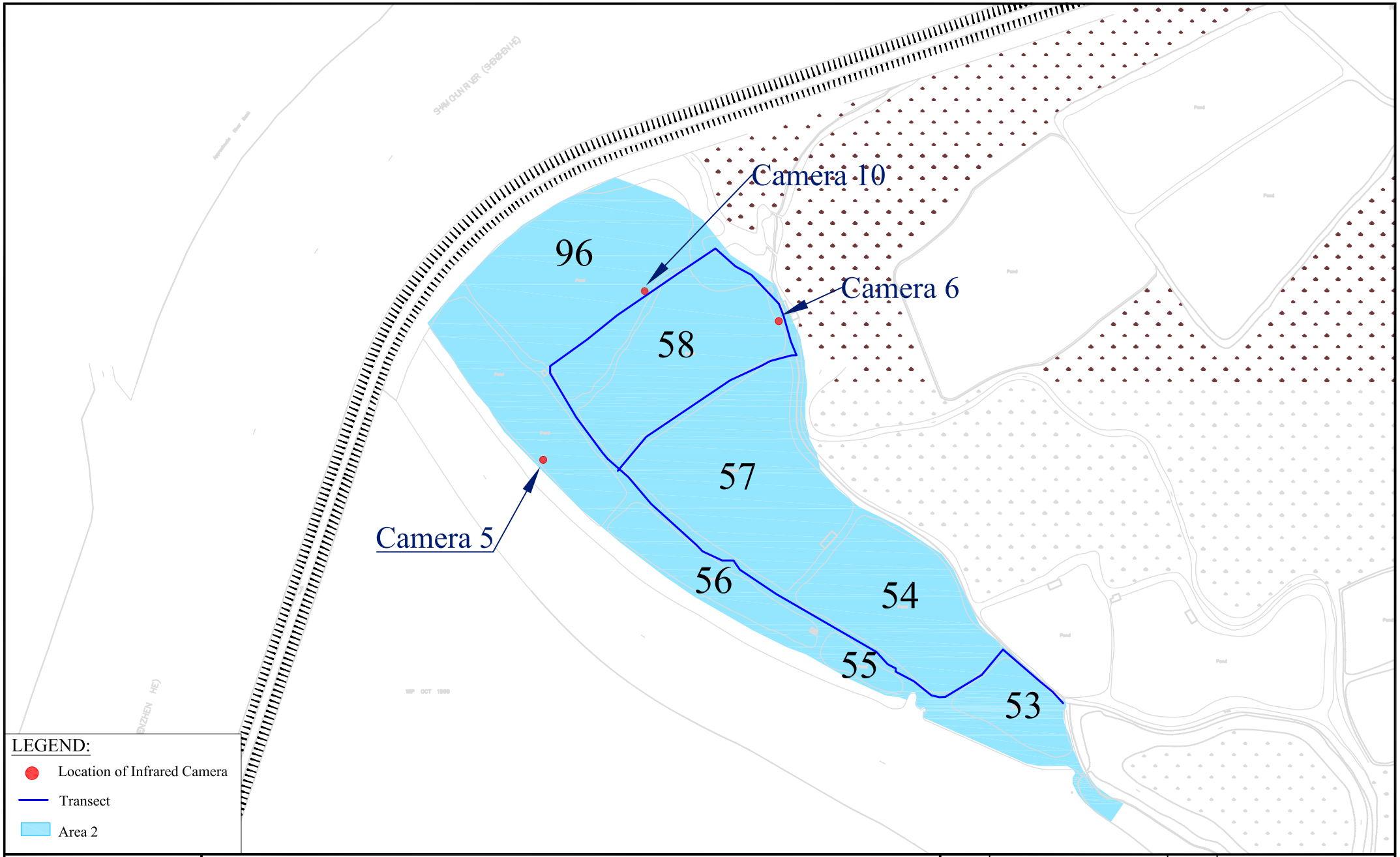


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Service Contract No. WD/04/2020
Development of Lok Ma Chau Loop: Main Work Package 1 - Environmental Team

Location of Area 2, 7 and 9

SCALE	1:500 @A4	DATE	May 2021
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		REV	-

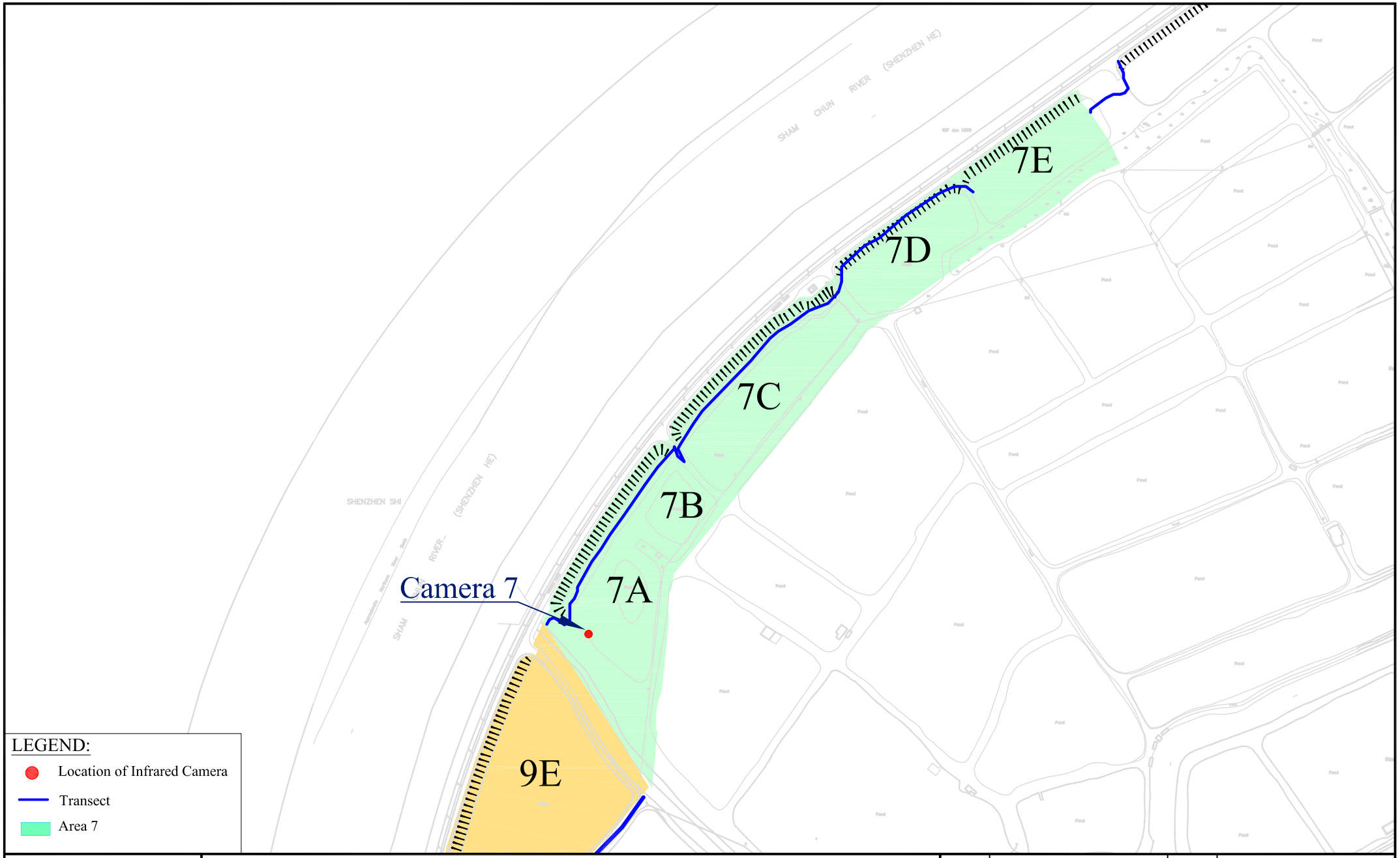


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Service Contract No. WD/04/2020
Development of Lok Ma Chau Loop: Main Work Package 1 - Environmental Team

Location of Transect and Infrared Cameras in Area 2

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JOB No.	WMA 21009	FIGURE NO.	Fig 3
		REV	-



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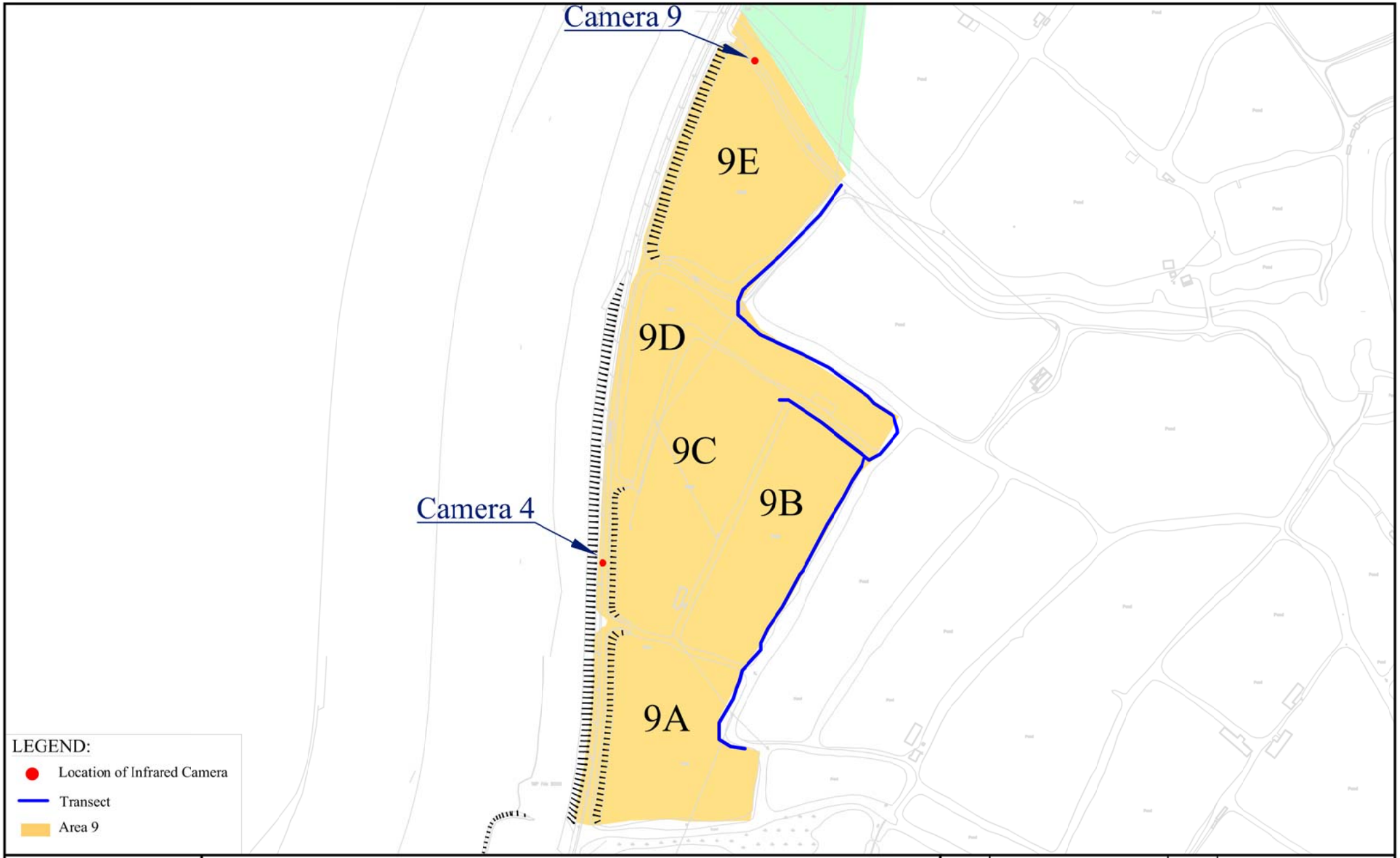
- Location of Infrared Camera
- Transect
- Area 7

WELLAB

Service Contract No. WD/04/2020
Development of Lok Ma Chau Loop: Main Work Package 1 - Environmental Team

Location of Transect and Infrared Cameras in Area 7

SCALE	1:90 @A4	DATE	May 2021
CHECK	IT	DRAWN	JT
JOB No.	WMA 21009	FIGURE NO.	Fig 4
		REV	-



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Service Contract No. WD/04/2020
Development of Lok Ma Chau Loop: Main Work Package 1 - Environmental Team

Location of Transect and Infrared Cameras in Area 9

SCALE	1:90 @A4	DATE	May 2021
CHECK	IT	DRAWN	JT
JOB No.	WMA 21009	FIGURE NO.	Fig 5
		REV	-

APPENDIX A
PHOTOGRAPHIC RECORDS OF MAMMAL SPECIES

Appendix A Photographic Records of Mammal Species



Eurasian Wild Pig 野豬

Sus scrofa (Area 2 Camera 6)



Eurasian Wild Pig 野豬

Sus scrofa (Area 2 Camera 6)



Small Asian Mongoose 紅頰獴

Herpestes javanicus (Area 2 Camera 10)



Small Asian Mongoose 紅頰獴

Herpestes javanicus (Area 2 Camera 10)



Small Indian Civet 小靈貓

Viverricula indica (Area 2 Camera 10)



Small Indian Civet 小靈貓

Viverricula indica (Area 9 Camera 4)

APPENDIX B
PHOTOGRAPHIC RECORDS OF HERPETOFAUNA SPECIES

Appendix B Photographic Records of Herpetofauna Species




Asian Painted Frog 花狹口蛙
Kaloula pulchra




Brown Tree Frog 斑腿泛樹蛙
Polypedates megacephalus




Gunther's Frog 沼蛙
Hylarana guentheri



Paddy Frog 澤蛙
Fejervarya limnocharis

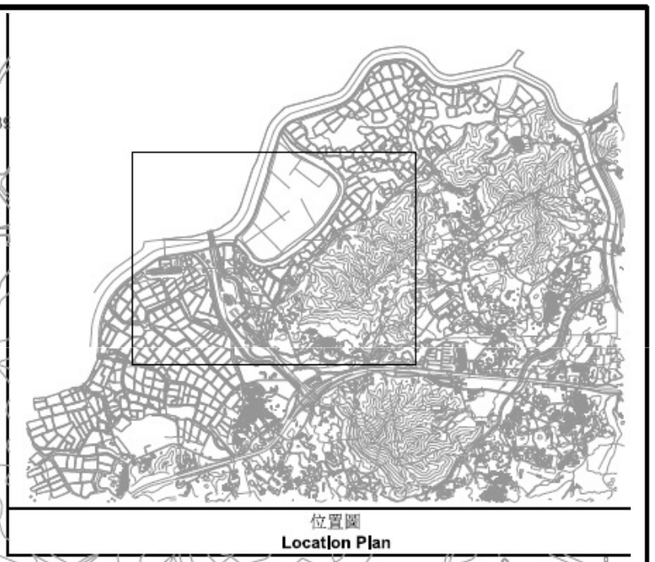


Bowring's Gecko 原尾蜥虎
Hemidactylus bowringii

Appendix B

Construction Impacts arising from
Western Connection Road
Figure 12.7 of the Lok Ma Chau Loop EIA Report

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落馬洲管制站直接連接道路
Direct Link to LMC Station

建設西面連接道路期間的棲息地喪失
Habitat Loss due to WCR during the Construction Phase

建設西面連接道路期間的禁區
Exclusion Zone of WCR during the Construction Phase

建設西面連接道路期間的降低密度區
Reduced Density Zone of WCR during the Construction Phase

受落馬洲支線干擾範圍
Disturbance Shadow of LMC Spurline

受影響的池塘棲息地
Pond Habitat Impacted

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合約編號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
西面連接道路和落馬洲管制站直接連接道路產生的施工影響
Construction Impacts arising from Western Connection Road and Lok Ma Chau Station Direct Connection

圖則編號 Figure No.
12-7

圖則 Scale
1:10000 ON A3

修訂編號 Rev.

Appendix C

Direct Link to Lok Ma Chau Station General Layout Figure 2.11a of the Lok Ma Chau Loop EIA Report

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圖例 :
LEGEND :

施工過程中受影響的漁塘
POND AFFECTED DURING CONSTRUCTION

施工過程中臨時受影響的蘆葦區域，將在完工後全數修復
REED BED TEMPORARILY AFFECTED DURING CONSTRUCTION ONLY AND TO BE REINSTATED AFTER CONSTRUCTION

地面道路
AT-GRADE ROAD

高架橋
ELEVATED VIADUCT

施工區界限
LIMIT OF WORKS AREA

高架公共運輸交匯處
ELEVATED PTI ABOVE EXISTING PTI

落馬洲邊界管制站
可擴建的區域
POSSIBLE FUTURE EXTENSION OF LMCSL BCP

現有緊急集合地點
EXISTING EMERGENCY ASSEMBLY AREA

新邊界巡邏路
NEW BOUNDARY PATROL ROAD

新深道
SAN SHAM ROAD

209840/HY/301

209840/HY/302

209840/HY/303

避讓較大的漁塘
(AVOID LARGE-AREA PONDS)

河套區
THE LOOP

TI

將來的西邊連接路
FUTURE WESTERN CONNECTION ROAD

R 495.35

GRADIENT = 4.5%

GRADIENT = 1%

R 250

R 175

+5.5

+6.8

+17.2

+17.6

+16.5

+18.2

+15.1

+15.15

+22.06

REEDBED NO.8

REEDBED NO.4

REEDBED NO.7

REEDBED NO.3

REEDBED NO.6

REEDBED NO.2

REEDBED NO.5

REEDBED NO.1

避讓蓄水池
(AVOID STORAGE PONDS)

面積約320平方米
AREA ≈ 320m²

連接落馬洲邊界管制站
CONNECT TO LMCSL BCP

擬接駁港鐵落馬洲站的行人天橋
PROPOSED FOOTBRIDGE FROM/TO MTR LOK MA CHAU STATION

連接現有的連接橋
CONNECTION TO EXISTING LINK BRIDGE

路面環保運輸系統的高架橋
VIADUCT FOR ROAD-BASED EFTS

禁區內需考慮保安措施
SECURITY MEASURE THROUGH CLOSED AREA

落馬洲支線
LOK MA CHAU SPUR LINE

下灣村
HA WAN TSUEN

HA WAN TSUEN ROAD

新田東的主要排水管道
SAN TIN EASTERN MAIN DRAINAGE CHANNEL

深圳河

825200 E

825400 E

825600 E

825800 E

825000 E

841200 N

841800 N

841600 N

N

0 25 50 75 100 125
METRES

CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合約編號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 - 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 落馬洲鐵路站連接通道總圖 Direct Link to Lok Ma Chau Station – General Layout – Key Plan	圖則編號 Figure No. 2.11a 圖則 Scale: AS SHOWN 修訂編號 Rev.

Appendix D

Permanent Habitat Loss Impacts Arising from the Project Figure 12.6 of the Lok Ma Chau Loop EIA Report

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N

降低密度區
Reduced Density Zone

禁區
Exclusion Zone

位置圖
Location Plan

落馬洲管制站直接連接道路
Direct Link to LMC Station

河套地區發展的棲息地喪失
Habitat Loss due to Development in Loop

東面連接道路導致的棲息地喪失
Habitat Loss due to ECR

西面連接道路導致的棲息地喪失
Habitat Loss due to WCR

受落馬洲支線的干擾範圍
Disturbance Shadow of LMC Spurline

蘆葦叢/沼澤
Reed Marsh

池塘
Pond

沼澤
Marsh

季節性濕草地
Seasonally Wet Grassland

次生林
Secondary Woodland

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 **Job Title**
合約編號 **Agreement No. CE 53/2008 (CE)**
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 **Title**
從項目產生的永久影響和棲息地的喪失
Permanent Habitat Loss Impacts arising from the Project

圖則編號 **Figure No.**
12-6

圖則 **Scale**
1:16000 ON A3

修訂編號 **Rev.**
-

Appendix E

Habitat Requirement for Key Species
Appendix 12-13 of the Lok Ma Chau Loop EIA Report

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Appendix 12-13
Habitat Requirements of Key Species

Great Cormorant

Great Cormorant is a common winter visitor to HK and is abundant in the Deep Bay area. It is an entirely piscivorous species and forages in fish ponds, rivers, intertidal areas and at sea. It forms very large night-time roosts and utililises smaller day-time roosts in less disturbed areas.

Little Egret

Little Egrets are found in HK throughout the year, primarily in the northeast and northwest New Territories. Habitat utilization has been studied by Young (1994), Young and Chan (1997) and Cornish (1996). These studies showed that Little Egrets in HK feed primarily in fishpond and intertidal areas. Little Egrets also feed opportunistically on stranded fish in ponds that are being drained, and are often the most abundant bird species in such circumstances. Breeding birds typically forage within 3 km of egretries (Young 1994).

Chinese Penduline Tit

Chinese Penduline Tit is a fairly common passage migrant and winter visitor to the Deep Bay area. It is insectivorous and forages almost exclusively in reed marsh (Carey *et al.* 2001).

Dusky Warbler

Dusky Warbler is common autumn migrant and winter visitor to the Deep Bay area but is uncommon elsewhere in HK. Although recorded from a variety of habitats, it shows a distinct preference for habitats associated with water, and is distinctly rare in shrubland habitats. It is insectivorous (Carey *et al.* 2001).

Oriental Reed Warbler

Oriental Reed Warbler is a common passage migrant and rare winter visitor to HK. It is widespread, but most common in wetland habitats, especially in reed marsh and grasses (particularly those around fishponds). It is insectivorous (Carey *et al.* 2001).

Black-browed Reed Warbler

Black-browed Reed Warbler is a common passage and rare winter visitor to HK that favours wetland areas, including reed marsh, fish pond bunds and inactive wet agricultural areas (Carey *et al*. 2001). Research at MPNR has shown that this species is significantly more abundant in permanently wet reed marsh than in seasonally wet reed marsh (WWFHK and HK Ringing Group unpubl. data).

Pallas's Grasshopper Warbler

Pallas's Grasshopper Warbler is primarily an autumn passage migrant to HK, with occasional winter and spring records. It occurs in most wetland habitats but most notably in areas of abandoned or inactive wet agriculture, along the bunds of fishponds and in reed marsh. It is insectivorous (Carey *et al.* 2001). Recent research has shown it to be abundant in reed marsh at MPNR although special effort is required to accurately survey this species (WWFHK and HK Ringing Group unpubl. data).

Bluethroat

Bluethroat is a winter visitor and spring migrant to HK; it is restricted to the northwest New Territories, where it frequents wet agricultural areas, well vegetated fishponds, freshwater ditches and reed marsh. It is insectivorous (Carey *et al.* 2001).

Eurasian Otter

Eurasian Otter Otter is highly restricted and mainly confined to the northwest New Territories. According to Shek (2006) and Shek *et al*. (2007), it primarily occurs in the Mai Po and Inner Deep Bay Area, and work for this Study indicates that LMC Meander and adjacent areas of LMC Loop and Hoo Hok Wai are important for the species. Eurasian Otters feed largely on fish and amphibians. As is shown in BBV (2002), in HK otters are known to make use of fishponds, *gei wai* and river channels. The former are probably largely used for feeding, whilst the latter appear to provide important movement corridors.

Leopard Cat

Leopard Cat has a wide distribution in HK, occurring in a wide range of habitats (from forest to fishponds) and can live close to rural settlements (Shek 2006). Primarily nocturnal and solitary, it feeds on small vertebrates and occasionally carrion; this species is a good climber and excellent swimmer (Smith & Xie 2008).

Chinese Bullfrog

Chinese Bullfrog is of Potential Regional Concern (Fellowes *et al.* 2002), and is a Class II Protected Species in China (http://www.sepa.gov.cn). It is recorded from many localities in HK, and is fairly common and widespread in the New Territories, but the local population appears to be diminishing due to habitat destruction and hunting for food (Chan *et al*. 2005). This is generally a lowland species that can occur in a range of waterbodies, though it prefers deeper pools. Generally it feeds on large insects, but can also take small rodents and frogs (Karsen *et al.* 1998).

Common Rat Snake

Common Rat Snake occurs in a variety of lowland habitats and is common across HK (Karsen *et al.* 1998). A diurnal species, it feeds primarily on amphibians, birds and rodents.

Two-striped Grass Frog

Two-striped Grass Frog inhabits a range of lowland habitats including grasslands, ponds and streams. The species is uncommon in Hong Kong and restricted to a few localities only (Karsen *et al.* 1998). A diurnal species feeds primarily on ants and other insects only.

Scarlet Basker

Scarlet Basker was considered by Fellowes *et al.* (2002) to be of Local Concern, but recent evidence suggests this species has since colonised much of the lowland in HK, especially in the northwest New Territories where it shows a preference for abandoned fish ponds (Tam *et al.* 2011). The larvae utilise weedy ponds and marshes.

Ruby Darter

Ruby Darter is common and widespread in HK and utilises marshes and ponds with dense floating plants, in which the larvae are found.

Common Evening Hawker

Common Evening Hawker is a common, semi-crepuscular species with populations scattered across HK. Generally it feeds around marshes and wet lowland agriculture where it is gregarious. It may be a wind-borne migratory species, and local populations may be supplemented by occasional influxes. The larvae often occur in seasonal ponds.

Sapphire Flutterer

Sapphire Flutterer is common and widespread in HK, and shows a preference for well-vegetated waterbodies such as weedy ponds and sluggish streams and marshes. Larvae cling to aquatic plants in weedy ponds or seasonal marshes.

Coastal Glider

Coastal glider utilises well-vegetated ponds and marshes. It is a highly migratory species and widespread in HK. Larvae are salt-tolerant and are known to occur in lagoons and estuaries.

Appendix F

Representative Photos of Site Conditions and Habitats in Offsite Wetland Compensation Areas

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Appendix F:
Representative Photos of Site Conditions and Habitats in Offsite Wetland Compensation Areas

Area 2 Existing Site Conditions



Photo 1: Typical water level of Pond 53 with oxygen machine on the left (October 2018)



Photo 2: Typical bank condition of Pond 53 (December 2018)



Photo 3: Typical water level of Pond 54 with oxygen machine in the middle (March 2019)



Photo 4: Additional structure at slope of Pond 54 with poor bank condition (June 2019)



Photo 5: Typical water level of Pond 57 with poor edge condition



Photo 6: Drain-down practice of Pond 57 in October

Area 2 Existing Site Conditions (continue)



Photo 7: Typical water level of Pond 58 with dense vegetation along bunds (March 2019)



Photo 8: Typical high water level of Pond 96 and dense vegetation along bunds (June 2019)



Photo 9: Typical condition of marsh in Pond 55 (December 2018)



Photo 10: Typical condition of marsh in Pond 56 (October 2018)



Photo 11: Typical condition of pond in Pond 56 (December 2018)

Area 2 Aerial Photos (July 2019)



Photo 12: Pond 53



Photo 13: Pond 54



Photo 14: Pond 57



Photo 15: Pond 58 (left) and Pond 96 (right)



Photo 16: Pond 55 (Marsh)



Photo 17: Pond 56 (Pond area)



Photo 18: Pond 55 (Marsh area)

Area 7 Existing Site Conditions



Photo 19: Typical low water level of Pond 7A (January 2019)



Photo 20: Typical water level of Pond 7B (December 2018)



Photo 21: Typical water level of Pond 7C with anglers fishing on existing jetty (January 2018)



Photo 22: Pond 7D (November 2018)



Photo 23: Low water level of Pond 7D exposing bottom soil (February 2019)



Photo 24: Typical condition of Pond 7E (January 2018)

Area 7 Aerial Photos (July 2019)



Photo 25: Pond 7A (right) and 7B (left)



Photo 26: Pond 7C



Photo 27: Pond 7D



Photo 28: Pond 7E

Area 9 Existing Site Conditions



Photo 29: Typical water level of Pond 9A with dense vegetation near fence road(January 2019)



Photo 30: Typical water level of Pond 9B with bread on bunds (January 2019)



Photo 31: Structure on edge of Pond 9B (December 2018)



Photo 32: Typical water level of Pond 9C with dense vegetation near fence road (March 2019)



Photo 33: Typical vegetation condition of Pond 9D (December 2018)



Photo 34: Typical vegetation condition of Pond 9E (March 2019)

Area 9 Aerial Photos (July 2019)



Photo 35: Pond 9A



Photo 36: Pond 9B (top) and 9C (bottom)



Photo 37: Pond 9D (L-shaped on top of 9B and 9C, left of 9C)



Photo 38: Pond 9E

Appendix G

Species Recorded of Updated Baseline Survey 2018/2019 For Offsite Wetland Compensation Areas

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Appendix G1 Flora Species Recorded within the Offsite Wetland Compensation Areas

Scientific Name	Growth Form	Native / Exotic to Hong Kong	Distribution in Hong Kong [1]	Count	Area 9					Area 7					Area 2						
					9A	9B	9C	9D	9E	7A	7B	7C	7D	7E	53	54	55	56	57	58	96
Acacia confusa Merr.	tree	exotic	-	1	+																
Acrostichum aureum L.	herb	native	restricted; common [2]	2					++									+			
Ageratum conyzoides L.	herb	exotic	common	4												+	++	+	+		
Alocasia macrorrhizos (L.) G. Don	perennial herb	native	very common	1								+									
Artocarpus heterophyllus Lam.	tree	exotic	common	1		+															
Bidens alba (L.) DC.	herb	exotic	very common	17	++	++	+	+	++	++	+	++	++	++	++	++	+	+	++	++	+
Blechnum orientale L.	herb	native	very common	3							++	+		+							
Brachiaria mutica (Forssk.) Stapf	herb	exotic	common [2]	17	++	+++	++	+	++	++	++	+++	+++	+++	++	++	+++	++	++	+++	+
Bridelia tomentosa Blume	shrub or small tree	native	very common	8				+	+	+	+	++					+	+	+		
Calliandra haematocephala Hassk.	shrub	exotic	common	2						+	+										
Canavalia maritima Thouars	climber: vine	native	common	3		+			+					+							
Capsicum annuum L. var. *conoides* (Mill.) Irish	perennial herb	exotic	widely planted	1	+																
Casuarina equisetifolia L.	tree	exotic	rare, but common cultivated	8	+		+	+	+	+		++	++	+							
Celtis sinensis Pers.	tree	native	common	6	+					+	+	+	+								+
Chloris barbata Sw.	herb	native	very common	5	+	+									+	++			+		
Cinnamomum burmannii (C. G. & T. Nees) Blume	tree or large shrub	native	-	1								+									
Clausena lansium (Lour.) Skeels	small tree	exotic	common	1											+						
Coix lacryma-jobi L.	herb	native	common [2]	1				+													
Colocasia esculenta (L.) Schott	herb	exotic	common [2]	1	+																
Commelina diffusa Burm. f.	herb	native	common; very common [2]	8				++		++	++	++	++					++	++	+	
Conyza canadensis (L.) Cronquist	herb	exotic	very common	3	+					+	+										
Cyclosorus interruptus (Willd.) H. Ito	herb	native	common; very common [2]	3					+++								++	++			
Cynodon dactylon (L.) Pers.	perennial herb	native	very common	7	++	+	+	+				+	++	++							
Cyperus difformis L.	herb	native	very common; common [2]	4								++	+	++		+					
Cyperus sp.	herb	-	-	1														+			
Cyperus rotundus L.	herb	native	very common; common [2]	8	+		+				++	++				+			+	+	+
Dactyloctenium aegyptium (L.) Beauv.	herb	native	common	6	+	+	+		+						+	++					
Daphniphyllum calycinum Benth	tree	native	common	1						+											
Echinochloa crusgalli (L.) P. Beauv.	herb	native	common [2]	3												+			+	+	
Emilia sonchifolia (L.) DC.	herb	native	very common	3		+												+		+	
Ficus subpisocarpa	tree	native	common	3		+												+		+	
Ficus hispida L. f.	shrub or small tree	native	very common	4	+					+		+	+								
Ficus microcarpa L. f.	tree	native	common	2						++		+									
Hibiscus tiliaceus L.	tree or shrub	native	very common	8	+		++			++	++	++	+	+							+
Ipomoea aquatica Forssk.	herb	exotic	very common; common [2]	1									+								
Ipomoea cairica (L.) Sweet	climber: twining herb	exotic	very common	4	+++							+	++	++							
Kyllinga polyphylla Willd. ex Kunth	herb	exotic	common [2]	4					+			+	++	++							
Lantana camara L.	shrub	exotic	very common	11	+		++	+		+	++		++	+	++	+		++		++	
Lepidosperma chinense Nees	herb	native	very common; common [2]	10	+		+		++			+	++	+		+	+			+	+
Leptochloa chinensis (L.) Nees	herb	native	very common; common [2]	1																	
Leucaena leucocephala (Lam.) de Wit	small tree	exotic	common	9	++		+	+		+	+			+				++			++
Litchi chinensis Sonn.	tree	exotic	restricted but widely planted	1		+															
Litsea glutinosa (Lour.) C. B. Rob.	tree	native	very common	2						+		+									
Lobelia chinensis Lour.	perennial herb	native	common	2	+	+															
Ludwigia hyssopifolia (G. Don) Exell	herb	native	very common [2]	2									++				++				
Ludwigia octovalvis (Jacq.) P. H. Raven	perennial herb	native	common; very common [2]	1					++												
Lygodium japonicum (Thunb.) Sw.	climbing herb	native	very common	4					++			+++		+			++				
Macaranga tanarius (L.) Müll. Arg. var.	tree	native	common	14	++		+	+	+	+	+	+	+	+	+		+	+		+	++
Mangifera indica L.	tree	exotic	-	1											+						
Manihot esculenta Crantz	shrub	exotic	common	2			+												+		
Mariscus cyperoides (L.) Urb.	herb	native	very common	6								+		+		+	+		+	+	
Melia azedarach L.	tree	exotic	common	13	+		++	++	+	+	+	++	++	+	+		+	+			++

Appendix G1 Flora Species Recorded within the Offsite Wetland Compensation Areas

Scientific Name	Growth Form	Native / Exotic to Hong Kong	Distribution in Hong Kong [1]	Count	Area 9					Area 7					Area 2						
					9A	9B	9C	9D	9E	7A	7B	7C	7D	7E	53	54	55	56	57	58	96
Microlepia hancei Prantl	herb	native	restricted	1							+										
Microstegium ciliatum (Trin.) A. Camus	perennial procumbent herb	native	very common; common [2]	4						+	++		++	++							
Mikania micrantha Kunth	climbing herb	exotic	very common	16	+	++	++	++	++	++	++	+++	+++	+	+	++	++	+	++		+
Mimosa pudica L.	herb	exotic	very common	3															++	+	+
Miscanthus sinensis Andersson	perennial herb	native	very common	2									+	+							
Morus alba L.	tree or shrub	native	common	1														+			
Murraya paniculata (L.) Jack	small tree	exotic	common	4						+	+	+	+								
Musa x *paradisiaca* L.	perennial herb	exotic	common	5		+	+	+	+							+					
Neyraudia reynaudiana (Kunth) Keng ex Hitchc.	perennial herb	native	very common; common [2]	1					+												
Panicum maximum Jacq.	perennial herb	exotic	very common	14	+++	++		+	++	++	++	++			++	++	++	++	++	++	+
Panicum repens L.	perennial herb	native	very common [2]	1																+	
Paspalum conjugatum P. J. Bergius	perennial herb	native	common	4		++			++							+	+				
Paspalum distichum L.	perennial herb	native	common [2]	2		+			+												
Persicaria perfoliata (L.) H. Gross	climbing herb	native	common	3					+			+	+								
Phragmites australis (Cav.) Trin. ex Steud.	perennial herb	native	very common; common [2]	5	++		+++				++		+								+
Phragmites vallatorius (L.) Veldkamp	perennial herb	native	very common; common [2]	9	+++		+	+++	++	+		+	+++	+			++				
Psidium guajava L.	tree	exotic	common	3			+	+								+					
Pueraria phaseoloides (Roxb.) Benth.	climber: vine	native	very common	2													+		+		
Rhus chinensis Mill.	shrub or small tree	native	common	1													+				
Rubus reflexus Ker Gawl.	climbing shrub	native	very common	1						+											
Sapium sebiferum (L.) Roxb.	tree	native	common	3											+	+	+				
Senna alata (L.) Roxb.	shrub	exotic	-	2					++												+
Solanum torvum Sw.	shrub	exotic	common	1															+		
Sonchus oleraceus L.	herb	exotic	very common	6	+	+		+	+									+	+		
Syzygium jambos (L.) Alston	tree	exotic	common	2		+		+													
Trema tomentosa (Roxb.) Hara	shrub or small tree	native	common	2		+												+			
Typha angustifolia L.	perennial herb	exotic	rare; common [2]	3			+		++												+
Vernonia cinerea (L.) Less.	herb	native	very common	4					+			+	+		+						
Wedelia trilobata (L.) Hitchc.	perennial herb	exotic	common; also widely cultivated	5	+++					++	++	++	++								
Lepidium virginicum L.	Annual or biennial herb	native	-	1		+															
Paederia scandens	climber	native	very common	5	++	+			+	+								+			
			Species No. Recorded from Each Habitat:		28	21	19	18	28	25	21	30	26	21	13	18	18	20	16	14	15

Notes:
(1) Corlett, R., Xing, F., Ng, S. C., Chau, L., Wong, L. (2000). *Hong Kong Vascular Plants: Distribution and Status* . Memoirs of the Hong Kong Natural History Society. 23:1-3.
(2) Yip, Y., Yip, K. L., Liu, K. U., Ngar Y. N., Lai, C. C. (2010). A Floristic Survey of Marshes in Hong Kong. Hong Kong Biodiversity. Issue No. 19.

Code for Abundance: ++++=abundant; +++=frequent; ++=occasional; +=scarce

Appendix G2 Avifauna Species Recorded within the Offsite Wetland Compensation Areas

Common Name	Scientific Name	IUCN Red List (Version 2021.1)[4]	Level of Concern [5]	Area 2		Area 7		Area 9	
				W	T	W	T	W	T
Asian Koel	*Eudynamys scolopaceus*	LC	-		+		+		+
Azure-winged Magpie	*Cyanopica cyanus*	LC	-					++	+++
Barn Swallow	*Hirundo rustica*	LC	-				+	++	
Black Drongo	*Dicrurus macrocercus*	LC	-		+		+		+
Black Kite[2][3]	***Milvus migrans***	LC	(RC)						++
Black-collared Starling	*Gracupica nigricollis*	LC	-		+++		++		+++
Black-crowned Night Heron[3]	***Nycticorax nycticorax***	LC	(LC)		+++				+++
Black-faced Bunting	*Emberiza spodocephala*	LC	-		+				
Black-faced Spoonbill [3]	***Platalea minor***	EN	PGC					+	
Black-winged Stilt[3]	***Himantopus himantopus***	LC	RC	+				+	
Chinese Bulbul	*Pycnonotus sinensis*	LC	-		+++	+	++		+++
Chinese Pond Heron[3]	***Ardeola bacchus***	LC	PRC (RC)	+	+++		+	+++	+++
Cinereous Tit	*Parus cinereus*	-	-				+		
Cinnamon Bittern[3]	***Ixobrychus cinnamomeus***	LC	LC						+
Collared Crow[3]	***Corvus torquatus***	VU	LC						+
Common Greenshank[3]	***Tringa nebularia***	LC	RC			+			
Common Kingfisher[3]	*Alcedo atthis*	LC	-		++		+	+	++
Common Myna	*Acridotheres tristis*	LC	-				+		+
Common Sandpiper[3]	*Actitis hypoleucos*	LC	-	++				++	
Common Snipe [3]	*Gallinago gallinago*	LC	-					+	
Common Tailorbird	*Orthotomus sutorius*	LC	-				+		+
Crested Myna	*Acridotheres cristatellus*	LC	-		+		++		+++
Daurian Redstart	*Phoenicurus auroreus*	LC	-				+		
Dusky Warbler	*Phylloscopus fuscatus*	LC	-		++		+++		++
Eurasian Collared Dove	*Streptopelia decaocto*	LC	-				+		++
Eurasian Coot[3]	***Fulica atra***	LC	RC					+	
Eurasian Teal[3]	***Anas crecca***	LC	RC	+++				++	
Eurasian Tree Sparrow	*Passer montanus*	LC	-				+		
Great Cormorant[3]	***Phalacrocorax carbo***	LC	PRC	+	+++++	+	+++	++	++
Great Egret[3]	***Ardea alba***	LC	PRC (RC)	++	++		+	++	+++
Greater Coucal[6]	***Centropus sinensis***	LC	-				++		++
Greater Spotted Eagle[2][3]	***Clanga clanga***	VU	GC						+
Green Sandpiper[3]	*Tringa ochropus*	LC	-			+			
Grey Heron[3]	***Ardea cinerea***	LC	PRC	++	+++	+	+++	+++	+++
Grey Wagtail	*Motacilla cinerea*	LC	-	+			+	+	+
House Swift	*Apus nipalensis*	LC	-		+			+++	+
Intermediate Egret[3]	***Egretta intermedia***	-	RC						+
Japanese White-eye	*Zosterops japonicus*	LC	-		+		+++		+
Little Bunting	*Emberiza pusilla*	LC	-				+		
Little Egret[3]	***Egretta garzetta***	LC	PRC (RC)		+++		+	++	++
Little Grebe[3]	***Tachybaptus ruficollis***	LC	LC	+++	+++	+	+	++	+

Appendix G2 Avifauna Species Recorded within the Offsite Wetland Compensation Areas

Common Name	Scientific Name	IUCN Red List (Version 2021.1)[4]	Level of Concern [5]	Area 2		Area 7		Area 9	
				W	T	W	T	W	T
Little Ringed Plover[3]	*Charadrius dubius*	LC	(LC)	+					
Long-tailed Shrike	*Lanius schach*	LC	-				++	+	++
Marsh Sandpiper[3]	***Tringa stagnatilis***	LC	RC	++					
Masked Laughingthrush	*Garrulax perspicillatus*	LC	-		++		+		+++
Northern Shoveler[3]	***Spatula clypeata***	LC	RC	+					
Oriental Magpie	*Pica serica*	LC	-						+
Oriental Magpie Robin	*Copsychus saularis*	LC	-		+		+		+
Oriental Turtle Dove	*Streptopelia orientalis*	LC	-		+		++		++
Pied Avocet[3]	***Recurvirostra avosetta***	LC	RC	+++					
Pied Kingfisher[3]	***Ceryle rudis***	LC	(LC)		++			+	++
Plain Prinia	*Prinia inornata*	LC	-	+	+		+		+
Purple Heron[3]	***Ardea purpurea***	LC	RC					+	
Red-billed Starling[3]	***Spodiopsar sericeus***	LC	GC		++++				+++
Red-whiskered Bulbul	*Pycnonotus jocosus*	LC	-		++		+		+
Richard's Pipit	*Anthus richardi*	LC	-					+	
Scaly-breasted Munia	*Lonchura punctulata*	LC	-				+		+
Sooty-headed Bulbul	*Pycnonotus aurigaster*	LC	-						+
Spotted Dove	*Spilopelia chinensis*	LC	-		++		++		++
Stejneger's Stonechat	*Saxicola stejnegeri*	-	-				++		+
Tufted Duck[3]	***Aythya fuligula***	LC	LC			+		+++	
Verditer Flycatcher	*Eumyias thalassinus*	LC	-		+				
White Wagtail	*Motacilla alba*	LC	-	+	+	+	+	+++	++
White-breasted Waterhen[3]	*Amaurornis phoenicurus*	LC	-		+	+	+	+	+
White-cheeked Starling	***Spodiopsar cineraceus***	LC	PRC						+++++
White-shouldered Starling	*Sturnia sinensis*	LC	(LC)		+++		+		++
White-throated Kingfisher[3]	***Halcyon smyrnensis***	LC	(LC)				+		
Yellow Bittern[3]	***Ixobrychus sinensis***	LC	(LC)		+				
Yellow-bellied Prinia	*Prinia flaviventris*	LC	-		+++		+++		+++
Yellow-browed Warbler	*Phylloscopus inornatus*	LC	-				++		+

Notes:

(1) All wild birds are Protected under Wild Animals Protection Ordinance (Cap. 170).

(2) Protected under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

(3) Wetland-dependent species (including wetland-dependent species and waterbirds).

(4) IUCN (2021). IUCN Red List of Threatened Species. Version 2021.1. LC: Least Concern; VU: Vulnerable; EN: Endangered.

(5) Fellowes *et al* . (2002): LC=Local Concern; PRC=Potential Regional Concern; RC=Regional Concern; PGC: Potential Global Concern; GC=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.

(6) China Red Data Book Status: Vulnerable and List of Wild Animals Under State Protection: Class II

Species of conservation importance is in **bold** type face

Code of Abundance: +=Rare; ++=Occasional; +++=Common; ++++=Abundant; +++++=Dominant

W: Observed on Water (Recorded in the fishpond/utilising the fishpond habitat); T: Observed on Tree (Recorded resting on nearby vegetation).

Appendix G3 Mammal and Herpetofauna Species Recorded within the Offsite Wetland Compensation Areas

Common Name	Scientific Name	IUCN Red List (Version 2021.1)[3]	Distribution in Hong Kong [4]	Level of Concern[5]	Area 2	Area 7	Area 9
Mammals							
Domestic Dog	*Canis lupus familiaris*	-	Common	-	++	+	++
Small Asian Mongoose[1]	***Herpestes javanicus rubrifrons***	LC	Uncommon	-	+++++		+
Eurasian Otter[1][2]	***Lutra lutra***	NT	Rare, Species of conservation concern	RC	++		
Leopard Cat[1][2]	***Prionailurus bengalensis***	LC	Uncommon	-		+	+
Eurasian Wild Pig	*Sus scrofa*	LC	Very Common	-	++++		
Small Indian Civet[1]	***Viverricula indica***	LC	Very Common	-	++++		++
Reptilians							
Bowring's Gecko	*Hemidactylus bowringii*	LC	Distributed throughout Hong Kong	-			+
Changeable Lizard	*Calotes versicolor*	-	Widely distributed	-	+		
Reeves' Smooth Skink	*Scincella reevesii*	-	Widely distributed	-			+
Amphibians							
Asiatic Painted Frog	*Kaloula pulchra pulchra*	LC	Widely distributed	-			+
Brown Tree Frog	Polypedates megacephalus	LC	Widely distributed	-			+
Gunther's Frog	*Hylarana guentheri*	LC	Widely distributed	-	++	+	++
Paddy Frog	Fejervarya limnocharis	LC	Widely distributed	-			+

Notes:

(1) Protected under Wild Animals Protection Ordinance (Cap. 170).

(2) Protected under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

(3) IUCN (2021). IUCN Red List of Threatened Species. Version 2021.1. LC: Least Concern; NT: Near Threatened.

(4) AFCD (2020). Hong Kong Biodiversity Database.

(5) Fellowes *et al*. (2002): RC=Regional Concern.

Species of conservation importance is in **bold** type face

Code of Abundance: +=Rare; ++=Occasional; +++=Common; ++++=Abundant; +++++=Dominant

Appendix G4 Lepidoptera and Odonata Species Recorded within the Offsite Wetland Compensation Areas

Common Name	Scientific Name	IUCN Red List (Version 2021.1)[1]	Distribution in Hong Kong [2]	Level of Concern[3]	Area 2	Area 7	Area 9
Lepidoptera							
Angled Castor	*Ariadne ariadne alterna*	-	Common	-			+
Common Sailer	*Neptis hylas hylas*	-	Very common	-			+
Dark Brand Bush Brown	*Mycalesis mineus mineus*	-	Very common	-		+	
Dark Grass Blue	*Zizeeria karsandra karsandra*	-	Uncommon	-	+		
Great Egg-fly	*Hypolimnas bolina kezia*	-	Common	-		+	
Indian Cabbage White	*Pieris canidia canidia*	-	Very common	-			+
Pale Grass Blue	*Pseudozizeeria maha serica*	-	Very common	-		+	+
Paris Peacock	*Papilio paris paris*	-	Very common	-	+		
Red-base Jezebel	*Delias pasithoe pasithoe*	-	Very common	-			+
Small Cabbage White	***Pieris rapae crucivora***	-	Rare	-	+		
Odonata							
Asian Amberwing	*Brachythemis contaminata*	LC	Abundant; Scattered	-	++		+
Asian Pintail	*Acisoma panorpoides panorpoides*	LC	Common; Widespread	-	+		
Blue Dasher	*Brachydiplax chalybea flavovittata*	LC	Common; Widespread	-		+	
Common Bluetail	*Ischnura senegalensis*	LC	Abundant; Scattered	-	++	+	+
Common Flangetail	*Ictinogomphus pertinax*	LC	Common; Widespread	-	+		+
Green Skimmer	*Orthetrum serapia*	LC	Abudant; Widespread	-	+++		++
Orange-tailed Sprite	*Ceriagrion auranticum*	LC	Abundant; Very Widespread	-	+	+	+
Pale-spotted Emperor	*Anax guttatus*	LC	Common; Scattered	-	+	+	
Pied Percher	*Neurothemis tullia tullia*	LC	Common; Widespread	-		+	
Scarlet Basker	***Urothemis signata signata***	LC	Common; Scattered	LC	+		
Variegated Flutterer	*Rhyothemis variegata arria*	LC	Common; Widespread	-	+++	+	++++
Wandering Glider	*Pantala flavescens*	LC	Abundant; Widespread	-	+		
Wisps	*Agriocnemis* sp.	-	-	-		+	

Notes:

(1) IUCN (2021). IUCN Red List of Threatened Species. Version 2021.1. LC: Least Concern.

(2) AFCD (2020). Hong Kong Biodiversity Database.

(3) Fellowes *et al*. (2002): LC=Local Concern.

Species of conservation importance is in **bold** type face

Code of Abundance: +=Rare; ++=Occasional; +++=Common; ++++=Abundant; +++++=Dominant

Appendix H

Representative Photographs of Mammal Species Recorded by Camera Traps for Updated Baseline Survey 2018/2019

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Appendix H:
Representative Photographs of Mammal Species Recorded by Camera Traps for Updated Baseline Survey 2018/2019



Photo 1: Eurasian otter recorded by camera trap number 5, on bund between Pond 56 and Lok Ma Chau meander in Area 2



Photo 2: Eurasian otter recorded by camera trap number 6, on muddy ground at edge of Pond 58 in Area 2



Photo 3: Leopard cat recorded by camera trap number 4, on an engineered rocky slope of Pond 9C in Area 9



Photo 4: Leopard Cat recorded by camera trap number 7 (wet season), on bank of channel at the side near Area 7



Photo 5: Small Asian mongoose recorded by camera trap number 5, on bund between Pond 56 and Lok Ma Chau meander in Area 2



Photo 6: Small Asian mongoose recorded by camera trap number 10, on bund between Pond 58 and 96 in Area 2



Photo 7: Small Indian civets recorded by camera trap number 5, on bund between Pond 56 and Lok Ma Chau meander in Area 2



Photo 8: Small Indian civets recorded by camera trap number 10, nursing action was recorded by video



Photo 9: Eurasian wild boar recorded by camera trap number 10, on bund between Pond 58 and 96 in Area 2

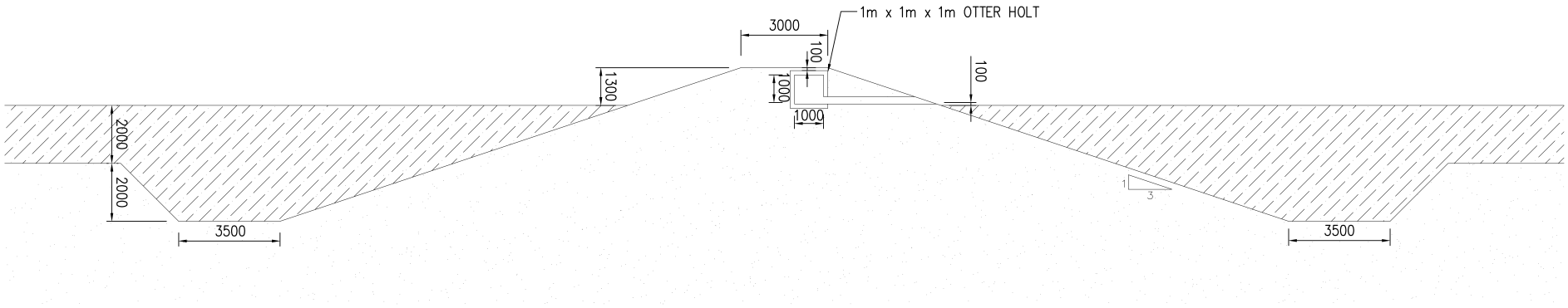


Photo 10: Domestic dog recorded by camera trap number 4, on an engineered rocky slope of Pond 9 C in Area 9

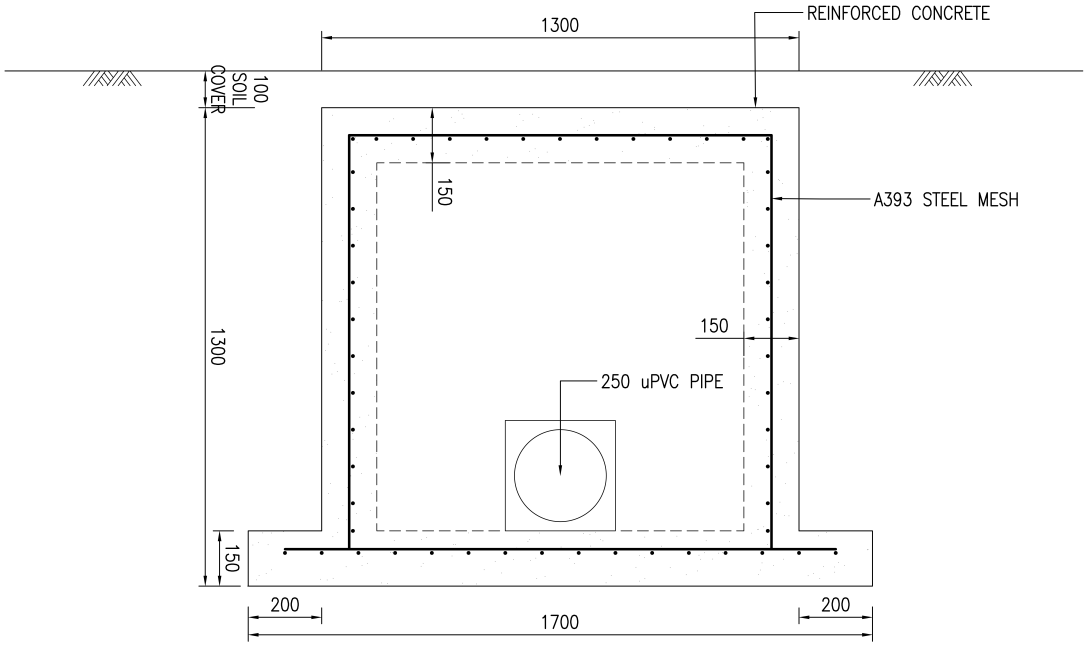
Appendix I

Proposed Design Details of Habitat Enhancement Features

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OTTER ISLAND AND HOLT AT AREA 2

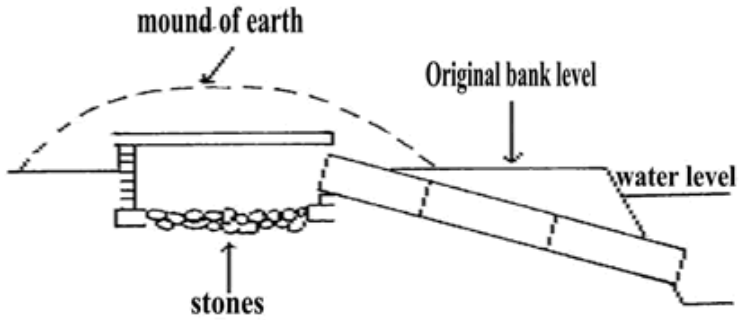


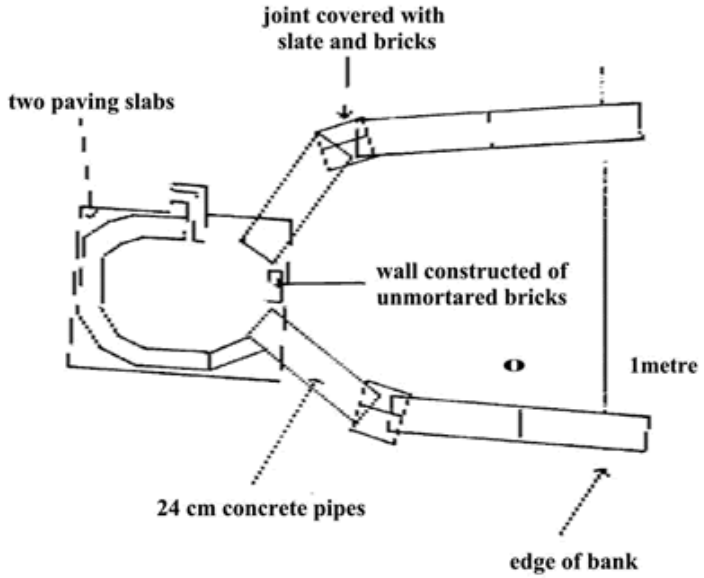
OTTER HOLT DETAILS

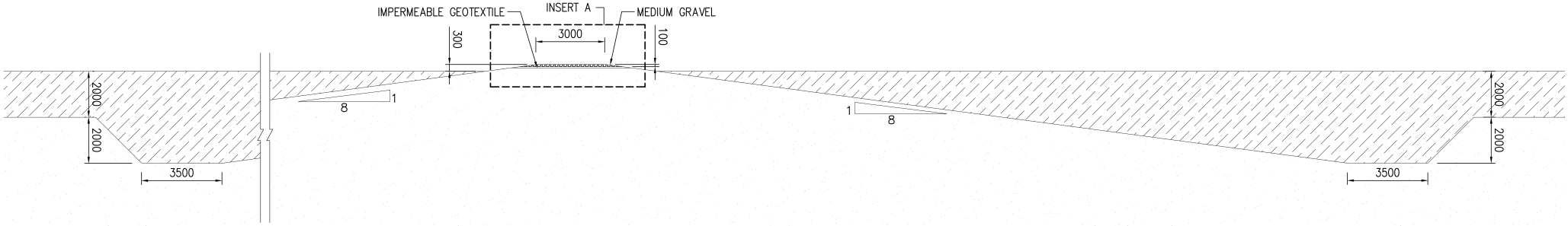
Notes: Exact design details will be determined on site

Construction reference for Otter Holt

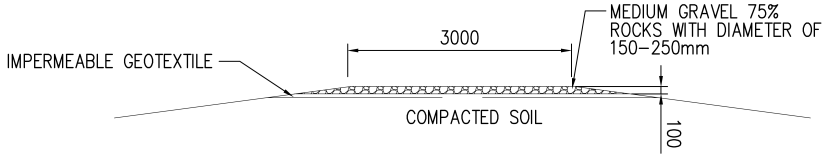
Construction of artificial holt





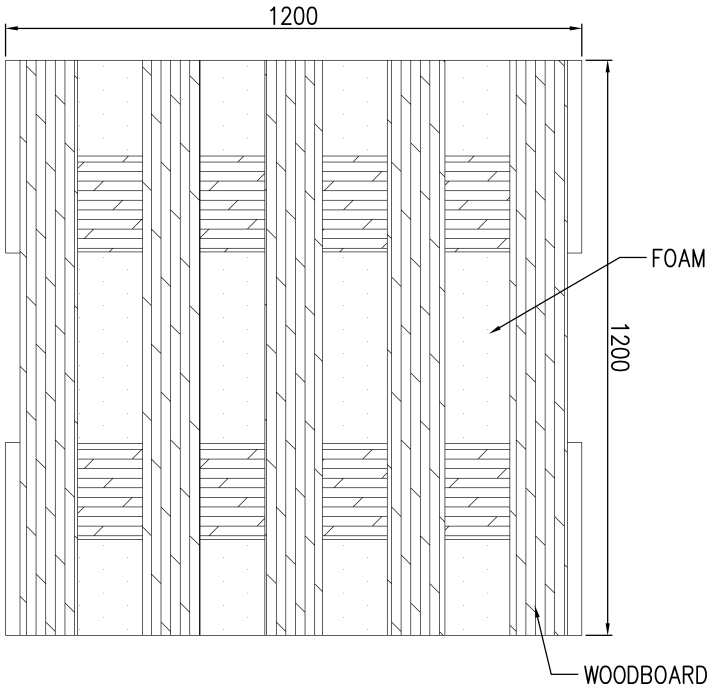


ISLAND (AREA 9)

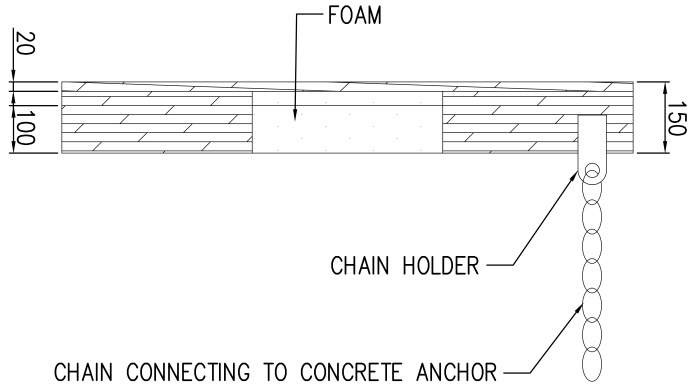


INSERT A

Notes: Exact design details will be determined on site



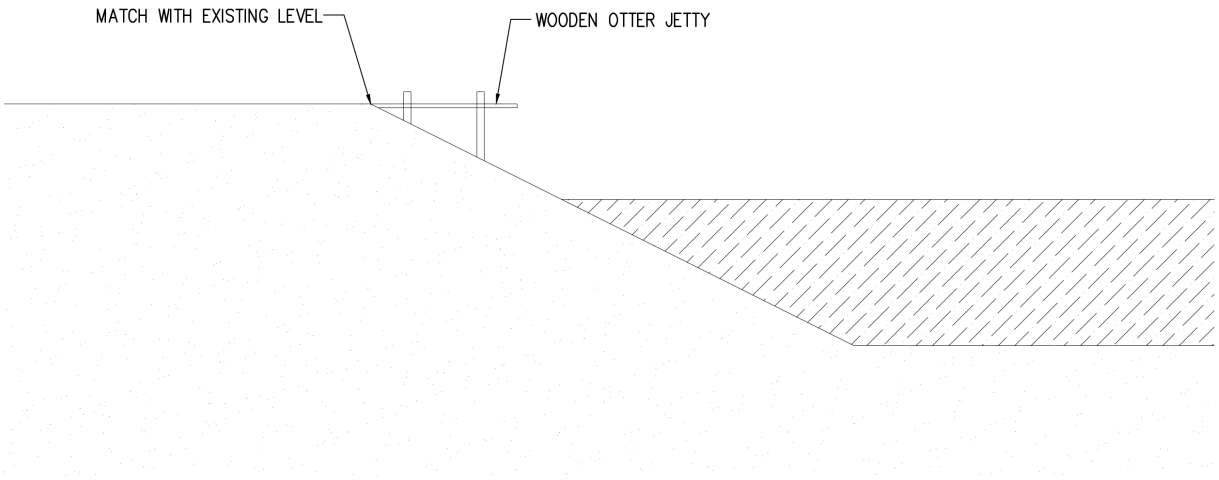
TOP VIEW



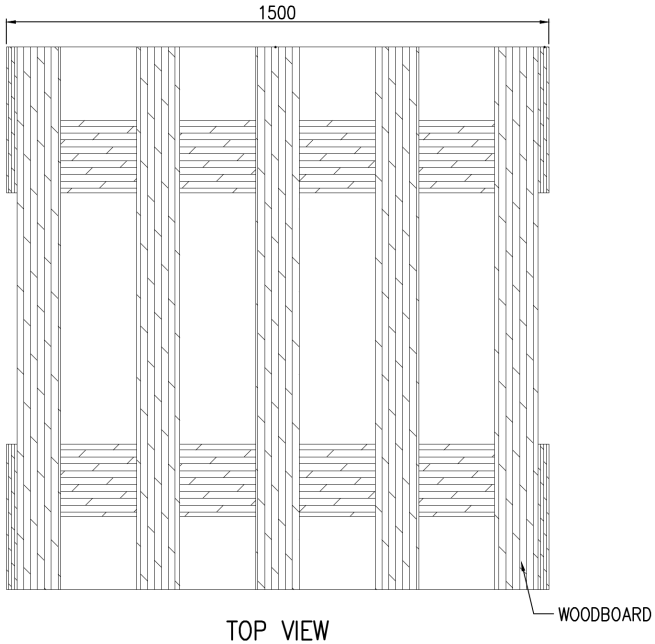
SIDE VIEW

FLOATING OTTER PLATFORM DETAIL

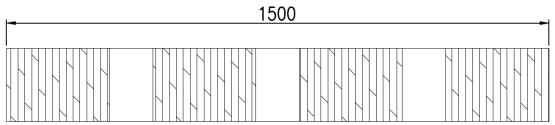
Notes: Exact design details will be determined on site



OTTER JETTY



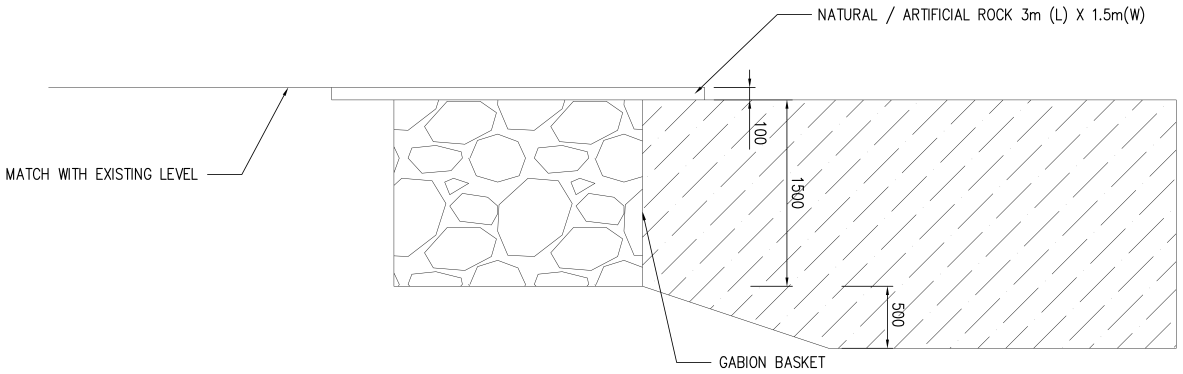
TOP VIEW



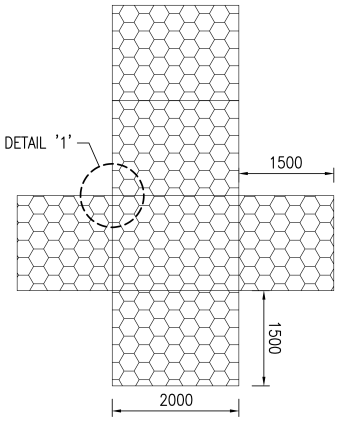
SIDE VIEW

WOODEN OTTER JETTY DETAIL

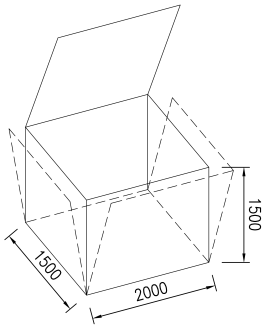
Notes: Exact design details will be determined on site



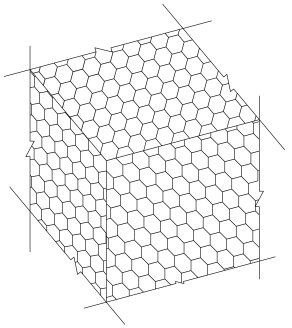
OTTER ROCK PLATFORM



BEFORE ASSEMBLY (PLAN)



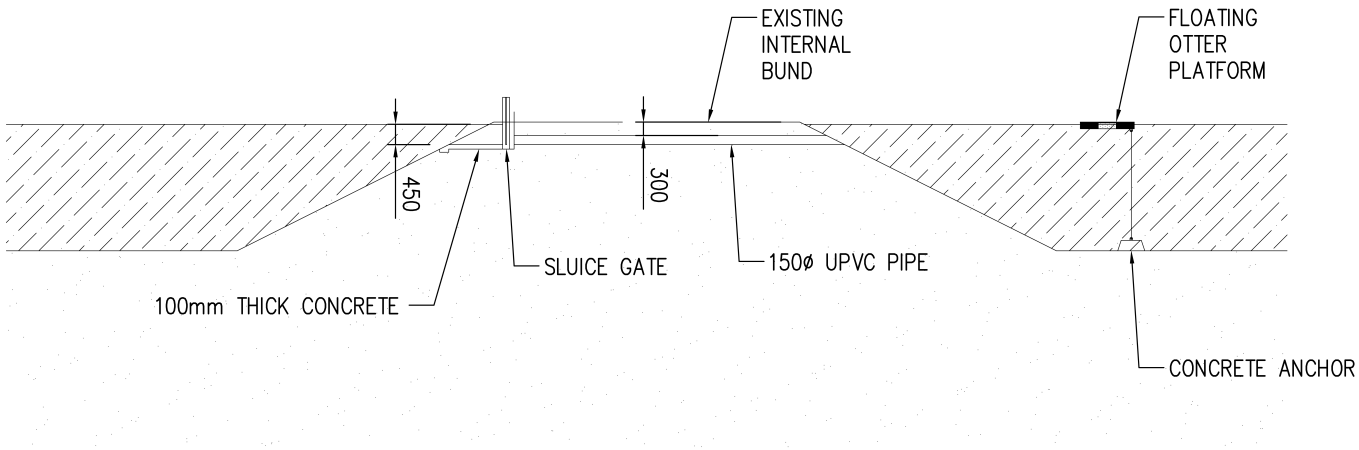
AFTER ASSEMBLY (LSOMETRIC VIEW)



DETAIL '1'

GABION BASKET DETAIL

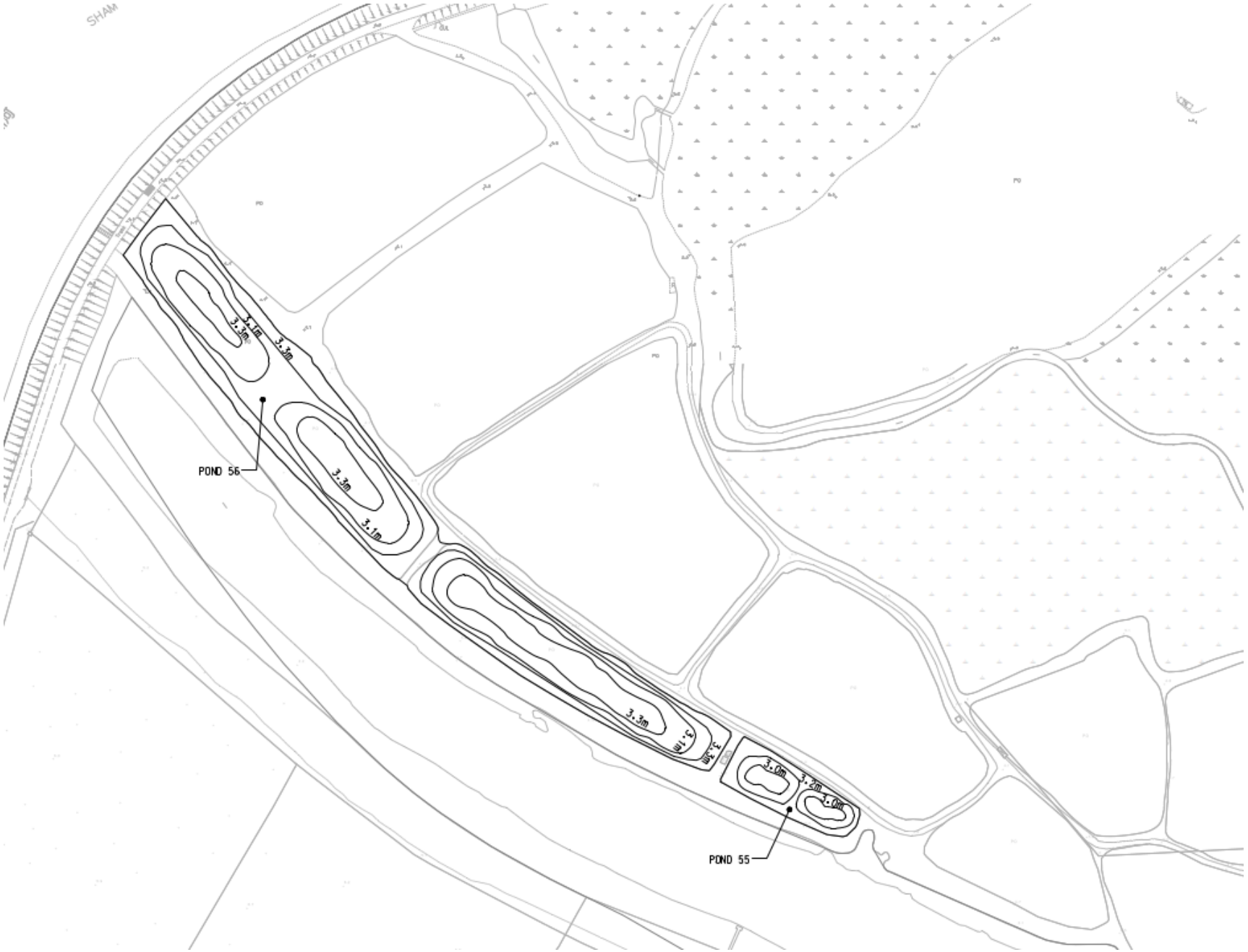
Notes: Exact design details will be determined on site



INTERCONNECTION PIPE AND SLUICE GATE FOR
DISTRIBUTION OF WATER BETWEEN PONDS/MARSHES

Notes: Exact design details will be determined on site

Proposed level for marsh area in Area 2



Appendix J

Species Suggestion for Planting in Offsite Wetland Compensation Areas

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Appendix J:
Species Suggestion for Planting in Offsite Wetland Compensation Areas

Trees

Celtis sinensis Pers.
Hibiscus tiliaceus
Litsea glutinosa
Macaranga tanarius var. *tomentosa*
Sapium sebiferum
Schefflera heptaphylla
Viburnum odoratissimum

Shrubs

Bridelia tomentosa Blume
Ficus hispida L. f.
Melastoma malabathricum
Melicope pteleifolia
Melastoma sanguineum
Psychotria asiatica
Rhaphiolepis indica
Rhodomyrtus tomentosa
Rhus chinensis Mill.
Trema tomentosa (Roxb.) Hara

Marsh

Short Marsh
Bacopa monnieri
Cyperus iria
Eleocharis spiralis
Floscopa scandens
Ludwigia adscendens
Philydrum lanuginosum
Polygonum dichotomum
Polygonum hydropiper
Sagittaria trifolia
Tall Marsh
Cyperus malaccensis
Equisetum debile

Persicaria lapathifolia
Polygonum glabrum
Floating Marsh
Euryale Ferox
Nymphaea sp.

Emergent Vegetation

Alternanthera sessilis
Coix lacryma-jobi
Cyperus malaccensis
Impatiens chinensis
Juncus effusus
Ludwigia octovalvis
Pogostemon auricularius
Rotala rotundifolia

Open Pond Bunds

Brassica oleracea var. alboglabra
Cynodon dactylon
Eremochloa ophiuroides
Imperata cylindrica
Phragmites australis
Phragmites karka
Polygonum chinense
Zoysia matrella

Vegetated Pond Bunds

Elaeocarpus chinensis
Ficus hispida
Glyptostrobus pensilis
Hibiscus tiliaceus
Litsea rotundifolia var. oblongifolia
Melastoma malabathricum
Melastoma sanguineum
Melia azedarach
Polyspora axillaris
Psychotria asiatica

Rhodomyrtus tomentosa

Otter Islands

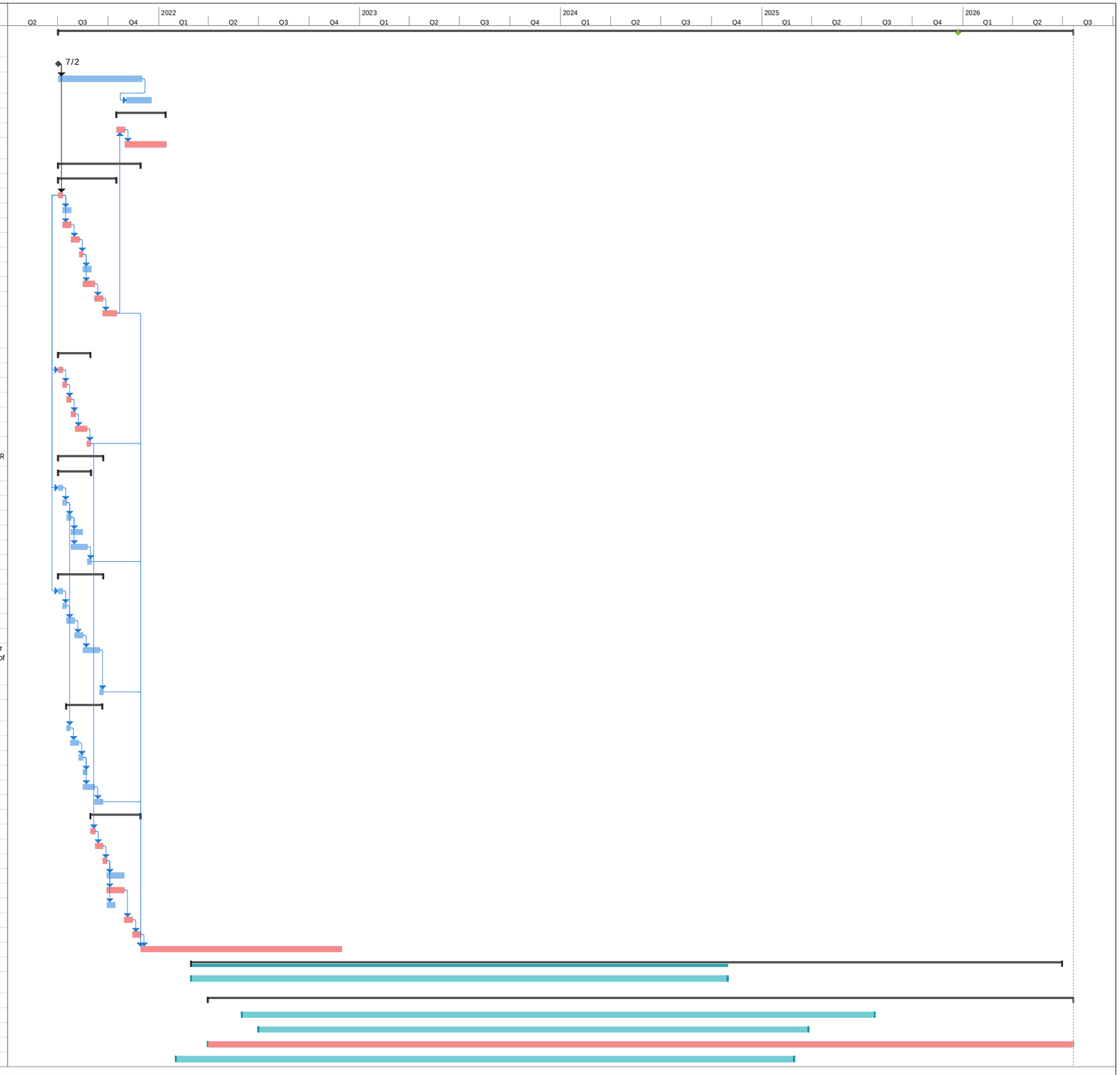
Bridelia tomentosa
Celtis sinensis
Ficus hirta
Ficus hispida
Ficus microcarpa
Hibiscus tiliaceus
Melia azedarach
Rhodomyrtus tomentosa

Appendix K

Detailed Works Program for Offsite Wetland Compensation Areas

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ID	Task Name	Duration (Month)	Start	Finish	Remarks
1	Contract 1 - Site Formation and Infrastructure Works inside LMCL and WCR Phase 1 (Section of WCR, Meander Bridge, Haul Road, Wetland and Woodland Compensation, Sewage treatment work)	17 mons	Fri 7/2/21	Mon 7/20/26	
2	Commencement of Contract 1	0 mons	Fri 7/2/21	Fri 7/2/21	
3	Obtain necessary approval from EPD, Implementation of NEC Subletting Procedures, Site Establishment	5 mons	Fri 7/2/21	Tue 11/30/21	
4	Hardcore serves as a working base	1.5 mons	Wed 11/3/21	Fri 12/17/21	
5	Haul Road Construction	3 mons	Sat 10/16/21	Thu 1/13/22	
6	Design of Haul Road	0.5 mons	Sat 10/16/21	Sat 10/30/21	
7	Construction of Temporary Haul Road linking Sai Kwo Road and Tun Yu Road to the Loop	2.5 mons	Sun 10/31/21	Thu 1/13/22	
8	Wetland and Woodland Compensation Works (Pre-bid Arrangement)	5 mons	Fri 7/2/21	Sun 11/28/21	
9	Area 7 (for Construction of Haul Road Compensation)	3.5 mons	Fri 7/2/21	Fri 10/15/21	0.032ha marsh & 2.28ha fishpond for haul road
10	Plant mobilisation	0.25 mons	Fri 7/2/21	Fri 7/9/21	
11	Site Cleanliness (i.e. remove vegetation and mud)	0.5 mons	Sat 7/10/21	Sat 7/24/21	for Pond 7A, 7B, 7D and 7E
12	Pruning Works	0.5 mons	Sat 7/10/21	Sat 7/24/21	
13	Drained down the pond	0.5 mons	Sun 7/25/21	Sun 8/8/21	
14	Installation of uPVC	0.25 mons	Mon 8/9/21	Sun 8/15/21	
15	Partially remove the bund	0.5 mons	Mon 8/16/21	Mon 8/30/21	
16	Re-profile pond	0.75 mons	Mon 8/16/21	Sun 9/5/21	
17	Fill water	0.5 mons	Mon 9/6/21	Mon 9/20/21	
18	Wetland vegetation for Pond 7E	0.75 mons	Tue 9/21/21	Fri 10/15/21	Reedmarsh for Pond 7E. Contractor should allow enough time (six month in advance of planting works) for supplier to propagate plant stocks as required.
19	Area 9 (Pond 9E)	2 mons	Fri 7/2/21	Sun 8/29/21	0.43ha for 190m WCR
20	Plant mobilisation	0.25 mons	Fri 7/2/21	Fri 7/9/21	
21	Site Cleanliness (i.e. remove all vegetation inside Pond 9E)	0.25 mons	Sat 7/10/21	Fri 7/16/21	
22	Drained down the pond	0.25 mons	Sat 7/17/21	Sat 7/24/21	
23	Installation of uPVC	0.25 mons	Sun 7/25/21	Sun 8/1/21	
24	Re-profile pond	0.75 mons	Mon 8/2/21	Sun 8/22/21	
25	Fill water	0.25 mons	Mon 8/23/21	Sun 8/29/21	
26	Area 2 (Pond 55, 56, 58 and 96)	2.75 mons	Fri 7/2/21	Tue 9/21/21	1.84 ha fishpond and 0.07ha marsh for 190m WCR
27	Area 2 (Pond 58 and 96)	2 mons	Fri 7/2/21	Mon 8/30/21	
28	Plant mobilisation	0.25 mons	Fri 7/2/21	Fri 7/9/21	
29	Drained down the pond	0.25 mons	Sat 7/10/21	Fri 7/16/21	
30	Installation of uPVC	0.25 mons	Sat 7/17/21	Sat 7/24/21	
31	Re-profile pond	0.75 mons	Sun 7/25/21	Sat 8/14/21	
32	Create islands	1 mon	Sun 7/25/21	Mon 8/23/21	
33	Fill water	0.25 mons	Tue 8/24/21	Mon 8/30/21	
34	Area 2 (Pond 55 and 56)	2.75 mons	Fri 7/2/21	Tue 9/21/21	
35	Plant mobilisation	0.25 mons	Fri 7/2/21	Fri 7/9/21	
36	Drained down the pond	0.25 mons	Sat 7/10/21	Fri 7/16/21	
37	Re-profile pond	0.5 mons	Sat 7/17/21	Sat 7/31/21	
38	Install clay liner	0.5 mons	Sun 8/1/21	Sun 8/15/21	
39	Wetland vegetation	1 mon	Mon 8/16/21	Tue 9/14/21	Freshwater marsh for Pond 55 and 56. Contractor should allow enough time (six month in advance of planting works) for supplier to propagate plant stocks as required.
40	Fill water	0.25 mons	Wed 9/15/21	Tue 9/21/21	
41	Area 2 (Pond 53, 54 and 57)	2.25 mons	Sat 7/17/21	Mon 9/20/21	4.51ha fishpond for indirect disturbance impacts on adjacent fish ponds habitats
42	Plant mobilisation	0.25 mons	Sat 7/17/21	Fri 7/23/21	
43	Drained down the pond	0.5 mons	Sat 7/24/21	Sat 8/7/21	
44	Installation of uPVC	0.25 mons	Sun 8/8/21	Sun 8/15/21	
45	Partially remove the bund	0.25 mons	Mon 8/16/21	Sun 8/22/21	
46	Re-profile pond	0.75 mons	Mon 8/16/21	Sun 9/5/21	
47	Fill water	0.5 mons	Mon 9/6/21	Mon 9/20/21	
48	Area 9 (Pond 9A, 9B, 9C and 9D)	3 mons	Mon 8/30/21	Sun 11/28/21	
49	Plant mobilisation	0.25 mons	Mon 8/30/21	Mon 9/6/21	
50	Drained down the pond	0.5 mons	Tue 9/7/21	Mon 9/20/21	
51	Installation of uPVC	0.25 mons	Tue 9/21/21	Mon 9/27/21	
52	Partially remove the bund	1 mon	Tue 9/28/21	Fri 10/29/21	
53	Re-profile pond	1 mon	Tue 9/28/21	Fri 10/29/21	
54	Create islands	0.5 mons	Tue 9/28/21	Tue 10/12/21	
55	Vegetation at island and bund	0.5 mons	Sat 10/30/21	Sat 11/13/21	
56	Fill water	0.5 mons	Sun 11/14/21	Sun 11/28/21	
57	Establishment Period	12 mons	Mon 11/29/21	Mon 11/28/22	
58	Construction of WCR from HWTER to J/O HWTER & LMCR (190m)	53 mons	Tue 3/1/22	Tue 6/30/26	
59	Construction of WCR from HWTER to J/O HWTER & LMCR and associated landscaping works	53 mons	Tue 3/1/22	Wed 10/30/24	
60	Contract 2 - Western Connection Road Phase 2, Connection Road to Sa	60 mons	Thu 3/31/22	Mon 7/20/26	
61	Construction of Remaining Western Connection Road (Phase 2)	38 mons	Wed 6/1/22	Thu 7/24/25	
62	Construction of Direct Road Link	33 mons	Fri 7/1/22	Wed 3/26/25	
63	Slip Road and Connection to San Tin Interchange	53 mons	Thu 3/31/22	Mon 7/20/26	
64	Contract 3 - Elevated PTI for DRL and Modification Works of LMC Statio	38 mons	Tue 2/1/22	Fri 2/28/25	



Task Milestone Summary Critical

Appendix B2

Management Review (2012 - 2016) and Management Manual for the Lok Ma Chau Terminus Public Transport Interchange Compensatory Pond

Lok Ma Chau Terminus Public Transport Interchange –
Compensatory Ponds 1A & 1B

Management Review (2012 – 2016) and Management Manual

Date: November 2018

Agriculture, Fisheries and Conservation Department

1 INTRODUCTION

1.1 Background

1.1.1.1 The Environmental Impact Assessment (EIA) for the Sheung Shui to Lok Ma Chau (LMC) Spur Line (the Project) was approved, and an Environmental Permit (EP) for the construction of the Project was issued to Kowloon-Canton Railway Corporation (KCRC) in 2002 (EP No. EP-129/2002). Highways Department obtained a further EP (EP No. FEP-05/129/2002/F) issued on 19 September 2007 for operation of the Public Transport Interchange at the Spur Line Lok Ma Chau Terminus and the station access road .

1.1.1.2 Under the EP condition 2.1, the Permit Holder shall implement and maintain, and monitor and review the effectiveness of a fishpond of 3.45 ha (Ponds 1A & 1B) located within the ecological compensation area for the "Sheung Shui to Lok Ma Chau Spurline" project.

1.1.1.3 Pond 1 was temporarily occupied by KCRC in order to permit implementation and establishment of ecological enhancement works, but were handed to Agriculture, Fisheries and Conservation Department (AFCD) for habitat management in September 2006, prior to commencement of the LMC Spur Line and Station operation.

1.1.1.4 The habitats and ecological functions to be provided by the LMC Pond 1 as well as the management, monitoring and reporting requirements were first specified in the Lok Ma Chau Station Habitat Creation and Management Plan (HCMP) Issue 11 (Revised) dated September 2006. Pond1 was grouped in Compartment A, together with Pond 2 within the LMC Ecological Enhancement Area (EEA) which has been under MTR's management on behalf of KCRC.

1.1.1.5 The Lok Ma Chau Wetland – Management Review Report for the LMC EEA dated October 2013 and the subsequently updated HCMP for LMC EEA Issue 16 dated January 2014, are considered as applicable as the first five-yearly review (2007-2011) and HCMP for the LMC Pond 1.

1.2 Location and Area of the LMC Pond 1

1.2.1.1 The location of the LMC Ponds 1A and 1B and LMC EEA are shown in **Figure 1**. Pond 1 has an area of 3.45 ha.

1.3 Purpose of the Management Review and Management Manual

1.3.1.1 This document serves as a record of the second five-yearly review (2012-2016), as well as a standalone Habitat Creation and Management Plan, for LMC Pond 1. For easy management, the updated management and monitoring requirement will commence in January 2019.

2 MANAGEMENT AND MAINTENANCE RESPONSIBILITIES

2.1.1.1 The management and maintenance of the LMC Pond 1 is a requirement of the EP and it is currently managed and maintained by AFCD.

3 REVIEW OF MANAGEMENT

3.1 Monitoring Data

3.1.1.1 Fauna species recorded in the LMC Pond 1 from 2012 to 2016 is are listed in **Appendix 1**. The mammal, bird, amphibian, reptile and odonate species recorded are comparable to those recorded in the LMC EEA, in particular Compartment A. As such, the management review of LMC EEA is considered applicable to the LMC Pond 1.

3.1.1.2 As shown in Appendix I, all the 18 target bird species proposed for Compartment A in the LMC EEA Management Review (2012-2016) were recorded in the LMC Pond 1 from 2012 to 2016. The target mammal species Eurasian Otter was not recorded in LMC Pond 1 likely due to the difficulty of detecting it. The target reptile species Chinese Soft-shelled Turtle, was not recorded in LMC Pond 1 from 2012 to 2016, but was recorded in 2011 and 2017. In view of the above, the revised target list for Compartment A of LMC EEA is considered appropriate for LMC Pond 1, which is listed in **Table 1**.

3.2 Monitoring Methodology and Management Strategy

3.2.1.1 The monitoring and management of LMC Pond 1 have been conducted generally using the same methodology/strategy as the LMC EEA but is simplified and some monitoring/management actions are not applicable, as the LMC Pond 1 is much smaller in size with no numerical targets.

3.2.1.2 Where applicable, the proposed changes of monitoring methodology for the LMC EEA are also valid for the LMC Pond 1, such as the proposed discontinue monthly monitoring of temperature, salinity and dissolved oxygen of water quality (which to be measured only under special circumstances). On the other hand, being smaller in size and simpler in habitat diversity, no changes are proposed to the survey methodology for mammals, birds, herptofauna, dragonflies and vegetation, as well as the management strategy.

3.3 Summary of Management Review

3.3.1.1 The LMC Pond 1 has been designed as part of the Management Compartment A of the LMC EEA as fishpond with same targets. Being immediately adjacent to Pond 2 of the LMC EEA, LMC Pond 1 is actually part of the contiguous fishponds of the area. Management review of the LMC Pond 1 shows that record of fauna in the LMC Pond 1 is comparable to those at Pond 2 of LMC EEA while the monitoring methodology and management strategy required are also similar to those of LMC EEA though in a simpler scale. As such, the management review of LMC EEA (2012-2016) is generally valid for LMC Pond 1.

4 MANAGEMENT OF LMC POND 1

4.1 Fauna Target

4.1.1.1 **Table 1** shows the target species of LMC Pond 1.

Table 1 *Target list for LMC Pond 1.*

Fauna Group/Common Name	Scientific Name	Current Conservation Status	
		IUCN (2018)	Fellowes *et al*. (2002)
Mammal **(1 species in total)**			
Eurasian Otter	*Lutra lutra*	Near Threatened	Regional Concern
Bird **(18 species in total)**			
Eurasian Wigeon	*Anas penelope*	-	Regional Concern
Eurasian Teal	*Anas crecca*	-	Regional Concern
Little Grebe	*Tachybaptus ruficollis*	-	Local Concern
Yellow Bittern^	*Ixobrychus sinensis*	-	Local Concern for breeding population
Black-crowned Night Heron	*Nycticorax nycticorax*	-	Local Concern for breeding population
Chinese Pond Heron	*Ardeola bacchus*	-	Potential Regional Concern and Regional Concern for breeding population
Grey Heron	*Ardea cinerea*	-	Potential Regional Concern
Great Egret	*Ardea alba*	-	Potential Regional Concern and Regional Concern for breeding population
Intermediate Egret	*Egretta intermedia*	-	Regional Concern
Little Egret	*Egretta garzetta*	-	Potential Regional Concern and Regional Concern for breeding population
Great Cormorant	*Phalacrocorax carbo*	-	Potential Regional Concern
Greater Spotted Eagle	*Clanga clanga*	Vulnerable	Global Concern
Eastern Imperial Eagle	*Aquila heliaca*	Vulnerable	Global Concern
Eurasian Coot	*Fulica atra*	-	Regional Concern
Black-winged Stilt	*Himantopus himantopus*	-	Regional Concern
Red-billed Starling	*Spodiopsar sericeus*	-	Global Concern
White-cheeked Starling	*Spodiopsar cineraceus*	-	Potential Regional Concern
White-shouldered Starling	*Sturnia sinensis*	-	Local Concern for breeding population
Herpetofauna **(1 species in total)**			
Chinese Soft-shelled Turtle	*Pelodiscus sinensis*	Vulnerable	Global Concern

Key:
^ Target species proposed to add in the LMC EEA Management Review Report 2012-2016.

4.2 Habitat Requirement

4.2.1.1 Pond 1 will be managed at a relatively low intensity and water levels will be permitted to fluctuate naturally while drain down and fish stocking may be considered in dry season to attract waterbirds. Part of the bund and the central island will be wooded for Starling species.

4.3 Vegetation Management

4.3.1.1 Routine grass cutting and weeding should be undertaken, but longer grass should be retained at part of the bund to provide refugia area for smaller birds and herpetofauna. Groups of aquatic plants can be kept along the bunds and islands to provide vegetation covers for birds and insects such as dragonflies in the wet season.

4.4 Monitoring Methodology

4.4.1 Mammal

4.4.1.1 Monitoring of mammal is primarily camera-based. A camera trap should be fixed at an appropriate height such that the ground level would be within the detective range of the camera, in order to maximise the chances of obtaining photographs of small mammals. Cameras should be checked and memory cards changed regularly. In addition, all direct sightings of mammals encountered should be recorded. Since most mammals are nocturnal and secretive in nature, tracks, signs and scats of mammals found should be photographed, identified and interpreted to provide records of mammal species present. Small mammal traps may be set when necessary and situation permit.

4.4.2 Bird

4.4.2.1 Monitoring of bird should be conducted on a weekly basis. Point counts should be carried out for larger bird species, while transect counts should be used for smaller and more cryptic species. All birds seen or heard during the surveys should be identified to species level and counted. Apart from the foraging raptors, flying birds are not recorded unless they are clearly foraging and associated with the habitat.

4.4.3 Herpetofauna

4.4.3.1 Two night-time surveys per month should be conducted during March to August. During surveys, all reptiles and amphibians observed or heard should be identified, and their abundance recorded. Habitat use and breeding activity should be recorded where possible.

4.4.4 Dragonfly

4.4.4.1 Dragonflies should be surveyed twice per month from April to August. All dragonfly species observed should be identified and counted, and signs of breeding recorded (such as presence of exuviae).

4.4.5 Vegetation

4.4.5.1 Monitoring of vegetation cover should be conducted twice yearly (end of wet season in March and end of dry season in September) and should map the distribution of the following habitat parameters:

- Woody vegetation (trees and shrubs);
- Herbaceous vegetation over 40cm in height in terrestrial areas;
- Herbaceous vegetation over 20cm but less than 40cm in height in terrestrial areas;
- Herbaceous vegetation less than 20cm in height in terrestrial areas;
- Bare ground;
- Emergent vegetation in ponds and whether reed *Phragmites australis* or other species;
- Open water in ponds.

4.4.6 Water Quality

4.4.6.1 pH should be measured once per month.

4.4.6.2 Water quality, including temperature, salinity and dissolved oxygen, should also be checked under special circumstances, such as when ponds are filled following drain-down, in response to events which may be linked to water quality (e.g. fish die-off) etc.

4.4.7 Water Capacity

4.4.7.1 Water level readings should be taken twice monthly, using the water level marker that is placed in Pond 1A.

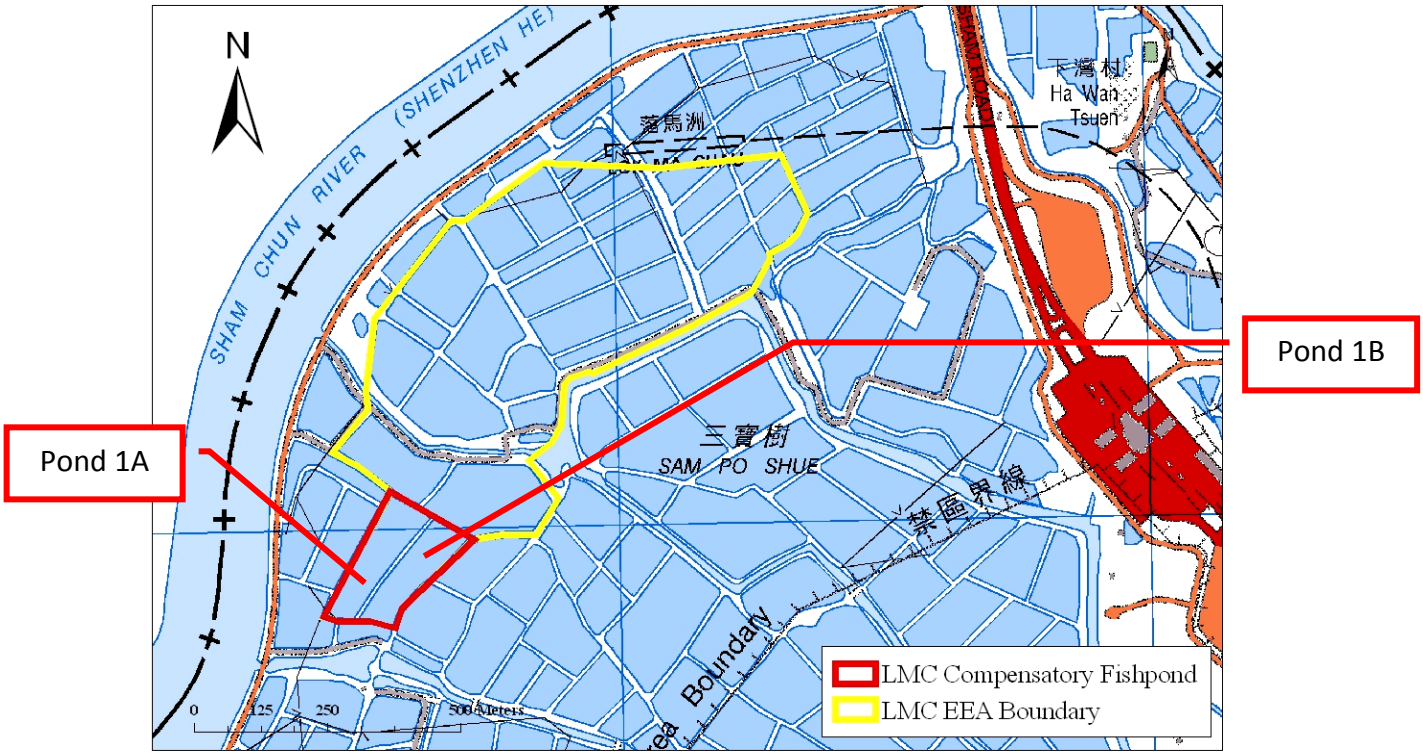
Table 2 *Summary of Monitoring for LMC Pond 1.*

Monitoring Parameter	**Monitoring Schedule**
Mammal	By camera trap
Bird	Weekly
Herpetofauna	Night-time: Twice per month during March to August
Dragonfly	Twice per month during April to August
Vegetation	End of wet season in March and end of dry season in September
Water Quality (pH)	Monthly
Water Depth	Twice per month

5 REPORTING REQUIREMENT

5.1.1.1 Monitoring observations and ecological performance of the LMC Pond 1 will be reviewed and evaluated annually for adaptive management. The HCMP will be revised as necessary.

Fig. 1 Location Map of Lok Ma Chau Terminus Public Transport Interchange Compensatory Pond 1 (Ponds 1A and 1B)



Appendix I - Fauna species recorded in the LMC Pond 1 from 2012 to 2016

Table 1. Mammal species recorded at Pond 1 between January 2012 and December 2016.

No.	Scientific Name	Common Name	Status*
1	*Canis lupus familiaris*	Domestic Dog	Common
2	*Pipistrellus abramus*	Japanese Pipistrelle	Very Common
3	*Herpestes javanicus*	Small Asian Mongoose	Uncommon
4	*Prionailurus bengalensis*	Leopard Cat	Uncommon
5	*Felis catus*	Domestic Cat	Uncommon
6	*Mus musculus*	House Mouse	Human Commensal
7	*Sus scrofa*	Wild Boar	Very Common

* Status followed Shek (2006)

Table 2. Birds recorded at Pond 1 between January 2012 and December 2016.

No.	Scientific Name	Common Name	Target Species #	Status*
1	*Accipiter trivirgatus*	Crested Goshawk		
2	*Acridotheres cristatellus*	Crested Myna		
3	*Acridotheres tristis*	Common Myna		
4	*Acrocephalus orientalis*	Oriental Reed Warbler		
5	*Actitis hypoleucos*	Common Sandpiper		
6	*Alcedo atthis*	Common Kingfisher		
7	*Amaurornis phoenicurus*	White-breasted Waterhen		
8	*Anas acuta*	Northern Pintail		RC
9	*Anas crecca*	Eurasian Teal	Y	RC
10	*Anthus cervinus*	Red-throated Pipit		LC
11	*Anthus hodgsoni*	Olive-backed Pipit		
12	*Anthus richardi*	Richard's Pipit		
13	*Apus nipalensis*	House Swift		
14	*Aquila heliaca*	Eastern Imperial Eagle	Y	GC
15	*Ardea alba*	Great Egret	Y	PRC (RC)
16	*Ardea cinerea*	Grey Heron	Y	PRC
17	*Ardea intermedia*	Intermediate Egret	Y	RC
18	*Ardea purpurea*	Purple Heron		RC
19	*Ardeola bacchus*	Chinese Pond Heron	Y	PRC (RC)
20	*Bubulcus coromandus*	Eastern Cattle Egret		(LC)
21	*Buteo japonicus*	Eastern Buzzard		
22	*Calidris temminckii*	Temminck's Stint		LC
23	*Caprimulgus affinis*	Savanna Nightjar		
24	*Cecropis daurica*	Red-rumped Swallow		
25	*Centropus bengalensis*	Lesser Coucal		
26	*Centropus sinensis*	Greater Coucal		
27	*Ceryle rudis*	Pied Kingfisher		(LC)
28	*Charadrius dubius*	Little Ringed Plover		(LC)
29	*Chlidonias hybrida*	Whiskered Tern		
30	*Chroicocephalus ridibundus*	Black-headed Gull		PRC
31	*Cisticola juncidis*	Zitting Cisticola		LC
32	*Clanga clanga*	Greater Spotted Eagle	Y	GC
33	*Columba livia*	Domestic Pigeon		
34	*Copsychus saularis*	Oriental Magpie Robin		
35	*Corvus macrorhynchos*	Large-billed Crow		
36	*Corvus torquatus*	Collared Crow		LC
37	*Coturnix japonica*	Japanese Quail		LC
38	*Cuculus micropterus*	Indian Cuckoo		
39	*Cyanopica cyanus*	Azure-winged Magpie		
40	*Dicrurus hottentottus*	Hair-crested Drongo		
41	*Dicrurus macrocercus*	Black Drongo		
42	*Egretta garzetta*	Little Egret	Y	PRC (RC)
43	*Emberiza aureola*	Yellow-breasted Bunting		RC
44	*Emberiza sulphurata*	Japanese Yellow Bunting		GC
45	*Eudynamys scolopaceus*	Asian Koel		
46	*Falco peregrinus*	Peregrine Falcon		(LC)
47	*Falco tinnunculus*	Common Kestrel		
48	*Fulica atra*	Eurasian Coot	Y	RC
49	*Gallinago gallinago*	Common Snipe		
50	*Gallinula chloropus*	Common Moorhen		
51	*Garrulax perspicillatus*	Masked Laughingthrush		
52	*Gracupica nigricollis*	Black-collared Starling		

53	*Halcyon smyrnensis*	White-throated Kingfisher		(LC)
54	*Hierococcyx sparverioides*	Large Hawk Cuckoo		
55	*Himantopus himantopus*	Black-winged Stilt	Y	RC
56	*Hirundo rustica*	Barn Swallow		
57	*Ixobrychus cinnamomeus*	Cinnamon Bittern		LC
58	*Ixobrychus sinensis*	Yellow Bittern	Y	(LC)
59	*Lanius cristatus*	Brown Shrike		
60	*Lanius schach*	Long-tailed Shrike		
61	*Lonchura punctulata*	Scaly-breasted Munia		
62	*Lonchura striata*	White-rumped Munia		
63	*Mareca penelope*	Eurasian Wigeon	Y	RC
64	*Milvus migrans*	Black Kite		(RC)
65	*Motacilla alba*	White Wagtail		
66	*Motacilla cinerea*	Grey Wagtail		
67	*Motacilla tschutschensis*	Eastern Yellow Wagtail		
68	*Muscicapa griseisticta*	Grey-streaked Flycatcher		
69	*Muscicapa latirostris*	Asian Brown Flycatcher		
70	*Nycticorax nycticorax*	Black-crowned Night Heron	Y	(LC)
71	*Orthotomus sutorius*	Common Tailorbird		
72	*Pandion haliaetus*	Western Osprey		RC
73	*Passer montanus*	Eurasian Tree Sparrow		
74	*Phalacrocorax carbo*	Great Cormorant	Y	PRC
75	*Phoenicurus auroreus*	Daurian Redstart		
76	*Phylloscopus fuscatus*	Dusky Warbler		
77	*Phylloscopus inornatus*	Yellow-browed Warbler		
78	*Phylloscopus proregulus*	Pallas's Leaf Warbler		
79	*Pica pica*	Eurasian Magpie		
80	*Platalea minor*	Black-faced Spoonbill		PGC
81	*Pluvialis fulva*	Pacific Golden Plover		LC
82	*Prinia flaviventris*	Yellow-bellied Prinia		
83	*Prinia inornata*	Plain Prinia		
84	*Pycnonotus aurigaster*	Sooty-headed Bulbul		
85	*Pycnonotus jocosus*	Red-whiskered Bulbul		
86	*Pycnonotus sinensis*	Chinese Bulbul		
87	*Recurvirostra avosetta*	Pied Avocet		RC
88	*Remiz consobrinus*	Chinese Penduline Tit		RC
89	*Saxicola stejnegeri*	Stejneger's Stonechat		
90	*Spatula clypeata*	Northern Shoveler		RC
91	*Spatula querquedula*	Garganey		
92	*Spilopelia chinensis*	Spotted Dove		
93	*Spodiopsar cineraceus*	White-cheeked Starling	Y	PRC
94	*Spodiopsar sericeus*	Red-billed Starling	Y	GC
95	*Streptopelia decaocto*	Eurasian Collared Dove		
96	*Streptopelia orientalis*	Oriental Turtle Dove		
97	*Streptopelia tranquebarica*	Red Turtle Dove		
98	*Sturnia sinensis*	White-shouldered Starling	Y	(LC)
99	*Tachybaptus ruficollis*	Little Grebe	Y	LC
100	*Tringa erythropus*	Spotted Redshank		RC
101	*Tringa glareola*	Wood Sandpiper		LC
102	*Tringa nebularia*	Common Greenshank		RC
103	*Tringa ochropus*	Green Sandpiper		
104	*Tringa stagnatilis*	Marsh Sandpiper		RC
105	*Turdus mandarinus*	Chinese Blackbird		
106	*Upupa epops*	Eurasian Hoopoe		
107	*Zosterops japonicus*	Japanese White-eye		

Target species to be effective from January 2019
* Fellowes *et al.* 2002 (GC: Global Concern; PGC: Potential Global Concern; RC: Regional Concern; PRC: Potential Regional Concern; LC: Local Concern; Letters in parentheses indicated the restrictedness of the species in breeding and/or roosting sites rather than in general occurrence)

Table 3. Amphibian species recorded at Pond 1 between January 2012 and December 2016.

No.	Scientific Name	Common Name	Status*
1	*Duttaphrynus melanostictus*	Asian Common Toad	Common
2	*Fejervarya limnocharis*	Paddy Frog	Very Common
3	*Hylarana guentheri*	Gunther's Frog	Common
4	*Kaloula pulchra pulchra*	Asiatic Painted Frog	Common
5	*Microhyla butleri*	Butler's Pigmy Frog	Common
6	*Microhyla fissipes*	Ornate Pigmy Frog	Common
7	*Polypedates megacephalus*	Brown Tree Frog	Common

* Status followed Karsen *et al*. (1998), Chan *et al*. (2005)

Table 4. Reptile species recorded at Pond 1 between January 2012 and December 2016.

No.	Scientific Name	Common Name	Status*
1	*Bungarus multicinctus multicinctus*	Many-banded Krait	Common
2	*Gehyra mutilata*	Four-clawed Gecko	Common
3	*Gekko chinensis*	Chinese Gecko	Very Common
4	*Hemidactylus bowringii*	Bowring's Gecko	Common
5	*Naja atra*	Chinese Cobra	Common
6	*Oligodon formosanus*	Taiwan Kukri Snake	Uncommon
7	*Ptyas mucosus*	Common Rat Snake	Common
8	*Ramphotyphlops braminus*	Common Blind Snake	Common
9	*Scincella reevesii*	Reeves' Smooth Skink	Common
10	*Xenochrophis flavipunctatus*	Checkered Keelback	Common

* Status followed Karsen *et al*. (1998), Chan *et al*. (2006)

Table 5. Dragonfly species recorded at Pond 1 between January 2012 and December 2016.

No.	Scientific Name	Common Name	Status*
1	*Acisoma panorpoides*	Asian Pintail	Common
2	*Agriocnemis pygmaea*	Wandering Midget	Common
3	*Anax guttatus*	Pale-spotted Emperor	Common
4	*Anax parthenope julius*	Lesser Emperor	Common
5	*Brachydiplax chalybea flavovittata*	Blue Dasher	Common
6	*Brachythemis contaminata*	Asian Amberwing	Abundant
7	*Ceriagrion auranticum ryukyuanum*	Orange-tailed Sprite	Abundant
8	*Crocothemis servilia servilia*	Crimson Darter	Abundant
9	*Epophthalmia elegans*	Regal Pond Cruiser	Common
10	*Hydrobasileus croceus*	Amber-winged Glider	Common
11	*Ictinogomphus pertinax*	Common Flangetail	Common
12	*Ischnura senegalensis*	Common Bluetail	Abundant
13	*Macrodiplax cora*	Coastal Glider	Common
14	*Orthetrum chrysis*	Red-faced Skimmer	Abundant
15	*Orthetrum sabina sabina*	Green Skimmer	Abundant
16	*Pantala flavescens*	Wandering Glider	Abundant
17	*Rhyothemis variegata arria*	Variegated Flutterer	Common
18	*Sinictinogomphus clavatus*	Golden Flangetail	Common
19	*Tholymis tillarga*	Evening Skimmer	Common
20	*Tramea virginia*	Saddlebag Glider	Abundant
21	*Urothemis signata signata*	Scarlet Basker	Common

* Status followed Tam *et al*. (2011)

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Appendix C

Habitat Requirements of Key Target Species and Supplementary Focus Species

Appendix C Habitat Requirements of Key Target Species and Supplementary Focus Species

Appendix B1 Habitat Requirements of Key Target Species

1.1 Avifauna

1.1.1 Piscivorous Avifauna (including Indicative Species and other Ardeids)

Black-faced Spoonbill

1.1.1.1 Black-faced spoonbill is common winter visitor to Hong Kong and commonly found in the Deep Bay area. The species is listed as Endangered in the Red List of China Vertebrates (Jiang *et al*., 2016) and vulnerable in the IUCN Red List (IUCN, 2025). Locally it has been assessed as of Potential Global Concern (Fellowes *et al.* 2002) and Moderate Risk (Or and Chan, 2025). It preys on fish (including Tilapia, Mullet), shrimps and other invertebrates. The species generally prefer open habitats and would avoid dense vegetation for feeding and roosting (Swennen and Yu, 2005). Common foraging grounds are drained *gei wai*, commercial fishponds, rivers, and intertidal areas during low tide. During pond drain down, mean abundance of Black-faced Spoonbill per fishpond could increase up to 4 times compared to before the drain down, showing greater feeding success (ACE, 2016).

Great Cormorant

1.1.1.2 Great cormorant is a very common winter visitor to HK and is abundant in the Deep Bay area. It has been assessed as of Low Risk in Hong Kong (Or and Chan, 2025). It is an entirely piscivorous species and forages in commercial fishponds, *gei wais*, rivers, intertidal areas and at sea. It dives to catch fish and hence cannot use very shallow water. Prey items may include Tilapia and grey mullet, which both are dominant species stocked by fish farmers in the Deep Bay area (HKBWS, n.d.). The species forms very large night-time roosts and utilises smaller day-time roosts in less disturbed areas as they startle easily (HKBWS, n.d.). During pond drain down before the pond bottom was exposed, mean abundance of great cormorant per fishpond could be doubled when compared to before the drain down (ACE, 2016).

Great Egret

1.1.1.3 Great egret is common resident, migrant and winter visitor that is widely distributed in Hong Kong, which has been assessed as of Potential Regional Concern (Fellowes *et al.* 2002) and Low Risk (Or and Chan, 2025). The species is primarily piscivorous and forages in commercial fishponds, *gei wais*, freshwater marshes and shallow intertidal areas. Great egret would be benefited by drained down fishponds and *gei wais* as prey items were trapped in smaller water volume, which enhance feeding success (AFCD, 2011). The mean abundance of ardeids per fishpond could increase by 29 times when comparing before and after drain down of fishponds (ACE, 2016). Large breeding population has established in the intertidal mangrove of the Deep Bay area. By 2020, over 800 breeding pairs were recorded in Hong Kong, with most pairs recorded in Deep Bay (HKBWS, n.d.).

Grey Heron

1.1.1.4 Grey heron is common winter visitor that occurs mainly in the Deep Bay area and has been assessed as of Moderate Risk (Or and Chan, 2025). Small number of grey heron can also be found elsewhere in habitats like coastal and inland wetland areas such as Starling Inlet, Kowloon Park, Cape D'Aguilar. The species is primarily piscivorous and forages in both freshwater and brackish fishponds, *gei wais*, rivers, intertidal areas and at sea. Prey items recorded for the species include Tilapia and grey mullet, which are common fish stocks in commercial ponds in the Deep Bay area. Local breeding was recorded in Mai Po Nature Reserve in June 2020 (HKBWS, n.d.).

1.1.2 Ducks and Grebe

Eurasian Teal

1.1.2.1 Eurasian teal is common and abundant winter visitor to Hong Kong, which has been assessed as of Regional Concern (Fellowes *et al.* 2002) and of High Risk (Or and Chan, 2025). It roosts and flies in large flocks, and often occurs in intertidal areas and brackish and freshwater marshes, as well as fishponds and along river channels in the Deep Bay area, Shuen Wan, Tai Lam Chung Reservoir, Victoria Harbour, and urban parks (HKBWS, n.d.). The diet of Eurasian teal includes insects, small fish and other invertebrates. During the drain down of fishponds, the mean abundance of ducks per fishpond could increase up to 14 times when compared to before the drain down (ACE, 2016).

Little Grebe

1.1.2.2 Little grebe is common resident that occurs mainly in fishponds and freshwater wetlands of Deep Bay area all year round. It has been assessed as of Low Risk (Or and Chan, 2025). It prefers fishponds and *gei wai* that have emergent or submergent vegetation. Little grebe is presumed to be insectivorous as well as consuming small fish and shrimps. The species is fairly tolerant to disturbance. When disturbed, it readily dives or skitters across water for refuge (HKBWS, n.d.; RSPB, n.d.).

1.1.3 Shorebirds and Gulls

Black-headed Gull

1.1.3.1 Black-headed gull is abundant winter visitor that is found in the Deep Bay area and coastal waters of Hong Kong. Its number has dropped in recent years and has been assessed as of High Risk (Or and Chan, 2025). It mainly occurs at mudflat, commercial fishponds, the sea and rivers during low tide. Black-headed gull is omnivorous and opportunistic, their diet consists predominantly of aquatic and terrestrial invertebrates, occasionally fish and rodents (IUCN, 2025). The species can be found forming large and vocal flocks on mudflats (HKBWS, n.d.).

Little Ringed Plover

1.1.3.2 Little ringed plover is resident, common winter visitor and passage migrant which is widely distributed in freshwater areas throughout Hong Kong. The local breeding population has been assessed as of High Risk while the visiting population is of Moderate Risk (Or and Chan, 2025). The small wader prefers margins of low-lying areas of fresh / brackish water, including wet agricultural land, freshwater marsh and drained fishponds area. Diet mainly comprised of insects, shrimps and other invertebrates. One record of breeding activity at fishponds at San Tin was recorded during the survey period of the Approved EIA of San Tin / Lok Ma Chau Development Node (CEDD & PlanD, 2024).

1.1.4 Freshwater Wetland Avifauna

Black-winged Stilt

1.1.4.1 Black-winged stilt has a wide distribution across the Deep Bay area. It has been assessed as of Region Concern (Fellowes *et al.* 2002) and Low Risk (Or and Chan, 2025). The species mainly occurs in freshwater marsh, brackish *gei wai* and commercial fishponds during drained down, as well as river and wet agricultural land in the northwest New Territories. Breeding activities were recorded in Long Valley and Mai Po Nature Reserve (HKBWS, n.d.). The species mainly forages at shallow water areas of fishponds and marshes, especially during drained-down process of ponds. Diet includes insects, small fish other invertebrates.

Red-throated Pipit

1.1.4.2 Red-throated pipit is common winter visitor and passage migrant. It is regarded as of Regional Concern (Fellowes *et al.* 2002) and has been assessed as of Moderate Risk locally (Or and Chan, 2025). It occurs in marshy or open grassy areas, wet and dry agricultural fields and fish pond bunds. Diet includes small insects and other invertebrates.

1.1.5 Other Wetland-associated Avifauna Species

Collared Crow

1.1.5.1 Collared crow is locally common resident that can be found in the Inner Deep Bay area, which is listed as Near Threatened in the Red List of China Vertebrates (Jiang *et al*., 2016) and Vulnerable in the IUCN Red List (IUCN, 2025). It has been assessed as of Moderate Risk locally (Or and Chan, 2025). It occurs at open lowland habitats near water such as agricultural lands and fields, as well as fishpond areas, rivers and watercourses. The species usually forages at drained *gei wai* and fishponds, while roosting in intertidal mangroves of *Kandelia obovata* at night (WWF, 2010; Stanton, Smith and Leung, 2014). An increase by a factor of 0.93 per fishpond is recorded in the abundance of Collared Crow during pond drain down (ACE, 2016). Regionally, population decline in numbers was due to prey depletion and overuse of pesticides across Southern China (WWF, 2010; IUCN, 2025). However, the collared crow population was found to have steadily increased at Mai Po Nature Reserve and its environs between 2004 and 2013 (Stanton, Smith and Leung, 2014).

Red-billed Starling

1.1.5.2 Red-billed starling is abundant winter visitor that is widely distributed in Hong Kong. It has been assessed as of High Risk (Or and Chan, 2025). Its wintering population mainly occurs in the northwest New Territories including Mai Po, San Tin and Tai Sang Wai. The species is omnivorous and opportunistic, which is associated with the fishponds in northwest New Territories as food is readily available in the form of spilled and wasted fish meal (HKBWS, n.d.). It also occurs in other habitats such as reedbeds, freshwater marshes, wet agricultural fields and watercourses. The species nests in tree holes, cavities in roof or wall of village houses or under air-conditioning units, and have been recorded in Tai Mei Tuk, Kowloon Park and Hung Shui Kiu. It is suspected that a large breeding population exists regionally in or nearby Shenzhen, given double-figure estimates of juveniles had been made in the Deep Bay area midsummer. (HKBWS, 2024)

1.1.6 Raptors

Eastern Imperial Eagle

1.1.6.1 Eastern imperial eagle is a winter visitor that is recorded mainly in the Deep Bay area and Ma Tso Lung. It has been assessed as of High Risk (Or and Chan, 2025). The species is carnivorous and tends to prey on waterbirds including domestic ducks that used to be raised in fishponds. It prefers open areas around wetlands and may be seen perching on trees near pond margins in the Deep Bay area. The species is listed as Endangered in the Red List of China Vertebrates (Jiang *et al*., 2016) and Vulnerable in the IUCN Red List (IUCN, 2025).

Greater Spotted Eagle

1.1.6.2 Greater spotted eagle is a winter visitor to Hong Kong that mainly occurs in the Deep Bay area and the surrounding hills. It is listed as Endangered in the Red List of China Vertebrates (Jiang *et al*., 2016) and Vulnerable in the IUCN Red List (IUCN, 2025). Locally it has been assessed as of High Risk (Or and Chan, 2025). It is carnivorous and opportunistic, which tends to prey on waterbirds and dead birds.

1.2 Mammal

Eurasian Otter

1.2.1.1 Eurasian otter is regarded as a species of Regional Concern (Fellowes *et al.* 2002) and is of High Risk (Or and Chan, 2025). It is highly restricted and mainly confined to the northwest New Territories. According to Shek (2006) and Shek et al. (2007), it primarily occurs in the Mai Po and Inner Deep Bay Area, and work for LMC Loop indicates that LMC Meander and the adjacent areas of LMC Loop and Hoo Hok Wai are also important for the species. The Eurasian otter feeds largely on fish and sometimes amphibians. A recent study by McMillian (2021) identified fish as a major prey group for otters in the Deep Bay area. Analysis of otter spraints showed that otters mainly prey on dominant species stocked by fish farmers in the area. This suggested that fishponds and the availability of stable food resources are important factors influencing the survivorship of the otter population in Deep Bay. Sighting and monitoring had also suggested the species would utilise river channels as important movement corridors (CEDD and PlanD, 2013).

1.3 Odonate

Scarlet Basker

1.3.1.1 Scarlet basker was considered by Fellowes *et al.* (2002) to be of Local Concern, but recent evidence suggests this species has since colonized much of the lowland habitat in Hong Kong, especially in the northwest New Territories, where it shows a preference for abandoned fishponds (Tam *et al.* 2011). It is assessed as of Low Risk (Or and Chan, 2025). The larvae utilized weedy ponds and marshes, while adults may be seen on conspicuous branches on warm days (HKWP, 2024).

1.4 Herpetofauna

Chinese Bullfrog

1.4.1.1 Chinese bullfrog has been assessed as of Potential Regional Concern (Fellowes et al. 2002) and Moderate Risk (Or and Chan, 2025), and is a Class II Protected Species in China. It is recorded from many localities in Hong Kong and is widespread in the New Territories, but the local population appears to be diminishing due to habitat destruction and hunting for food (Chan et al. 2005). Imported individuals from breeding farms, which are often paler, are commonly for sale in local markets and are often released. This is generally a lowland species that can occur in a range of still-water bodies, though it prefers deeper pools than other amphibians. Generally, it feeds on large insects, but can also take small rodents and frogs (Karsen et al. 1998).

1.5 Summary

1.5.1.1 Summary of key target species are detailed in **Table B1.1** below.

Table C1.1 Summary of Key Target Species

Species[1]	Distribution and status in Hong Kong [2]	Protection and Conservation Status
Black-faced Spoonbill *Platalea minor*	Common winter visitor	PGC[3], Class I[4], Endangered[5], Vulnerable[6], MR[7]
Great Cormorant *Phalacrocorax carbo*	Common winter visitor	PRC[3] , LR[7]
Great Egret *Ardea alba*	Common resident, migrant and winter visitor	PRC(RC) [3] , LR*[7]
Grey Heron *Ardea cinerea*	Common winter visitor	PRC[3] , MR[7]
Eurasian Teal *Anas crecca*	Common winter visitor	RC[3] , HR*[7]
Little Grebe *Tachybaptus ruficollis*	Common resident	LC[3], B: LR** / V: LR*[7]
Black-headed Gull *Chroicocephalus ridibundus*	Abundant winter visitor	PRC[3] HR[7]
Little Ringed Plover *Charadrius dubius*	Resident, common winter visitor and passage migrant	(LC) [3] , B: HR / V: MR[7]
Black-winged Stilt *Himantopus himantopus*	Common migrant and wintor visitor	RC[3] , B: LR** / V: LR*[7]
Red-throated Pipit *Anthus cervinus*	Common passage migrant and winter visitor	LC[3] , MR[7]
Collared Crow *Corvus torquatus*	Locally common resident	LC[3], Near Threatened[6] , MR[7]
Red-billed Starling *Spodiopsar sericeus*	Abundant winter visitor	GC[3] , HR[7]
Eastern Imperial Eagle *Aquila heliaca*	Common winter visitor	GC[3], Class I[4], Vulnerable[5], Endangered[6] , HR[7]
Greater Spotted Eagle *Clanga clanga*	Common winter visitor	GC[3], Class I[4], Rare[5], Endangered[6] , HR[7]
Eurasian Otter *Lutra lutra*	Restricted to Mai Po, Lok Ma Chau, Hoo Hok Wai, and nearby areas	RC[3], Class II[4], Vulnerable[5], Endangered[6] , HR[7]
Scarlet Basker *Urothemis signata signata*	Common in areas with abandoned fish ponds throughout Hong Kong; Scattered	LC[3] , LR[7]
Chinese Bullfrog *Hoplobatrachus rugulosus*	Widely distributed in Hong Kong	PRC[3], Class II[4], Endangered[6] , MR[7]

Notes:

1. All wild birds are Protected under Wild Animals Protection Ordinance (Cap. 170).
2. AFCD (2021a) Hong Kong Biodiversity Database
   Distribution of fauna species in Hong Kong follows Wu and Lee (2000), Xing et al. (2000) , AFCD (2022) and Reels (2019)
3. 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.
4. Zheng, G. M. & Wang, Q. S. (1998). China Red Data Book of Endangered Animals. Aves. Science Press, Beijing, China. 346pp. (In Chinese only).
5. Jiang *et al*. (2016). Red List of China's Vertebrates. *Biodiversity Science* **24**(5): 500-551.
6. International Union for the Conservation of Nature (IUCN) (2025). The IUCN Red List of Threatened Species. Version 2025-1
7. Or, C.K.M. & Chan, B.P.L. (Eds.) (2025) The State of Hong Kong's Biodiversity 2025. WWF-Hong Kong. 65pp.: B = Breeding Population; V = Visiting Population; LR = Low Risk of Extinction in Hong Kong Species Status Assessment; MR = Moderate Risk of Extinction in Hong Kong Species Status Assessment; HR = High Risk of Extinction in Hong Kong Species Status Assessment.

Appendix C2 Habitat Requirements of Supplementary Focus pecies

1.6 Avifauna

1.6.1 Ducks and Grebe

Eurasian Coot

1.6.1.1 The Eurasian coot is an uncommon winter visitor to the Deep Bay area that occurs in Hong Kong from mid-November to mid-March. The Hong Kong population has been in decline since 1990s, which may be attributed to climate change and milder winters which allow the Eurasian coot to remain further North. It is most numerous on ponds inside Mai Po Nature Reserve and the tidal waters along the coast form Nim Wan to Tsim Bei Tsui, as well as Inner Deep Bay. High numbers can be seen in certain fishpond areas in San Tin. Eurasian coots are herbivores, and are sometimes loosely associated with Tufted Ducks in coastal waters.

Northern Shoveler

1.6.1.2 The northern shoveler is an abundant winter visitor to the intertidal areas of Deep Bay, typically present from October to April, with small numbers recorded in shallower part of the brackish *gei wai* and freshwater ponds of Mai Po Nature Reserve and commercial fish ponds. Most of the time, the species it found to be foraging in or roosting in water, or wading in wet mudflat. Foraging habitats include tidal waterways draining into Deep Bay such as Shan Pui River and Kam Tin Main Drainage Channel, Ngau Tam Mei Drainage Channel and San Tin East Main Drainage Channel

Tufted Duck

1.6.1.3 The tufted duck is an abundant winter visitor that mainly occurs in the Deep Bay area from October to April, with few records away from the Deep Bay Area such as Plover Cove Reservoir, Starling Inlet and Nam Chung. Diet mainly consists of molluscs, also crustaceans and insects which are foraged by diving in water. The species forages and roosts in large flocks.

1.6.2 Shorebirds and Gulls

Stints

1.6.2.1 Several species of stint (*Calidris* spp.) regularly occur in the Deep Area as passage migrant or winter visitor. All of them are regarded as of Local Concern (Fellowes *et al.,* 2002). These small waders prefer margins of fresh or brackish water, including wet agricultural land, freshwater marsh, drained fishponds and intertidal mudflat (for Red-necked Stint). Diet mainly comprised of invertebrates.

Wood Sandpiper

1.6.2.2 The wood sandpiper is a common migrant and winter visitor to freshwater wetland, and general occurs in low-lying areas of freshwater and brackish marsh, wetland agriculture fishponds, larger channelised watercourses and rice paddies throughout the New Territories, especially in the Long valley, Kam Tin and, previously, in the San Tin-Lok Ma Chau-Chau Tau area. The wood sandpiper forages in shallow water or wet mud, picking at the water or mud surface and sweeping bill through the water.

1.6.3 Freshwater Wetland Avifauna

Black-crowned Night Heron

1.6.3.1 The black-crowned night heron is an abundant passage migrant and winter visitor in Hong Kong with a smaller breeding population. It occurs in a variety of wetland or wetland-edge habitats throughout Hong Kong. The Deep Bay area has the highest numbers of black-crowned night heron, within the largest roosts occurring in mangroves. The black-crowned night heron forages in both open wetland habitats such as fresh and brackish water fishponds, natural and man-made watercourses, rocky shores, as well as vegetated habitats such as edge of mangrove and in freshwater marsh. Breeding activity has been recorded in the outer mangroves at Mai Po.

Bittern spp.

1.6.3.2 The bitterns commonly occur at a variety of freshwater wetlands (e.g., reedbeds) across Deep Bay and some other locations (i.e. Po Toi), of mainly passage migrants populations. Breeding behaviour of bitterns (e.g., cinnamon bittern and yellow bittern) were recorded in area such as Hong Kong Wetland Park, San Tin, Kam Tin and LMC Ecological Enhancement Area (HKBWS, n.d.). Their diet includes both small vertebrates and invertebrates.

Chinese Pond Heron

1.6.3.3 The Chinese pond heron commonly occurs at a variety of freshwater and brackish wetlands across Hong Kong throughout the year, with both migratory and resident populations. Chinese pond heron occurs in most low-lying damp area in New Territories. Around 80% of Chinese pond herons nest in Deep Bay Area. Their diet includes fish such as Mosquito Fish and Swampy Eel, frogs, shrimps, dragonflies and insects such as flies.

Intermediate Egret

1.6.3.4 The intermediate egret occurs commonly on passage from September to November, but scarcely at other times of the year. It favours freshwater marshy areas, but also occurs in commercial fishponds, intertidal areas and along freshwater streams that feed into estuarine water, with most records in freshwater habitats in the Deep Bay area. Diet consists of fish, mudskippers and Reeve's Smooth Skink.

Little Egret

1.6.3.5 The little egret is present in Hong Kong year-round in a wide variety of fresh and non-freshwater wetland habitats, with both resident and migratory populations. In northwestern New Territories, drained down fishponds and gei wai are a particularly important feeding habitat for little egrets. Colony decline or abandonment can be attributed to human disturbance and predation during the sensitive period of the breeding cycle and death of the trees used for breeding due to smothering by climbers such as *Mikania micrantha*.

Pheasant-tailed Jacana

1.6.3.6 The pheasant-tailed jacana is a scarce passage migrant occurring in freshwater wetlands during Autumn of Hong Kong (HKBWS, n.d.) and is assessed as being extinct in Hong Kong (Or and Chan, 2025). It used to breed in *Euryale ferox* ponds that was turned into Fairview Park development in 1970's (Or and Chan, 2025). Recent recorded locations include Mai Po Nature Reserve, Long Valley and Lok Ma Chau Ecological Enhanced Area. The species favours lilies, as well as *Trapa*. Diet mainly includes insects and small invertebrates found on water surface and aquatic vegetations (HKBWS, n.d.).

Snipes

1.6.3.7 Snipe species (*Gallinago* spp.) generally occur in the freshwater wetlands of the northern New Territories, including Long Valley and Mai Po Nature Reserve. Notable species include Swinhoe's snipe which is a species of conservation and regarded of Local Concern (Fellowes *et al*., 2002). Diet and behaviour vary among species but generally prefers freshwater marsh and wet agricultural fields (HKBWS, n.d.).

1.6.4 Other Wetland-associated Avifauna Species

White-cheeked Starling

1.6.4.1 The species is common winter visitor of the Deep Bay area, Kam Tin and the Long Valley (AFCD, 2024). It generally occurs in the lowland open habitats, including wet agricultural land and fishpond areas in the Deep Bay area (HKBWS, n.d.). It is assessed as Least Concern under IUCN Red List (IUCN, 2025) and of Potential Regional Concern (Fellowes *et al*., 2002). Omnivorous but mostly frugivorous, attracted to fruits of Chinaberry tree (*Melia azedarach*) which is common within the Deep Bay area.

White-shouldered Starling

1.6.4.2 The species is passage migrant and uncommon winter visitor of Hong Kong with a small breeding population. It is assessed as Least Concern (Fellowes *et al*., 2002; IUCN, 2025). Open habitats with perching spots such as trees, building and overhead wires are generally preferred by the species, including fishpond areas of the Deep Bay, where the largest population can be found. Omnivorous, including fruits of native or exotic vegetation species and insects preferred (HKBWS, n.d.).

Zitting Cisticola

1.6.4.3 Zitting cisticola is a common passage migrant and winter visitor in Hong Kong with a small breeding population. The species is insectivorous, which is widespread in open grassland, grassy wetland, meadows, agricultural land and fishponds, including the Long Valley area (HKBWS, n.d.). Grassy areas that are recently cleared or urban edges are also utilised by the species. It usually forages in grassy and reedy vegetation and flies low when flushed. The diet of this species primarily comprises insects and small invertebrates.

1.6.5 Mammal

Bat spp.

1.6.5.1 Some species of bats can be found utilising fishpond areas and adjacent areas for foraging or roosting. Both insectivorous and fruit-eating bats were previously recorded in the San Tin area, including Japanese pipistrelle and short-nosed fruit bats. The former species usually forage above waterbodies and under trees for insects at dusk and at night. The latter forage on fruit trees on bunds after dark, and during the day roosts under palm tree leaves such as Chinese fan-palm (*Livistona chinensis*) and Petticoat palm (*Washingtonia robusta*), as well as under banana tree leaves and artificial structures such as house eaves on occasion. All bat species are of conservation importance.

Leopard Cat

1.6.5.2 The leopard cat is a nocturnal feline species native to Hong Kong, and is protected under Cap. 170 and Cap. 586. It is carnivorous and primarily feeds on various small animals such as rodents, birds and amphibians. Leopard cats are widely distributed in countryside areas throughout Hong Kong, except for Lantau Island. Leopard cats are frequently caught on camera traps in the Mai Po and Inner Deep Bay area, but are threatened by habitat loss.

1.6.6 Firefly

Mai Po Bent-winged Firefly

1.6.6.1 The Mai Po bent-winged firefly is restricted to Southern China, recorded in northwestern New Territories including Mai Po and Tin Shui Wai. It is regarded as Endangered on IUCN red list and is commonly found in mangrove-fringed channels between March to October. Larvae preys on small snails such as *Assiminea* sp. and *Auriculastra* sp. which are densely populated in the Mai Po mangroves (AFCD, 2022; IUCN, 2025; Yiu, 2011). Mai Po bent-winged firefly inhabits mangroves near intertidal rivers and adjacent wet grassland, with larvae staying on intertidal mudflats and burrowing into the brackish mud to pupate, and feeding on small snails (Yiu, 2012; HKBWS, 2022). Population peaks in May and September and it has been observed that increased light intensity would negatively impact the firefly species (HKBWS, 2020).

1.7 Summary

1.7.1.1 Summary of supplementary focus species are detailed in **Table C2.1** below.

Table C2.1 Summary of Supplementary Focus Species

Species[1]	Distribution and status in Hong Kong [2]	Protection and Conservation Status
Eurasian Coot *Fulica atra*	Uncommon winter visitor	RC[3] , HR[7]
Northern Shoveler *Spatula clypeata*	Abundant winter visitor	RC[3] , LR[7]
Tufted Duck *Aythya fuligula*	Abundant winter visitor	LC[3] , LR[7]
Wood Sandpiper *Tringa glareola*	Common migrant and winter visitor	LC[3] , HR[7]
Black-crowned Night Heron *Nycticorax nycticorax*	Common resident and migrant	(LC) [3] , LR*[7]
Chinese Pond Heron *Ardeola bacchus*	Common resident	PRC(RC) [3] , LR*[7]
Intermediate Egret *Ardea intermedia*	Resident and passage migrant	RC[3] , LR*[7]
Little Egret *Egretta garzetta*	Common resident, migrant and winter visitor	PRC(RC) [3] , RL[7]
Pheasant-tailed Jacana *Hydrophasianus chirurgus*	Uncommon migrant and rare winter visitor	LC[3], Class II[4], Near Threatened[6] , EX[7]
White-cheeked Starling *Spodiopsar cineraceus*	Locally common winter visitor	PRC[3] , MR[7]
White-shouldered Starling *Sturnia sinensis*	Locally common passage migrant and uncommon winter visitor	(LC) [3] , LR[7]
Zitting Cisticola *Cisticola juncidis*	Common passage migrant and winter visitor	LC[3] , HR[7]
Leopard Cat *Prionailurus bengalensis*	Widely distributed in countryside areas throughout Hong Kong, except for Lantau Island	Class II[4], Vulnerable[5][6] , LR[7]
Maipo Bent-winged Firefly *Pteroptyx maipo*	Mai Po, Tin Shui Wai. (Restricted to Southern China (including Hong Kong))	-

Notes:
1. All wild birds are Protected under Wild Animals Protection Ordinance (Cap. 170).
2. AFCD (2021a) Hong Kong Biodiversity Database
   Distribution of fauna species in Hong Kong follows Wu and Lee (2000), Xing et al. (2000) , AFCD (2022) and Reels (2019)
3. 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.
4. Zheng, G. M. & Wang, Q. S. (1998). China Red Data Book of Endangered Animals. Aves. Science Press, Beijing, China. 346pp. (In Chinese only).
5. Jiang *et al*. (2016). Red List of China's Vertebrates. *Biodiversity Science* **24**(5): 500-551.
6. International Union for the Conservation of Nature (IUCN) (2025). The IUCN Red List of Threatened Species. Version 2025-1
7. Or, C.K.M. & Chan, B.P.L. (Eds.) (2025) The State of Hong Kong's Biodiversity 2025. WWF-Hong Kong. 65pp.: B = Breeding Population; V = Visiting Population; LR = Low Risk of Extinction in Hong Kong Species Status Assessment; MR = Moderate Risk of Extinction in Hong Kong Species Status Assessment; HR = High Risk of Extinction in Hong Kong Species Status Assessment; EX = Extinct in Hong Kong Species Status Assessment.

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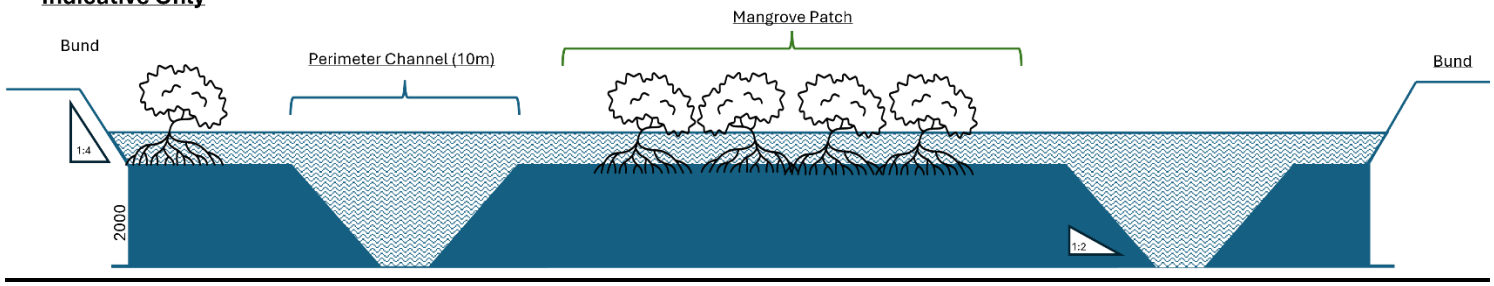
Appendix D

Typical Sections for Habitat Creation

Appendix D Typical Sections for Habitat Creation

Appendix D1 Typical Cross-section of Ecological Enhanced Fishpond (Open Water and Vegetated *Gei Wai*)

Indicative Only

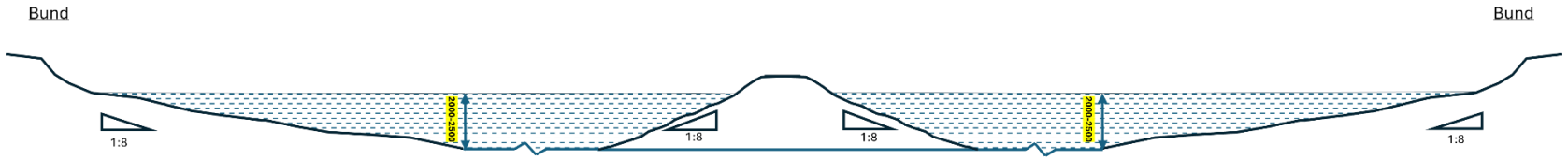


Note:

1. Drawing and proposed water levels are **indicative only**, final design subjected to on-site condition.
2. Unit presented is in mm.
3. Perimeter channel running internally with water depth of 2m, and 10m width.

Typical Cross-section for Proposed Vegetated Gei Wai (EEF)

Indicative Only



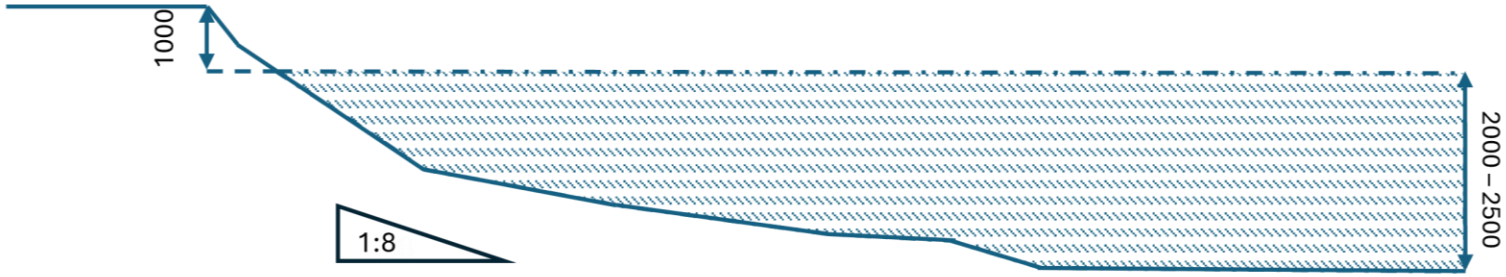
Note:

1. Drawing and proposed water levels are **indicative only**, final design subjected to on-site condition.
2. Unit presented is in mm.

Typical Cross-section for Proposed Open Water Gei Wai (EEF)

Appendix D2 Typical Cross-section of Ecological Enhanced Fishpond (Traditional Fishpond / Low Intensity Management Area)

Indicative Only

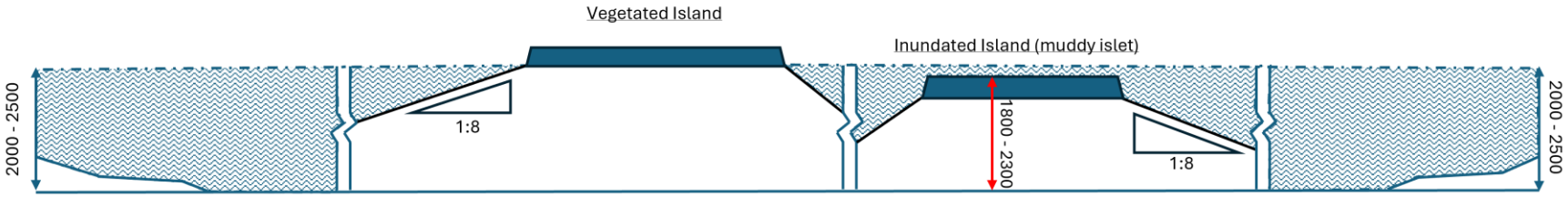


* Drawing and proposed water levels are **indicative only**, final design subjected to on-site condition
* Unit presented is in mm.

Typical Pond Bund Section for Traditional Fishponds / Low Intensity Management Area (EEF)

Appendix D3 Typical Cross-section of Ecological Enhanced Fishpond Vegetated Island and Inundated Island

Indicative Only

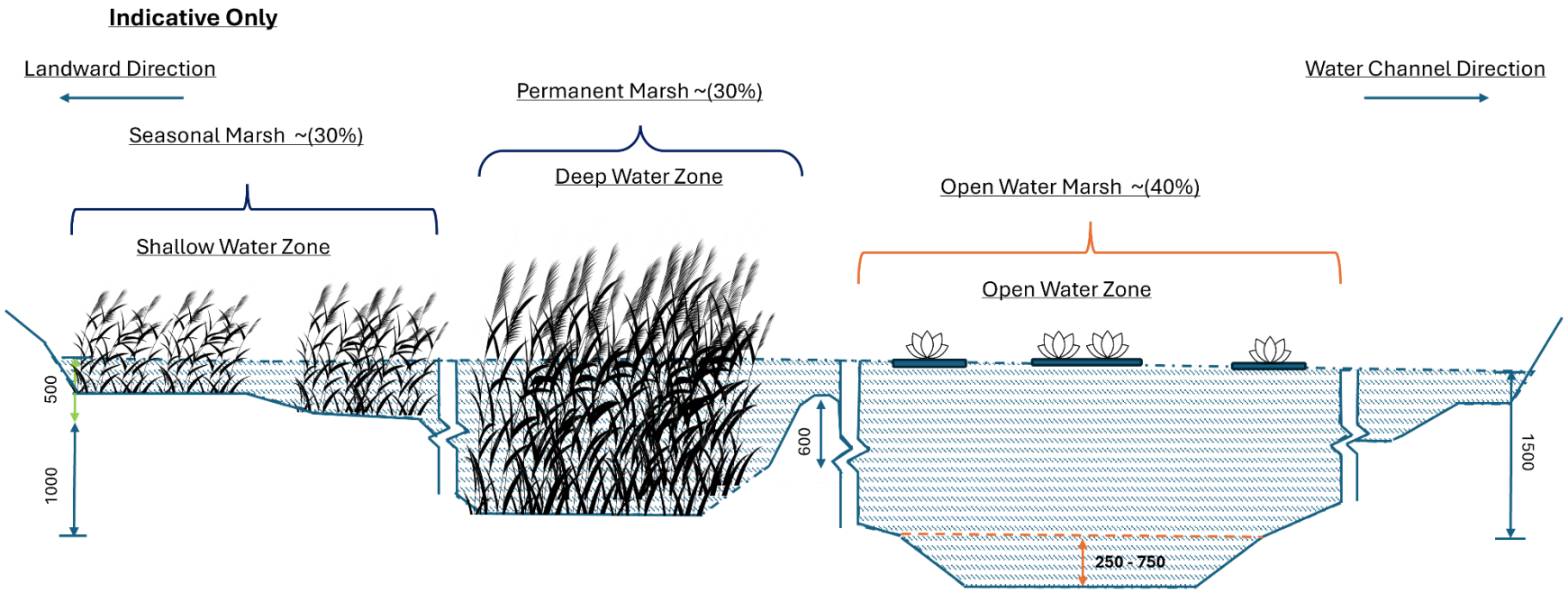


Note:

1. Drawing and proposed water levels are **indicative only**, final design subjected to on-site condition.
2. Unit presented is in mm.
3. Slope will be graded gently towards the proposed bird / vegetated islands located at the middle of the larger EEF ponds.

Typical Cross-section for Vegetated Island and Inundated Island (EEF)

Appendix D4 Typical Cross-section of Enhanced Freshwater Wetland (Freshwater Marsh)



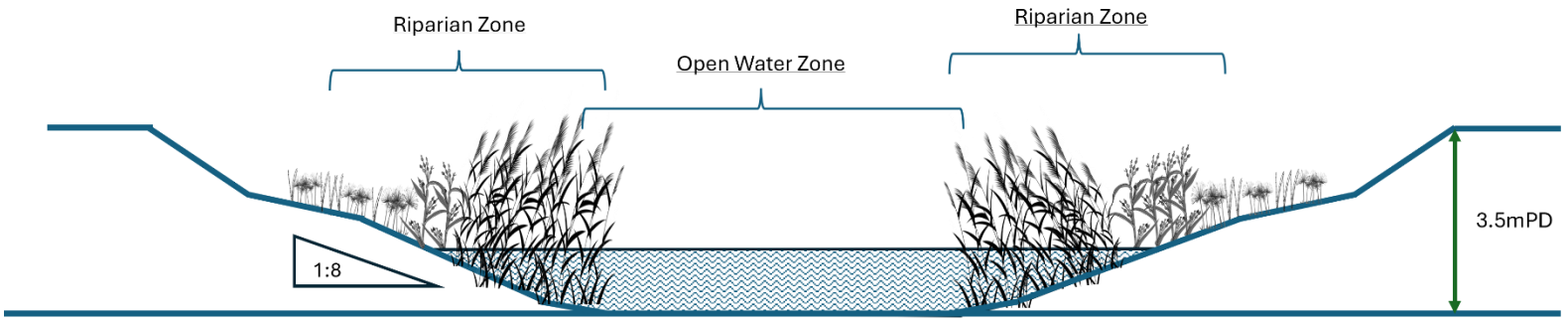
Note:

1. Drawing and proposed water levels are **indicative only**, final design subjected to on-site condition.
2. Unit presented is in mm.
3. Shallow water zone (0.1 ~ 0.5m) and open water habitat will be created, with slope graded gently towards centre of the freshwater marsh. A bund will be created (~0.6m) to retain sufficient water for permanent marsh inundated. Open water marsh will have deeper water depth (addition 0.25 ~ 0.75m).

Typical Cross-section for Freshwater Marshes (EFW)

Appendix D5 Typical Cross-section of Enhanced Freshwater Wetland (Widened Water Channels)

Indicative Only



Note:

1. Drawing and proposed water levels are **indicative only**, final design subjected to on-site condition.
2. Unit presented is in mm unless specified.

Typical Cross-section for Widened Water Channels (EFW)

Appendix E

Detail Design Examples of Habitat Enhancements

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

822800 E

823000 E

823200 E

840000 N

839800 N

N

NOTE:

1. THE DETAILED DESIGN IS INDICATIVE ONLY AND SUBJECT TO CHANGE IN LATER STAGE.

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- POND BUND
- MUDFLAT
- PERIMETER CHANNEL
- MANGROVE
- SMART SLUICE GATE

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SCALE 比例
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DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60738497

AGREEMENT NO. 協議編號
CE 25/2024 (CE)

SHEET TITLE
圖紙名稱

DETAILED DESIGN EXAMPLE OF ECOLOGICALLY ENHANCED FISHPONDS (VEGETATED GEI WAI)

SHEET NUMBER
圖紙編號

60738497/512a/AP1

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ISO A1 594mm x 841mm
Approved:
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Project Management Initials:



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SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位

KEY PLAN
索引圖

PROJECT NO. 項目編號
60738497

AGREEMENT NO. 協議編號
CE 25/2024 (CE)

SHEET TITLE
圖紙名稱

DETAILED DESIGN EXAMPLE OF ECOLOGICALLY ENHANCED FISHPONDS (TRADITIONAL)

SHEET NUMBER
圖紙編號

60738497/512a/AP2

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ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

824000 E

824200 E

824400 E

824600 E

840200 N

840000 N

N

練板村
LIN BARN TSUEN

合盛圍

NOTE:

1. THE DETAILED DESIGN IS INDICATIVE ONLY AND SUBJECT TO CHANGE IN LATER STAGE.

LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- FRESHWATER MARSH
- POND BUND
- OPEN WATER MARSH
- PERMANENT MARSH
- SEASONAL MARSH
- ADJUSTABLE WEIR

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SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位

KEY PLAN
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PROJECT NO. 項目編號
60738497

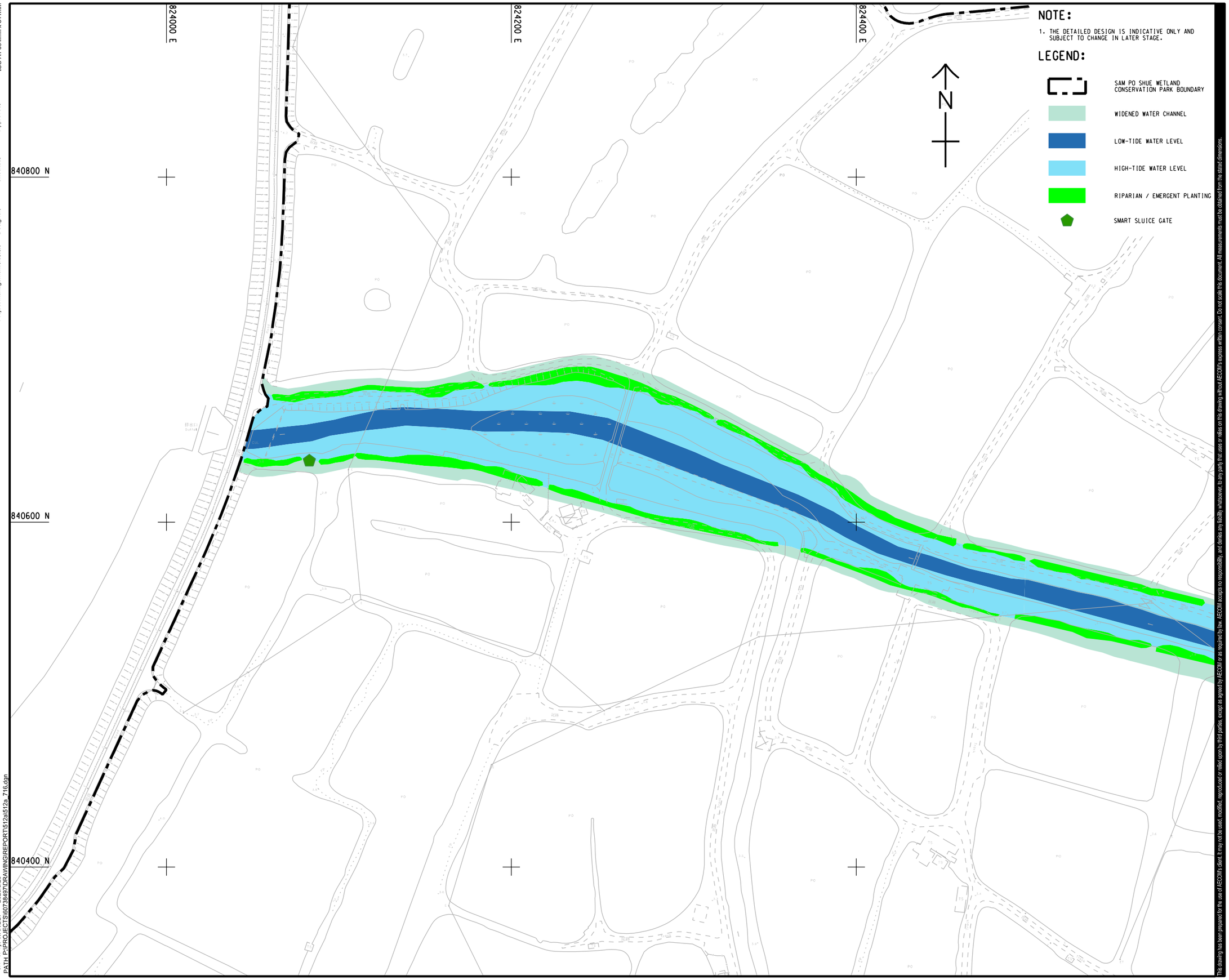
AGREEMENT NO. 協議編號
CE 25/2024 (CE)

SHEET TITLE
圖紙名稱

DETAILED DESIGN EXAMPLE OF
ENHANCED FRESHWATER
WETLAND (FRESHWATER MARSH)

SHEET NUMBER
圖紙編號

60738497/512a/AP3



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

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階段

SCALE 比例 — **DIMENSION UNIT** 尺寸單位

A3 1 : 2000

KEY PLAN
索引圖

PROJECT NO. 項目編號 — **AGREEMENT NO.** 協議編號

60738497 — CE 25/2024 (CE)

SHEET TITLE
圖紙名稱

DETAILED DESIGN EXAMPLE OF
ENHANCED FRESHWATER WETLAND
(WIDENED WATER CHANNEL)

SHEET NUMBER
圖紙編號

60738497/512a/AP4

Appendix F

Eco-friendly Aquaculture Demonstration Zone Detail

ISO A1 594mm x 841mm

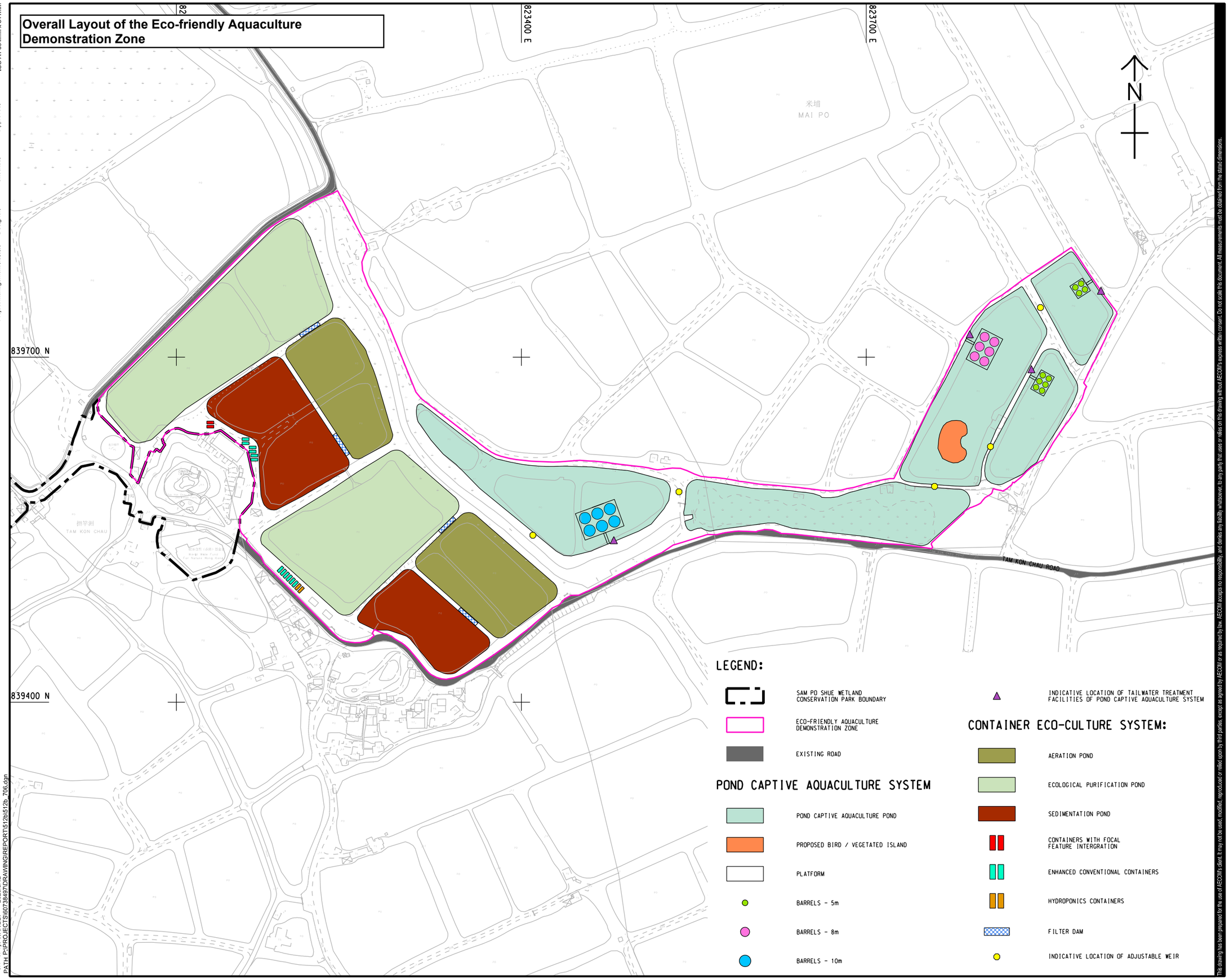
Approved:

Checked:

Designer:

Project Management Initials:

Overall Layout of the Eco-friendly Aquaculture Demonstration Zone



LEGEND:

- SAM PO SHUE WETLAND CONSERVATION PARK BOUNDARY
- ECO-FRIENDLY AQUACULTURE DEMONSTRATION ZONE
- EXISTING ROAD

POND CAPTIVE AQUACULTURE SYSTEM

- POND CAPTIVE AQUACULTURE POND
- PROPOSED BIRD / VEGETATED ISLAND
- PLATFORM
- BARRELS - 5m
- BARRELS - 8m
- BARRELS - 10m
- INDICATIVE LOCATION OF TAILWATER TREATMENT FACILITIES OF POND CAPTIVE AQUACULTURE SYSTEM

CONTAINER ECO-CULTURE SYSTEM:

- AERATION POND
- ECOLOGICAL PURIFICATION POND
- SEDIMENTATION POND
- CONTAINERS WITH FOCAL FEATURE INTERGRATION
- ENHANCED CONVENTIONAL CONTAINERS
- HYDROPONICS CONTAINERS
- FILTER DAM
- INDICATIVE LOCATION OF ADJUSTABLE WEIR

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ESTABLISHMENT OF
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STATUS 階段

SCALE 比例: A3 1 : 3000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60738497

AGREEMENT NO. 協議編號: CE 25/2024 (CE)

SHEET TITLE 圖紙名稱

LAYOUT PLAN FOR ECOLOGICALLY ENHANCED FISHPONDS ECO-FRIENDLY AQUACULTURE DEMONSTRATION ZONE

SHEET NUMBER 圖紙編號

60738497/512b/FIGURE 8.2

Appendix G

Recommended Plant Species for Habitat Creation

Appendix G Recommended Plant Species for Habitat Creation

Table G1 Native Species Recommended for Planting at Ecological Enhanced Fishpond

Vegetated Gei Wai	
True Mangrove and Mangrove Associates	
Acanthus ilicifolius	*Aegiceras corniculatum*
Avicennia marina	*Bruguiera gymnorhiza*
Lumnitzera racemosa	*Kandelia obovata*
Traditional / Low Intensity Management Area	
Vegetated Island	
Short Marsh	
Bacopa monnier	*Ceratopteris thalictroides*
Eleocharis spp.	*Equisetum debile*
Impatiens chinensis	*Persicaria barbata*
Persicaria glabra	*Rumex trisetifer*
Tall Marsh	
Cyperus malaccensis	*Ludwigia perennis*
Open Pond Bund	
Cynodon dactylon	*Eremochloa ophiuroides*
Paspalum paspaloides	*Zoysia matrella*
Floating Plants	
Euryale ferox	*Marsilea quadrifolia*
Nymphaea spp.	*Trapa natans*
Emergent Vegetation	
Alternanthera sessilis	*Coix lacryma-jobi*
Colocasia esculenta	*Hedychium coronarium*
Saururus chinensis	

Table F2 Native / South China Species Recommended for Planting at Enhanced Freshwater Wetland

Marsh Species	
Tall Marsh / Reedbed	
Phragmites australis	*Ludwigia perennis*
Floating Plants	
Euryale ferox	*Marsilea quadrifolia*
Nymphaea spp.	*Trapa natans*
Emergent Vegetation	
Alternanthera sessilis	*Coix lacryma-jobi*
Colocasia esculenta	*Hedychium coronarium*
Saururus chinensis	
Reedbed	
Phragmites australis	*Phragmites vallatorius*
Swamp Forest	
Glyptostrobus pensilis	
Brackish Species	
Acrostichum aureum	*Cyperus malaccensis*
Cyperus malaccensis var. brevifolius	*Phragmites australis*
Mangrove Species	
Avicennia marina	*Kandelia obovata*

Appendix H

Pond Drain Down Sequence

Appendix H Pond Drain Down Sequence

1.1.1 Introduction

1.1.1.1 Pond drain down management will be carried out during the dry season (i.e. November to March). 20% of EEF ponds will be drained at any time during the drain down period to maximise avifauna feeding opportunities. In general, the duration of drain-down for other ponds would last about three to five weeks for each cycle, equivalent to four to six cycles for each cluster throughout the dry season. Whereas draining down of *gei wai* would be during peak migration season (i.e. December to February) to harvest larger fish, with each *gei wai* being drained for one month. The drain-down period for both the pond eco-captive culture ponds and 3P2D System ponds at the Demonstration Zone shall coordinate with fish harvesting, and carried out upon fish harvested or when the containers and/or ponds are under maintenance.

1.1.1.2 Submersible electric pumps will be used to transfer pond water to adjacent ponds. To facilitate the water drain down management throughout dry season, a total of eight pond clusters are created. Each cluster will be further developed into three to four subgroups, ensuring the 20% pond drain down requirement is met at any time within the drain down period. Overview of pond clusters and drain down cycles and schedule are listed in **Table H-1** and **Table H-2** respectively. Drain down cycles and sequence for each subgroup are detailed in the following sections. Note that the suggested sequences act only as one indicative example of how the drain down can be planned, and can be modified based on site condition and management.

1.1.1.3 Considering the water in some of the ponds would be discharged during drain down to provide additional storage capacity for later drain down activities, sequence of subgroup should alternate every year (e.g. from 1→2→3→4 to 2→3→4→1 next year).

Table H-1 Overview of Pond Clusters and Drain Down Cycles

Cluster	Subgroup	Duration Per Cycle (Weeks)	Cycle
1a	4	5	4
1b	4	5	4
1c (operate individually under Phase 1)	3	3-4	6
2	4	5	4
3	4	5	4
4 + 1c (under full operation)	4	5	4
5 (*Gei wais*)	3	4	3
6 (Low Intensity Management Area)	4	5	4
Total	**-**	**-**	**33**

Table H-2 Overview of Pond Drain Down Schedule

Cluster	Sub-group	November	December	January	February	March
1a	1					
	2					
	3					
	4					
1b	1					
	2					
	3					
	4					
1c	1					
	2					
	3					
2	1					
	2					
	3					
	4					
3	1					
	2					
	3					
	4					
1c+4	1					
	2					
	3					
	4					
5	1					
	2					
	3					
6	1					
	2					
	3					
	4					

1.1.2 Cluster 1a

1.1.2.1 Cluster 1a consist of seven ponds, spanning a total of 7.8 ha. To meet the 20% drain down requirement, at least 1.6 ha of ponds must be drained at any time during the drain down period. Four subgroups have been developed with reference to the requirement, with each subgroup of ponds being drained for six weeks. Pond number and drain down schedule for Cluster 1a are presented in **Exhibit H-1** and **Table H-3** respectively.

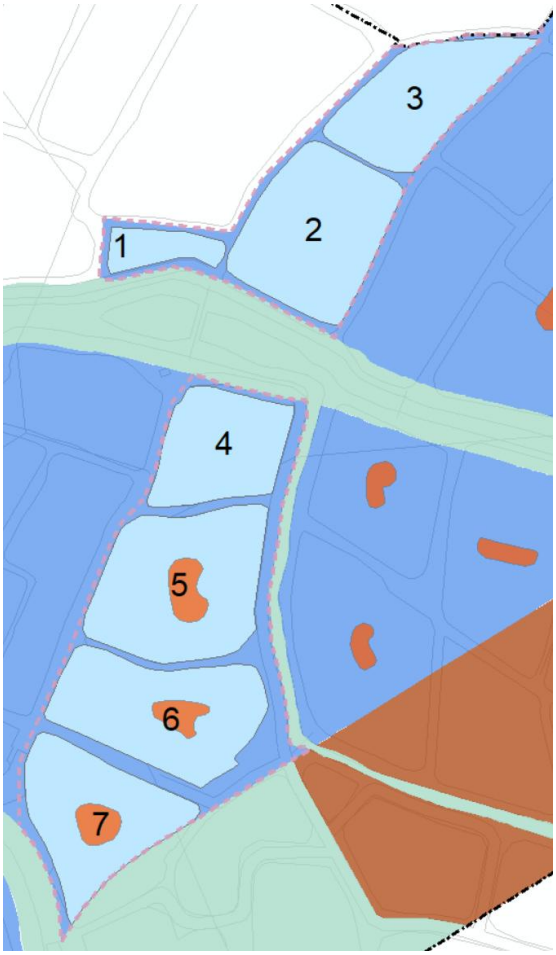


Exhibit H-1 Pond Number for Cluster 1a

Table H-3 Drain Down Schedule for Cluster 1a

	Cycle			
Pond Number	**1**	**2**	**3**	**4**
1	-	-	**Drained down (move to 2)**	Fill from 3
2	**Drained down (discharged)**	**Drained down**	Fill from 1	Fill from 3
3	-	-	-	**Drained down (move to 1&2)**
4	**Drained down (discharged)**	Fill from 5	-	-
5	-	**Drained down (move to 4)**	Fill from 6	-
6	-	-	**Drained down (move to 5)**	Fill from 7
7	-	-	-	**Drained down (move to 6)**

1.1.3 Cluster 1b

1.1.3.1 Cluster 1b consist of 12 ponds, spanning a total of 24.6 ha. To meet the 20% drain down requirement, at least 4.9 ha of ponds must be drained at any time during the drain down period. Four subgroups have been developed with reference to the requirement, with each subgroup of ponds being drained for six weeks. Pond number and drain down schedule for Cluster 1b are presented in **Exhibit H-2** and **Table H-4** respectively.

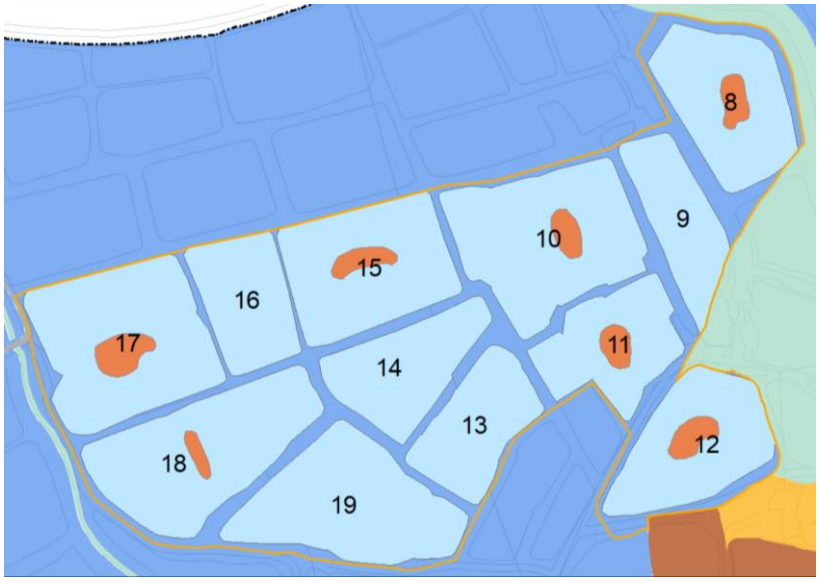


Exhibit H-2 Pond Number for Cluster 1b

Table H-4 Drain Down Schedule for Cluster 1b

	Cycle			
Pond Number	**1**	**2**	**3**	**4**
8	**Drained down (discharged)**	Fill from 9	-	-
9	-	**Drained down (move to 8)**	Fill from 10	-
10	-	-	**Drained down (move to 9)**	Fill from 15
11	-	**Drained down (move to 12)**	Fill from 13	-
12	**Drained down (discharged)**	Fill from 11	-	-
13	-	-	**Drained down (move to 11)**	Fill from 14
14	-	-	-	**Drained down (move to 13)**
15	-	-	-	**Drained down (move to 10)**
16	-	-	**Drained down (move to 18)**	Fill from 17
17	-	-	-	**Drained down (move to 16)**
18	-	**Drained down (move to 19)**	Fill from 16	-
19	**Drained down (discharged)**	Fill from 18	-	-

1.1.4 Cluster 1c

1.1.4.1 Cluster 1c consist of 4 ponds, spanning a total of 6.8 ha. To meet the 20% drain down requirement, at least 1.4 ha of ponds must be drained at any time during the drain down period. Three subgroups have been developed with reference to the requirement, with each subgroup of ponds being drained for four weeks. Each subgroup would be drained twice during one dry season to ensure 20% of ponds are drained down any time within the period. In particular, pond 20 will be drained for two consecutive cycles to reduce repetitive works. Pond number and drain down schedule for Cluster 1c are presented in **Exhibit H-3** and **Table H-5** respectively. Note that when the SPS WCP fully operates, Cluster 1c would be incorporated with Cluster 4 and managed together (**Section 1.1.7.1** refers).

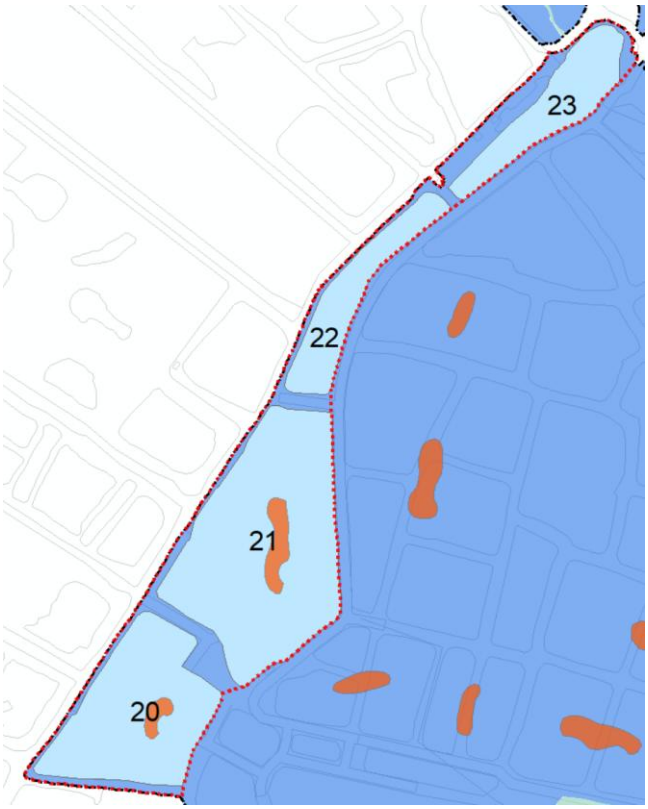


Exhibit H-3 Pond Number for Cluster 1c

Table H-5 Drain Down Schedule for Cluster 1c

	Cycle					
Pond Number	**1**	**2**	**3**	**4**	**5**	**6**
20	**-**	-	**Drained down (move to 21)**	**Drained down**	Fill from 21	**-**
21	**-**	**Drained down (move to 22&23)**	Fill from 20	**-**	**Drained down (move to 20)**	Fill from 20
22	**Drained down (discharged)**	Fill from 21	**-**	**-**	-	**Drained Down (move to 21)**
23	**Drained down (discharged)**	Fill from 21	-	**-**	-	**Drained Down (move to 21)**

1.1.5 Cluster 2

1.1.5.1 Cluster 2 consist of 8 ponds, spanning a total of 11.8 ha. To meet the 20% drain down requirement, at least 2.4 ha of ponds must be drained at any time during the drain down period. Four subgroups have been developed with reference to the requirement, with each subgroup of ponds being drained for six weeks. Pond number and drain down schedule for Cluster 2 are presented in **Exhibit H-4** and **Table H-6** respectively.

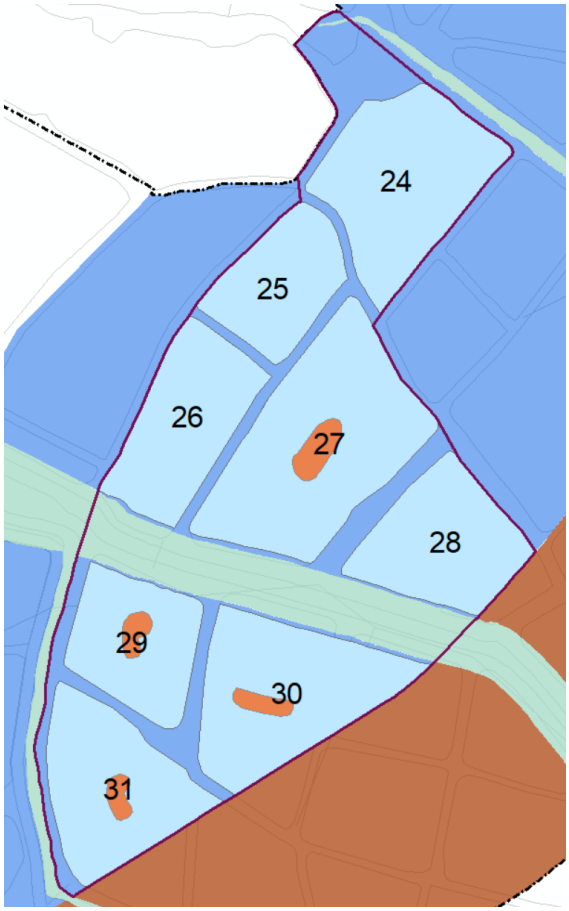


Exhibit H-4 Pond Number for Cluster 2

Table H-6 Drain Down Schedule for Cluster 2

	Cycle			
Pond Number	**1**	**2**	**3**	**4**
24	-	-	-	**Drained down (move to 27)**
25	-	**Drained down (move to 28)**	Fill from 27	-
26	-	-	-	**Drained down (move to 27)**
27	-	-	**Drained down (move to 25)**	Fill from 24&26
28	**Drained down (discharged)**	Fill from 25	-	-
29	-	-	-	**Drained down (move to 31)**
30	**Drained down (discharged)**	Fill from 31	-	-
31	-	**Drained down (move to 30)**	**Drained down**	Fill from 29

1.1.6 Cluster 3

1.1.6.1 Cluster 3 consist of 15 ponds, spanning a total of 27.0 ha. To meet the 20% drain down requirement, at least 5.4 ha of ponds must be drained at any time during the drain down period. Four subgroups have been developed with reference to the requirement, with each subgroup of ponds being drained for six weeks. Pond number and drain down schedule for Cluster 3 are presented in **Exhibit H-5** and **Table H-7** respectively.

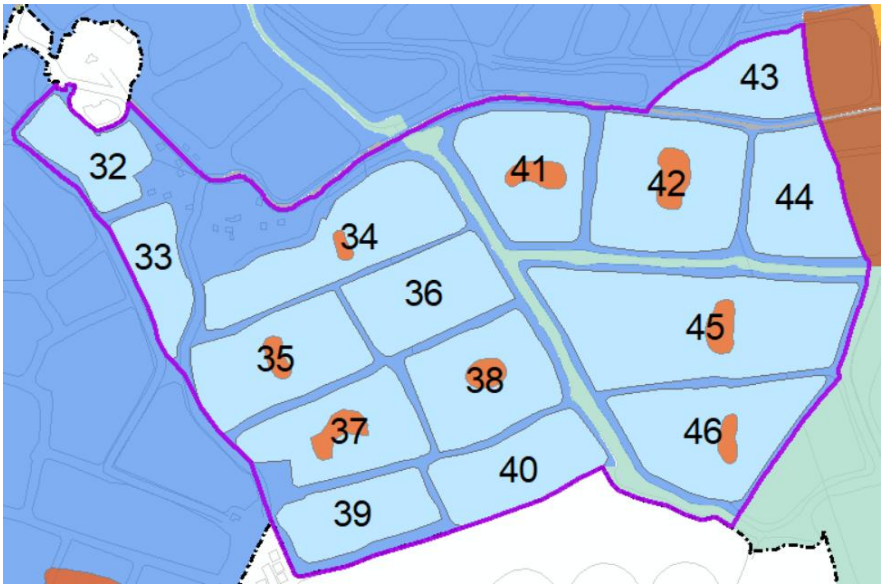


Exhibit H-5 Pond Number for Cluster 3

Table H-7 Drain Down Schedule for Cluster 3

	Cycle			
Pond Number	**1**	**2**	**3**	**4**
32	**Drained down (discharged)**	Fill from 33	-	-
33	-	**Drained down (move to 32)**	**Drained down**	Fill from 34
34	-	-	-	**Drained down (move to 35&33)**
35	-	**Drained down (move to 36)**	**Drained down**	Fill from 34
36	**Drained down (discharged)**	Fill from 35	-	-
37	-	-	-	**Drained down (move to 39)**
38	**Drained down (discharged)**	Fill from 40	-	-
39	-	-	**Drained down (move to 40)**	Fill from 37
40	-	**Drained down (move to 38)**	Fill from 39	-
41	**Drained down (discharged)**	Fill from 41	-	-
42	-	**Drained down (move to 41)**	Fill from 44	-
43	-	-	-	**Drained down (move to 44)**
44	-	-	**Drained down (move to 42)**	Fill from 33
45	-	-	**Drained down (discharged)**	Fill from 46
46	-	-	-	**Drained down (move to 45)**

1.1.7 Cluster 1c+4

1.1.7.1 When the SPS WCP fully operates, Cluster 1c in phase 1 would be incorporated with Cluster 4 and managed together. Cluster 1c+4 consist of 22 ponds, spanning a total of 36.5 ha. To meet the 20% drain down requirement, at least 7.3 ha of ponds must be drained at any time during the drain down period. Four subgroups have been developed with reference to the requirement, with each subgroup of ponds being drained for six weeks. Pond number and drain down schedule for Cluster 1c+4 are presented in **Exhibit H-6** and **Table H-8** respectively.

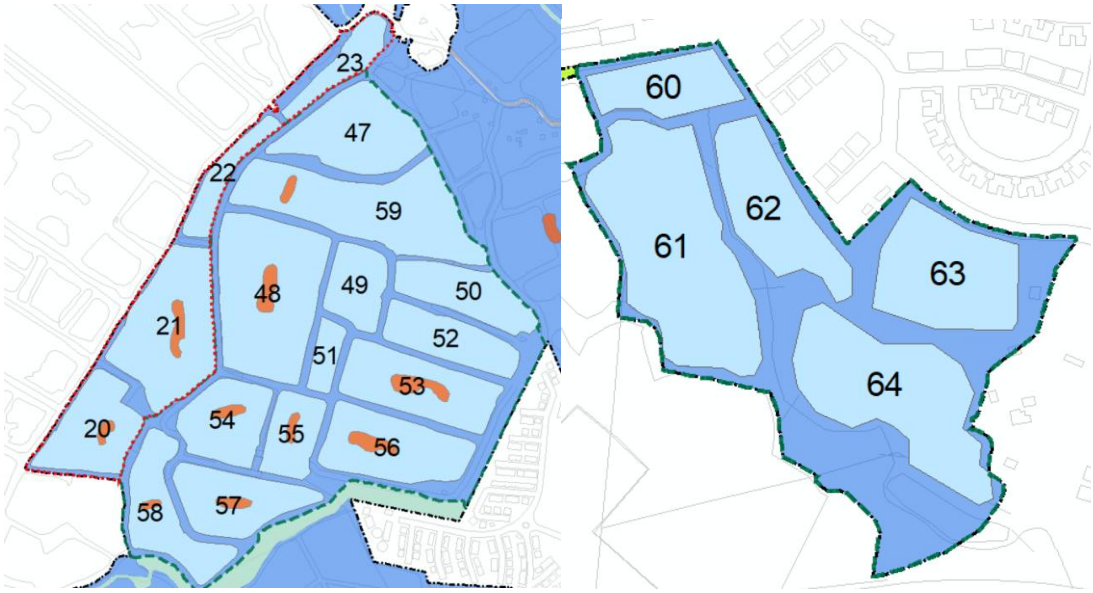


Exhibit H-6 Pond Number for Cluster 1c+4

Table H-8 Drain Down Schedule for Cluster 1c and 4

	Cycle			
Pond Number	**1**	**2**	**3**	**4**
20	-	**Drained down (move to 58)**	Fill from 21	-
21	-	-	**Drained down (move to 20)**	Fill from 48
22	**Drained down (discharged)**	Fill from 47	-	-
23	**Drained down (discharged)**	Fill from 47	-	-
47	-	**Drained down (move to 22&23)**	Fill from 59	-
48	-	-	-	**Drained down (move to 21)**
49	-	-	-	**Drained down (move to 59)**
50	-	-	-	**Drained down (move to 52)**
51	-	-	-	**Drained down (move to 55)**
52	-	-	**Drained down (move to 53)**	Fill from 50
53	-	**Drained down (move to 56)**	Fill from 52	-
54	-	**Drained down (move to 57)**	Fill from 55	-
55	-	-	**Drained down (move to 54)**	Fill from 51

56	**Drained down (discharged)**	Fill from 53	-	-
57	**Drained down (discharged)**	Fill from 54	-	-
58	**Drained down (discharged)**	Fill from 20	-	-
59	-	-	**Drained down (move to 47)**	Fill from 49
60	**Drained down (discharged)**	Fill from 61	-	-
61	-	**Drained down (move to 60&62)**	Fill from 64	-
62	**Drained down (discharged)**	Fill from 61	-	-
63	-	-	-	**Drained down (move to 64)**
64	-	-	**Drained down (move to 61)**	Fill from 63

1.1.8 Cluster 5 (*gei wais*)

1.1.8.1 Cluster 5 consist of 4 *gei wais* (both vegetated and non-vegetated), spanning a total of 55.0 ha. As mentioned, draining down of *gei wai* would be during peak migration season (i.e. December to February) to harvest larger fish. Therefore, draining down of *gei wai* would not count against the 20% drain down requirement, but instead consider as providing additional feeding opportunities. Both vegetation and unvegetated *gei wai* will be drained in turn, each for one month. To facilitate management, the 4 *gei wais* were also developed into three subgroups, with each subgroup being drained together for one month. Pond number and drain down schedule for Cluster 5 are presented in **Exhibit G-7** and **Table G-9** respectively.

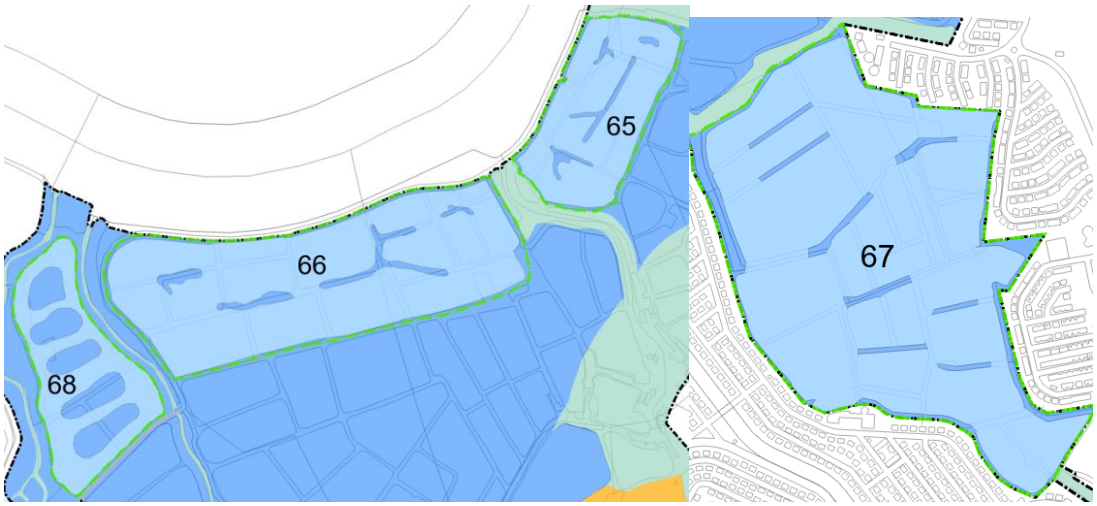


Exhibit H-7 Pond Number for Cluster 5

Table H-9 Drain Down Schedule for Cluster 5

Pond Number	December	January	February
65	**Drained down (discharged)**	-	**-**
66	**-**	**Drained down (discharged)**	-
67	**-**	**-**	**Drained down (discharged)**
68	**Drained down (discharged)**	-	**-**

1.1.9 Cluster 6

1.1.9.1 Cluster 6 consist of 5 ponds within the low intensity management area, spanning a total of 20.0 ha. To meet the 20% drain down requirement, at least 4.0 ha of ponds must be drained at any time during the drain down period. Four subgroups have been developed with reference to the requirement, with each subgroup of ponds being drained for six weeks. Pond number and drain down schedule for Cluster 6 are presented in **Exhibit G-8** and **Table G-10** respectively.

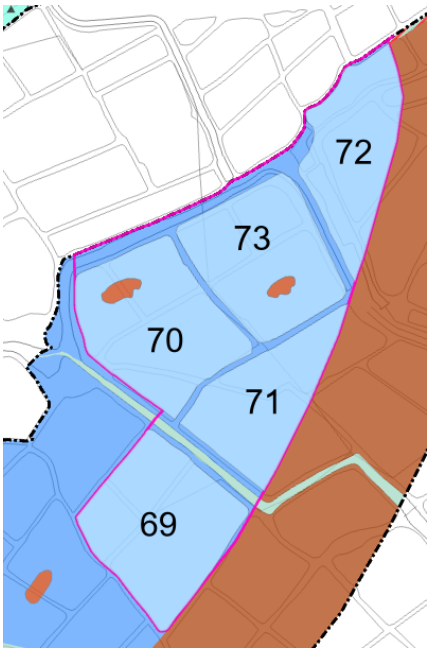


Exhibit H-8 Pond Number for Cluster 6

Table H-10 Drain Down Schedule for Cluster 6

	Cycle			
Pond Number	**1**	**2**	**3**	**4**
69	**Drained down (discharged)**	Fill from 70	-	**-**
70	-	**Drained down (move to 69)**	Fill from 73	**-**
71	-	-	-	**Drained down (move to 73)**
72	-	-	-	**Drained down (move to 73)**
73	-	-	**Drained down (move to 70)**	Fill from 71 & 72