

Agreement No. CE 13/2014 (CE)

Development of Kwu Tung North and Fanling North New Development Areas

Phase 1 – Design and Construction



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1 INTRODUCTION

1.1 Background

- 1.1.1 The Territorial Development Strategy Review in 1990s first identified the potential for strategic growth in the North East New Territories (NENT). The Planning and Development Study on NENT (NENT Study) was commissioned in 1998 and completed in 2003 under Agreement No. CE 64/96. This Study identified areas at Kwu Tung North (KTN), Fanling North (FLN) and Ping Che/Ta Kwu Ling (PC/TKL) as suitable for the development of New Development Areas (NDAs), and confirmed the feasibility of development based on the findings and recommendations from various technical assessments
- 1.1.2 The NENT NDAs Study under Agreement No. CE 61/2007(CE) was commissioned jointly by Civil Engineering and Development Department (CEDD) and Planning Department (PlanD), and was substantially completed in December 2013. Various planning, engineering and environmental studies were completed to formulate a revised proposal for the NENT NDAs based on the NENT Study, confirm the feasibility of implementing the revised proposal, and formulate implementation strategies and programme for the NDAs. A planning and development framework for the KTN, FLN and PC/TKL NDAs was also established to meet the long-term demand for housing (especially public housing) and employment. Development of the NENT NDAs could also cater for various land use needs arising from social and economic developments in Hong Kong.
- 1.1.3 The KTN and FLN NDAs would be developed as extensions to the Fanling/Sheung Shui New Town to form the Fanling/Sheung Shui/Kwu Tung (FL/SS/KT) New Town, which will have a total population of about 460,000 upon full development. The FL/SS/KT New Town will be an integrated community with wide-ranging commercial, retail, community, recreational and cultural facilities as well as employment opportunities serving the larger population.
- 1.1.4 Environmental Impact Assessment (EIA) and various technical assessments such as traffic and transport, drainage, sewerage, water supply, public utilities, geotechnical, site formation, air ventilation, sustainability, etc were carried out to support the proposed planning and development framework for the KTN and FLN NDAs. Infrastructure, government, institution, community and recreation facilities were proposed to meet the community needs.
- 1.1.5 On 16 June 2008, CEDD and PlanD commissioned Ove Arup & Partners Hong Kong Limited (Arup) as the consultant for the EIA report for the NENT NDA (the EIA Report). Findings from the EIA revealed that Long Valley is the area with the highest ecological value in the Study Area of the NDA as well as a site of ecological significance in Hong Kong due to it being the largest remaining contiguous area managed for the production of wet agricultural crops. The presence of wet agriculture in combination with other habitats supports a diverse group of fauna, especially freshwater-associated wetland birds. To safeguard the conservation value of Long Valley, it was proposed the highest ecologically valuable wetland area (37.17ha approx.) in southeast of the Sheung Yue River and in southwest of the Shek Sheung River for designation as the Long Valley Nature Park (LVNP). However, after reviewing the details of the sizes and extents of land lots at LVNP for the future land resumption process, the feasible size of LVNP would be 37.30 ha. The location of the LVNP is shown in **Figure 1.1.1**. The ecological enhancement of this area would also serve to mitigate ecological impacts resulting from the wider NENT NDA development.

- 1.1.6 The Advisory Council on the Environment (ACE) endorsed the EIA report with conditions and recommendations and the EIA report was approved by the Director of Environmental Protection (DEP) on 18 October 2013 and the Environmental Permits (EPs) were issued by the DEP on 21 November 2013. Under the EP for KTN NDA Road D1 to D5 (EP- 68/2013/A), the permit holder is required to submit a Habitat Creation & Management Plan (HCMP) for LVNP including the designation, design and implementation aspects for the establishment of LVNP.
- 1.1.7 Based on the recommendations from the EIA, the Outline Development Plan (ODP) of the NDA has left the LVNP undeveloped to maintain its rural characteristic. Amendments have also been incorporated into the statutory land use of the area, the new KTN draft Outline Zoning Plan (OZP) No. S/NE-KTN/8 has been published by the PlanD. Long Valley Nature Park has been proposed to be zoned as “Other Specified Uses (Nature Park)” . This zone is intended primarily for the development of a Nature Park to protect and enhance existing wetland habitats for the benefit of the local ecology and promotion of nature conservation and education. On 20 December 2014, the draft OZP was published and made available for public inspection. The Town Planning Board (TPB) is scheduled to approve the plan tentatively in early 2015. The segment of this plan focusing on Long Valley is shown in Figure 1.2.1.

1.2 Development of Kwu Tung North and Fanling North New Development Areas, Phase 1 – Design and Construction

- 1.2.1 AECOM Asia Co. Ltd. was commissioned by CEDD to undertake Agreement No. CE 13/2014(CE) – Development of Kwu Tung North and Fanling North New Development Areas,Phase 1 – Design and Construction (the Project). The Project commenced on 7 November 2014 and is scheduled to be completed November 2024.
- 1.2.2 The scope of this Project comprises various components, principally relating to advance works for site formation, engineering infrastructure, soil remediation and landscaping works for the KTN and FLN NDA’s and associated developments. The scope also requires implementation of various environmental monitoring and mitigation measures required for the advanced works. These measures require the development of the LVNP including wetland enhancement works and a visitor centre.
- 1.2.3 Clause 6.3.8 of the Project Brief identifies the specific requirements of the LVNP under this project as follows:
- (a) To safeguard the conservation value of Long Valley, it is proposed to designate the area of highest ecological value, the largely wetland area south and east of the Sheung Yue River and south and west of the Shek Sheung River, as the Long Valley nature park. The Consultants shall design the nature park, comprising an indoor visitor centre, an outdoor park and other facilities, taking into account the needs of various stakeholders including those related to nature conservation, farming, etc. The nature park shall conserve and enhance the ecologically important environment which supports a diverse bird community, and compensate for the wetland loss due to the NDAs development. Two green groups, the Conservancy Association (CA) and the Hong Kong Bird Watching Society (HKBWS), are running Management Agreements (MA) under the New Nature Conservation Policy (NNCP) with participation by farmers with focus on ecological importance.

- (b) To engage a sub-consultant with ample ecological experience and devise a detailed habitat creation and management plan (HCMP) for the nature park in consultation with AFCD and relevant parties, conduct the pre-construction baseline data collection and evaluation and the HCMP review, and design and ensure the implementation of all mitigation measures and monitoring prior to and/or after handing over of the nature park to the maintenance and operation authority.
- (c) To ensure the visitor centre of the nature park shall include any atrium(s), exhibition galleries, audio visual theatre(s), souvenir shop(s), cafe(s), meeting room(s), activity room(s), resource centre(s), ancillary area(s), area for fire emergency exit and circulation, and/or other area(s) in accordance with the requirements of the stakeholders.
- (d) To ensure that in addition to the mitigation measures stipulated in the approved EIA Report, the outdoor park and other facilities of the nature park shall include any footpath(s) and footbridge(s), viewing facilities, exhibition pond(s), external display area(s), store(s), workshop(s), planting, plant nursery, coach/car parking spaces, and/or other facilities in accordance with the requirements of the stakeholders.
- (e) To ensure the design and construction of the nature park shall comply with all requirements and provisions stipulated in Chapter 13 and other parts of the approved EIA Report.
- (f) To determine and/or adjust the boundaries and levels of the nature park and the location of visitor centre to suit the planning and design of the other parts of the Works and the interfaces with other projects in the vicinity, such as the cycle track project, when necessary.
- (g) To ensure mitigation measures and monitoring to minimise the Construction Phase impacts are implemented in accordance with the approved EIA Reports.
- (h) To consult the stakeholders, including but not limited to the following parties, and conduct necessary liaison and coordination meetings with the stakeholders for any views, comments and information that are relevant and useful for the design and implementation of the nature park:
 - (i) the relevant green groups;
 - (ii) local farmers, residents and village representatives; and
 - (iii) the future management, operation and maintenance parties for the nature park, including AFCD.
- (i) To take into account the pertaining findings and recommendations of the value management workshops conducted under the NENT NDAs Study into the design, construction and handing over of the nature park.

1.3 Objectives of the Habitat Creation and Management Plan

- 1.3.1 The overall objective of this HCMP is to provide a framework and specifications for development and management of the LVNP. The HCMP guide development to maintain and enhance the 37ha of low-lying wetland habitats, so that it continues to support the full range of functioning ecological processes, maintain its existing crop production, landscape value and cultural significance as well as providing an educational resource for the community. It is intended that the conservation value of Long Valley would be safeguarded in the long term with the designation of the LVNP. Achievement of these objectives will require careful consideration of the various requirements of the Project Brief, as described in Section 1.2.3.
- 1.3.2 Given the future uncertainties of ecological and environmental conditions (locally, regionally and globally), a strategic and adaptive management approach allows for flexibility to accommodate changing conditions in the future. The short-term and long-term strategic objectives of LVNP differ slightly from each other with regards to the changes undertaken in the surrounding landscape (e.g., construction and operation of the NENT NDA), changes to local policies (e.g., implementation of Hong Kong Biodiversity Strategy and Action Plan [BSAP]), and regional/global ecological conditions. Nonetheless, these strategic objectives will remain in-line with the overall objective of LVNP as stated in Section 1.3.1 above.

Short-term Objective

- 1.3.3 Upon the establishment of LVNP, the primary goal of the first five years is to ensure that no adverse ecological impacts from the construction of the NDA would arise. Management measures to enhance the conditions of the Nature Park with response to the construction works would be adapted.

Long-term Objective

- 1.3.4 Over a longer time-frame, the optimal management practices at LVNP would have been identified and implemented. Lessons learned from management practices would have provided enough information so that management solutions are available to address various scenarios (i.e. extreme weather conditions, water shortages, pest problem, etc.). Opportunities to explore new management techniques for habitat enhancement could be undertaken. The habitats at LVNP would continue to provide suitable habitats for target species. Innovative education programs will continue to promote environmental awareness and a better understanding of the cultural heritage and landscape value of Long Valley.

1.4 Structure of this Report

- 1.4.1 The report is divided into eleven sections as follows:
- Chapter 1: Summarizes background information and the objectives of the HCMP as stipulated in the EIA, EP and Project brief
 - Chapter 2: Describes the general site information from Long Valley
 - Chapter 3: Details environmental conditions of the site

- Chapter 4: Presents the current management practices at Long Valley for nature conservation
- Chapter 5: Presents an evaluation of the key characteristics and important features of the site
- Chapter 6: Outlines general design considerations for the LVNP
- Chapter 7: Describes detailed management objectives
- Chapter 8: Presents management planning and measures to be undertaken
- Chapter 9: Presents the monitoring and reporting requirements for effective management of the LVNP
- Chapter 10: Presents the LVNP implementation plan
- Chapter 11: Details reporting requirements

2 GENERAL SITE INFORMATION

2.1 Location

2.1.1 The proposed LVNP is located within the KTN NDA, approximately 1km west of Sheung Shui (Figure 1.1.1). The area comprises just around 37ha of agricultural land around the confluence of the Sheung Yue (to the northwest) and Shek Sheung (to the east) Rivers. It extends from the confluence of these two rivers south to Yin Kong Village.

2.2 Access

2.2.1 The proposed LVNP is bounded by an access road with limited vehicular traffic on northern and eastern edge. The northern edge is a vegetated slope, with five access points. All entrance points are paved with concrete. Conditions are fair to poor. Only two of these paths extend into core area of LVNP. Accessibility is generally medium (**Figure 2.1.1**)

2.2.2 The eastern edge is bounded by a cycle track (which will connect North West NT with North East NT – Tuen Mun to Sheung Shui section) and a drainage maintenance access. Majority of the eastern edge is currently fenced off. Entrance point from eastern edge into site of LVNP is paved with concrete to a short extent. Condition ranges from fair to poor. Accessibility is poor (**Figure 2.1.2**).

2.2.3 The southern edge comprises a variety of conditions, ranging from inaccessible slope or fence to highly permeable edge lying between agricultural fields. Boundary is defined by concrete path in several instances (**Figure 2.1.5**). A peripheral concrete path runs in and out of the LVNP boundary on the southern edge. Majority of this path is of good condition, except the section closer to the eastern edge. This peripheral path is accessible from Tin Kwong Po at several points but these paths do not connect into the agricultural fields. Only one proper path extends into the LVNP area. It is a concrete path of good condition which stops shortly after entering LVNP boundary. (**Figure 2.1.3**) It continues as a well-defined earth path inside the proposed LVNP. Accessibility along the southern edge is good but accessibility in and out of the fields is medium to poor

2.2.4 The western edge will be bounded by a planned road in KTN NDA. No access point will be provided along the western edge. However, there is an existing well-defined concrete path close to the western edge, leading from Yin Kong through the site of LVNP to its northern edge. Path condition and accessibility are very good, except a short slightly deteriorated section at the northern entrance point. (**Figure 2.1.4**)

2.2.5 Currently, there is no formal access control at the proposed LVNP area. The majority of the area is open to the public, except for some squatter houses that are fenced off. The majority of visitors enter the proposed LVNP area from one of two points: through Yin Kong village in the south, or across Sheung Yue River from Ho Sheung Heung village in the northeast (**Figures 2.1.1-2.1.5**). Mini-buses are available from Sheung Shui and/or Yuen Long to access the area. These two locations also have limited parking space for drivers, with more parking spaces at Ho Sheung Heung.

2.2.6 Inside the proposed LVNP there is a network of concrete footpaths and earthen field bunds that can be used to access most parts of the site. Since the majority of the visitors are bird watchers or photographers, there are some routes that are more frequently visited (especially around wet agricultural land and ponds in the centre of the area). There have been previous records of visitors straying from the paths and bunds into agricultural fields without consent from the land owners, resulting in damage to the crops and causing conflicts with farmers.

2.3 Land Tenure

- 2.3.1 Land ownership at Long Valley is complicated and dispersed. The indigenous clans at the area (including Hau, Kan, Chan, etc.) owned more than half of lands in Long Valley in 2011, whilst private companies and joint ownership by both clan and companies also own other lands (Chick, 2011). Tenant farmers renting from land owners for crop production are also common in Long Valley.
- 2.3.2 To determine the current ownership of the land within the LVNP area, a land freezing survey will be conducted as part of the land resumption process. Land freezing survey is a standard administrative process in development projects requiring land resumption to determine the ownership of the private land. Ex-gratia allowance for crops under existing practice would be granted to tenant farmers.

2.4 Development Context

Current Conditions

- 2.4.1 The proposed LVNP is located between the eastern bank of Sheung Yue River and western bank of Shek Sheung River. Across Shek Sheung River to the east of the proposed LVNP was Shek Wu Hui Sewage Treatment Works and Sheung Shui Slaughter House; further east of Shek Sheung River were mainly residential area, commercial buildings and other local villages. West of Sheung Yue River mainly comprised of Ho Sheung Heung Village and associated agricultural area; further west of Sheung Yue River were mainly clusters of open storage, recreational/public facilities (e.g. school) or local villages and home for the aged. Since the proposed LVNP is located within the confluence of Sheung Yue River and Shek Sheung River, disturbance from these areas is buffered by the rivers themselves as well as associated paths and tree planting.
- 2.4.2 To the south of the proposed LVNP was Yin Kong Village and agricultural area. There is an open storage in the southwest. Disturbance from Fanling Highway in the south was shielded by these village housings, agricultural fields and the open storage.
- 2.4.3 Agricultural area and local village houses are the major land use types next to the proposed LVNP. No high rise buildings are present at these two land use types, and low density of human activities would occur in these land use types. Thus, the proposed LVNP is relatively insulated from these two surrounding land use types. The open storage may be the most disturbing land use type adjacent to the proposed LVNP. It is located next to the southwestern corner of the proposed LVNP, next to Fanling Highway, and was far from the core area of the proposed LVNP with higher biodiversity.

Future Land Use

- 2.4.4 The ODPs for the KTN and FLN NDAs are departmental plans formulated on the basis of the final proposals of the NENT NDAs Study. They serve to provide a comprehensive planning framework to guide the future development of the KTN and FLN NDAs in an integrated and coordinated manner, by giving a comprehensive picture of the proposed land use patterns and the provisions of major infrastructure within the area. They provide the basis for the preparation of the OZPs and more detailed layout plans for the area, the planning for Government works, site reservation for open space, Government, Institute or Community (G/IC) facilities, transport and other infrastructures, public and private housing, commercial and other development proposals, and the detailed design and implementation of the engineering works. The ODPs (namely Nos. D/KTN/1 and D/FLN/1 for KTN and FLN NDAs respectively) were adopted by the Secretary for Development on 20 December 2013.

- 2.4.5 On the basis of the ODPs, the statutory OZPs for the KTN and FLN NDAs were prepared and gazetted on 20 December 2013. The OZPs indicate the broad land use zones and major road network for the NDAs so that development and redevelopment of land within the area can be put under statutory planning control. The draft OZPs for KTN and FLN NDAs (namely Nos. S/KTN/1 and S/FLN/1 respectively) can be viewed at the link: <http://www.ozp.tpb.gov.hk/default.aspx>. The OZP for the LVNP and adjacent areas is shown in **Figure 1.2.1**.
- 2.4.6 The areas of highest ecological value in the Long Valley areas have been zoned as “Other Use” zoning (‘OU’) annotated “Nature Park” in the OZP. To the immediate southeast of LVNP, the area has been zoned as “Agriculture” and “Green Belt”; the area north of LVNP across Sheung Yue River at the upper reach has been zoned as “Agriculture (1)” and “Open Space”. Land use in the large area zoned under “Agriculture”, “Agriculture (1)”, “Green Belt” and “Open Space” would remain unchanged, and thus maintaining a semi-natural landscape and implying less disturbance in comparison to other land use types in the ambient environment. The “Agriculture (1)” zone north of LVNP would act as a buffer for the proposed LVNP and shield disturbance from surrounding development.
- 2.4.7 The other smaller areas comprising wet agriculture, plantation and orchard habitats southwest and south to the proposed LVNP has been zoned as “Other specified Uses (Amenity)” zone, “Comprehensive Development Area”, “Open Space” zone, and “Village Type Development”.
- 2.4.8 Ho Sheung Heung is located on the other side of Sheung Yue River and has been zoned as “Village Type Development” with some parts as “Government, Institute or Community”. The Fung Shui Woodland west of Ho Sheung Heung has been zoned as “Green Belt”. Little development is expected in these zonings. Southwest of Ho Sheung Heung and the “Green Belt”, “Residential (Group B)” zone has been provided, where development density is expected to be higher than the other areas described above.
- 2.4.9 The majority of remaining lowland natural/semi-natural habitats in KTN NDA and FLN NDA would be developed for residential purpose and associated infrastructure and facilities. Disturbance from these developed areas could impact LVNP and the adjacent agricultural area. Moreover, as the LVNP and the contiguous agricultural area would become closer to residents and the transportation may be more convenient, it should be expected that more visitors would enter the area.

3 ENVIRONMENTAL INFORMATION

3.1 Physical

Climate

- 3.1.1 Hong Kong has a sub-tropical monsoonal climate. The temperature ranges from 12°C to 32°C, with higher temperatures occurring from mid-March through until November (HKO, 2015). Rainfall occurs mainly from April to September. The mean annual rainfall at northern region of Hong Kong ranges from 1,600-2,000mm, which is comparatively lower than the rest of the territory, as the region is situated in the rain shadow of the Tai Mo Shan which shields the warm moist air from the ocean, thus keeping the area behind the mountain with less rainfall. Heavy rain associated with tropical cyclones may last for a few days.

Geology

- 3.1.2 The solid geology around Long Valley mainly consists of two types of bedrock: the upland sedimentary in the north and volcanic bedrock in the west (CEDD, 2013a). From boreholes investigation within Long Valley, different ground layers were found. The topmost soil layer comprised fill, pond deposits and estuarine deposits. Beneath the soil layer, two layers of alluvium were recorded, comprising of clay/silt deposits and sand/gravel deposits respectively. Decomposed volcanic tuff was recorded beneath the alluvial layers (KCRC, 2001). The main aquifer (water-bearing permeable layer) was found at the alluvial sand/gravel layer.
- 3.1.3 Two sets of fault lines were also observed in Long Valley, one going from southeast to northwest while another one going from northeast to southwest. The south side of Long Valley is raised slightly higher than the north side (Chick, 2011).

Geomorphology

- 3.1.4 Long Valley is situated on a former floodplain between Sheung Yue River and Shek Sheung River, contributing a flat geomorphology. Main habitats in Long Valley include active and inactive agricultural fields with ponds and marshes, which are also flat in nature. The limited sizes of village areas, developed areas and plantations in Long Valley contribute to a slightly rugged geomorphology, but flat land still dominates the area.
- 3.1.5 Both rivers along Long Valley (Sheung Yue River and Shek Sheung River) experienced minor alteration by villagers for irrigation before 1945. During a major flood prevention programme by the Government in the 1980s, the rivers were subjected to more extensive alteration, which the major works beginning in 1994 (refer to **Figure 3.1.1**). Shek Sheung River was straightened, widened and lined with concrete, while training works were also performed on Sheung Yue River, coupled with designation of mitigation wetlands along Sheung Yue River. Farming areas along both sides of the rivers have been reduced due to the works, along with altered hydrology and aquatic ecology (Chick, 2011). Changes in geomorphology around Long Valley were also contributed by lining of roads, urban development and expansion, and abandoning of villages and agricultural fields in recent years (Chick, 2011).

Soils/Substrates

- 3.1.6 Long Valley is located on a former floodplain of Sheung Yue River and Shek Sheung River which contribute to a flat and low-lying land with fertile soil (CEDD, 2013a). Soil at Long Valley comprises various types of substrata, including fill (fine to coarse gravel and cobble-sized concrete), pond deposits (sandy silt and clay) and estuarine deposits (clayey silt). Thickness of these substrata ranges from 0 to 3.7 m thick, occupying the uppermost layer of the ground. Slightly thicker layers of alluvium with clay and silt (0 to 6.8 m) were also found at the uppermost layer of soil in Long Valley. A relatively high permeability was observed in these soil layers, with a permeability of 7.67×10^{-6} m/s in fill, pond deposits and estuarine deposits, and 5.32×10^{-6} m/s in clay and silt alluvium (KCRC, 2001). Thick layers of tuff can be found beneath these layers of soil, but the layers of tuff are seldom exposed above ground.
- 3.1.7 Mean arsenic content in soil within Long Valley are slightly elevated compared to average conditions across Hong Kong, at around 4.7ng /m^3 . However, this level is lower than the arsenic content in the general vicinity, which ranges from 4.7 to 6.7ng /m^3 . Arsenic content in the soil is likely to be naturally occurring within Long Valley (CEDD, 2013a). Although arsenic is known for its toxicity (it has been used as a pesticide and insecticide at sufficiently high doses); the concentrations in the soil at Long Valley are not thought to pose any significant health risk.

Hydrology

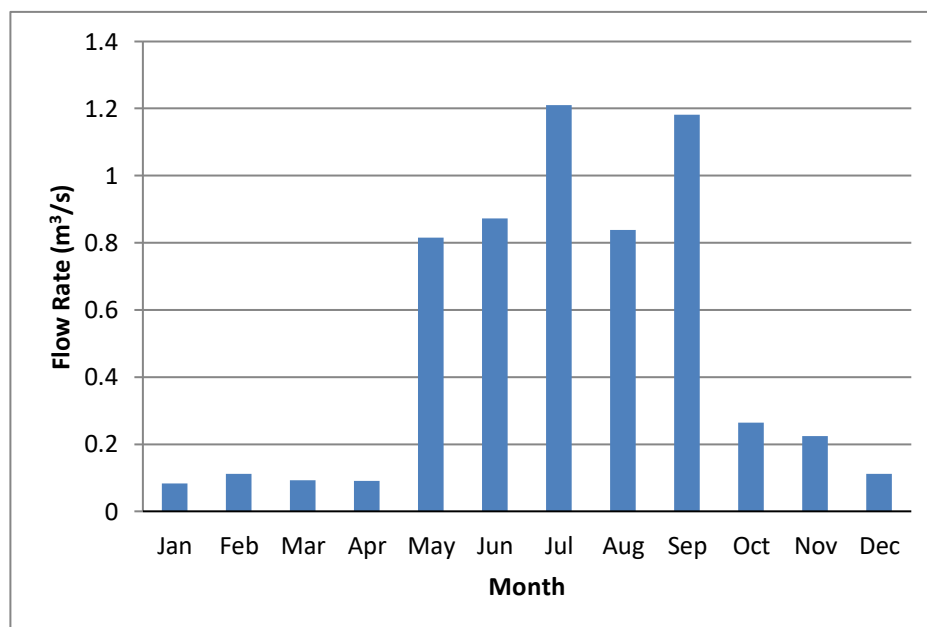
Regional Hydrology and Flooding

- 3.1.8 The Sheung Yue River, also known as River Beas, is one of the larger rivers in the northern New Territories passing through the existing area of Kwu Tung. Its sources are near Kai Kung Leng and Ki Lun Shan, covering a total catchment of about 70km^2 . It flows through the existing areas of KTN NDA and runs parallel to the northwestern boundary of the proposed LVNP. It joins the Shek Sheung River just to the north of Long Valley and eventually discharges into Ng Tung River.
- 3.1.9 The topography and surface hydrological character of Long Valley was described in the EIA Report for Sheung Shui to Lok Ma Chau Spur Line (Sheung Shui to Lok Ma Chau Spur Line Environmental Impact Assessment, Binnie Black and Veatch Hong Kong Limited, 2002). Historically, the Valley has been subject of annual flooding events due to its low-lying topography and location at the confluence of the Sheung Yue, Shek Sheung and Ng Tun Rivers. Since the implementation of large scale drainage improvement works at the Sheung Yue and Shek Sheng Rivers, major flooding is no longer an issue across the LVNP. Information provided by the local farmers and green groups suggest that localized flooding has been recorded after heavy rainfall in recent years, particularly in the northern end of Long Valley. This flooding is a consequent of runoff from the re-configured Long Valley sub-catchment being confined behind the main river channel walls pending the opening of the non-return valves in the channel bunds. These non-return valves prevent the much larger storm flows in the main channel from flooding Long Valley, but only open when the water levels in the main channels have subsided sufficiently to allow the discharge from Long Valley.

Irrigation Water Supply

- 3.1.10 The primary irrigation source for the LVNP is the Sheung Yue River: an inflatable irrigation dam drawing more nutrient rich waters from upstream in the Sheung Yue River, immediately south of the NT Circular Road. The flow rate of Sheung Yue River between 1986 and 2007 was recorded by EPD (EPD, 2014), as shown in **Figure 3.2.1**. The average flow rate within the river in the section upstream of the inflatable dam is 0.49m³/s. From the graph, it showed that in dry season, the lowest average flow rate is 0.08m³/s and the highest average flow rate is 1.21m³/s in wet season.

In-text Figure 3.2 – Average Daily Flow Rate for Sheung Yue River



- 3.1.11 This water passes through an open box channel to the western boundary of Long Valley, where it is then distributed throughout the valley via a network of permanent and temporary drainage channels (**Figure 3.3.1**). Water is transferred from these channels into adjacent fields by small petrol driven pumps. Irrigation water from the Sheung Yue River is supplemented by groundwater (from small wells located at various locations throughout the LVNP), as well as direct rainfall during the wet season.
- 3.1.12 Discussion with Green Groups involved in the MA programme indicates that there have been some issues with irrigation water supply in recent years, with insufficient water being channeled through the LVNP area to supply agricultural land/MA managed fields at the eastern end of the site. It is not clear if this is a consequence of inadequate supply from the Sheung Yue River, or over-abstraction/blockage of irrigation channels by farmers in the western end of the Long Valley. A detailed water balance model will be developed as part of the Drainage Impact Assessment (DIA) as part of the wider NENT NDA Projects, which will determine the availability of river water that can be used for irrigation at the LVNP.

Irrigation Water Quality

- 3.1.13 The water quality of the Sheung Yue River is monitored by EPD at three stations, the closest monitoring station to the abstraction point above the irrigation weir is RB2. The results of the latest monitoring data (EPD, 2013) from this station are shown in **Table 3.1**.

Table 3.1 Summary of Water Monitoring Data for Sheung Yue River in 2013

Parameter	Unit	Average Water Quality
Dissolved Oxygen	mg/L	7.7
Suspended Solids	mg/L	4
BOD ₅	mg/L	5
E. Coli	cfu/100mL	2600
Ammonia-nitrogen	mg/L	0.45
Nitrate-nitrogen	mg/L	0.3
Total Kjeldahi Nitrogen	mg/L	1.3
Total Phosphorous	mg/L	0.27
Flow	L/s	120

- 3.1.14 In general, water quality for Sheung Yue River is classified as “Fair” . However, both E-coli and Faecal coliforms are of concern due to their high content (5,900 and 21,000 cfu/100mL respectively). This is mainly because livestock farms, unsewered villages and small industrial establishments in the catchment which discharging untreated low quality water into the river.

3.2 Biological

- 3.2.1 Literature review was conducted to obtain ecological baseline information from Long Valley, including the habitats in LVNP. The literature review included the EIA Report, which covered habitats within Long Valley and provided comprehensive information; HKBWS Long Valley Bird Monitoring Reports; and progress and completion reports submitted to the Environment and Conservation Fund (ECF) under the MA scheme. Field checks were conducted in 2014 and 2015 under the current Assignment to confirm validity of this information.

Habitats and Vegetation

- 3.2.2 Long Valley comprises habitats typically found in the northern New Territories, with a mixture, of lowland habitats including agricultural lands, ponds and marshes. Other habitats in Long Valley include watercourses, grasslands, plantations, village/orchards, developed area as well as mitigation wetland and mitigation plantations. A habitat map is presented in **Figure 3.3.1**, and a breakdown of existing habitat types within the LVNP boundary provided in **Table 3.2**.

Table 3.2 Breakdown of Existing Habitat Types Recorded within the LVNP Boundary (based on habitat map presented in EIA Report)

Habitat	Area (ha)*	% of Total*
Wet Agriculture	14.1	38.4
Dry Agriculture	8.9	24.2
Ponds	3.0	8.1
Plantation	2.1	5.7
Marsh	2.0	5.5
Mitigation Plantation	1.4	3.8
Urban Area	1.3	3.5
Grassland	1.1	3
Mitigation Wetland	1.0	2.7
Seasonally Wet Grassland	0.9	2.4
Village Area	0.6	1.6
Minor Channelised Watercourse	0.3	0.8
Minor Watercourse	0.05	0.1
Total	37.1	100%

*Totals may not be exact due to rounding off

- 3.2.3 Within the LVNP, wetland areas (ponds, marshes and mitigation wetlands) and agricultural areas are of particular ecological importance. These show ecological connection to the more extensive Deep Bay wetlands and attract a high abundance and diversity of fauna species, especially birds. Long Valley itself contains one of the largest remaining areas of wet agriculture in Hong Kong and contains a mixture of wetland habitats supporting various species with a limited distribution in the territory. Agricultural area habitat refers to man-made habitat for crop production. This habitat made up a large proportion of the Long Valley area, with various types of agricultural areas recorded, including dry agriculture, wet agriculture and fallow agricultural lands.
- 3.2.4 Wet agricultural lands are found to be the dominant habitat in Long Valley, with crops such as water spinach (*Ipomoea aquatica*) and water cress (*Nasturtium officinale*). This wet agricultural habitat dominates Long Valley as the area was originally formed on rice paddies with flooded conditions.
- 3.2.5 Dry agricultural fields were recorded to the south of Long Valley near Yin Kong village. The fields are raised approximately 1.5-2m above the level of the land closer to the Sheung Yue River; thus flooding in these fields is minimized. In addition, these fields are highly fragmented by developed areas, grassland and wooded habitats. Dry agricultural is often rotated with wet agricultural in Long Valley. Commonly planted crops include Chinese cabbage (*Brassica chinensis*) and lettuce (*Lactuca sativa*).
- 3.2.6 Patches of mitigation wetlands in Long Valley were formerly meanders along Sheung Yue River, and was created to compensate for the ecological impact from the channelization of rivers in the vicinity. These mitigation wetlands are now maintained by AFCD as ponds or marshes, including planting of wetland plants and riparian vegetations. Habitats in the meanders are ponds and marshes with wetland plant species, such as *Commelina diffusa*, *Cyperus flabelliformis*, *Cyperus malaccensis*, *Hedychium coronarium*, *Ludwigia perennis*, and *Nelumbo nucifera*.
- 3.2.7 There are several ponds in LVNP which are managed either for production of invertebrate fish food (*Daphnia* sp./Chironomids) and/or with conservation objectives. These water flea ponds are shallow in depth (less than 30cm) and are maintained with aquatic or riparian vegetation.

- 3.2.8 Minor watercourse and minor channelized watercourses are also found in LVNP. These small ditches are largely maintained for agricultural irrigation supply: channeling water from upstream of the inflatable dam on the Sheung Yue River into Long Valley.
- 3.2.9 Plantation habitats are mostly observed along field bunds in the central northern part of the LVNP, and are dominated by small trees such as longan (*Dimocarpus longan*), camphor tree (*Cinnamomum camphora*), Chinese hackberry (*Celtis sinensis*), big-leaved fig (*Ficus virens* var. *sublanceolata*) and Chinese banyan (*Ficus microcarpa*). It is understood most of these were planted quite recently, prior to construction of the Lok Ma Chau Spurline (as can be seen in **Figure 3.3.1**).
- 3.2.10 Mitigation plantations are found lining the agricultural fields along Sheung Yue River and Shek Sheung River, where they were planted as a compensatory measure for the ecological impact of drainage improvement works. This habitat is managed by AFCD and comprises mostly exotic tree species (e.g., white popinac *Leucaena leucocephala* and Taiwan acacia *Acacia confusa*), along with some relatively young native tree species such as big-leaved fig, Chinese banyan and bamboo clumps. Despite its assessment as being of relatively low ecological value in the EIA report, these habitats are considered significant as they screen wildlife in Long Valley from human disturbance along the river, act as a barrier to discourage access from riverside paths, and increase the habitat diversity of Long Valley.
- 3.2.11 Small areas of grassland are present within the LVNP area, mainly located at the southwest of the site. Some areas of grassland are seasonally wet, and are formed from poorly drained abandoned agricultural land.
- 3.2.12 Small patches of urban and village areas are found interspersed with other habitats within the LVNP area. The village areas are mostly associated with agricultural land, and consist of squatter housing and storage areas amongst the agricultural plots. The urban area is formed from a larger open storage facility at the southwest corner of the LVNP, as well as a larger road connecting village housing to the Sheung Yue River access road in the central north portion of the proposed LVNP.

Fauna

Avifauna

- 3.2.13 Since December 2005, the HKBWS have been conducting regular weekly monitoring of the wider Long Valley area (comprising Long Valley and Ho Sheung Heung). Up until 2012, a total of 278 bird species have been recorded during these surveys, including 93 species of conservation importance (HKBWS 2012 and HKBWS in lit.). Species of conservation importance are defined as having a Rare distribution in Hong Kong, ranked as having a level of concern by Fellowes *et al.* (2002), under Class I or II protection in China, or listed as Near Threatened or above under the China Red Data Book and IUCN Redlist.
- 3.2.14 A high abundance and diversity of birds have also been recorded from Long Valley by other sources. According to the AFCD Biodiversity Survey (from 2002 to 2014), a total of 133 avifauna species have been recorded within Long Valley, including 52 species of waterbirds or wetland-dependent species. This underlines the importance of wetlands to avifauna communities within Long Valley. A total of 50 bird species of conservation importance were also recorded in Long Valley during these surveys (AFCD, 2014, refer to **Table 3.3**).

- 3.2.15 A number of rare species has also been recorded in Long Valley (rare species are not ranked as endangered or protected under legislations, but due to their rare distribution, they are considered of conservation interest). These species include crested bunting (*Emberiza lathami*), yellow-breasted bunting (*Emberiza aureola*) and grey-headed lapwing (*Vanellus cinereus*). Avifauna species that have shown recent declines were also recorded during the biodiversity survey conducted by AFCD, including the crested bunting and the yellow-breasted bunting. Both species were previously common in Hong Kong, but have declined dramatically in recent years: crested bunting were absent for a decade between 2000 and 2010. Recent records of both species in Long Valley indicate the recovery and the ecological importance of Long Valley as both species were reported to utilize agricultural lands (Carey et al., 2001).
- 3.2.16 The factors underlying the high abundance and diversity of birds at Long Valley include the diverse wetland and open country habitats present in the area, forming a mosaic of habitats. The large area of continuous wetland habitats in Long Valley also contributed to the high abundance, as birds would be able to fully utilize a continuous belt of different habitats. For example, the EIA Report notes that greater painted-snipe (*Rostratula benghalensis*) forage in shallow ponds and lightly-vegetated wet agricultural land, while preferring to roost in heavily-vegetated wetland habitats. Passerine birds can forage in agricultural lands and roost in marshes or plantations as well. The close proximity and continuity of these habitats in Long Valley provide an ideal habitat structure for a large number of bird species.
- 3.2.17 A second reason for the large number of species recorded from the Long Valley area is simply the high intensity of bird survey coverage in the area. For instance, HKBWS has undertaken weekly bird surveys in Long Valley since December 2005. With such survey intensity in mind, more emphasis should be placed on bird species that are regularly recorded in the area, rather than simply investigating the number of species recorded.

Table 3.3 Bird Species of Conservation Importance Recorded in Long Valley

Common Name ⁽¹⁾	Scientific Name	Distribution in Hong Kong ⁽²⁾	Principal Status ⁽³⁾
Japanese Quail	<i>Coturnix japonica</i>	Scarce	W
Eurasian Wigeon ⁽⁵⁾	<i>Anas penelope</i>	Winter Visitor	W
Northern Shoveler ⁽⁵⁾	<i>Anas clypeata</i>	Abundant	W
Northern Pintail ⁽⁵⁾	<i>Anas acuta</i>	Abundant	W
Eurasian Teal ⁽⁵⁾	<i>Anas crecca</i>	Common	W
Little Grebe ⁽⁵⁾	<i>Tachybaptus ruficollis</i>	Common	P
Cinnamon Bittern ⁽⁵⁾	<i>Ixobrychus cinnamomeus</i>	Scarce	M
Chinese Pond Heron ⁽⁵⁾	<i>Ardeola bacchus</i>	Common	P
Grey Heron ⁽⁵⁾	<i>Ardea cinerea</i>	Common	W
Great Egret ⁽⁵⁾	<i>Ardea modesta</i>	Common	P
Intermediate Egret ⁽⁵⁾	<i>Egretta intermedia</i>	Common	M,P
Little Egret ⁽⁵⁾	<i>Egretta garzetta</i>	Common	P
Black Kite ⁽⁴⁾⁽⁵⁾	<i>Milvus migrans</i>	Common	W,R
Crested Serpent Eagle ⁽⁴⁾	<i>Spilornis cheela</i>	Uncommon	R,M
Eastern Buzzard ⁽⁴⁾⁽⁵⁾	<i>Buteo japonicus</i>	Common	W
Common Kestrel ⁽⁴⁾	<i>Falco tinnunculus</i>	Common	AM,W
Ruddy-breasted Crake	<i>Porzana fusca</i>	Scarce	M,W
Black-winged Stilt ⁽⁵⁾	<i>Himantopus himantopus</i>	Common	W
Pied Avocet ⁽⁵⁾	<i>Recurvirostra avosetta</i>	Abundant	W
Grey-headed Lapwing ⁽⁵⁾	<i>Vanellus cinereus</i>	Scarce	W

Pacific Golden Plover ⁽⁵⁾	<i>Pluvialis fulva</i>	Common	M,W
Greater Painted-snipe ⁽⁵⁾	<i>Rostratula benghalensis</i>	Passage migrant and winter visitor	M,R
Pheasant-tailed Jacana ⁽⁵⁾	<i>Hydrophasianus chirurgus</i>	Scarce	M
Swinhoe's Snipe ⁽⁵⁾	<i>Gallinago megala</i>	Uncommon	M
Spotted Redshank ⁽⁵⁾	<i>Tringa erythropus</i>	Abundant	W/M

Common Name ⁽¹⁾	Scientific Name	Distribution in Hong Kong ⁽²⁾	Principal Status ⁽³⁾
Greater Painted-snipe ⁽⁵⁾	<i>Rostratula benghalensis</i>	Passage migrant and winter visitor	M,R
Pheasant-tailed Jacana ⁽⁵⁾	<i>Hydrophasianus chirurgus</i>	Scarce	M
Swinhoe's Snipe ⁽⁵⁾	<i>Gallinago megala</i>	Uncommon	M
Spotted Redshank ⁽⁵⁾	<i>Tringa erythropus</i>	Abundant	W/M
Common Redshank ⁽⁵⁾	<i>Tringa totanus</i>	Common	W
Marsh Sandpiper ⁽⁵⁾	<i>Tringa stagnatilis</i>	Common	M,W
Greater Coucal	<i>Centropus sinensis</i>	Common	R
Wood Sandpiper ⁽⁵⁾	<i>Tringa glareola</i>	Common	M,W
Red-necked Stint ⁽⁵⁾	<i>Calidris ruficollis</i>	Abundant	M
Long-toed Stint ⁽⁵⁾	<i>Calidris subminuta</i>	Uncommon	M
Sharp-tailed Sandpiper ⁽⁵⁾	<i>Calidris acuminata</i>	Common	M
Oriental Pratincole ⁽⁵⁾	<i>Glareola maldivarum</i>	Passage migrant	M
Greater Coucal	<i>Centropus sinensis</i>	Common	R
Collared Crow ⁽⁵⁾	<i>Corvus torquatus</i>	Uncommon	R
Yellow-bellied Tit	<i>Periparus venustulus</i>	Rare	W
Chinese Penduline-Tit	<i>Remiz consobrinus</i>	Common	M,W
Zitting Cisticola	<i>Cisticola juncidis</i>	Common	W
Red-billed Starling ⁽⁵⁾	<i>Spodiopsar sericeus</i>	Common	W
White-cheeked Starling	<i>Spodiopsar cineraceus</i>	Common	W
Brown-headed Thrush	<i>Turdus chrysolaus</i>	Rare	W,M
Dusky Thrush	<i>Turdus eunomus</i>	Rare	W
Bluethroat	<i>Luscinia svecica</i>	Common	W
Grey Bush Chat	<i>Saxicola ferreus</i>	Scarce	AM,W
Citrine Wagtail	<i>Motacilla citreola</i>	Scarce	M,W
Pechora Pipit	<i>Anthus gustavi</i>	Scarce	M
Red-throated Pipit	<i>Anthus cervinus</i>	Common	M,W
Buff-bellied Pipit	<i>Anthus rubescens</i>	Rare	W
Crested Bunting	<i>Emberiza lathamii</i>	Rare	R
Chestnut-eared Bunting	<i>Emberiza fucata</i>	Scarce	M
Yellow-breasted Bunting	<i>Emberiza aureola</i>	Common	M

Note:

- All wild birds are Protected under Wild Animals Protection Ordinance (Cap. 170).
- AFCD (2015). Hong Kong Biodiversity Database.
- Carey *et al.* (2001): R=resident; W=winter visitor; Su=summer visitor; M=migrant; Sp=spring; A=autumn; P=present all year, exact composition unknown.
- Protected under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).
- Wetland-dependent species (including wetland-dependent species and waterbirds).

Mammals

- 3.2.18 Few mammalian species have been recorded in Long Valley, with a single mongoose recorded in recent surveys in Long Valley (CEDD, 2013). Small mammals including musk shrew (*Suncus murinus*), roof rat (*Rattus rattus rattus*), brown rat (*Rattus norvegicus*), and Ryukyu mouse (*Mus caroli*) have also been recorded by Dudgeon & Corlett (2001). Camera trapping surveys recorded single individuals of small Indian civet (*Viverricula indica*) and Eurasian wild pig (*Sus scrofa*), as well as domestic dogs and cats, and a sighting of greater bandicoot rat (*Bandicota indica*) (Wan, 2010). Rare observations of East Asian porcupine (*Hystrix brachyura*), small-toothed ferret badger (*Melogale moschata*), leopard cat (*Prionailurus bengalensis*) and masked palm civet (*Paguma larvata*) have also been reported from interviews with local farmers (Hung and Pang, 2008).
- 3.2.19 Japanese pipistrelle (*Pipistrellus abramus*) was recorded to be abundant in Long Valley during recent survey (CEDD, 2013), while possible presence of pomona leaf-nosed bat was also reported by Dudgeon and Corlett (2001).

Table 3.4 Mammal Species of Conservation Importance Recorded in Long Valley

Common Name ⁽¹⁾	Scientific Name	Distribution in Hong Kong ⁽²⁾
Japanese Pipistrelle ⁽²⁾	<i>Pipistrellus abramus</i>	Abundant
Greater Bandicoot Rat	<i>Bandicota indica</i>	Rare
East Asian Porcupine ⁽²⁾	<i>Hystrix brachyura</i>	Abundant
Small-toothed Ferret Badger ⁽²⁾	<i>Melogale moschata</i>	Common
Masked Palm Civet ⁽²⁾	<i>Paguma larvata</i>	Common
Small Indian Civet ⁽²⁾	<i>Viverricula indica</i>	Abundant
Small Asian Mongoose ⁽²⁾	<i>Herpestes javanicus rubrifrons</i>	Uncommon
Leopard Cat ⁽²⁾⁽³⁾	<i>Prionailurus bengalensis</i>	Uncommon
Red Muntjac	<i>Muntiacus muntjak</i>	Abundant

Note:

1. AFCD (2015)
2. Protected under Wild Animals Protection Ordinance (Cap. 170).
3. Protected under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

Herpetofauna

- 3.2.20 High diversity of reptiles have been recorded in Long Valley, reportedly due to the suitable habitat (open wetland and dryland habitat), the abundance of prey species (including amphibians, rodents and small birds), as well as a relatively high survey effort (CEDD, 2013). Fifteen and 23 species of reptiles were recorded by Hung and Pang (2008) and Wan (2010) respectively. Six species of reptiles were also recorded from biodiversity survey conducted by AFCD from 2002 to 2014 (AFCD, 2014).
- 3.2.21 Ten amphibian species were recorded in Long Valley from previous surveys (AFCD, 2014; CEDD, 2013). Only one species of conservation importance was recorded; while most of the amphibian species were recorded in wet agriculture and ponds.

Table 3.5 Herpetofauna Species of Conservation Importance Recorded in Long Valley

Common Name	Scientific Name	Distribution in Hong Kong ⁽¹⁾
Reptiles		
Reeve's Terrapin ⁽²⁾⁽³⁾	<i>Chinemys reevesii</i>	Widespread in the territory. Used to be a common species but sightings have been rare in recent years. Found in most local reservoirs.
Chinese Soft-shelled Turtle ⁽²⁾	<i>Pelodiscus sinensis</i>	Locally found in reservoirs and fishponds in Deep Bay area
Tokay Gecko	<i>Gekko gekko</i>	Distributed in rocky areas in Tung Chung and Sham Wat on Lantau Island, Lion Rock Country Park. Population on Hong Kong Island are considered as escaped from snake shops
Common Water Monitor ⁽²⁾⁽³⁾	<i>Varanus salvator</i>	Rare, records from Sha Tau Kok, Fanling and Kowloon Reservoir but probably released or escaped individuals
Burmese Python ⁽²⁾⁽³⁾	<i>Python molurus bivittatus</i>	Widely distributed
Buff-striped Keelback	<i>Amphiesma stolatum</i>	Distributed in lowland in central and northern New Territories and Lantau Island
Indo-Chinese Rat Snake	<i>Ptyas korros</i>	Widely distributed
Common Rat Snake ⁽³⁾	<i>Ptyas mucosus</i>	Widely distributed
Banded Krait	<i>Bungarus fasciatus</i>	Distributed in few localities of the New Territories, Hong Kong Island and Lantau Island
Many-banded Krait	<i>Bungarus multicinctus multicinctus</i>	Widely distributed in New Territories, Hong Kong Island and Lantau Island
Chinese Cobra ⁽³⁾	<i>Naja atra</i>	Widely distributed
King Cobra ⁽³⁾	<i>Ophiophagus hannah</i>	Widely distributed
Amphibians		
Chinese Bullfrog	<i>Hoplobatrachus chinensis</i>	Widely distributed in Lantau Island and New Territories
Two-striped Grass Frog	<i>Rana taipehensis</i>	Distributed in Sai Kung, Tai Lam Country Park, Pat Sin Leng Country Park, Tai A Chau

Note:

1. AFCD (2015)
2. Protected under Wild Animals Protection Ordinance (Cap. 170).
3. Protected under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

Fish

- 3.2.22 Only two species of freshwater fish have been recorded within Long Valley, the North African Catfish (*Clarias gariepinus*) and the Nile Tilapia (*Oreochromis niloticus*), both recorded from biodiversity survey conducted by AFCD from 2002 to 2014 (AFCD, 2014), and are exotics. No freshwater fish species of conservation importance were recorded within Long Valley.

Butterflies and Odonates

- 3.2.23 A total of 31 butterfly species and 25 odonate species were recorded from Long Valley by the AFCD biodiversity survey from 2002 to 2014 (AFCD, 2014). These include three butterfly species and five dragonfly species of conservation importance. All three butterfly species (grass demon, swallowtail and small cabbage white) as well as one dragonfly species (elusive adjutant, *Aethriamanta brevipennis*) are rare in Hong Kong (AFCD, 2015).
- 3.2.24 Four more butterfly species of conservation importance were also recorded in Long Valley during surveys conducted from July 2008-June 2009, including Pale Hedge Blue, Painted Lady, Danaid Egg-fly and Commander. Danaid Egg-flies recorded in the area are likely to be associated with agricultural and wetland habitats (CEDD, 2013).

Table 3.6 Butterfly and Odonate Species of Conservation Importance Recorded in Long Valley

Common Name	Scientific Name	Distribution in Hong Kong ⁽¹⁾
Butterflies		
Grass Demon	<i>Udaspes folus</i>	Rare
Swallowtail	<i>Papilio xuthus xuthus</i>	Rare
Small Cabbage White	<i>Pieris rapae crucivora</i>	Rare
Plain Hedge Blue	<i>Celastrina lavendularis limbata</i>	Very rare
Painted Lady	<i>Vanessa cardui</i>	Rare
Danaid Eggfly	<i>Hypolimnas misippus</i>	Uncommon
Commander	<i>Moduza procris procris</i>	Very rare
Odonates		
Dusky Lilysquatter	<i>Paracercion calamorum dyeri</i>	Uncommon
Blue Chaser	<i>Potamarcha congener</i>	Common
Ruby Darter	<i>Rhodothemis rufa</i>	Common
Scarlet Basker	<i>Urothemis signata signata</i>	Common
Elusive Adjutant	<i>Aethriamanta brevipennis brevipennis</i>	Rare

1. AFCD (2015)

Freshwater Invertebrates

3.2.25 Surveys of the aquatic habitats around the broader Kwu Tung district recorded 21 freshwater invertebrate taxa. Surveys of mitigation wetlands within Long Valley have shown them to be dominated by freshwater snails *Pomacea canaliculata* (Apple Snail) and *Sinotaia quadrata*. These species exotic, are tolerant of disturbed and moderately polluted environments, and would reproduce rapidly in suitable habitat, leading to a high abundance (CEDD, 2013). Apple Snails are notorious invasive species in freshwater habitats, which are further discussed in **Section 8.2.30-8.2.33**.

3.3 Built Environment

3.3.1 There are a handful of existing built structures located within the boundary of LVNP, mostly comprising squatter village housing and storage facilities (**Figure 3.5.1**).

4 CURRENT MANAGEMENT FOR NATURE CONSERVATION

4.1 International Recognition

Important Bird Area Designation

- 4.1.1 Birdlife International, a global-wide nature conservation partnership committed to bird conservation world-wide, has identified two Important Bird Areas (IBAs) in Hong Kong, namely the Inner Deep Bay and Shenzhen River Catchment IBA, and the Tai Po Kau, Shing Mun, Tai Mo Shan IBA.
- 4.1.2 The wetlands of Long Valley form part of the Inner Deep Bay and Shenzhen River Catchment, which totals to 3,150ha in area. This IBA consists of terrestrial wetland habitat and intertidal habitats including, mudflats, fishponds, mangroves, Gei Wais and farmland (**Figure 4.1.1**). Long Valley makes up the majority of the farmland habitats within this IBA. IUCN red-list bird species that have been recorded at this IBA include Vulnerable: Greater Spotted Eagle (*Aquila clanga*), Imperial Eagle (*Aquila heliaca*), Japanese Yellow Bunting (*Emberiza sulphurata*), Near-threatened: Schrenck's Bittern (*Ixobrychus eurhythmus*), Black Vulture (*Aegypius monachus*), Grey-headed Lapwing (*Vanellus cinereus*), Asiatic Dowitcher (*Limnodromus semipalmatus*), Japanese Waxwing (*Bombycilla japonica*), Red-billed Starling (*Sturnus sericeus*) and Chestnut-cheeked Starling (*Sturnus philippensis*) (Birdlife, 2000).

4.2 New Nature Conservation Policy and Environment and Conservation Fund

New Nature Conservation Policy

- 4.2.1 The New Nature Conservation Policy (NNCP) was adopted in 2004 to enhance the conservation of ecologically important sites which are privately owned. A scoring system was used to evaluate the relative ecological importance of different sites, and identify priority sites for enhanced conservation. The scoring system criteria included naturalness, habitat diversity, non-recreatability, species diversity, richness and species rarity/endemism. Twelve priority sites were identified under the NNCP (AFCD, 2006).
- 4.2.2 As the largest remaining freshwater wetland and an important habitat for resident, migratory and visiting bird species and lowland amphibian species, Long Valley was ranked eighth out of the twelve priority sites.
- 4.2.3 To facilitate biodiversity conservation of priority sites under the NNCP, two types of management structure were developed: Public-private Partnership (PPP) and Management Agreement (MA). Under PPP, land owners are allowed to develop less ecologically sensitive parts of their site, with requirements to enhance and actively manage more ecologically sensitive areas in partnership with an NGO. Given the land parcels of priority sites are privately owned, NGOs could provide financial incentives to and work closely with individual landowners / tenants under management agreements to manage their land in an ecologically-friendly way.

Environment and Conservation Fund (ECF)

- 4.2.4 Within the MA framework, NGOs can apply for funding from the ECF. The ECF was established under the Environment and Conservation Fund Ordinance (Cap. 450) in 1994. Local NGOs can apply for funding to support projects for educational, research and other projects and activities in relation to environmental and conservation matters (ECF, 2007).

4.3 On-going HKBWS / CA Management Agreement Projects

- 4.3.1 The first MAs at Long Valley from 2005-2008 were administered by Conservancy Association (CA) and Hong Kong Bird Watching Society (HKBWS) separately. Since 2008, these two organizations have joined together to implement a series of management plans, conservation measures and public activities to enhance and promote the ecological value and the unique cultural landscape in Long Valley (Sung et al., 2008a). Agreements signed under MA are voluntary, and only 30.7% of the entire Long Valley and Ho Sheung Heung Priority site was being managed by the MA as of 2012 (CEDD, 2013b). Currently the MA is under its 7th contract, which began in September 2019. Location of fields under existing MA was shown in **Figure 4.2.1**.
- 4.3.2 The key conservation objectives of the current MA include: (1) To enhance long term conservation measures of entire Long Valley and Ho Sheung Heung area; (2) To conserve Long Valley and Ho Sheung Heung' s landscape and biodiversity, particularly freshwater wetland dependent avifauna, amphibians and other species; (3) To promote and develop Long Valley into an Eco-agriculture Area to benefit wildlife and achieve long-term sustainability of the landscape; (4) To continue the working with local stakeholders, particularly landowners, farmers and villagers to conserve their lands and promote eco- agriculture; (5) To conduct specific habitat and biodiversity monitoring and surveys to provide up-to-date ecological information to continuously fine tune project and formulate long term strategies; (6) To strengthen education elements and set up an education center to provide more opportunities for the public to enjoy and learn in Long Valley (ACE, 2013a); and (7) To continue the impetus of past MA projects to enhance the conservation and ecological values of the freshwater wetlands at the Long Valley through partnership with local landowners and farmers.
- 4.3.3 Under the current MA, an ECF funding application is made every one to three years to continue the MA projects in Long Valley. Since the beginning of this scheme, approved funding has ranged between \$1.5 million and \$9.8 million, with more funding in recent years. The applied funding is used as monetary incentive for participating farmers, education programs and partial salary of staff members.
- 4.3.4 The management actions implemented by CA and the HKBWS can be classified into two categories. One is more scientific-based and wildlife-oriented, focusing on research, directly enhancing ecological value, biodiversity and habitat health of Long Valley. The other is educational-based, which aims to strengthen the connection between the natural environment and people and increase the awareness of biodiversity conservation in local communities and the public.

Working Arrangement with Local Farmers

- 4.3.5 Under the MA scheme, farmers are allowed to participate on a voluntary-basis. Management agreements are signed between the NGOs and the farmers. Under the management agreement, the farmers are required to provide a specific habitat type by either planting a specific crop or maintaining a certain water level and carrying out management measures (i.e. ploughing, weeding, etc.). Management fees will be given to the farmers on a fixed schedule over the management agreement period, the amount of management fees varies depending on the habitat type that is provided and the size of the habitat.

Biodiversity Surveys

- 4.3.6 To collect ecological information for the MA scheme, surveys focusing on habitats and vegetation, specific fauna groups and breeding activities are conducted including seasonal habitat survey, vegetation survey, bird monitoring programme, breeding bird survey and regular night survey for breeding amphibians (ECF, 2014b). Bird monitoring programme involves regular bird survey and regular night bird survey (ECF, 2014b). Other fauna surveys conducted include mammal, amphibian, reptile, butterfly and odonate surveys (ECF, 2010;Hau *et al.*, 2007).

Habitat Management

- 4.3.7 HKBWS and CA are responsible for creating and managing different types of habitats in Long Valley for the MA project. Under their management, they have created/enhanced habitats including Dry Agricultural Lands, Less Intensive Wet Agricultural Lands, Shallow Water Habitats, Farmland Margins, Fish / Marsh Ponds and Water Flea Ponds. Location of fields under existing MA in 2014 and the distribution of habitats under the MA in 2014 are shown in **Figures 4.2.1 and 4.3.1** respectively. Representative photographs of the habitats provided under the MA are shown in **Figure 3.4.1**.
- 4.3.8 The results of the monitoring programme to date have shown that managed fields have higher bird abundance than unmanaged fields in Long Valley and that maintaining diverse habitat types is important. The bird abundance and diversity have shown an increasing trend since the start of the programme. When comparing the managed and the unmanaged fields, the effect of the management efforts appeared to be more significant in autumn and winter than that of the summer (Sung *et al.*, 2011). Mean bird density of managed and unmanaged fields for all four seasons since 2007 have been plotted and provided in **Figure 4.4.1**. The monitoring results also showed that marsh habitats, less intensive wet agricultural lands and shallow water habitats had the highest amphibian diversity (ACE, 2013a).

Dry Agricultural Land

- 4.3.9 Inclusion of this habitat under the MA began in 2005, but was discontinued in 2008 (Yu and Sung, 2008). Dry Agricultural Lands were created and managed to cultivate flowering Chinese cabbage and choi sum and attract birds by the uncut flowers and seeds of the plants (Yu, 2006a; Yu, 2007a). Other habitat enhancement measures involved weed removal and retaining bunds (Yu, 2006b). The target species for this habitat include pipits, buntings and Japanese quail (*Coturnix japonica*) (Yu, 2007b) and wagtails were also attracted by active agricultural lands (HKBWS, 2008). The result of the management in this habitat was positive but the resulting bird number increase was mainly contributed by nontargeted common species (HKBWS, 2008). In addition to this, due to the increasing preference of farmers to convert from wet agricultural practices to farming dry crops, it was considered that the area of dry agricultural land was above what is needed for biodiversity conservation and thus is no longer a target habitat of MA.

Less Intensive Wet Agricultural Land

- 4.3.10 Less Intensive Wet Agricultural Lands are managed by active cultivation of paddy rice, water chestnut, water spinach, Chinese arrow-head, water cress, water caltrop, water lily and lotus (Yu, 2006d; 2007a; 2007b; Sung *et al.*, 2009a). Paddy rice farming is one of the most successful components of the MA scheme, especially in 2010 to enhance bird abundance (Sung *et al.*, 2012). Paddy rice is a preferred food for many seed-eating birds (granivores), and is typically planted before the migratory season to synchronize with the arrival of migrants including the globally vulnerable Yellow-breasted Bunting (Sung *et al.*, 2010; 2011). Since autumn 2009, these buntings have been regularly recorded in Long Valley every year (Sung & Hau, 2014). The first crop of rice planted in April is ripe and ready for harvest in July (Chick, 2013a). Trial planting of floating heart lotus and reeds was made to attract secretive birds and reed-associated species such as crakes and Pheasant-tailed Jacana (*Hydrophasianus chirurgus*) (Sung *et al.*, 2011).
- 4.3.11 Rice paddies are also potential breeding sites of amphibians (Osawa, 2009) and many low land amphibian species of South China are associated with rice paddies (Xie *et al.*, 2007). Therefore, the management of rice paddy in Long Valley is also important in order to maintain the amphibian diversity. It was suggested that the use of organic fertilizers (i.e. peanut meal and chicken manure) are less harmful to amphibians (Ma, 2013).

Shallow Water Habitat

- 4.3.12 Shallow Water Habitat has been the most successful and cost effective habitat intervention under the MA., with targeted species including greater painted-snipe, *Gallinago snipes*, rails, crakes, bitterns and egrets (Yu, 2007b). This habitat also attracts a high abundance of amphibians (Ma, 2012). Maintaining a suitable water depth and regular ploughing seems important to attract waterbirds, and HKBWS control the water depth between 1-5 cm (Yu, 2006a). Maintenance techniques include pumping water into the field, water level control, weeding, controlling disturbance and ploughing (Yu, 2007a; Sung *et al.*, 2009a). HKBWS note the attractiveness of these habitats to waterbirds seems to decrease over time, as newly formed habitats attract more birds (HKBWS, 2008).

Intensive Agricultural Land

- 4.3.13 Various crops include tomato, corn, sweet pepper, eggplant, ladyfinger, ginger flower are planted and maintained along the margins of Intensive Agricultural Lands to diversify habitat heterogeneity (Chick, 2013b). No pesticide is allowed in some of the farmland margins so that insects would feed on the crops, which in turn, would attract insectivorous birds (Chick, 2013a).

Fish Pond (Deep Water Pond)

- 4.3.14 The management of fishponds under the MA began in 2008 (Sung, *et al.*, 2008), but stopped in 2012 due to high management cost and labour requirement (Chick, 2012; Sung & Hau, 2013). Existing fishponds under the MA are now managed as fish/marsh pond (as described in **Section 4.3.15** below). The ponds were stocked with commercial fish species including mud carp, grass carp, edible goldfish and big head carp (ECF, 2010). Birds attracted by this habitat include ardeids, Black-winged Stilt and kingfishers (Sung *et al.*, 2008). The first sightings of Black-faced Spoonbill (*Platalea minor*) in Long Valley were in winter 2008/2009, and subsequent sightings were mainly made in managed fish ponds or in-flight (Sung *et al.*, 2010). Drained fish ponds provide foraging grounds for waterbirds (ECF, 2010).

Fish / Marsh Pond

- 4.3.15 Fish/Marsh ponds were modified from fish ponds. Modifications from modern fish ponds to fish and marsh ponds was conducted by stocking with emergent plants such as lotus and water lily (Ma, 2013). Water lily was planted in the spring growing season (Chick, 2013a). Marsh pond was a newly created and managed habitat in 2012 (Chick, 2012). This habitat provides a breeding ground for waterbirds, with a pair of breeding little grebe (*Tachybaptus ruficollis*) recorded in this habitat in 2012 (Chick, 2012).

Water Flea Pond

- 4.3.16 Water Flea Ponds are maintained to culture water flea (*Daphnia* sp.) and chironomids for aquarium fish feed (Ma, 2012). This habitat type consists of shallow ponds that are nutrient- rich due to the chicken manure that is added. The pond bunds are maintained by physical removal of weeds and vegetation (Chick, 2012). This habitat is attractive to Barn Swallow (*Hirundo rustica*) and Black-winged Stilt (Sung *et al.*, 2008; 2009a). A significant proportion of Black-winged Stilts in Long Valley were recorded in this habitat (Sung *et al.*, 2009b). Chinese Bullfrog (*Hoplobatrachus rugulosus*) which is of conservation importance is regularly recorded in this habitat (ACE, 2013a).

Environmental Education

- 4.3.17 Small scale paddy rice farming was re-introduced into Long Valley since 2007 as a component of the MA. Long Valley Eco-Rice is available for sale as an organic product to the public. The profit is used to support the ongoing management practices.
- 4.3.18 Eco-tourism related programmes included eco-guide training, night safari workshops, paddy rice workshops, Harvest Festival and Long Valley Olympic Game (ACE, 2013a). Some programmes were targeted to local schools including education workshops, seminars, school exhibitions and Education Centre (ACE, 2013a). Publicity events such as exhibitions and The Big Bunting and voluntary conservation activities including conservation and farming volunteering and international workcamps were also organized to promote nature conservation to the public (ACE, 2013a).
- 4.3.19 The Harvest Festival is co-organized annually by HKBWS and CA. The aim of the Harvest Festival is to conserve the biodiversity and cultural landscape in Long Valley through promoting sustainable and traditional agriculture and the natural beauty of Long Valley. The event highlights the connection between nature, agriculture and culture in Long Valley. Activities organized in the Festival consist of a series of workshops for the participants to experience traditional farming practices such as harvesting Water Chestnut, Chinese Arrowhead, cultivation sessions and kiln building. The Festival also provides a platform for the visitors to purchase local crops. For promoting the biodiversity, wildlife photo exhibition and guided tours are organized to raise the conservation awareness of the participants (**Figure 4.5.1**).

5 SITE EVALUATION

5.1 Introduction

5.1.1 The following section assesses the important ecological and landscape characteristics of the LVNP area that should be enhanced and preserved by the management of the LVNP. The assessment has been made primarily with reference Annex 8 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The criteria in this Annex are the local standard for evaluating the ecological value of a habitat or site. Additional consideration of the intrinsic ecological value and landscape character/value of the area have also been included in this evaluation.

5.2 Size

5.2.1 Long Valley is the largest remaining area of freshwater wetland in Hong Kong, and the core area as identified in the EIA study included the 37.17ha of the LVNP area comprises some of the highest ecological value habitat across Long Valley as a whole. After reviewing the details of the sizes and extents of land lots at LVNP for the future land resumption progress, the area of LVNP is now measured at 37.30ha.

5.3 Diversity

5.3.1 A diverse mixture of microhabitats is present in the LVNP area. The dominant habitat is wet agricultural land, but a wide variety of other habitats are also recorded, including dry and abandoned agricultural land, grassland, plantation, developed area, watercourses, mitigation wetlands, marsh, and ponds. These habitats are found in proximity to each other with high ecological connectivity, while wetland habitats in the area are ecologically linked to the wider in Deep Bay IBA (BirdLife, 2015).

5.3.2 Moderate flora diversity was observed in Long Valley. With agricultural areas as the dominant habitat, flora within the LVNP is mostly planted and dominated by a few selected species with economic benefit. Other native plant species are mainly limited to the marsh, grassland and plantation habitats in vicinity.

5.3.3 The wide range of habitats supports a highly diverse community of wetland fauna species, especially birds. Long Valley has been recognized as an important habitat for wetland bird species (BirdLife, 2015). A total of 295 bird species have been recorded in Long Valley from regular monitoring conducted by HKBWS since December 2005, including 93 species of conservation importance (Sung & Hau, 2014). From surveys conducted by AFCD from 2002 to 2014, a total of 52 waterbirds species were also recorded in Long Valley (AFCD, 2014).

5.3.4 Other wetland fauna species recorded in Long Valley include ten amphibian species and 25 odonate species recorded from surveys between 2002 and 2014 (AFCD, 2014).

5.4 Naturalness

5.4.1 Long Valley is dominated by agricultural fields, which are man-made habitats established for crop production, and native vegetation is often completely removed from the fields. Active management exists at some of the fields, with regular disturbance from farmers (and to some extent, photographers and wildlife watchers). Some areas such as inactive agricultural areas and grassland habitats show natural succession into marsh.

- 5.4.2 Although the dominant habitats in Long Valley are man-made, they still support a rich biodiversity. The diversity of microhabitats in these fields contribute to a high abundance and richness of fauna (especially birds) utilizing the fields as a feeding and foraging ground.

5.5 Rarity

- 5.5.1 The agricultural fields and marshes that dominate Long Valley were once common across the northern areas of Hong Kong, but have become increasingly rare and fragmented due to new town development, village expansion, industrial development/open storage and infrastructure works. This loss of rural landscapes has been replicated across much of southern Guangdong. Wen *et al.* (2010) reported a drop in the overall area of farmland around the Pearl River Estuary of over 63% between 1979 and 2005, with its proportion dropped from 48.8% to 17.7% of the total land. In this context, the large and well connected freshwater wetland habitat is considered the last remaining agricultural wetland in Hong Kong (ECF, 2014a; BirdLife, 2015), and is increasingly important in a regional context.
- 5.5.2 Aside from wet agricultural land, other habitats in the LVNP are more common in Hong Kong. Terrestrial habitats such as dry agricultural land, plantation, developed area and grassland are fairly common in Hong Kong.
- 5.5.3 Numerous faunal species of conservation importance have been recorded in Long Valley, including avifauna, mammals, herpetofauna, butterflies and dragonflies. As described in **Section 3.2.13**, 93 bird species of conservation importance have been recorded in Long Valley from avifauna survey conducted by the HKBWS since December 2005, as well as three butterfly, four dragonfly, one amphibian and two reptilian species of conservation importance.
- 5.5.4 Among the avifauna species recorded in Long valley, the Yellow-breasted Bunting and Crested Bunting have been recorded in recent years. Both species were previously common in Hong Kong, but showed significant decline during the past decade from 2000 to 2010, with no records of Crested Bunting.

5.6 Recreatability

- 5.6.1 Agricultural areas are man-made habitats, subject to regular human disturbance, and are easily re-creatable *per se*. In Long Valley, the wet agricultural fields form a well connected mosaic of freshwater wetland with other habitats such as ponds and marshes, which provide a transition between terrestrial and aquatic habitats. A high degree of ecological linkage was observed between these habitats, and such habitat connectivity is not easily re-creatable. Furthermore, land shortages in Hong Kong mean that there are few (if any) other areas of contiguous flat, low lying land suitable for wet agricultural farming that could realistically be used to re-create a similar ecological landscape such as that found at LVNP.
- 5.6.2 Wetland habitats are also known to be fragile due to their hydrological characteristics. Factors that would affect hydraulic condition, such as changes in water supply, climate change, sedimentation, water quality, and loss of vegetation, would subsequently affect the habitat. Climate change would induce a higher intensity or frequency of extreme events such as storms, droughts and flood, which would damage the wetland habitat. Storms and floods would disturb the hydraulic condition of the area; while drought would contribute to the absence of wet agricultural areas which are crucial in providing habitats for waterbirds. Sedimentation from runoff would affect the volume of the wetland as well as water flow. Poor water quality could also affect habitat quality, that turn could affect the flora and fauna within the habitat. Aside from hydraulic condition, invasive species could also affect the wetland habitat (e.g. Mile-a-minute weed) which would reduce habitat value by decreasing vegetation diversity (NSW DECC, 2008).

5.7 Fragmentation

- 5.7.1 A large mosaic of habitats is observed in Long Valley, dominated by agricultural fields and interspersed with marshes, ponds, and occasionally grasslands (and seasonally wet grassland). This large, relatively unfragmented rural landscape is unique in Hong Kong.

5.8 Ecological Linkage

- 5.8.1 Wetland habitats (such as wet agricultural lands, ponds, and marshes) at the LVNP area show high ecological connectivity with each other despite physical fragmentation such as existing walking paths. Fauna such as waterbirds were reported to utilize this mosaic of habitat for different purposes such as roosting, breeding and foraging.
- 5.8.2 In addition, the proposed LVNP and its wetland habitats are linked to local ecological resources. Agricultural land to the north and south of the proposed LVNP formed a continuum of ecologically valuable agricultural land, and play a complementary and buffering role. Sheung Yue River and Shek Sheung River provide foraging ground for wetland birds. Ho Sheung Heung egretty is located around 1km north of the proposed LVNP; ardeids were observed flying south to Long Valley in the EIA study. These habitats near the proposed LVNP demonstrate significant ecological linkage at a local scale.
- 5.8.3 Ecological linkage of the LVNP to its surroundings is also exhibited in a larger scale. Situated within the northern area of Hong Kong, Long Valley is recognized internationally as part of the Inner Deep Bay and Shenzhen River Catchment IBA. A high diversity of birds has been recorded in this IBA as well as within Long Valley, including a large number bird species of conservation importance and species recognized as globally threatened by BirdLife International (BirdLife, 2015).
- 5.8.4 In a global context, the IBA is situated in the mid-way of the East Asia-Australasian Flyway (EAAF), which extends from the Arctic Circle through Southeast Asia to Australia and New Zealand. This EAAF is home to 50 million migratory waterbirds, including 28 globally threatened species (WWF, 2015). Hence, the wetland habitats in Long Valley act as an important component in the ecological linkage within the EAAF.

5.9 Potential Value

- 5.9.1 The potential value of Long Valley, especially to birds, has been made clear since ecological monitoring began under the MA scheme. As discussed in **Sections 4.3.7** and **4.3.8**, managed fields supported a significantly higher abundance of birds compared to unmanaged fields. Aside from agricultural fields, the management of fish ponds by the means of adding fish fry and conducting pond draining has also proved to be successful in providing foraging grounds for waterbirds (**Section 4.3.14**). With the expansion of similar management practices to cover a larger portion of the LVNP area, the potential to increase the ecological value of LVNP is very high.

5.10 Nursery / Breeding Ground

- 5.10.1 Long Valley is a breeding/nursery ground for a number of bird species, such as greater painted-snipe (CEDD, 2003), as well as other wetland-dependent species of conservation importance such as little grebe (*Tachybaptus ruficollis*), yellow bittern (*Ixobrychus sinensis*), and little ringed plover (*Charadrius dubius*) (CEDD, 2013a). The watercourse along Long Valley is also used as a foraging site by ardeids of the Ho Sheung Heung and Man Kan To egrettries (CEDD, 2013a).
- 5.10.2 The presence of tadpoles at Long Valley indicates that it is a breeding ground for various amphibian species. Ecological surveys undertaken as part of the MA scheme have recorded ten species of native frogs, which are likely to breed at Long Valley (Ma, 2013).

5.11 Age

- 5.11.1 There are limited written records of the local farming history around Long Valley. A traditional agricultural society dominated Hong Kong prior to World War II (between 1938 and 1945), with rice cultivation as a major operation in agriculture. Starting from the late 1950s to the 1980s, the traditional agricultural society was greatly impacted by socio-economic changes, in which many farmlands in Long Valley were left abandoned during. A shift to wet agricultural practices was observed around the 1980s, in which water spinach and watercress were favoured. Despite the decline in farming practice, wet agriculture of water spinach/watercress rotation is still observed in Long Valley (Chick, 2011).

5.12 Abundance/Richness of Wildlife

- 5.12.1 The wide range of habitats at LVNP support a highly diverse community of wetland fauna species, especially birds. Long Valley has been recognized as an important habitat for wetland bird species (BirdLife, 2015), as described in **Section 4.1.1**. A total of 300 bird species has been recorded in Long Valley since December 2005. Many of the species recorded in Long Valley have a restricted distribution in Hong Kong or are otherwise considered of conservation interest.
- 5.12.2 A relatively high diversity of herpetofauna was also recorded in the area, supported by the abundance and diverse aquatic habitats. Ten species of amphibians and six species of reptiles were recorded in Long Valley from biodiversity survey conducted by AFCD from 2002 to 2014 (AFCD, 2014).
- 5.12.3 Other terrestrial fauna recorded in LVNP include 14 mammal, 35 butterfly, and 25 odonate species (AFCD, 2014; CEDD, 2013a; Hung and Pang, 2008; Wan, 2010). Limited records of aquatic fauna were made around LVNP, including two species of freshwater fish (AFCD, 2014), as well as 21 taxa of freshwater invertebrate recorded from mitigation wetlands within LVNP and outside the LVNP around Kwu Tung (CEDD, 2013a).

5.13 Intrinsic Appeal

- 5.13.1 The intrinsic ecological value of Long Valley is significant due to its uniqueness as the largest remaining freshwater wetland habitat in Hong Kong, its high diversity of habitats, and high abundance and diversity of wetland species, including numerous species of conservation interest. Its geographical location also enhances its value as an important habitat for migrating birds along the flyway.

5.14 Landscape Character and Value

- 5.14.1 Long Valley is the largest and most intact piece of active and contiguous agricultural land in Hong Kong which is difficult to recreate in Hong Kong due its unique characteristics and a lack of similar areas. It is situated in a village-type rural landscape with a continuous open view and ridgelines as backdrop, providing high quality visual resource of excellent aesthetic value. Long Valley is also representative of traditional agricultural landscapes of the New Territories, exemplified by its physical relationship with the two local indigenous villages – Ying Kong and Ho Sheung Heung, as well as Tin Kwong Po squatter area. Continuous evolution of these agricultural communities in history is inseparable from the development of irregular farmlands and mosaic pattern of the landscape of Long Valley. Landscape features, including flood prevention bund on the peripheral and current agricultural field boundaries, reflect historical and cultural processes typical of rural New Territories. Long Valley, therefore, possesses significant value both as a cultural landscape and a scenic resource.

6 DESIGNATION OF LONG VALLEY NATURE PARK

6.1 Introduction

6.1.1 The overall objective of the HCMP is to provide a framework and specifications for development and management of the LVNP. The LVNP will serve to maintain and enhance the 37.30ha of low-lying wetland habitats, so that it continues to support the full range of functioning ecological processes, maintains its existing crop production, landscape value and cultural significance as well as providing an educational resource for the community. Due to the implications of land resumptions in terms of land lots and existing irremovable structures, i.e. graves, the final area of the LVNP has been changed from 37.17ha as proposed in the EIA to 37.30 ha. It is intended that the conservation values of Long Valley would be safeguarded in the long term with the designation of the LVNP (**Section 1.3.1**). To achieve these objectives, several factors need to be taken into consideration:

- **Site Evaluation:** The LVNP should conserve and enhance existing biodiversity resources identified in the project area (as identified in section 5).
- **Requirements of the Environmental Impact Assessment/Environmental Permit:** The LVNP should meet mitigation requirements stipulated in the EIA/EP for the KTN NDA and FLN NDA.
- **Requirements of the Statutory Outline Zoning Plan:** The LVNP should meet statutory planning requirements under the OZP.
- **Stakeholder Engagement:** The LVNP should be planned taking into consideration the comments and suggestions of key stakeholders including farmers, government departments and green groups.

6.1.2 The following sections provide more details of these considerations, and summarize key issues to be incorporated into the HCMP.

6.2 Site Evaluation

6.2.1 The key ecological characteristics and landscape values identified in **Section 5** should be maintained and enhanced. In particular, the design of the HCMP must maintain the mosaic pattern of wet and dry agricultural land, ecological connectivity and habitat heterogeneity in the overall LVNP. By doing so, species diversity can be maintained along with the intrinsic value of LVNP as the largest remaining freshwater habitat in Hong Kong.

6.3 Requirements of the Environmental Impact Assessment / Environmental Permit

Environmental Impact Assessment (EIA) Report

6.3.1 The other lowland area in KTN NDA and FLN NDA would be largely developed, leading to direct impacts to 5.82ha of wetland and agriculture habitats and associated species. The EIA study proposes that enhancement of habitats within the LVNP area will provide compensation and enhancement to mitigate these impacts. The mitigation measures identified in the EIA Report include:

- Enhancement of wetland habitats to abate the impact of fragmentation and permanent loss of wet agriculture, ponds and mitigation wetlands outside LVNP;
- Redistribution of wetland habitat to concentrate closed wetland habitats (e.g. marsh and reed marsh) to more disturbed areas;

- Fish stocking to compensate for disturbance to foraging areas outside LVNP, including Sheung Yue River;
- Enhancement of non-wetland habitats to mitigate for the impact of disturbance imposed on bird species utilizing dry agriculture and woodland.

6.3.2 In addition to the compensation measures, the EIA also identified a number of requirements that need to be implemented to ensure that the ecological value of LVNP can be maintained. During the construction phase, dull green site boundary fences 2m in height are to be erected between Long Valley and works areas. To minimize human disturbances outside and within LVNP, screen planting along the river channels and visitor management in the form of controlling visitor numbers has been recommended. Finally, to ensure that the wet agriculture habitats can be maintained, a reliable water supply must be provided and water quality impacts should be minimized.

6.3.3 A Preliminary Management Plan (PMP) with suggestions outlining how LVNP will be managed has been provided in Appendix 13.10 of the EIA Report. The design consideration of the HCMP should also take recommendation and specific requirements from the PMP into consideration. These include:

- A visitor center should locate on the west side of the Sheung Yue River in area B3-15 of the ODP;
- Access into LVNP would be via the visitor center
- A clearly delineated site boundary by either fence of restricted access; and
- Screen planting between the cycling track and LVNP to minimize disturbance

Environmental Permit (EP)

6.3.4 As stipulated in EP-468/2013/A, Section 2.9, specific conditions, submissions or measures to be implemented before construction of the Project, the submission of a HCMP is required. The permit holder shall, “submit a HCMP for LVNP in consultation with relevant authorities, including the AFCD, for approval by the Director (of environmental protection) prior to the commencement of the construction of relevant part the Project. The HCMP shall include designation, design, and implementation aspects for the establishment of the LVNP. It shall address, but need not be limited to, the final determination of target species and monitoring protocol and the objectives, detailed design, implementation, maintenance, management and monitoring requirements for the LVNP. The Permit Holder shall implement all the recommendations and measures in accordance with the approved HCMP.”

6.4 Requirements of the Statutory Outline Zoning Plan

6.4.1 Long Valley Nature Park falls within the Kwu Tung North Outline Zoning Plan (OZP). The entire LVNP has been proposed to be zoned as “Other Specified Uses (Nature Park)”. The planning intention of this zone is, “intended primarily for the development of a nature park to protect and enhance existing wetland habitats for the benefit of the local ecology and promotion of nature conservation and education. The primary intention is to discourage new development unless it is required to support the conservation of the ecological integrity of the wetland habitats or the development of an essential infrastructure project with overriding public interest” (PlanD, 2014).

6.4.2 Always permitted uses within the “Other Specified Uses (Nature Park)” (without planning application to the Town Planning Board) include agricultural use (other than plant nursery), field study/education/visitor center, nature reserve, nature trail and wetland habitat.

6.4.3 Uses that may be permitted with or without conditions on application to the Town Planning Board include, government refuse collection point, government use (not elsewhere specified), on farm domestic structure, public convenience and public utility installation.

6.5 Stakeholder Engagement

6.5.1 There are several groups who are important stakeholders in the planning and future management of LVNP, including government departments, existing farmers and NGO’s. The following list of stakeholders was suggested and provided by CEDD and AFCD.

- 古洞蔬菜產銷貸款有限責任合作社 (hereafter referred to as “古洞合作社”)
- 香港新界本地農協會(hereafter referred to as “本地農協會”)
- Hong Kong Conservancy Association (hereafter referred to as “CA”)
- Hong Kong Bird Watching Society (hereafter referred to as “HKBWS”)
- Farmers under CA/HKBWS Management Agreement

6.5.2 To facilitate the preparation of the plan, a stakeholder engagement programme has been initiated. Three meetings have been held to date (in January 2015) to gather views/opinions/suggestions for the future LVNP. These comprise:

- Meeting with CA/HKBWS/CEDD/AFCD (20 Jan 2015)
- Meeting with 本地農協會 (23 Jan 2015)
- Meeting with 古洞合作社 (29 Jan 2015)

6.5.3 The major issues raised during these meetings are summarized in Tables 6.1-6.3 below.

Table 6.1 Major issues discussed during the meeting with CA/HKBWS/CEDD/AFCD

Item	Issue	Concerned / Suggested Party(ies)
1.	The proposed access hierarchy plan in the approved EIA report was not appropriate. A more flexible management framework should be provided.	CA/HKBWS
2.	Cultural, educational and heritage aspect should be maintained and enhanced in addition to ecological considerations.	HKBWS
3.	Dry and wet farming be maintained at a suitable ratio to provide different habitats for different species.	CA
4.	Flexibility should be allowed to adjust farmland locations, management practice and crops types across the whole area. Entry to the areas within the Public Access Zone and Limited Access Zone should be controlled by some access points subject to ecological condition rather than on a fixed zoning.	CA
5.	It is noted that new construction should be incompatible with the existing agricultural landscape. Facilities should be flexible and should not be fixed or concentrated at one location, and existing bunds/pathways should be maintained where possible.	CA/HKBWS
6.	Assessment of adaptive reuse potential in existing buildings is suggested in the future HCMP would be carried out.	CA
7.	A study for the hydrology of the area to assess potential alternative water supplies is suggested.	HKBWS
8.	It is suggested that a Code of Conduct should be developed for all park visitors (and for photographers in particular)	CA
9.	It is noted that compensation was the basic concern for most farmers and landowners, and they also concerned about the potential damage to the ecological value of the habitats in LVNP during the transition period before land resumption.	CA/HKBWS
10.	Engagement with farmers and local residents in formulating the management plan is suggested.	CA/HKBWS

Table 6.2 Major issues discussed during the meeting with 本地農協會

Item	Issue	Concerned / Suggested Party(ies)
1.	農協會 emphasized they could promote organic farming, and selling the vegetative produce in a competitive cost. As such, It is suggested that some areas need to be provided for the above practice.	本地農協會
2.	Future management organization should be more comprehensive. Infrastructure construction is suggested.	本地農協會
3.	In order to make the Long Valley' s transportation more convenience, a road is suggested to be constructed through the future Long Valley Nature Park.	本地農協會
4.	Cycle path and jogging path is suggested to be included into the future design of Long Valley Nature Park.	本地農協會

Table 6.3 Major issues discussed during the meeting with 古洞合作社

Item	Issue	Concerned / Suggested Party(ies)
1	古洞合作社 emphasized that their major concern is the compensation for the crops/plants and they also concerned if they would be allowed to continue farming in LVNP.	古洞合作社
2	古洞合作社 considered the water quality in Long Valley is acceptable for watering the agriculture and they have been utilizing such water source for over 20 years.	古洞合作社
3	As some of the farmers are living within Long Valley, 古洞合作社 suggested that the future development should cater residential areas for those farmers.	古洞合作社
4	With the convenient transportation network around Long Valley, there is no need to construct a new access/footpath/road across the LVNP to facilitate access between Ho Sheung Heung and Yin Kong.	古洞合作社
5	古洞合作社 expressed that majority of the existing farmers are not practicing organic agriculture due to the costly and complicated procedures.	古洞合作社
6	古洞合作社 is willing to provide explanations and demonstrations in farming for visitors inside the park.	古洞合作社
7	In the cooperation of 古洞合作社 with CA/HKBWS, farmers who cultivated low-priced crops were subsidized. 古洞合作社 is looking for subsidy classification according to different types of crop.	古洞合作社

6.5.4 A debriefing forum has been held to provide background information on detailed design, implementation, maintenance and monitoring recommendation for the proposed LVNP on 26 Jan 2017. A follow up discussion forum on the HCMP and latest design elements in visitor zone has been held on 26 September 2018. Non-governmental organizations (NGOs) including HKBWS, CA, Green Power (GP), WWF – Hong Kong, Environmental Association Ltd. (EA) and Kadoorie Farm and Botanical Garden (KFBG) have been participated.

6.6 Summary

6.6.1 Information gathered based on the existing conditions of Long Valley, findings from previous studies and assessment, statutory requirements and suggestions from relevant stakeholders have been collected and considered for incorporation into the HCMP. The key elements identified are listed as below:

- Compliance with legal/regulatory requirements of the EIA, EP and OZP;
- Develop a management plan with the primary intention to preserve the existing ecological resources of Long Valley;
- Maintain overall habitat integrity as the largest freshwater wetland habitat in Hong Kong;
- Maintain the mosaic pattern of dry and wet agricultural lands;
- Maintain and enhance ecological connectivity within LVNP and with the surrounding agricultural lands;
- Identify and provide suitable habitats for target species;
- Enhance agricultural management practices to increase biodiversity value by leveraging experiences from MA;
- Maintain commercial agricultural elements and promote organic farming;
- Provide equitable agreements with existing farmers;
- Promote cultural heritage/environmental education;

- Provision of a visitor centre on the west side of Sheung Yue River;
- Provision of maintenance access in the southern boundary of LVNP;
- Management flexibility in internal zoning and management;
- Maintain free public access but at the same time implement measures to control visitors access; and
- Improve water source in terms of water quality, water supply and water management.

7 DETAILED HABITAT MANAGEMENT OBJECTIVES

7.1 Target Species

7.1.1 As identified in the EIA report, target species for LVNP include species that are associated with agricultural land (especially wet agricultural land) and species that could be significantly impacted as a result of the NDA.

In addition, regularly occurring species and/or species of conservation importance identified in the EIA report and target species under the current MA scheme should also be the target species of LVNP. The list of target species of the HCMP as provided in Tables 7.1-7.3 below are determined by a compilation of recommended species from the PMP, target species of the MA scheme and any species of conservation importance that have been recently recorded at Long Valley and are known to have a restricted distribution to areas of large wetland.

7.1.2 Information presented in the EIA was obtained prior to 2013. In order to ensure that all important species recorded at Long Valley in recent years would be included, a review of recent bird surveys has been undertaken. Findings revealed that the abundance and diversity of Buntings (*Emberiza* sp.) have increased in recent years. In particular, Crested Bunting, a species that is now rare in Hong Kong (Fellowes *et al*, 2002) due to the lack of rice paddies, has been recorded at Long Valley consistently since 2010 during the migration months (Sung *et al.*, 2011). The importance of Long Valley to Buntings has become more evident in recent years with the increasing area of rice paddies being planting under the MA Scheme. In addition to the target bird species identified in the EIA, target species under the current MA scheme, Crested Bunting has also been added to the list. The total number of target bird species is 73 (Table 7.1).

Table 7.1 Avifauna Target Species of Long Valley Nature Park

	Common Name ⁽¹⁾	Scientific Name	Distribution in Hong Kong ⁽²⁾	Level of Concern ⁽³⁾	Protection Status	PMP of EIA	Target Species under MA scheme	HCMP Target Species
1	Japanese Quail	<i>Coturnix japonica</i>	Scarce	LC	Near Threatened ⁽⁴⁾	✓	✓	✓
2	Northern Shoveler ⁽⁷⁾	<i>Anas clypeata</i>	Abundant	RC	-		✓	✓
3	Northern Pintail ⁽⁷⁾	<i>Anas acuta</i>	Abundant	RC	-		✓	✓
4	Garganey ⁽⁷⁾	<i>Anas querquedula</i>	Common	-	-		✓	✓
5	Eurasian Teal ⁽⁷⁾	<i>Anas crecca</i>	Common	RC	-	✓	✓	✓
6	Black-faced Spoonbill ⁽⁷⁾	<i>Platalea minor</i>	Common	PGC	Endangered ⁽⁴⁾ Class II ⁽⁶⁾		✓	✓
7	Yellow Bittern ⁽⁷⁾	<i>Ixobrychus sinensis</i>	Uncommon	(LC)	-	✓	✓	✓
8	Von Schrenck's Bittern ⁽⁷⁾	<i>Ixobrychus eurhythmus</i>	Scarce	RC	-	✓	✓	✓
9	Cinnamon Bittern ⁽⁷⁾	<i>Ixobrychus cinnamomeus</i>	Scarce	LC	-	✓	✓	✓

	Common Name ⁽¹⁾	Scientific Name	Distribution in Hong Kong ⁽²⁾	Level of Concern ⁽³⁾	Protection Status	PMP of EIA	Target Species under MA scheme	HCMP Target Species
10	Black-crowned Night Heron ⁽⁷⁾	<i>Nycticorax nycticorax</i>	Common	(LC)	-	✓	✓	✓
11	Chinese Pond Heron ⁽⁷⁾	<i>Ardeola bacchus</i>	Common	PRC (RC)	-	✓	✓	✓
12	Eastern Cattle Egret ⁽⁷⁾	<i>Bubulcus coromandus</i>	Common	(LC)	-	✓	✓	✓
13	Grey Heron ⁽⁷⁾	<i>Ardea cinerea</i>	Common	PRC	-	✓	✓	✓
14	Great Egret ⁽⁷⁾	<i>Ardea modesta</i>	Common	PRC (RC)	-	✓	✓	✓
15	Intermediate Egret ⁽⁷⁾	<i>Egretta intermedia</i>	Common	RC	-	✓	✓	✓
16	Little Egret ⁽⁷⁾	<i>Egretta garzetta</i>	Common	PRC (RC)	-	✓	✓	✓
17	Eurasian Hobby ⁽⁸⁾	<i>Falco subbuteo</i>	Uncommon	(LC)	Class ⁽⁶⁾ Cap. 586 ⁽⁸⁾	✓		✓
18	Ruddy-breasted Crane	<i>Porzana fusca</i>	Scarce	LC	-	✓	✓	✓
19	Black-winged Stilt ⁽⁷⁾	<i>Himantopus himantopus</i>	Common	RC	-	✓	✓	✓
20	Pied Avocet ⁽⁷⁾	<i>Recurvirostra avosetta</i>	Abundant	RC	-	✓		✓
21	Grey-headed Lapwing ⁽⁷⁾	<i>Vanellus cinereus</i>	Scarce	LC	-		✓	✓
22	Pacific Golden Plover ⁽⁷⁾	<i>Pluvialis fulva</i>	Common	LC	-	✓	✓	✓
23	Little Ringed Plover ⁽⁷⁾	<i>Charadrius dubius</i>	Common	(LC)	-	✓	✓	✓
24	Greater Painted-snipe ⁽⁷⁾	<i>Rostratula benghalensis</i>	Passage migrant and winter visitor	LC	-	✓	✓	✓
25	Pheasant-tailed Jacana ⁽⁷⁾	<i>Hydrophasianus chirurgus</i>	Scarce	LC	-	✓	✓	✓
26	Swinhoe's Snipe ⁽⁷⁾	<i>Gallinago megala</i>	Uncommon	LC	-	✓	✓	✓
27	Marsh Sandpiper ⁽⁷⁾	<i>Tringa stagnatilis</i>	Common	RC	-	✓		✓
28	Common Greenshank ⁽⁷⁾	<i>Tringa nebularia</i>	Abundant	RC	-	✓	✓	✓
29	Green Sandpiper	<i>Tringa ochropus</i>	Uncommon	-	-		✓	✓
30	Wood Sandpiper ⁽⁷⁾	<i>Tringa glareola</i>	Common	LC	-	✓	✓	✓
31	Temminck's Stint ⁽⁷⁾	<i>Calidris temminckii</i>	Uncommon	LC	-	✓	✓	✓
32	Long-toed Stint ⁽⁷⁾	<i>Calidris subminuta</i>	Uncommon	LC	-	✓	✓	✓

	Common Name ⁽¹⁾	Scientific Name	Distribution in Hong Kong ⁽²⁾	Level of Concern ⁽³⁾	Protection Status	PMP of EIA	Target Species under MA scheme	HCMP Target Species
33	Red-necked Phalarope ⁽⁷⁾	<i>Phalaropus lobatus</i>	Common	-	-		✓	✓
34	Oriental Pratincole ⁽⁷⁾	<i>Glareola maldivarum</i>	Passage migrant	LC	-	✓	✓	✓
35	Savanna Nightjar	<i>Caprimulgus affinis</i>	Uncommon	-	-		✓	✓
36	House Swift	<i>Apus nipalensis</i>	Common	-	-		✓	✓
37	White-throated Kingfisher ⁽⁷⁾	<i>Halcyon smyrnensis</i>	Common	(LC)	-	✓	✓	✓
38	Black-capped Kingfisher ⁽⁷⁾	<i>Halcyon pileata</i>	Common	(LC)	-		✓	✓
39	Common Kingfisher ⁽⁷⁾	<i>Alcedo atthis</i>	Common	-	-		✓	✓
40	Pied Kingfisher ⁽⁷⁾	<i>Ceryle rudis</i>	Uncommon	(LC)	-	✓		✓
41	Eurasian Hoopoe	<i>Upupa epops</i>	Occasional	-	-		✓	✓
42	Eurasian Wryneck	<i>Jynx torquilla</i>	Uncommon	-	-		✓	✓
43	Long-tailed Shrike	<i>Lanius schach</i>	Common	-	-		✓	✓
44	Black Drongo	<i>Dicrurus macrocercus</i>	Common	-	-		✓	✓
45	Collared Crow ⁽⁹⁾	<i>Corvus torquatus</i>	Uncommon	LC	Vulnerable ⁽⁴⁾	✓	✓	✓
46	Eurasian Skylark	<i>Alauda arvensis</i>	Rare	-	-		✓	✓
47	Barn Swallow	<i>Hirundo rustica</i>	Abundant	-	-		✓	✓
48	Red-rumped Swallow	<i>Cecropis daurica</i>	Uncommon	-	-		✓	✓
49	Japanese Bush Warbler	<i>Horornis diphone</i>	-	-	-		✓	✓
50	Dusky Warbler	<i>Phylloscopus fuscatus</i>	Common	-	-		✓	✓
51	Oriental Reed Warbler	<i>Acrocephalus orientalis</i>	Common	-	-		✓	✓
52	Black-browed Reed Warbler	<i>Acrocephalus bistrigiceps</i>	Common	-	-		✓	✓
53	Lanceolated Warbler	<i>Locustella lanceolata</i>	Scarce	-	-		✓	✓
54	Pallas's Grasshopper Warbler	<i>Locustella certhiola</i>	Common	LC	-	✓	✓	✓

	Common Name ⁽¹⁾	Scientific Name	Distribution in Hong Kong ⁽²⁾	Level of Concern ⁽³⁾	Protection Status	PMP of EIA	Target Species under MA scheme	HCMP Target Species
55	Zitting Cisticola	<i>Cisticola juncidis</i>	Common	LC	-	✓	✓	✓
56	Golden-headed Cisticola	<i>Cisticola exilis</i>	Scarce	LC	-	✓	✓	✓
57	Red-billed Starling⁽⁷⁾	<i>Spodiopsar sericeus</i>	Common	GC	-		✓	✓
58	White-cheeked Starling	<i>Spodiopsar cineraceus</i>	Common	PRC	-		✓	✓
59	Black-collared Starling	<i>Gracupica nigricollis</i>	Common	-	-		✓	✓
60	Bluethroatt	<i>Luscinia svecica</i>	Common	LC	-	✓	✓	✓
61	Siberian Rubythroatt	<i>Luscinia calliope</i>	Common	-	-		✓	✓
62	Stejneger's Stonechat	<i>Saxicola stejnegeri</i>	Common	-	-		✓	✓
63	Eastern Yellow Wagtail	<i>Motacilla tschutschensis</i>	Common	-	-		✓	✓
64	Citrine Wagtail	<i>Motacilla citreola</i>	Scarce	LC	-	✓	✓	✓
65	Richard's Pipit	<i>Anthus richardi</i>	Common	-	-		✓	✓
66	Olive-backed Pipit	<i>Anthus hodgsoni</i>	Common	-	-		✓	✓
67	Pechora Pipit	<i>Anthus gustavi</i>	Scarce	LC	-	✓	✓	✓
68	Red-throated Pipit	<i>Anthus cervinus</i>	Common	LC	-	✓	✓	✓
69	Buff-bellied Pipit	<i>Anthus rubescens</i>	Rare	LC	-	✓	✓	✓
70	Crested Bunting	<i>Emberiza lathamii</i>	Rare	LC	-			✓
71	Chestnut-eared Bunting	<i>Emberiza fucata</i>	Scarce	LC	-	✓	✓	✓
72	Yellow-breasted Bunting	<i>Emberiza aureola</i>	Common	RC	Critically Endangered ⁽⁴⁾	✓	✓	✓
73	Japanese Yellow Bunting	<i>Emberiza sulphurata</i>	Scarce	GC	Vulnerable ⁽⁴⁾	✓	✓	✓

* Species in bold font are of conservation importance

- All wild birds are protected under Wild Animals Protection Ordinance (Cap. 170).
- AFCD (2015).
- Fellowes *et al.* (2002): RC=Regional Concern; LC=Local Concern; PRC=Potential Regional Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
- IUCN (2018). IUCN Red List of Threatened Species.
- Zheng, G. M. and Wang, Q. S. (1998).
- List of Wild Animals Under State Protection (promulgated by State Forestry Administration and Ministry of Agriculture on 14 January, 1989). [國家重點保護野生動物名錄(1989年1月14日林業局及農業部發佈施行)]
- Wetland-dependent species (including wetland-dependent species and waterbirds).
- Protected under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

7.1.3 In addition to avifauna, Long Valley is also known to support an abundance of amphibian species. All ten amphibian species that have been previously recorded at Long Valley will form the target species list for amphibian of the management plan. This is similar to the approach of the MA scheme. Chinese bullfrog is a species of conservation importance that is of Potential Regional Concern (Fellowes et al., 2002) has been targeted in the habitat enhancement measures in previously years under the MA Scheme. Special attention will be paid to the habitat requirements of this species in the future management plan. Refer to the **Table 7.2** below for the complete list of targeted amphibian species.

Table 7.2 Amphibian Target Species of Long Valley Nature Park

Common Name	Scientific Name	Distribution in Hong Kong ⁽¹⁾	Level of Concern ⁽²⁾	PMP of EIA	Target Species under MA scheme	HCMP Target Species
Asian Common Toad	<i>Bufo melanostictus</i>	Widely distributed	-		✓	✓
Spotted Narrow-mouthed Frog	<i>Kalophrynus interlineatus</i>	Widely distributed from low to moderate altitudes in northern and central New Territories	-		✓	✓
Asiatic Painted Frog	<i>Kaloula pulchra</i>	Widely distributed	-		✓	✓
Butler's Pigmy Frog	<i>Microhyla butleri</i>	Widely distributed	-		✓	✓
Ornate Pigmy Frog	<i>Microhyla ornata</i>	Widely distributed	-		✓	✓
Marbled Pigmy Frog	<i>Microhyla pulchra</i>	Widely distributed	-		✓	✓
Paddy Frog	<i>Fejervarya limnocharis</i>	Widely distributed	-		✓	✓
Chinese Bullfrog	<i>Hoplobatrachus chinensis</i>	Widely distributed in Lantau Island and New Territories	PRC	✓	✓	✓
Gunther's Frog	<i>Rana guentheri</i>	Widely distributed	-		✓	✓
Two-striped Grass Frog	<i>Rana taipehensis</i>	Distributed in Sai Kung, Tai Lam Country Park, Pat Sin Leng Country Park, Tai A Chau	LC	✓		✓
Brown Tree Frog	<i>Polypedates megacephalus</i>	Widely distributed	-		✓	✓

Note:

* Species in bold font are of conservation importance

1. AFCD (2015).

2. Fellowes et al. (2002): PRC=Potential Regional Concern.

- 7.1.4 Reptiles were also recommended in the PMP as target species. The provision of habitat for snake species in general to benefit the reptile species of conservation importance previously recorded at Long Valley (Buff-striped Keelback, Many-banded Krait, Chinese Cobra and King Cobra) should be implemented in LVNP.
- 7.1.5 The target species above are identified based on the existing ecological profile of Long Valley. Should the future enhancement measures effectively attract other species of conservation importance or the statuses of currently unprotected species become protected (findings from the development of the Hong Kong Red List under BSAP), the list target species of LVNP should be reviewed and where appropriate, adjusted accordingly.

7.2 Target Habitats

- 7.2.1 The provision of suitable habitat types plays an important role to meeting the objectives of LVNP. The primary intention of the target habitats is to provide suitable foraging and roosting grounds for target species: waterbirds and wetland-dependent species (i.e. ardeids, waders, sandpipers, kingfishers, crakes and rails), granivores, open area/farmland birds, amphibians and reptiles. These habitats should also provide breeding grounds for various target species (e.g., greater painted-snipe, little grebe and Chinese Bullfrog).
- 7.2.2 Based on the needs and characteristics of the target species (**Section 7.1**), wetland habitats/wet agricultural land will be the primary target habitats. However, the inclusion of dry agricultural land is also important to diversify the habitats present. Aside from generalist bird species, dry agriculture is also an important habitat for some uncommon species such Japanese quail (*Coturnix japonica*) (Leven, n.d.).
- 7.2.3 Five habitat types that are known to have successfully achieved the targets of attracting birds and amphibians under the MA scheme would be incorporated into LVNP:
- **Shallow Water Habitat (SWH):** an area of relatively undisturbed, very shallow water that is free of weeds and crops.
 - **Less Intensive Wet Agricultural Land (LI-WAL):** consists of mainly wet crops such as paddy rice, water chestnut, chinese arrow-head raised at a lower labour input than commercial crops.
 - **Intensive Agricultural Land (IAL):** consists of mainly wet crops such as water spinach and watercress.
 - **Water Flea Ponds (WFP):** shallow, nutrient-rich ponds that are maintained free of vegetation and used to raise invertebrates for aquarium fish food.
 - **Fish and Marsh Pond (FMP):** ponds with emergent vegetation (i.e. lotus and water lily).
- 7.2.4 In addition to these, three further habitat types would be included as Target Habitats under the LVNP:
- **Dry Agricultural Lands (DAL):** consists of farming mono-species such as lettuce and beets.
 - **Deep water Pond (DWP):** fish fry are added and ponds are drained for waterbird use.
 - **Reedbed (RB):** densely planted with reeds (*Phragmites australis*).
- 7.2.5 DAL and DWP are currently present at Long Valley but not target habitats under the MA Scheme. RB is not currently present at Long Valley but is likely valued as a foraging and breeding habitat for target avifaunal species.
- 7.2.6 Should other habitat types be identified as useful foraging and breeding grounds for birds and/or amphibians be identified in the future, these habitat types should be included as a target habitat as well.

7.3 Landscape, Cultural and Educational Targets

- 7.3.1 A key planning objective of LVNP is to conserve agricultural landscape character and landscape resources of Long Valley. Its historical and cultural context is to be recognized and protected through careful site planning which avoids unnecessary disturbance to the existing landscape conditions and fabric. Existing footpaths, earth bunds and landscape features will be retained and improved selectively and will be utilized as far as possible to minimize the extent of disturbance. Key historical and cultural elements, as well as the landscape context, will provide an important integrated educational resource for LVNP.

8 DESIGN AND MANAGEMENT PLANNING

8.1 Management Zoning

8.1.1 The zoning of land use in the LVNP is primarily intended to maintain the existing mosaic pattern of wet and dry agriculture, while controlling the activities that could potentially disturb target habitats and species. To achieve this, agricultural lands for commercial farming and biodiversity conservation farming have been allocated to different parts of the Nature Park. In addition, a small section of the Nature Park will be designated as a visitor zone, allowing visitors to experience the diverse agricultural practices of Long Valley without encroaching sensitive areas of the park to minimize human disturbance. The overall landuse character of the LVNP can therefore be considered as three broad zones:

- **Visitor Zone (VZ)** – 4.86ha in the northwest corner of the LVNP designed to accommodate visitor as well as storage and other facilities.
- **Agriculture Zone (AZ)** – 11.20ha across the northern portion of the LVNP largely designated for commercially focused crop production.
- **Biodiversity Agriculture Zone (BAZ)** – 21.24ha across the southern portion of the LVNP largely designated for biodiversity conservation.

8.1.2 The zoning plan is (shown in **Figure 8.1.1 and 8.1.2**) recognizes the importance of maintaining commercial agricultural activities in Long Valley, with the AZ separated from BAZ to minimize potential conflicts between management objectives and goals. However, it is important to note the zoning plan should not impact habitat heterogeneity. The AZ and BAZ would be managed as a single unit to ensure the existing mosaic pattern of different crop types and habitats across the whole LVNP is maintained and enhanced.

8.1.3 Further descriptions of the three broad management zones are provided in the following sections.

Visitor Zone

8.1.4 The proposed VZ is located at the far west of LVNP. This location is preferred as a VZ for several reasons:

- Existing habitats in this area are of relatively low ecological value compared to other portions of the site.
- Based on the layout of the NDA, this area will also be located nearest to the Technology Park and Kwu Tung Town Center, and therefore potentially subject to higher levels of disturbance than the rest of the LVNP.
- It is adjacent to the proposed visitor center across the Sheung Yue River.

8.1.5 All habitat types of the LVNP would be provided in the VZ for educational purposes. Well maintained footpaths/boardwalks (routed largely along existing concrete pathways) would provide access to a variety of landscapes and control circulation within visitor area.

8.1.6 The management objective of the VZ is to provide educational activities, including but not limited to, guided tours, birdwatching stations, information stands and interactive areas where visitors can gain first-hand experience in farming.

8.1.7 The size of the VZ (4.86ha) is based primarily on the smallest size required to provide a reasonable circulation loop and areas of interest for visitor experience.

Agriculture Zone

- 8.1.8 The AZ is proposed along the northern side of LVNP, along Sheung Yue River. The total area of AZ is 11.20ha whilst the total area of agricultural plots within the AZ is 9.17 ha.
- 8.1.9 The intention of this zone is to maintain commercial farming within the LVNP as requested by the consulted stakeholders, whilst separating farming areas for commercial use and biodiversity enhancement to minimize crop damage by birds and other potential conflicting management issues. Within the AZ, commercial farming is permitted with some limitations as to what types of crops are to be planted (wet or dry crops), and how these crops are raised (e.g., use of pesticides/fertilizers). These limitations will ensure that the overall ratio and mosaic patterns of wet and dry agriculture across the entire LVNP can be controlled.

Biodiversity Agriculture Zone

- 8.1.10 The majority of the LVNP will be zoned as BAZ. The total area of AZ is 21.24ha whilst the total area of agricultural plots within the BAZ is 18.06 ha. This zone is located along the eastern side and southern part of the LVNP, and includes the majority of agricultural lands under the current MA scheme. This portion of the LVNP also has the best access to irrigation water ditches, as well as having good boundary access control.
- 8.1.11 The primary objective for this zone is to provide foraging, roosting and potential breeding sites for waterbirds, wetland-dependent species and amphibians. The BAZ will increase the total area of land managed primarily for biodiversity conservation in the LVNP area from 7.86ha to 18.06ha. This will fulfill the requirements of the EIA, adequately compensating for the loss of 5.82ha relatively low value wetland from the NENT NDA, outside of the LVNP.
- 8.1.12 An appropriate mix of wet and dry agricultural activities will be managed in this zone, with some crops (especially rice paddies) left on-site after ripening to provide foraging for birds. This area will be mainly accessed by the management parties of LVNP: casual visitors will be discouraged from entering.

8.2 Habitat Management

- 8.2.1 Within the overall zoning framework described in Section 8.1, management of the LVNP should allow for a high degree of flexibility to maintain and enhance the existing complex mosaic of habitats at Long Valley. To allow for this, detailed management prescriptions are not provided for most agricultural plots, allowing managers to determine the appropriate course of action to take based on the results of on-going monitoring and particular circumstances at each plot (e.g., presence of nesting birds, crop rotation planning, condition of adjacent plots). Nevertheless, some general management considerations are relevant to the entire LVNP (described in Sections 8.2.2-8.2.11). More specific management prescriptions for different land-uses/habitat types are provided in Sections 8.2.12-8.2.23.

General Management Considerations

- 8.2.2 The existing pattern of agricultural plots and the bunds demarcating these plots will be maintained. Areas of abandoned agricultural land within the LVNP will be resumed for commercial or biodiversity focused agriculture/aquaculture.

- 8.2.3 Existing built structures within the LVNP are generally of poor quality, and (subject to the findings of building inspections) are unlikely to meet required safety, health and environmental standards. These buildings would be removed as part of the LVNP implementation.
- 8.2.4 Areas of fruit tree plantation along the bunds of the central north LVNP could be transplanted to the northern and eastern boundaries of the LVNP if necessary. At the present location, these trees break up the open landscape of Long Valley, and reduce the ecological value of adjacent wet agricultural land and fishponds to target species (especially wetland and open country avifauna species).
- 8.2.5 Low-ecological value areas within the LVNP (including existing open-storage areas, location of built structures to be removed, and fruit trees to be transplanted) should be used for construction of education facilities, storage areas or other required built structures to avoid encroaching on existing agricultural land.
- 8.2.6 Existing public access to the LVNP should be maintained, but the number and location of access points should be controlled through the use of soft landscape features. These will comprise a small water filled ditch along the southern boundary of the LVNP, and level-change/dense tree screen planting along the remaining boundary areas. Details of these boundary treatments are provided in **Section 8.6**.
- 8.2.7 Internal access and circulation through the LVNP should be carefully controlled. New paths and boardwalks will be provided in the VZ to cater for higher visitor densities. Improved paths and boardwalks are required in this area for increased capacity, improved visitor experience, safety, ease of maintenance and improved access for the physically disabled. New paths and boardwalks would be constructed along existing concrete pathways in the VZ where possible to minimize disturbance to adjacent agricultural land. Access to the AZ and BAZ from the VZ would be controlled through gates. Access within the AZ and BAZ would be along existing pathways and bunds: no pathway improvement would be provided in these zones. Further details of pathways, boardwalks and other visitor facilities are provided in **Section 8.4**.
- 8.2.8 Management of all three LVNP zones should be integrated to maintain and enhance the mosaic of habitats across Long Valley. Plots should be managed to increase the proportion of wet agricultural land to about 70%, with 30% of plots maintained as dry agricultural land. The distribution of wet and dry agricultural land should be well distributed throughout the VNP to increase overall habitat heterogeneity.
- 8.2.9 Crop rotation should be practiced both spatially and temporally. This will optimize the crop production potential of each agricultural plot, as well as creating “new” habitats for birds to forage and roost. Crop rotation cycles should be carefully considered to maximize planting of different crops in adjacent fields (thereby increasing overall habitat heterogeneity).
- 8.2.10 Agricultural land should be left fallow for one year every two to three years. Land should be managed to ensure active and fallow agricultural land is well distributed throughout the LVNP to increase overall habitat heterogeneity. Fallow land can be left dry or flooded to create shallow water habitats.

- 8.2.11 As is the case with the existing MA, agricultural techniques should draw on the knowledge and experience of local farmers with regards to planting, crop care, harvesting, irrigation etc. In addition, all agriculture and aquaculture within the LVNP should make reference to the latest version of the ***Organic Production, Aquaculture and Processing Standard (IFOAM Accredited Version)***, published by Hong Kong Organic Resource Centre Certification Limited (HKORCCL). The types of pesticides and fertilizers allowed in the LVNP will be determined by management party making reference to the Standard. These Standards are included for reference in **Appendices 8.1 and 8.2.**

Specific Management Prescriptions

Shallow Water Habitat (SWH)

- 8.2.12 The creation of SWH is similar to the traditional practice of flooding fallow agricultural land in Long Valley. It requires active management to maintain optimal water levels of 1-5cm. The amount of water required is determined according to soil permeability as well as weather conditions. Maintaining sufficient water levels also minimizes issues with invasive weeds. It should be noted that observations by CA and HKBWS have shown a potential decline in bird usage for SWHs after six to seven years. Based on this, SWHs should be converted to other types of habitats (i.e. wet agricultural land or dry agricultural land) at least once every five years. This habitat type targets waterbirds and wetland-dependent species including waders, ducks, ardeids and kingfishers.

Less Intensive Wet Agricultural Land (LI-WAL)

- 8.2.13 Wet agriculture crops that have previously been successfully planted at Long Valley will continue to be planted in the future LVNP, this includes rice paddy, water lily, water chestnut, lotus, water bamboo, canna lily and Chinese arrowhead. For all wet crops, maintaining water levels is an important management task, which needs to be adjusted depending on crop type and maturity. Soil and weather conditions will determine how frequently water needs to be added. Based on past experience from the MA, watering frequency varies from daily to once every five days. Similar to SWHs, target species of LI-WAL includes a number of waterbird species. Additionally, the crops present provide feeding opportunities for buntings.
- 8.2.14 Planting rice to provide habitat for granivores (seed-eating birds) differs slightly from that of commercial rice production. Seeding density is low to actually reduce crop production: this minimizes the amount of leftover grain (as the birds' foraging demands are low). Seeds should be planted far apart enough so that there is sufficient space for crakes and rails to navigate within the rice paddy. In terms of ecological monitoring, this planting method also allows for easier observations of the birds utilizing the rice paddies. Similar to the existing MA scheme, rice paddies should be planted twice a year, once in March/April and the second in July/August. Rice planted in the second season will mature in time to provide food for the arrival of buntings in November (when they stopover in Hong Kong). Following the migration month, rice paddies should remain un-harvested over the winter to provide feeding grounds for birds.

Intensive Agricultural Land (IAL)

- 8.2.15 Intensively managed agricultural land includes mainly watercress and water spinach farm- lands which are the commonest habitat type and area crucial component of the freshwater agricultural wetland habitat in Long Valley. They maintain the wetland biodiversity of Long Valley. Yellow and citrine wagtails, pipits, ardeids and *Gallinago* snipes are the target species of this habitat.

Water Flea Ponds (WFP)

- 8.2.16 Water flea ponds are relatively low-maintenance compared to other habitat types. Management requirements include weed removal along the bunds, sterilization of bottom of the pond and addition of livestock manure to feed the water fleas. As in the past, chicken manure could be added. Experience from the MA demonstrates that this habitat type is highly successful in attracting targeted waterbirds, especially pied avocet and black-winged stilts.

Fish and Marsh Pond (FMP)

- 8.2.17 Management of fish and marsh pond involves planting emergent vegetation and water lily and management of marsh habitat. Water lily can be planted between March and July. The emergent aquatic vegetation and relatively deeper water depth compared to SWH and LI- WAL provides suitable foraging and roosting ground for target species like ducks, rails and coots.

Dry Agricultural Lands (DAL)

- 8.2.18 Dry agriculture practices consist of planting of mono-species (i.e. lettuce, beets, etc.). Current farming practices of Long Valley for crop production will be implemented in LVNP. The target species for DAL includes Japanese quail, pipits and starlings.

Deep Water Pond (DWP)

- 8.2.19 This habitat type refers to typical aquaculture ponds that are managed for ecological enhancement. Typical management actions would include the annual addition of fish fry/trash fish and vegetation control (especially during the wet season months), to avoid the succession of reeds and grass into the water body. Pond draining would be conducted during the winter months to provide feeding ground for waterbirds: water levels should be drained to 30cm or less to allow waterbirds to stand comfortably. Deep water ponds within LVNP should be drained at different times of the dry season so that foraging grounds are available for an extended period of time. It is suggested existing fishponds are converted to DWP within the LVNP, and similar techniques could be adopted at the abandoned meanders of Sheung Yue River. During the un-drained period, DWP will be utilized by kingfishers, pond margins would be used by rails and coots. During the drain-down period targeted waterbird species would forage on the fish remaining in the water.
- 8.2.20 This management technique was carried out previously under the MA scheme (**Section 4.3.14**) and is also a management technique under another MA project by the HKBWS, "Hong Kong Got Fish Pond – Eco-fishpond Management Agreement Scheme 2013-2015". Survey results from this project supported that drained fishponds support a significantly high abundance of waterbirds than un-drained pond (ACE, 2013b).

Reedbed (RB)

- 8.2.21 Under the HCMP, stands of *Phragmites australis* will be planted in the water treatment wetland area located in the VZ. Reedbeds are slow growing and require long term management. The water treatment wetland area should provide a water depth of approximately 60cm. Reedbeds provide suitable roosting sites for secretive bird species like bitterns.

Biodiversity Enhancement Measures

Breeding Birds

- 8.2.22 Small islands are proposed to be added to SWHs and FMP to enhance the habitats for potential breeding species. Bird islands made with weeds/grass provided at SWHs have been successful at attracting greater painted-snipe and white-breasted waterhen (Hung *et al.*, 2013). Grass clippings from these islands can also be used by other breeding species as nesting materials.
- 8.2.23 Observations from previous breeding bird surveys found little grebe favor deep water habitat with some aquatic vegetation for nest building, and some individuals were observed building nests on floating foam boxes (Hung *et al.*, 2013). Based on these observations, the provision of foam boxes and planting aquatic vegetation can be explored to enhance the breeding conditions for little grebe. These management works should be conducted before the start of the breeding season (March).
- 8.2.24 Aside from waterbird species, measures to enhance the breeding conditions for passerines should be explored. Nesting boxes for swallows and nesting holes for starling can be incorporated into the design of buildings within the LVNP.

Amphibians

- 8.2.25 The tadpole stage of amphibians lasts approximately two months, during this time they require the presence of water to survive. Water therefore needs to be maintained at wet agricultural land, marsh/fish pond and water flea ponds during the breeding months (March to September) to increase the reproduction success of amphibians.

Reptiles

- 8.2.26 The provision of refugia made up of leaf litter, logs and branches would provide favorable roosting sites for reptiles. Basking sites should also be provided in areas near fugias. Basking sites should be kept free or low coverage of vegetation so sunlight would be available for reptiles. Human disturbances should be kept to minimum at refugias and basking sites. Active management at basking sites would be required so that it is kept free of overgrown vegetation.

Invasive Species Control

Mikania

- 8.2.27 Mile-a-minute weed (*Mikania micrantha*) is a major invasive weed species in Hong Kong, overgrowing other native vegetative species. This vine species will climb upon the canopy of vegetation, forming a closed layer and blocking the sunlight from reaching vegetation underneath and thus killing it. It will also quickly cover bare ground that is a preferred foraging/breeding habitat for some species.
- 8.2.28 Currently, no native species in Hong Kong have been shown to naturally control the growth of the weed. A parasitic vine (*Cuscuta* sp.) can hinder mile-a-minute growth, but no concrete results had been shown so far (Zhang *et al.*, 2004). Regular physical removal of the mile-a-minute is conducted by volunteers in Long Valley as a control measure, which is considered as the only effective measure so far. This measure should also be adopted under the LVNP management.

Apple Snails

- 8.2.29 Apple snails (*Pomacea canaliculata*) were introduced to Asia from South America during the 1980s and spread rapidly in across the freshwater habitats of many countries. They pose a serious threat to the local ecosystem as they consume aquatic plants rapidly (and potentially predate other aquatic fauna), and change the habitat to a turbid environment dominated by planktonic algae (Carlsson *et al.*, 2004).
- 8.2.30 Various method of controlling apple snails have been investigated, including physical methods such as prolonged draught and installing screens, and chemical controls that reduce snail populations. These methods are not considered suitable in Hong Kong, due to various reasons such as ineffectiveness of physical methods and possible impacts to the native flora and fauna from chemical treatments (Leung and Wong, 2013). Instead, “Bottle Traps” have been found to effectively capture apple snails from ponds and paddy fields. During experimentation on the effects of these traps, water spinach was found to be effective as bait, attracting higher amount of snails. The advantage of using such trap was that snails can be effectively attracted and trapped while the baits were readily accessible with low costs. The plastic bottles that make up the trap were also found to be durable during experimentation, thus increasing effectiveness.
- 8.2.31 Other practices to diminish apple snail populations include manual collection and removal of adult snails, and killing the eggs by submerging them in water. This method is currently practiced by WWF-HK at Mai Po, and could be adopted at LVNP.
- 8.2.32 Lastly, experience from the current MA scheme suggests that crop rotation (with the application of pulverized lime between plantings) can effectively control apple snail populations. It is suggested that a combination of trapping, physical removal and crop rotation can be adopted to control apple snails.

Red Imported Fire Ant

- 8.2.33 Red Imported Fire Ants (*Solenopsis invicta*), also known as RIFA, are serious pests that have invaded Hong Kong as well as other countries around the world. Their mounds (nests) are usually found along ponds and in agricultural fields; and combined with their aggressive nature (and painful bites) mean they inflict both economic and ecological impacts by directly damaging field crops and preying on beneficial insects (e.g. pollinating insects). Various studies have suggested that presence of RIFA suppresses the population of herbivorous insects and other invertebrates (Eubanks, 2001; Wojcik *et al.*, 2001).
- 8.2.34 Both biological and physical methods have been considered and used for extermination of the fire ants in the world. Biological methods include introduction of pathogens (e.g. virus) and parasitoids (e.g. phorid flies) that target RIFA. Results of these biological methods are often not immediate, and there are also uncertainties and possible unintended harmful effects to other organism if the biological agent is not specific on the RIFA species. These biological measures have not been adopted in Hong Kong.
- 8.2.35 Physical and chemical control methods have shown effective results in Hong Kong and elsewhere. These methods include drenching or injecting the RIFA mounds with boric acid, and using baits which eliminate populations by toxicity, sterilization or inhibiting growth. Current management practice adopted by WWF at Mai Po mainly involves usage of baits placed around the RIFA mound.

- 8.2.36 For the LVNP, it is recommended Boric acid should be used to exterminate any identified ant colonies. To avoid re-infestation of the ants, nests in vicinity to each other shall be exterminated within a short period of time. The frequency for extermination would be determined by the managing party. Signage should be erected near the RIFA mounds to prevent visitors from accessing the mound and provoking the ants.

Greenhouse Frog

- 8.2.37 Greenhouse Frogs (*Eleutherodactylus planirostris*) have been recorded during seven years of amphibian studies within farmland areas in Ho Sheung Heung and Long Valley, with a highest record of 32 adults and juveniles captured within one night in Long Valley. This species originated from the Caribbean region, but has invaded and established in the Pacific region (Kraus *et al.*, 1999; Christy *et al.*, 2007). Diet of this species includes ants, which would lead to competition with native ant-eating amphibians (e.g. Microhylid community) within the farmland area (ECF 2014), and possibly out-competing the native amphibians in the area.
- 8.2.38 To ensure this species would not disrupt the local ecosystem in the area, close monitoring of this species should be conducted, coupled with appropriate measures such as immediate removal should its population spread out and show significant increase.

Feral Cats

- 8.2.39 Multiple domestic cats have been observed hunting and killing birds within Long Valley (ECF, 2014b). These feral cats would induce negative impact by attacking the target fauna to be protected and possibly damaging the crops and fields directly. Predation from these feral fauna would also reduce the viability of the wetland as refuges for other fauna such as birds (ECF, 2014; NSW DECC, 2008).
- 8.2.40 To avoid the target species (birds) from being attacked by cats, current measures under the MA include strapping on bells on these animals so that birds are alerted to their presence. Owners of domestic animals were also contacted and encouraged to do the same (ECF, 2014). Some feral animals were also collected and castrated before re-release to prevent increased populations in the managed area.

8.3 Water Management

Overall Water Management

- 8.3.1 The overall water management proposed for LVNP would make some minor changes to the existing system to address problems identified in **Section 3.1.8-3.1.14**. The overall plan is shown in **Figure 8.2.1**, and would include the following key elements:
- The primary irrigation source would remain water channeled from the Sheung Yue River
 - An enhanced irrigation ditch network would be provided to improve access to irrigation water and increase storage capacity of the LVNP
 - Improved management and maintenance would be implemented to prevent blockages and localized flooding
 - Water quality improvement would be improved through wetland treatment system
 - Reprofiling part of LV to improve water circulation as proposed in the PMP of the EIA could be considered. However, this method must also take into consideration of the green groups' concerns to maintain the historical condition of the site
 - A storage pond would be provided to further improve the water storage capacity and act as a buffer to flooding

Irrigation Water Supply

- 8.3.2 The existing main water supply source will be maintained under the planned LVNP. The inflatable dam at the Sheung Yue River would be retained to store the river water from the upstream (and prevent tidal intrusion). A water balance analysis has been conducted and concluded that the existing primary water source/supply from Sheung Yue River is able to satisfy the needs/demand of the future LVNP.
- 8.3.3 Poor irrigation water supply to the eastern part of the LVNP has been reported in the past. This may be caused by the over-extraction by upstream farmers in the west, or blockage and lack of irrigation channels within the LVNP area. Potential solutions would be to enlarge the ditches/channels to reduce the possibility of blockages and extend the distribution networks to the east by increasing the numbers of channels. These measures would also increase the water storage capacity within LVNP itself. The other potential solution is to develop a series of management procedures to limit the farmers at the west end will not over extracting water.

- 8.3.4 A further option (depending on the future water balance assessment), would be to increase the volume of river water diverted into the valley.

Irrigation Contingency Planning

- 8.3.5 Under drought conditions, water supply from Sheung Yue River could be limited and therefore contingency plan is required to ensure water supply to LVNP.
- 8.3.6 In the dry season, groundwater levels may drop as well as the water level in Sheung Yue River. Therefore, when both groundwater and river water are insufficient to supply required volume, the volume of water being diverted into Long Valley should be increased to ease the situation.
- 8.3.7 If there is insufficient water in the Sheung Yue River to provide water to LVNP, water stored in the wetland/irrigation ditch system/fishponds can be used as a short term measure to maintain the require volume of water in the LVNP. However, the volume of the wetland will be limited and it would only able to supply water for a few days.
- 8.3.8 In worst-case scenario (where there is insufficient water from other sources); potable water would be required to ensure the water supply in the LVNP will not be affected.

Flood Mitigation

- 8.3.9 Localized flooding has been reported at the most downstream (eastern) end of the LVNP due to the non-return valve stops flooding water discharged from the valley. To ease the flooding issue in this area, some interconnections between irrigation ditches and fishponds should be provided to channel flood waters into the ponds.

Water Quality

- 8.3.10 The main concerns of the water quality are *E.coli* and Faecal Coliforms. A wetland is proposed at the upstream of in the LVNP water system as shown in **Figure 8.3.1**. The main purpose of the wetland will be to remove total suspended solids as well as reduce coliform contents. The wetland will be separated into three main zones:
- **Sedimentation Pond** – Irrigation water flows from the culvert into a wetland via the open water inlet zone, which removes larger particles such as silt and clay.
 - **Macrophyte zone** – Water then passes through a macrophyte zone, the main zone of a wetland, where aquatic plants help to treat and clean the water, removing nutrients and coliforms.
 - **Open water zone** – The open water zone allows further settlement of the treated water to remove fine particles, as well as allowing solar penetration of the water to provide further disinfection.

Sedimentation Pond

- 8.3.11 The sedimentation pond is an open water area that allows water to flow out of a waterway and into a wetland. Its purpose is to:
- Reduce the speed of inflowing water
 - Trap coarse sediments
 - Protect the macrophyte zone
- 8.3.12 Aquatic plants around the edges of this zone can help reduce water flows during severe storms. A porous rock wall, which only allows water but not sediments to flow through should be constructed to separate the sedimentation and macrophyte zone.

Macrophyte zone

- 8.3.13 A macrophyte zone will support dense stands of *Phragmites australis*. The roots and stems of these plants support algae and bacteria, known as biofilms, which grow on their surface. The plants trap leaves and finer sediments, while the algae and bacteria convert soluble pollutants into nutrients and help treat the stormwater
- 8.3.14 Deeper sections will be provided near the inlet and outlet help water flow between the zones

Open Water Zone

- 8.3.15 Open water zone is downstream area that allows the water to sit for a period of time so that finer particles can settle and sink to the bed. A portion of this zone will be shallow which allow sunlight to penetrate through the water and kill unwanted bacteria such as E-Coli.
- 8.3.16 The treated river water from the wetland will then be distributed to the entire LVNP for irrigation.

8.4 Visitor Facilities

Visitor Accessibility

- 8.4.1 The LVNP Visitor Centre will be located on the northern bank of Sheung Yue River opposite to the VZ. A pedestrian footbridge will cross the river from the Visitor Centre, bringing visitors directly into the VZ. The footbridge alignment should be adjusted so it will connect with an existing concrete footpath, such that the designated visitor loop can make best use of existing built paths. Proposed paths within the VZ will be diverse in materiality – concrete, boardwalk, and earth path. They are well-defined and are easily accessible to visitors. Short guided tours within the VZ can be provided. (Refer to **Figure 8.4.1**).
- 8.4.2 Educational guided tours can be provided for parties interested in exploring the AZ and BAZ of the LVNP. Tours can extend beyond the boundary of LVNP and provide an understanding of a wider context including the history and culture of the agricultural communities. Proposed route also makes use of existing concrete paths to ensure minimal disturbance to the site (refer to **Figure 8.4.1**).

- 8.4.3 Further guided tours can be provided by those responsible for managing LVNP in the future. Tour routes shall be flexibly determined by the LVNP management with respect to seasons and actual site conditions.

Visitor Zone Attractions

- 8.4.4 The VZ provides a diversity of programme areas to maximize its educational and recreational values (Refer to **Figure 8.5.1 and 8.5.2**).
- 8.4.5 The Entrance Area provides viewing/photography point, sufficient signage and information.
- 8.4.6 Education Areas focus on displaying diverse agricultural practices and illustrating agricultural history of Hong Kong. Information board, audio guide and smart phone app will provide facts and Q&A along the path. Flexible arrangement shall be considered to take account of possible crop rotations
- 8.4.7 Experiential Farming Area provides visitors with opportunities to have first-hand experience of farming. This area comprises mainly dry agricultural fields, providing practices similar to a typical recreational farm. A composting facility is placed here for use of this Experiential Farming area, offering educational interests in ecological farming.
- 8.4.8 The Water Treatment Wetland Area is the demonstration area which visitors can walk through via boardwalk. It gathers run-off from the adjacent road and purifies this water naturally through *Phragmites australis* beds. Cleansed water will be diverted into irrigation channels for agricultural fields.
- 8.4.9 Communal / NGOs Area is open to communal or experimental farmers or organizations interested in “ecological agriculture” . This area provides a testing ground and out-reach opportunities for these organizations, and will become an integrated part of educational aspects of the VZ.
- 8.4.10 The proposed Event Area utilizes a degraded site to the south of the VZ. A large existing tree stands at the middle of the site, which should be retained as the landscape focal point. Farmer’s Forum under the tree is proposed as a multi-functional event space, serving as an outdoor classroom or place for festival events.

Paths / Boardwalks

- 8.4.11 Existing concrete paths, earth paths and earth bunds will be used as far as possible to minimize disturbance to the site. In the VZ, the existing concrete path of good condition will be used as major circulation route with minor improvements as necessary. An short additional length of concrete pathway would be required along the channelized river to complete the loop. Boardwalk is proposed to bring visitors around and through the proposed wetland treatment area, whereas upgrading some existing earth paths can bring visitors into the Experiential Farming Area. Minor path improvement work is needed, particularly at the access road in the Entrance Area. The majority of the VZ is flat land with good paths, allowing universal accessibility to be ensured in the majority of this area (Refer to **Figure 8.6.1**).

- 8.4.12 In the AZ and BAZ, most of the paths and earth bunds will remain unchanged. Paths along the route of guided tours will remain as earth paths or earth bunds but regular maintenance shall be carried out to keep them well-defined and reasonably accessible for visitors. Only areas of potential hazard will be upgraded and reinforced (Refer to **Figure 8.6.1**).

Bird Hides

- 8.4.13 One permanent bird watching station is suggested in the VZ, next to the proposed water treatment wetland (**Figure 8.5.2**) Either the reuse of existing structure or creating new structure compatible with Long Valley's characteristics shall be considered in design stage. The photomontage of the bird watching station is shown in **Figure 8.7.1**.

Signage and Information

- 8.4.14 Signage design shall be compatible with the agricultural landscape but must also be visible and legible, adequately guiding visitors and providing educational information. Audio tour and smart phone based applications can be considered as an integral part of the educational aspect of the LVNP. The flexibility allowed by these systems would be particularly important in LVNP, where changing agricultural practices and wildlife distributions will change frequently. Signage design shall be considered in more detail in the design stage, in particular making reference to current practices in Long Valley.

8.5 Maintenance Facilities

Equipment

- 8.5.1 HKBWS/CA are being consulted to obtain a complete list of equipment used for agricultural practice under the MA. Typical equipment required includes:
- Water pumps
 - Ploughing machines
 - Plastic crates
 - Wheel barrow
 - Two-wheel tractor
 - Various handheld tools (e.g., rake, shovel, sickle, hose, pitch fork)
 - Bamboo (for climbing crops)

Storage and Maintenance

- 8.5.2 Small huts for storing equipment and materials (e.g., fertilizers) are scattered throughout the existing LVNP. These are essential to ensure the smooth daily operation of agricultural practices and should be retained or upgraded as necessary. Other centralized storage facilities are required for storing larger equipment and materials or those which are needed less frequently (e.g., equipment and booths for events). A designated storage area is planned in the currently degraded site to the south of the Visitor Zone, whereas additional storage area can be incorporated inside the Visitor Centre.

Composting

- 8.5.3 A composting facility is provided at the edge of Experiential Farming Area as discussed in **Section 8.4.7**. It is located in the currently abandoned and fenced-off site, between the enhanced meander and recreational dry agricultural area.

8.6 Access and Security

Options presented in Preliminary Management Plan of Approved EIA

- 8.6.1 Under previous proposed concept design the entire LVNP will be fenced with access restricted as a clear demarcation of its boundary. Several options of access control are explored in the Preliminary Management Plan as follows:
- **Access for all visitors to the LVNP:** This would permit access by anyone from the visitor centre. Access would not be unrestricted in that visitors would be required to keep to paths and the path network could be managed such that some parts of the area would receive fewer visitors.
 - **Access by pre-arranged group visits only:** This would limit the number of people accessing the site, and would therefore permit a control over the levels of disturbance experienced.
 - **Issue of individual permits:** Certain individuals could apply for permits to freely access this part of the site.
 - **Pre-booked individual permits:** This could involve a limited number of day permits to be issued each day.
 - **A combination of some of the systems outlined above:** This may involve limiting numbers of visitors using one entry method, either spatially or temporally.

Proposed Boundary Control

- 8.6.2 Ecological connectivity with adjoining habitats, including for wild mammals, will be affected if fenced with access restricted is in place and it is, thus, considered as undesirable. Alternative proposal using landscape features and natural level differences is preferable for boundary control without hard infrastructure.
- 8.6.3 As discussed in **Section 2.2**, the northern and eastern edges are largely inaccessible vegetated slopes. Enhancement of existing screen planting can improve visual appearance and provide adequate boundary control. Visual permeability in selected locations along the cycling track will be considered in the design stage, providing attractive, controlled glimpses of the agricultural areas whilst maintaining boundary security. Tree and tall shrub planting can be considered to replace existing chain fence to maintain a pleasant view of farmland from the future cycling track.
- 8.6.4 A number of access points are located along these edges, although accessibility is poor to medium. Since most of the visitors will arrive from the Visitor Centre and from the KTN new town area in the future, the current access points will likely serve only farmers and local villagers working in the AZ. Accessibility to and within the VZ, however, will largely be improved; diversity of experience and interest will be maximized such that regular visitors' activities are encouraged to be confined to the VZ.
- 8.6.5 The southern edge is currently intact with the surrounding landscape and community and therefore relatively porous and insecure. Stone barrier of 500mm spacing will be as the barrier. The only existing proper path extending into the LVNP area shall be maintained for local access but a information sign and Code of Conduct is to be displayed here to raise local awareness that beyond that point they are entering a biodiversity conservation area. Activities causing disturbance will be strictly prohibited. Options of southern boundary control have been explored in view of achieving efficient access control with minimal disturbance to the site (**Appendix 8.3**).

Visitor Numbers

- 8.6.6 The VZ has been designed to be relatively disturbance tolerant; therefore, number of visitor is not intended to be restricted at this point. Visitor numbers in the AZ and BAZ will be limited by controlling the size of guided tours (e.g. limited to groups of 15 persons, except with special application by school groups). Visitor demand shall be accommodated instead by increasing the frequency of guided tours in holiday seasons and weekends
- 8.6.7 It is not recommended to physically control internal access from the VA to the AZ and BAZ. It is suggested softer measures can be used to limit visitor numbers to this area:
- Access to the AZ and BAZ from the VZ would largely be on earthen paths/bunds, which would discourage casual visitors.
 - Information and code of conduct signs should be prominently displayed at entrance points to the AZ and BAZ from the VZ, again to discourage casual visitors from entering these areas.
- 8.6.8 Visitor numbers and behavior should be closely monitored to address any disturbance issues (**Section 9.4.11** refers).

Code of Conduct

- 8.6.9 A code of conduct is being reviewed for the LVNP to minimize potential conflicts between conservationists, visitors, villagers and the farmers. Complete enclosure is not recommended as such measure would hinder farmer utilization of the area. Instead, gates could be considered for farmers to access the fields within the nature park. Signage could be set up at entry points to avoid unwanted intrusion or wandering by other visitors.
- 8.6.10 Signage should be erected to encourage visitors to follow rules that facilitate conservation and crop protection such as maintaining quiet, staying within the boardwalk/existing paths, prohibition of baiting and flushing birds, minimum distance to maintain between visitors and nesting sites and prohibition of removing or damaging crops within the farmlands.

9 MONITORING

9.1 Introduction

9.1.1 The NENT EM&A Manual requires that monitoring measures for the construction of the LVNP, including the creation and enhancement of wetland to compensate for wetland loss, are detailed in the LVNP HCMP. It also notes that monitoring should be undertaken in all areas where impacts on habitats and fauna may arise as a consequence of the project. This includes the LVNP where impacts on disturbance-sensitive fauna are predicted in the absence of mitigation measures (including adaptive management measures in Long Valley). Taking these two objectives into consideration, the EM&A Report concludes that ecological monitoring protocol to be followed in LVNP should satisfy three objectives:

- Monitoring of numbers and distribution of fauna (especially species of conservation significance) relative to adaptive management targets;
- Monitoring of numbers and distribution of fauna (especially species of conservation significance) for which habitat enhancement and other measures in LVNP are required to mitigate for impacts of the project on their use of Long Valley habitats;
- Monitoring of numbers and distribution of fauna (especially species of conservation significance) for which habitat enhancement and other measures in LVNP are required to mitigate for impacts of the project on their use of habitats in the main river channels.

9.1.2 Given the criteria listed in Section 9.1.1, it is important that monitoring efforts for the LVNP are well coordinated with other EM&A works associated with the NENT development (e.g., monitoring of disturbance to waterbirds using in Ng Tung, Sheung Yue and Shek Sheung Rivers). The monitoring protocol described below has been designed to generate data that can be used for other EM&A works required under the NENT project.

9.1.3 In addition to ecological monitoring to fulfill requirements from the EM&A Manual, broader monitoring requirements should be considered as part of the adaptive management plan for LVNP. These include biological monitoring (incorporating requirements from the EM&A Manual), water quality monitoring, and general site monitoring.

9.2 Baseline Monitoring

9.2.1 Monitoring should be undertaken prior to construction of the LVNP to provide an updated baseline for construction phase impact monitoring; and also to provide a baseline against which ecological enhancement measures introduced under the long term LVNP management can be assessed. Unless stated otherwise, monitoring should cover the 12 months prior to commencement of construction works.

Biodiversity Monitoring

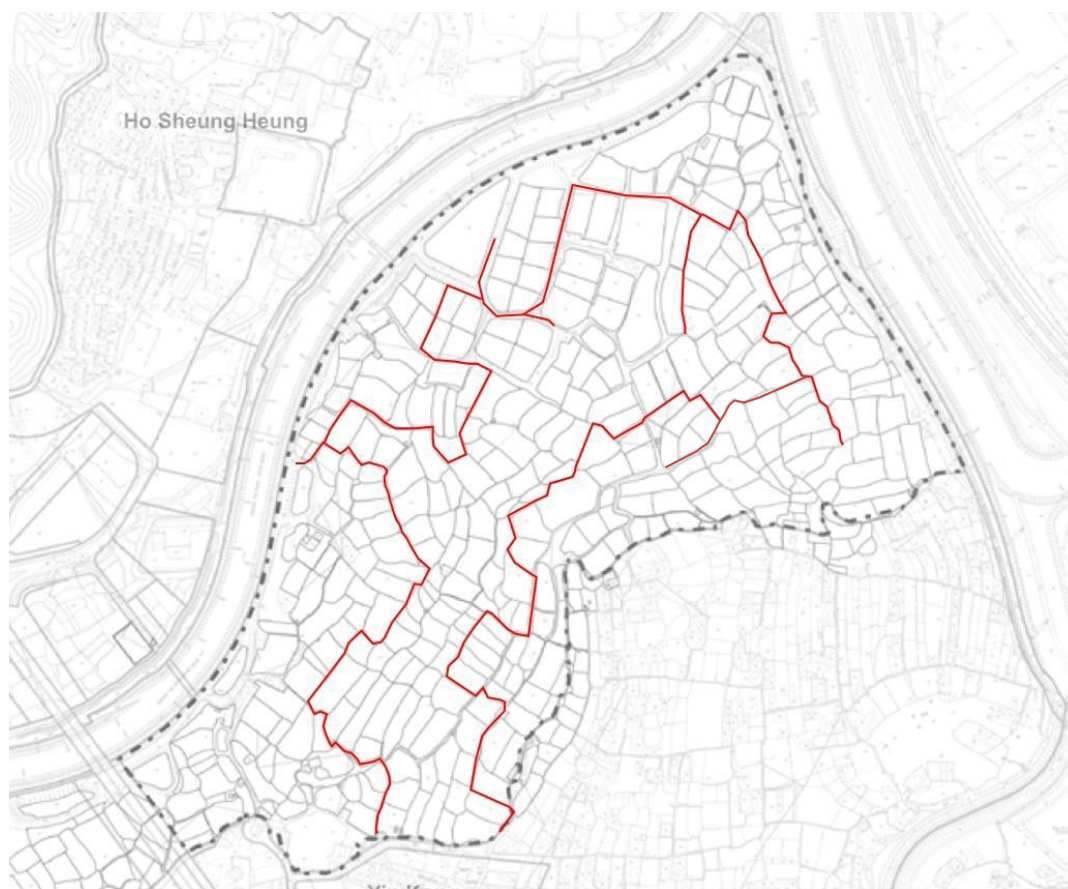
9.2.2 Based on recommendations in the NENT EM&A Manual, survey methodologies and frequencies for fauna species and groups of species which are the targets for mitigation measures are specified in the following sections.

Wildlife

Avifauna

- 9.2.3 Avifauna would be monitored following the same methodology adopted by the regular HKBWS bird monitoring programme at Long Valley that follows a regular transect route (**Figure 9.1.1**) in order to obtain comparable results and complete coverage of all farmlands in the shortest time.
- 9.2.4 Monitoring would be conducted in the morning on a weekly basis, with the species, abundance and location (i.e. plot number) of all birds encountered (including seen and heard) recorded. Any notable behavior (nesting, roosting, large flocks of feeding birds) should be recorded. Birds flying over the survey area should be recorded but not allocated to any specific location. Bird calls heard which could not be exactly located to a specific plot number should be marked as 'heard'

In-text Figure 9.1.1 – Avifauna transect adopted by the existing HKBWS monitoring programme



- 9.2.5 Additional, twice-monthly night surveys should be conducted along the same transect shown in **In-text Figure 9.1.1**. Night surveys should be conducted from September to April (covering migration and wintering periods). The species, abundance and location (i.e. plot number) of all birds encountered (including seen and heard) should be recorded.

Mammals

- 9.2.6 As mammals in Hong Kong are typically secretive and often crepuscular/nocturnal, infra-red camera ‘traps’ would be the most effective monitoring tool for most species. The aim of camera trap monitoring would be to assess the composition and relative abundance of species occurring in the LVNP. In this context, 10-15 cameras should be deployed covering all major zones and habitats across the LVNP. The cameras should have a high sensitivity, large detection zone and fast trigger speed.
- 9.2.7 Monthly day and night mammal surveys should be conducted to supplement camera trapping. Mammal surveys should follow the same transect route shown in Figure 9.1, and record direct observations as well as indirect signs of mammal activity such as tracks, scats and burrowing.
- 9.2.8 Monthly bat surveys should be conducted along the transect route shown in Figure 9.1. The surveys should start shortly after sunset, with bat detector used to record the echolocation calls of foraging bats (using frequency division). The structure of the echolocation calls should be analysed to identify species as far as possible. The relative abundance of each species in the habitat was estimated from the field and from recordings using a scale from one (single individual recorded) to five (very abundant).

Herpetofauna

- 9.2.9 Herpetofauna surveys should be conducted monthly, following the transect route shown in **In-text Figure 9.1.1**. Animals foraging or basking in the open should be identified and counted. Active searching in appropriate microhabitats (i.e., underneath stones, logs or other objects lying on the ground) should also be conducted.
- 9.2.10 Additional monthly night surveys should be conducted from March to October. These surveys should concentrate on recording the distinctive vocalizations of advertising males, for which the peak activity occurs in the early wet season, especially after dusk and during or after rain.

Butterflies and Dragonflies

- 9.2.11 Monthly butterfly and dragonfly surveys should be conducted along the transect route shown in **In-text Figure 9.1.1**. The surveys can be conducted simultaneously, with particular attention given to favoured habitats for the groups. All adult butterflies and dragonflies seen during the surveys should be recorded and counted.
- 9.2.12 For dragonflies, additional surveys of exuviae should be conducted in habitats that are intended to provide mitigation and/or enhanced habitat for odonates. Surveys should be conducted from March-May, when the majority of emergence occurs in Hong Kong (Reels, 2010). Six to eight emergence traps should be deployed along the shoreline at each plot, with the open side submerged. Within each plot, traps should be positioned to cover a variety of substrate/vegetation types.

Freshwater Macro-invertebrates

9.2.13 Freshwater macro-invertebrate surveys should be undertaken once a month across a range of habitats potentially affected by proposed construction activities. As there would be shifting of agricultural practices, the sampling locations would be determined by the future management party based on the overall management of LVNP. Nonetheless, the sampling points should cover different habitat types such as reedbeds, meanders, permanent water features and other major habitat types. Three replicates should be taken at each sampling point. With fish and macroinvertebrates collected by direct observation and kick-sampling. Dissection microscope, digital camera and hand net can be used to aid identification, with the relative abundance of different taxon recorded.

Flora

9.2.14 As no plant species or communities are targeted for ecological mitigation under the NENT EIA Report, no floral monitoring is required by the EM&A Manual. However, it is recommended that under the LVNP baseline monitoring a clear record of habitats, plant species and agricultural practices across the LVNP are made prior to the construction phase. The distribution (across different habitat types) and relative frequency of plant species should be recorded. Floral surveys should be conducted once in the wet and once in the dry seasons.

Table 9.1 Baseline Monitoring Survey Programme

Fauna or Flora Group	Survey Frequency
Avifauna	Daytime surveys: weekly Nighttime surveys: twice monthly from September to April
Mammals	Daytime and nighttime surveys: monthly
Herpetofauna	Nighttime surveys: monthly, with additional surveys from March to October
Butterflies and Dragonflies	Daytime surveys: monthly Additional exuviae surveys: from March to May
Freshwater Macro-invertebrate	Daytime: monthly
Flora	Once in wet season and once in dry season

9.3 Construction Phase Monitoring

9.3.1 Construction phase monitoring at LVNP is required to monitor the effectiveness of ecological mitigation measures implemented within the LVNP during the construction phase of the wider NENT development (e.g., stocking of ponds within LVNP with trash fish to mitigate construction phase impacts from waterbirds using in Ng Tung, Sheung Yue and Shek Sheung Rivers).

Biodiversity Monitoring

9.3.2 Construction phase monitoring would focus on avifauna, adopting the same methodologies as outlined in Sections 9.2.3-9.2.5.

Table 9.2 Construction Phase Monitoring Survey Programme

Fauna Group	Survey Frequency
Avifauna	Daytime surveys: weekly Nighttime surveys: twice monthly from September to April

General Site Inspections

9.3.3 During the construction phase, weekly site inspections of the LVNP should be conducted to check for disturbance impacts, littering, damage/impacts outside of designated construction areas.

Action/Limit Levels and Responses

9.3.4 Action/Limit Levels and responses for monitoring disturbance to avifauna and general environmental disturbance are summarized in Table 9.1 below.

Table 9.3 Action/Limit Levels and Responses

Action Level	Response	Limit Level	Response
Biodiversity Monitoring			
Decline in numbers of all target avifauna species relative to numbers during Baseline Monitoring such that the Action Level* response is triggered.	Investigate cause and if cause identified as related to LVNP construction, instigate remedial action to remove or reduce source of disturbance.	Decline in numbers of all target avifauna species relative to numbers during Baseline Monitoring such that the Limit Level** response is triggered.	Investigate cause and if caused identified as related to LVNP construction, instigate remedial action.
Decline in numbers of any one target avifauna species relative to numbers during Baseline Monitoring such that the Action Level* response is triggered.	Investigate cause and if cause identified as related to LVNP construction, instigate remedial action to remove or reduce source of disturbance.	Decline in numbers of any one target avifauna species occurring in significant numbers* during Baseline Monitoring such that the Limit Level** response is triggered.	Investigate cause and if caused identified as related to LVNP construction, instigate remedial action.
General Site Inspections			
Activity likely to cause unacceptable environmental disturbance or damage noted in LVNP	Investigate source and instigate remedial action.	Activity causing unacceptable environmental disturbance or damage noted in LVNP	Investigate source and instigate remedial action.

*Action and Limit Levels to be set using baseline survey data.

9.4 Operational Phase Monitoring

9.4.1 Operational monitoring is required to assess the effectiveness of management interventions at LVNP, and determine if the LVNP is providing mitigatory functions required by the NENT EIA.

Biodiversity Monitoring

Wildlife

9.4.2 Operational phase monitoring of wildlife would adopt the same methodologies as outlined in Sections 9.2.3-9.2.13.

Flora

- 9.4.3 Operational phase monitoring would adopt the same methodologies as outlined in Section 9.2.14. Additional monitoring of both reedbeds and trees is recommended as part of the routine operation phase monitoring programme at LVNP, as described in the sections below.

Table 9.4 Operational Phase Monitoring Survey Programme

Fauna or Flora Group	Survey Frequency
Avifauna	Daytime surveys: weekly Nighttime surveys: twice monthly from September to April
Mammals	Daytime and nighttime surveys: monthly
Herpetofauna	Nighttime surveys: monthly, with additional surveys from March to October
Butterflies and Dragonflies	Daytime surveys: monthly Additional exuviae surveys: from March to May
Freshwater Macro-invertebrate	Daytime: monthly
Flora	Once in wet season and once in dry season

Reedbed Monitoring

- 9.4.4 Reedbeds located in the visitor zone will play an important role in maintaining water quality in LVNP, as well as providing habitat for certain target species. Regular monitoring of reedbed condition is therefore recommended. Quarterly surveys of the reedbeds should be conducted to measure percentage of flowering reed stems, length of reed stems and depth of leaf litter.
- 9.4.5 Reedbed monitoring should also look out for signs of *Dimorphopterus spinolae* infestation. *Dimorphopterus spinolae* is a species of bug that feeds on Phragmites reeds, and previous outbreaks at Hong Kong Wetland Park, the Yuen Long Bypass Floodway Engineered Wetland (Chan et al. 2008), the MTR Lok Ma Chau Spur Line Wetland Compensation Area and MPNR (in 2011, 2012 and 2013) have resulted in poor health or die-back of Phragmites within affected reedbeds.

Tree Risk Assessment

- 9.4.6 The health and structural condition of trees in the visitor zone should be monitored.

Invasive Species

- 9.4.7 Certain invasive species are widely established in the New Territories (including Long Valley), and are known or are thought to have adverse impacts on native biodiversity. These include animals (e.g., *Pomacea lineata*, *Solenopsis invicta*, *Gambusia affinis*) and plants (e.g., *Mikania micrantha*, *Bidens alba*, *Lantana camara*, *Urochloa mutica*). Quarterly monitoring of the distribution and abundance/frequency of such species is recommended to track the effectiveness of control programmes.
- 9.4.8 In addition to existing invasive species, regular monitoring is required to track the emerging threats. For example, the recent colonization of MPNR by *Typha angustifolia* is being closely tracked to determine if measures are needed to control this species. Quarterly monitoring of existing invasive species should also include a search for any new exotic species occurring in LVNP. The distribution and abundance/frequency of these species can then be tracked in subsequent surveys.

Water Quality Monitoring

- 9.4.9 Weekly water samples should be taken at both upstream and downstream of the VZ treatment wetland to monitor the performance of the treatment wetland. The parameters to be monitored include dissolved oxygen, pH, temperature, total nitrogen, total phosphorus, BOD, suspended solids and *E Coli*. Dissolved oxygen, pH and temperature can be measured on-site with suitable multi-meter. Other parameters should be analyzed at a HOKLAS accredited laboratory.

General Site Inspections

- 9.4.10 Weekly inspections, particularly in the Visitor Zone, should be conducted to ensure infrastructure (e.g., drains and water channels, footpaths and boardwalks, fencing and other barriers) is well maintained and functioning.

Visitor Numbers and Disturbance

- 9.4.11 The LVNP would be designed and managed to concentrate visitors in an existing lower ecological value area of Long Valley, minimizing potential disturbance impacts to more sensitive areas. Nevertheless, a monitoring of visitor numbers and activities within LVNP should be undertaken as part of the adaptive management process.

Data Analysis and Adaptive Management Strategies

- 9.4.12 As described in **Section 1.3.2** this HCMP is designed to give a framework for management of the LVNP without being overly prescriptive, given a high degree of flexibility for future management interventions to address specific issues as and when they arise. In this regard, it is not considered useful to develop detailed guidelines for management responses based on proposed operation phase monitoring.

9.5 Review of Operation Phase Monitoring

- 9.5.1 The effectiveness of monitoring methodologies (in terms of how useful the data collected is in relation to survey effort) should be reviewed from time to time. If considered necessary, monitoring methodology and frequency can be changed to improve data collection and/or minimize data redundancy.

9.6 Summary of Monitoring Works for Long Valley Nature Park

9.6.1 Proposed monitoring works for the LVNP, including ecological monitoring as required by the EM&A Manual and other boarder monitoring requirements, are summarized in below **Table 9.5**.

Table 9.5 Overall Monitoring Survey Programme for Long Valley Nature Park

Phase	Monitoring Type and Survey Frequency
Pre-construction (Baseline Monitoring)	<u>Biodiversity Monitoring</u> Avifauna <ul style="list-style-type: none"> • Weekly daytime surveys • Twice monthly nighttime surveys from September to April Mammals <ul style="list-style-type: none"> • Monthly daytime and nighttime surveys Herpetofauna <ul style="list-style-type: none"> • Monthly nighttime surveys • Additional surveys from March to October Butterflies and Dragonflies <ul style="list-style-type: none"> • Monthly daytime surveys • Additional exuviae surveys from March to May Freshwater Macro-invertebrate <ul style="list-style-type: none"> • Monthly daytime survey Flora <ul style="list-style-type: none"> • Survey once in wet season and once in dry season
Construction	<u>Biodiversity Monitoring</u> Avifauna <ul style="list-style-type: none"> • Weekly daytime surveys • Twice monthly nighttime surveys from September to April <u>General Site Inspections</u> <ul style="list-style-type: none"> • Weekly site inspection on disturbance impacts, littering, damage or impacts outside of designated construction areas
Operational	<u>Biodiversity Monitoring</u> Avifauna <ul style="list-style-type: none"> • Weekly daytime surveys • Twice monthly nighttime surveys from September to April Mammals <ul style="list-style-type: none"> • Monthly daytime and nighttime surveys Herpetofauna <ul style="list-style-type: none"> • Monthly nighttime surveys • Additional surveys from March to October Butterflies and Dragonflies <ul style="list-style-type: none"> • Monthly daytime surveys • Additional exuviae surveys from March to May Freshwater Macro-invertebrate <ul style="list-style-type: none"> • Monthly daytime survey Flora <ul style="list-style-type: none"> • Survey once in wet season and once in dry season Reedbed Monitoring <ul style="list-style-type: none"> • Quarterly surveys on reedbed condition and signs of <i>Dimorphopterus spinolae</i> infestation Tree Risk Assessment <ul style="list-style-type: none"> • Regular monitoring on health and structural condition of trees in Visitor Zone Invasive Species

Phase	Monitoring Type and Survey Frequency
	<ul style="list-style-type: none"> • Quarterly surveys on distribution and abundance of invasive species and search for new exotic species to review on effectiveness of control programmes <p><u>Water Quality Monitoring</u></p> <ul style="list-style-type: none"> • Weekly water quality samples taken at upstream and downstream of treatment wetland for monitoring <p><u>General Site Inspection</u></p> <ul style="list-style-type: none"> • Weekly site inspection, especially in the Visitor Zone, to ensure infrastructure is well maintained and functioning <p><u>Visitor Numbers and Disturbance</u></p> <ul style="list-style-type: none"> • Monitoring of visitor numbers and activities as part of the adaptive management process <p><u>Data Analysis and Adaptive Management Strategies</u></p> <ul style="list-style-type: none"> • Strategies shall be developed by future management interventions to address specific issues

10 IMPLEMENTATION

10.1 Summary of Enhancement Measures

10.1.1 This HCMP aims to:

- Provide a framework and specifications for development and management of the LVNP
- Guide the development to maintain and enhance the existing wetland habitats
- Safeguard the conservation value of Long Valley in the long term with designation of the LVNP

10.1.2 The LVNP will be divided into three broad zones of land use with general and specific management practices, key enhancement measures to be implemented by AFCD are summarized in **Table 10.1** below:

Table 10.1 Summary of Key Enhancement Measures for the LVNP

Design/ Management Planning	Enhancement Measures
Management Zoning	Visitor Zone <ul style="list-style-type: none"> • Designed to accommodate visitors, storage and other facilities Agriculture Zone <ul style="list-style-type: none"> • Largely designated for commercially focused crop production Biodiversity Agriculture Zone <ul style="list-style-type: none"> • Largely designated for biodiversity conservation
Habitat Management	General Management Practices <ul style="list-style-type: none"> • Areas of abandoned agriculture land will be resumed for commercial or biodiversity focused agriculture/ aquaculture • Existing built structures of poor quality will be removed • Existing fruit tree plantation along bunds at central north area could be transplanted to north or south side • Construction of education facilities, storage or other required built structures in areas of low ecological value • Usage of soft landscape features to control number and location of existing public access points • Careful control of internal access and circulation within the LVNP base on management zone • Integrated management of all three management zones to ensure well distribution of wet and dry agriculture land within the whole LVNP • Spatial and temporal practice of crop rotation • Agriculture land should be left fallow for a year every two to three years, such practice will be carried out in rotation within the whole LVNP Specifically Managed Habitats <ul style="list-style-type: none"> • Shallow water habitat • Less intensive wet agricultural land • Intensive agricultural land • Water flea ponds • Fish and marsh pond • Dry agricultural lands • Deep water pond

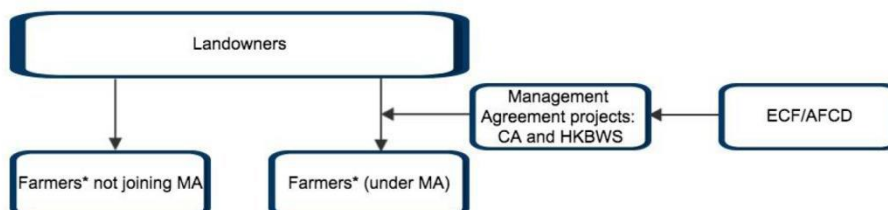
	<ul style="list-style-type: none"> • Reedbed <p>Biodiversity Enhancement Measures</p> <ul style="list-style-type: none"> • Small islands to be added to some pond habitat to enhance habitats for potential breeding species • Provision of foam boxes and aquatic planting to enhance breeding conditions for little grebe • Incorporate nesting boxes into design buildings • Water to be maintained at wet agricultural land, marsh/fish-pond and water flea ponds during breeding months (March to September) to increase reproduction success of amphibians • Provision of reptiles roosting sites by making refugia using leaf litter, logs and branches <p>Invasive Species Control</p> <ul style="list-style-type: none"> • Regular physical removal of Mikania • Set up “bottle traps” to capture Apple Snails in ponds and paddy fields • Manual collection and removal of adult Apple Snails • Usage of boric acid to exterminate identified Red Imported Fire Ant colonies • Monitoring and immediate removal of Greenhouse Frog • Strapping bells and castrated of wild feral animals
Water Management	<ul style="list-style-type: none"> • Look into potential of enlarging ditches/ channels to reduce blockages and extend distribution network for irrigation water supply • Using water stored in wetland / irrigation ditch system/ fishponds as irrigation contingency plan to maintain required water volume • Provision of interconnections between irrigation ditches and fishponds to channel flood waters into the ponds to ease flooding problems • Proposed wetland at upstream of LVNP to remove total suspected solids and reduce coliform contents
Visitor Facilities	<ul style="list-style-type: none"> • Attractions to provide diversity of programme areas for education and recreation purposes • Retain existing paths, bunds of good condition for circulation route • Proposed boardwalks to bring visitors around the area • Provision of bird hide for bird watching • Provision of educational signage
Maintenance Facilities	<ul style="list-style-type: none"> • Small huts are scattered throughout the area for storage of essential equipment and materials for daily agriculture operation • Centralized storage facilities for large equipment and materials less frequently used • Provision of a composting facility
Access and Security	<ul style="list-style-type: none"> • Preferably use landscape features and natural level differences for boundary control without hard infrastructure • Accessibility to and within the visitor zone will largely be improved to encourage visitors’ activities confined in the zone • Visitor numbers in the visitor zone will not be restricted • Visitor numbers in the agriculture zone and biodiversity agriculture zone will be limited by controlling size of guided tours

10.2 Implementation Plan and Programme

Overall Implementation Programme

- 10.2.1 Development of the LVNP is closely tied to the overall NENT NDA project. This project itself is contingent on an extensive land resumption programme. The land resumption programme will follow normal practice. The earliest construction works was commenced in October 2019. The Existing mode of management can be referred to in Figure 10.2.1.

Figure 10.2.1 Existing Mode of Management



Note (*): including farmers' organisations supporting farmers (e.g. 香港新界本地農協會、古洞蔬菜產銷貸款有限責任合作社) and individual farmers

Management for Development the future LVNP

- 10.2.2 Possible management arrangements for the following stages were studied and discussed in various meetings with the relevant parties including DevB, AFCD, LandsD, DLO, CEDD.
- before land resumption
 - after land resumption / commencement of the construction works under CEDD' s contracts
 - after handing over of the LVNP areas to AFCD / completion of construction works under CEDD' s contracts.

10.3 Review of HCMP

HCMP might be reviewed in appropriate intervals (e.g. 5 years), to set out any new management objectives, to revise the management zonings, or to adjust the monitoring efforts as necessary. The review results and recommendations shall be endorsed by the Management Committee of the LVNP.

The possible arrangement before and after land resumption and the resources requirements for management and maintenance of LVNP can be found in **Appendices 8.7 and 8.8** respectively.

11 REPORTING

- 11.1.1 Regular reports similar to those prepared by CA/HKBWS under MA should be prepared documenting management and monitoring activities undertaken during the reporting period. Draft contents are listed out in **Table 11.1** below for reference:

Table 11.1 Draft Contents for LVNP Reports

Item	Content
Management Activities Undertaken in Current Reporting Period	<ul style="list-style-type: none"> Document details of management practice for various habitats, including general and specific management and method used for invasive species control Document specific biodiversity enhancement measures implemented
Monitoring Undertaken in Current Reporting Period	<ul style="list-style-type: none"> Document monitoring activities undertaken in the reporting period and present results
Other Issues	<ul style="list-style-type: none"> Document issues such as disturbance, pollution or other items affecting management of LVNP
Next Reporting Period	<ul style="list-style-type: none"> Details planned activities in next reporting period

- 11.1.2 The management parties appointed by AFCD for managing the LVNP shall prepare and submit the LVNP Reports in monthly basis. Further details of reporting requirements will be developed once the overall management structure for LVNP is confirmed.

12 SUMMARY

- 12.1.1 This Habitat Creation and Management Plan aims to provide a framework and specifications for development and management of the LVNP. The HCMP guide development to maintain and enhance the 37ha of low-lying wetland habitats, so that it continues to support the full range of functioning ecological processes, maintain its existing crop production, landscape value and cultural significance as well as providing an educational resource for the community. It is intended that the conservation value of Long Valley would be safeguarded in the long term with the designation of the LVNP.
- 12.1.2 All the recommended mitigation measures were summarized in Implementation Schedule under Section 14 based on the latest available information. Should there be any further amendment to the mitigation measures due to actual site conditions, agreement from AFCD and EPD should be obtained before implementation.

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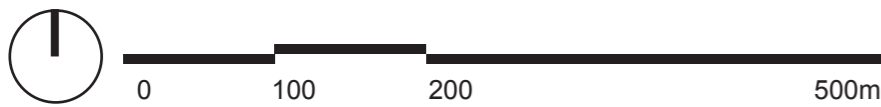
14 IMPLEMENTATION SCHEDULE

14.1.1 This implementation schedule is to summarize the recommended mitigation measures in this Plan.

Recommended Mitigation Measures	Objective of the Measures	Who to Implement / Maintain the Measures?	Location of the Measures	When to Implement the Measures?	Reference to paragraph(s) in this IS
Management Zoning at LVNP 1. Management zoning will be considered by dividing the LVNP into Visitor Zone, Agriculture Zone and Biodiversity Agriculture Zone with different management objectives.	1. To maintain the existing mosaic pattern of wet and dry agriculture and minimize potential conflicts between management objectives of different zones.	Future Management Party	LVNP	After the construction phase	Refers to para(s). 8.1 of the HCMP
Habitat Management at LVNP 1. General management considerations to maintain and enhance the existing complex mosaic of habitats at Long Valley . 2. Specific management prescriptions will be set for different zonings/ habitat types. 3. Biodiversity enhancement measures on breeding birds and amphibians will be implemented. 4. Invasive species control, such as <i>Mikania</i> , apple snails and red imported fire ants etc.	1. To allow for a high degree of flexibility to maintain and enhance the existing complex mosaic of habitats at Long Valley. 2. To provide detailed management prescriptions for maintaining specific land-use/ habitats. 3. To enhance the habitats for potential breeding species 4. To control the spread of the invasive species	Future Management Party	LVNP	After the construction phase	Refers to para(s). 8.2 of the HCMP

Recommended Mitigation Measures	Objective of the Measures	Who to Implement / Maintain the Measures?	Location of the Measures	When to Implement the Measures?	Reference to paragraph(s) in this IS
Water Management at LVNP 1. To enhance irrigation channel network 2. To improve management and maintenance of water channel 3. Construction of proposed wetland at upstream of LVNP 4. Provision of a storage pond	1. To improve availability of irrigation water to different parts of the LVNP and increase storage capacity of the LVNP 2. To reduce blockages and localized flooding 3. To improve water quality by removing total suspended solids and reduce coliform contents. 4. To improve the water storage capacity and act as a buffer to flooding	Contractor / Resident Site Engineer / ET / Future Management Party	LVNP	Throughout and after the construction phase	Refers to para(s). 8.3 of the HCMP
Baseline Monitoring for LVNP 1. To conduct baseline biodiversity monitoring for LVNP.	1. To provide an updated baseline for construction phase impact monitoring and assess effectiveness of ecological enhancement measures.	ET	LVNP	Prior to the construction phase for 12 months	Refers to para(s). 9.2 of the HCMP
Construction Phase Monitoring 1. To conduct monitoring focusing on avifauna and general site inspections	1. To monitor effectiveness of ecological mitigation measures implemented within the LVNP during construction phase of the wider NENT development.	ET	LVNP	Throughout the construction phase	Refers to para(s). 9.3 of the HCMP

Recommended Mitigation Measures	Objective of the Measures	Who to Implement / Maintain the Measures?	Location of the Measures	When to Implement the Measures?	Reference to paragraph(s) in this IS
Operational Phase Monitoring 1. To conduct biodiversity monitoring, water quality monitoring, general site inspection, and monitoring on visitor numbers and disturbance.	1. To assess effectiveness of management interventions at LVNP and determine if LVNP is providing mitigatory functions as required by the NENT EIA	Future Management Party	LVNP	Operation phase	Refers to para(s). 9.4 of the HCMP



Legend

Current site boundary
(Site Area: 37.30 ha.)

PROJECT

DEVELOPMENT OF
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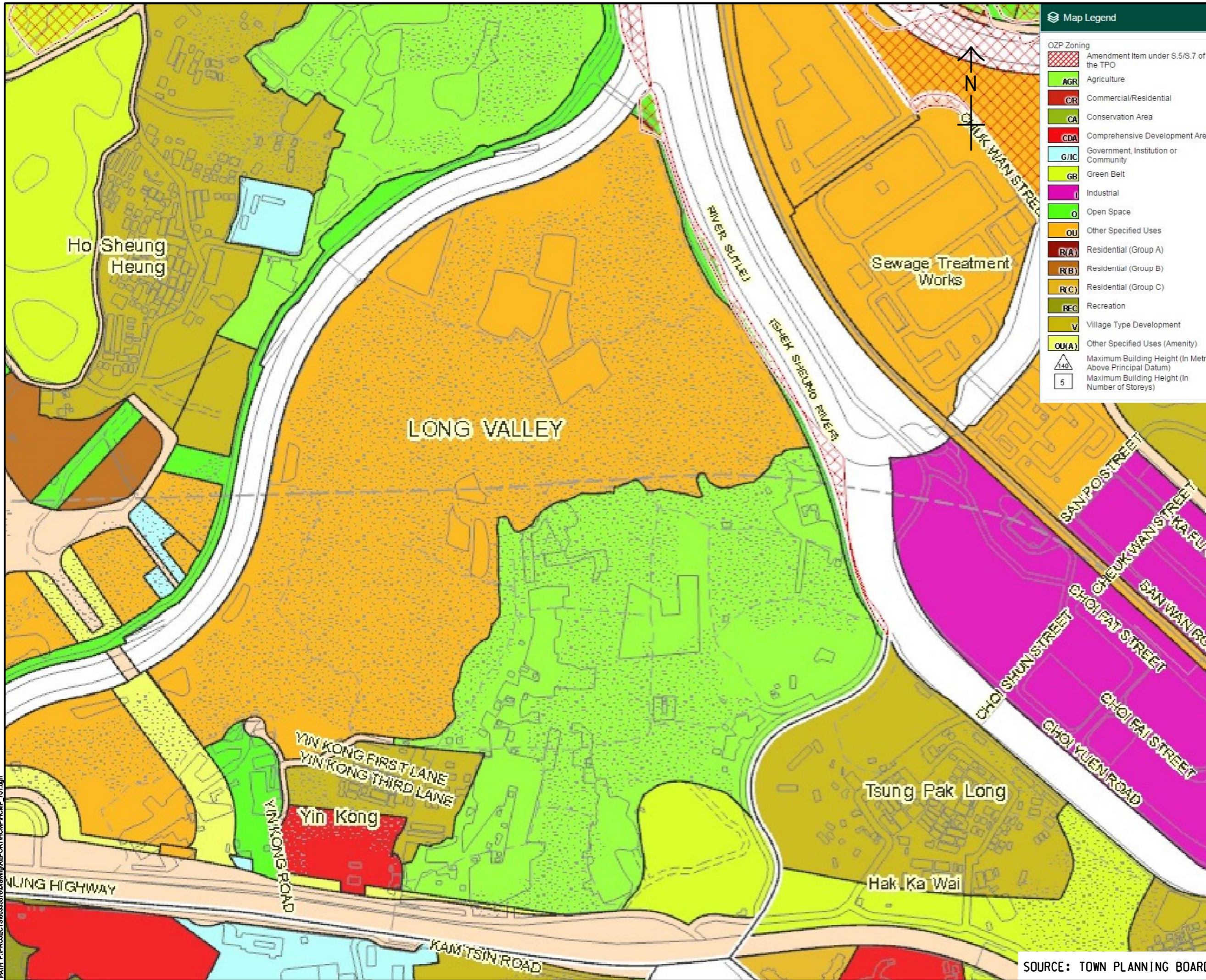
SHEET TITLE

LVNP General Location Plan

SHEET NUMBER

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Map Legend

OZP Zoning

- Amendment Item under S.5/S.7 of the TPO
- AGR Agriculture
- CR Commercial/Residential
- CA Conservation Area
- CDA Comprehensive Development Area
- G/IC Government, Institution or Community
- GB Green Belt
- I Industrial
- O Open Space
- OU Other Specified Uses
- R(A) Residential (Group A)
- R(B) Residential (Group B)
- R(C) Residential (Group C)
- REC Recreation
- V Village Type Development
- OU(A) Other Specified Uses (Amenity)
- Maximum Building Height (In Metres Above Principal Datum)
- Maximum Building Height (In Number of Storeys)

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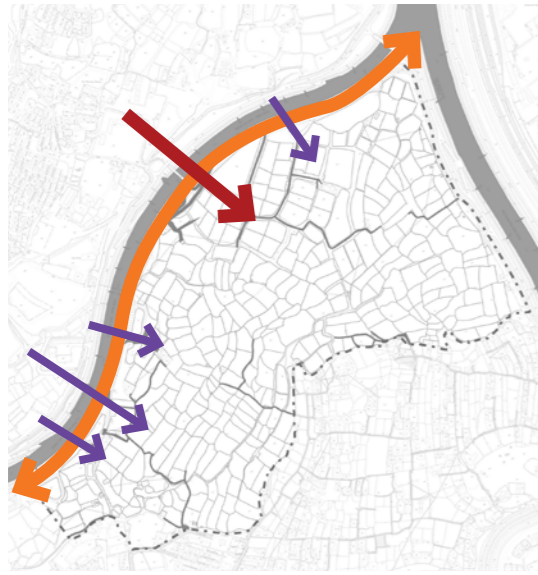
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SHEET TITLE
Outline Zoning Plan of Long Valley Nature Park and Adjacent Areas

SHEET NUMBER
60335576/HCOMP/FIGURE 1.2.1

SOURCE: TOWN PLANNING BOARD

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-  Primary entrance point
-  Secondary entrance point
-  Edge

Northern Edge



Footbridge connecting Ho Sheung Heung



Access road with vegetated slope edge

Concrete path at entrance points



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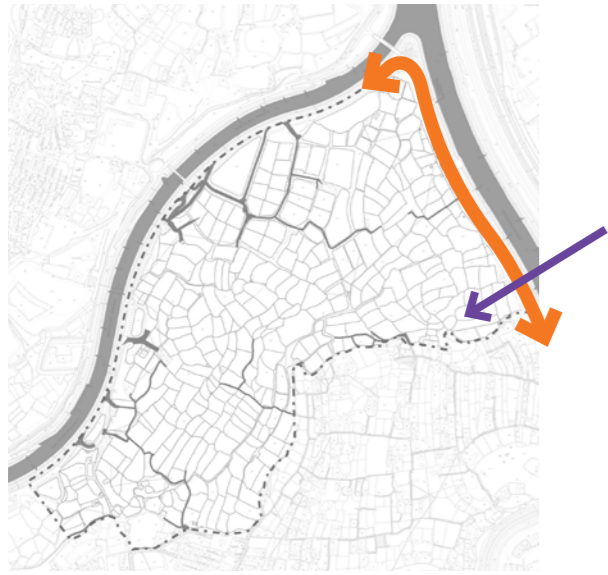
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SHEET TITLE

LVNP Edge Conditions and
 Accessibility (Sheet 1 of 5)

SHEET NUMBER

60335576/HCMP/ Figure 2.1.1



 Secondary entrance point
 Edge

Eastern Edge



Cycle track and footpath



Drainage maintenance access and fences

Entrance point



Concrete path



Concrete edge



Earth bund

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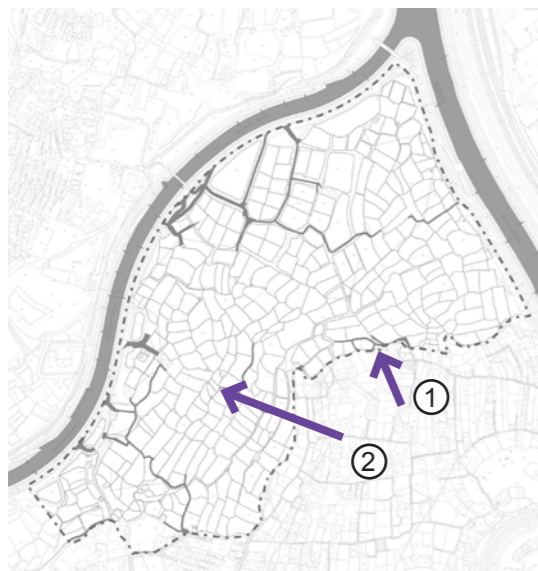
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SHEET TITLE

LVNP Edge Conditions and Accessibility (Sheet 2 of 5)

SHEET NUMBER

60335576/HCMP/ Figure 2.1.2



→ Secondary entrance point
 — Edge

Entrance points 1 (Only to periphery path, not into the fields)



Access into Tin Kwong Po



Access into Tin Kwong Po

Entrance point 2



Concrete path



Earth path

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LVNP Edge Conditions and
 Accessibility (Sheet 3 of 5)

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60335576/HCMP/ Figure 2.1.3



→ Primary entrance point

Northern entrance



Degraded aggregate / earth path



Concrete path



Concrete path

Major section to southern entrance



Concrete path



Concrete path

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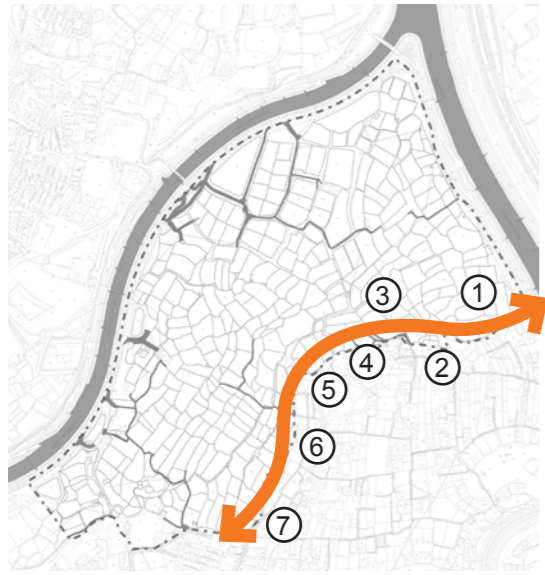
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SHEET TITLE

LVNP Edge Conditions and
 Accessibility (Sheet 4 of 5)

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60335576/HCMP/ Figure 2.1.4



Edge

Southern Edge



① Small slope behind structure



② Agricultural field at higher level



③ Concrete path



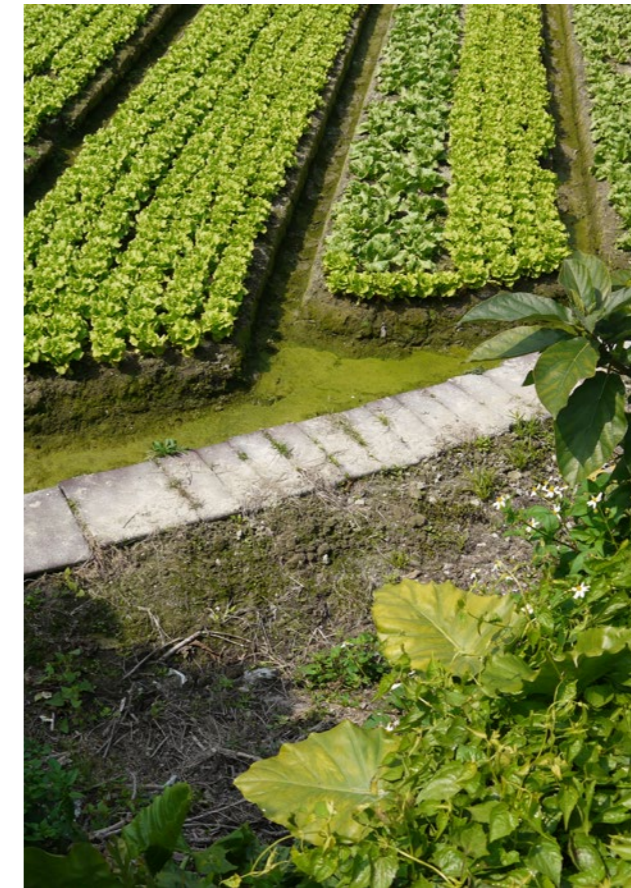
④ Between agricultural fields



⑤ Fenced off behind structure



⑥ Between agricultural fields



⑦ Over 2m level difference

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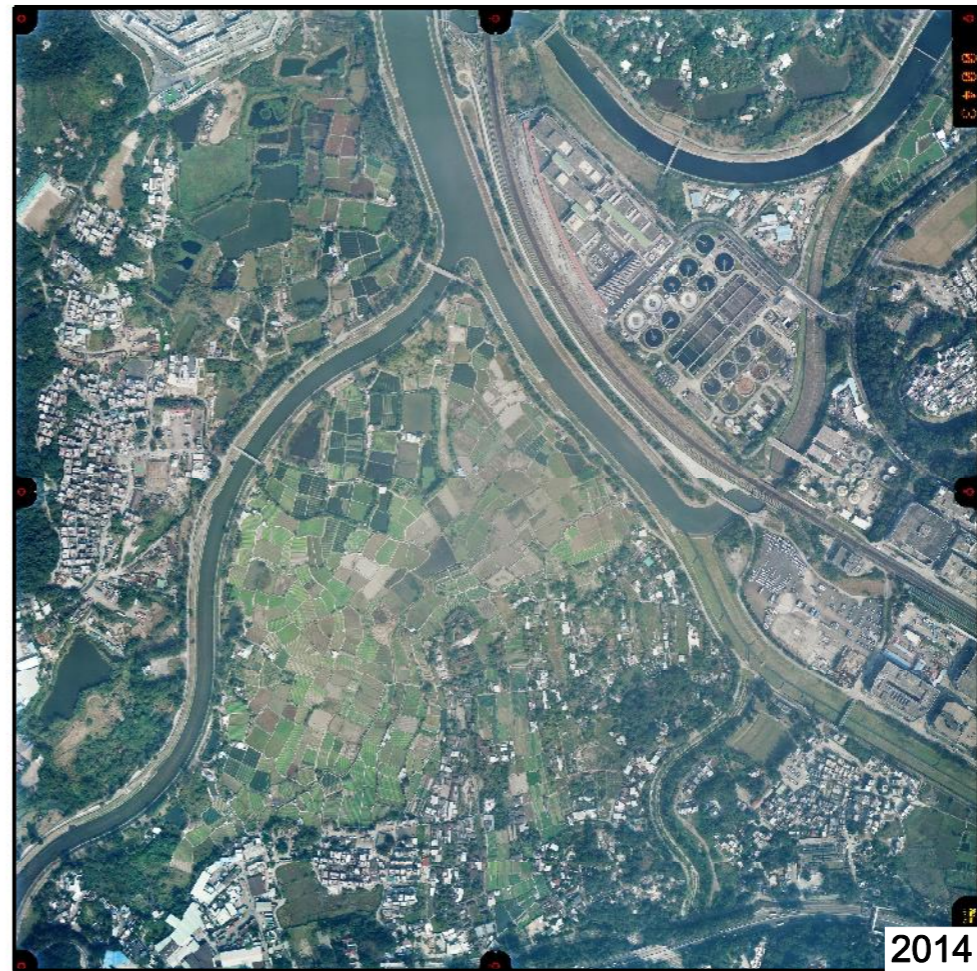
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SHEET TITLE

LVNP Edge Conditions and
 Accessibility (Sheet 5 of 5)

SHEET NUMBER

60335576/HCMP/ Figure 2.1.5



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DIMENSION UNIT
尺寸單位

METRES

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SHEET TITLE
圖紙名稱

Historic Aerial Photos of Long Valley

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60335576/HCMP/FIGURE 3.1.1

SOURCE: LANDS DEPARTMENT

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比例 尺寸單位

N.T.S. METRES

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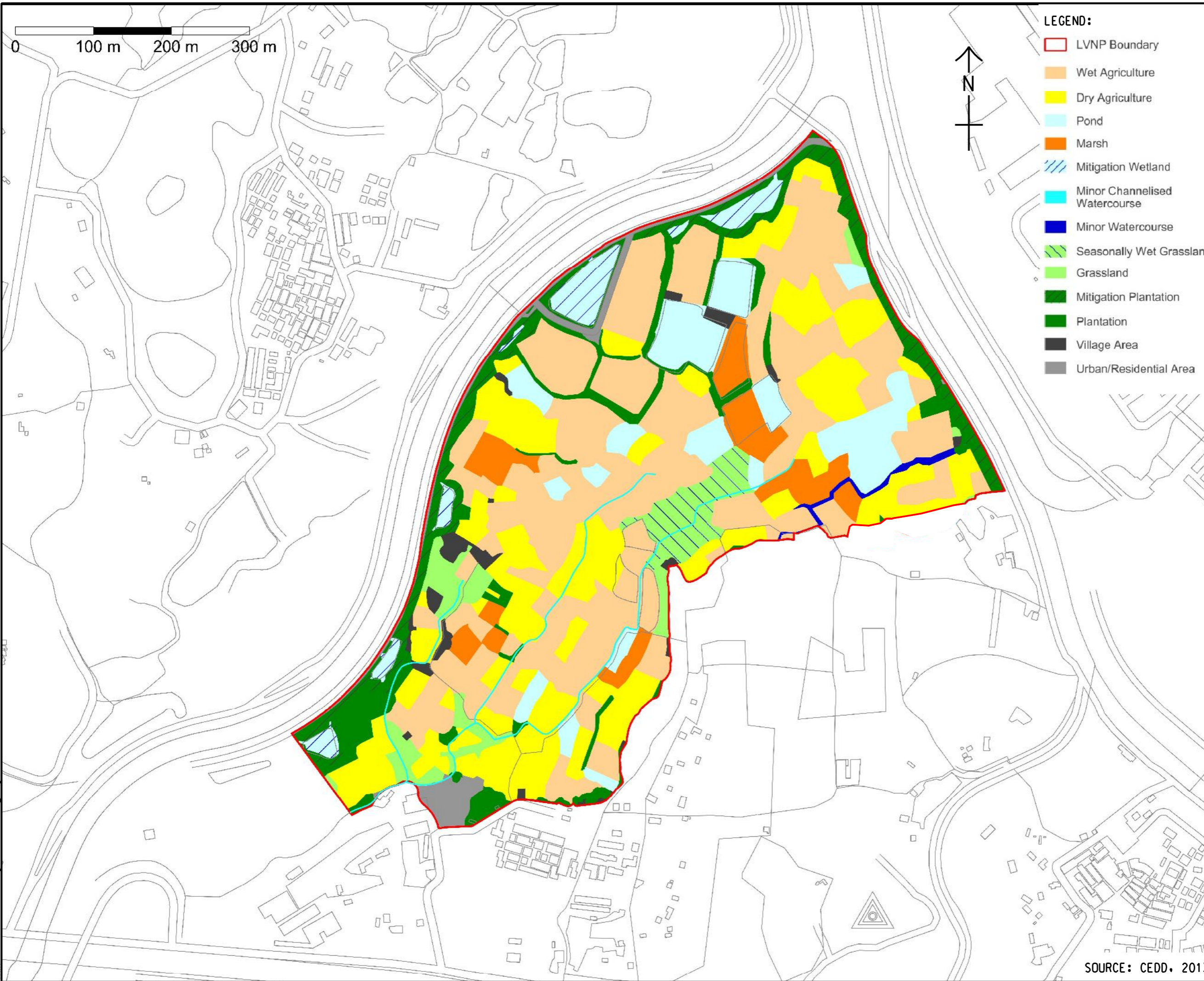
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EXISTING HYDROLOGICAL MAP
OF LVNP

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- LEGEND:**
- LVNP Boundary
 - Wet Agriculture
 - Dry Agriculture
 - Pond
 - Marsh
 - Mitigation Wetland
 - Minor Channelised Watercourse
 - Minor Watercourse
 - Seasonally Wet Grassland
 - Grassland
 - Mitigation Plantation
 - Plantation
 - Village Area
 - Urban/Residential Area

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比例	尺寸單位
N.T.S.	METRES

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PROJECT NO.	CONTRACT NO.
項目編號	合約編號
60335576	CE 13/2014 (CE)

SHEET TITLE
圖名
Existing Habitat Map of LVNP

SHEET NUMBER
圖號
60335576/HCMP/FIGURE 3.3.1

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PLATE 1: LESS INTENSIVE WET AGRICULTURAL LAND (PADDY RICE FIELD)



PLATE 2: PADDY RICE FIELD



PLATE 3: INTENSIVE AGRICULTURAL LAND (FARMLAND MARGIN)



PLATE 4: SHALLOW WATER HABITAT



PLATE 5: FISH POND



PLATE 6: WATER FLEA POND

SOURCES: CONSERVANCY ASSOCIATION, HONG KONG BIRD WATCHING SOCIETY

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SHEET TITLE

Photographs of Existing Habitats

SHEET NUMBER

60335576/HCMP/FIGURE 3.4.1



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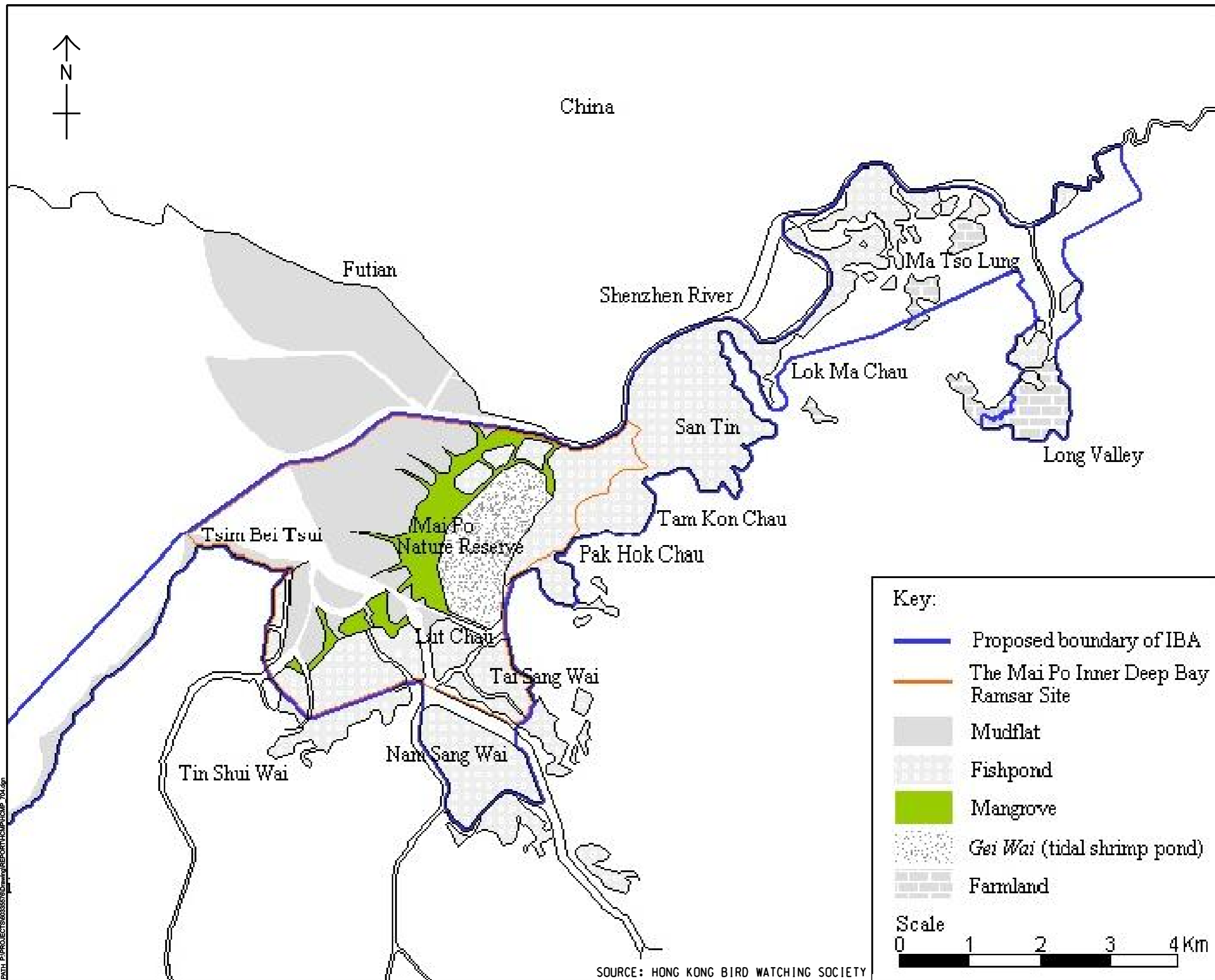
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OF BUILT STRUCTURES

SHEET NUMBER
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SOURCE: HONG KONG BIRD WATCHING SOCIETY

Key:

- Proposed boundary of IBA
- The Mai Po Inner Deep Bay Ramsar Site
- Mudflat
- Fishpond
- Mangrove
- Gei Wai (tidal shrimp pond)
- Farmland

Scale
 0 1 2 3 4 km

PROJECT
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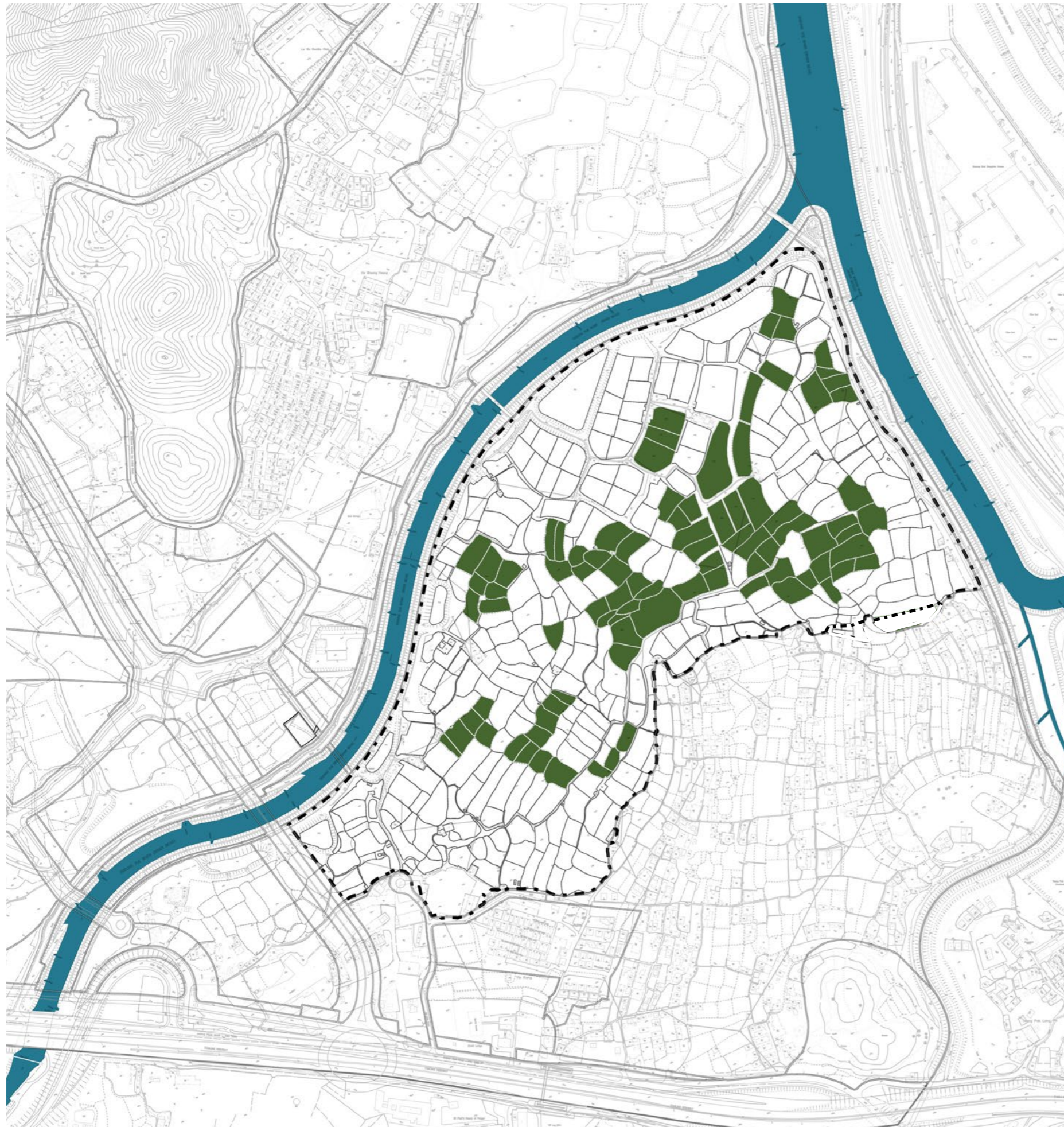
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

SHEET TITLE
 IMPORTANT BIRD AREA - INNER DEEP BAY AND SHENZHEN RIVER CATCHMENT AREA

SHEET NUMBER
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Legend

-  Current site boundary
-  Fields under Existing Management Agreement Scheme (Area: 7.86 ha.)
(as at August 2014)



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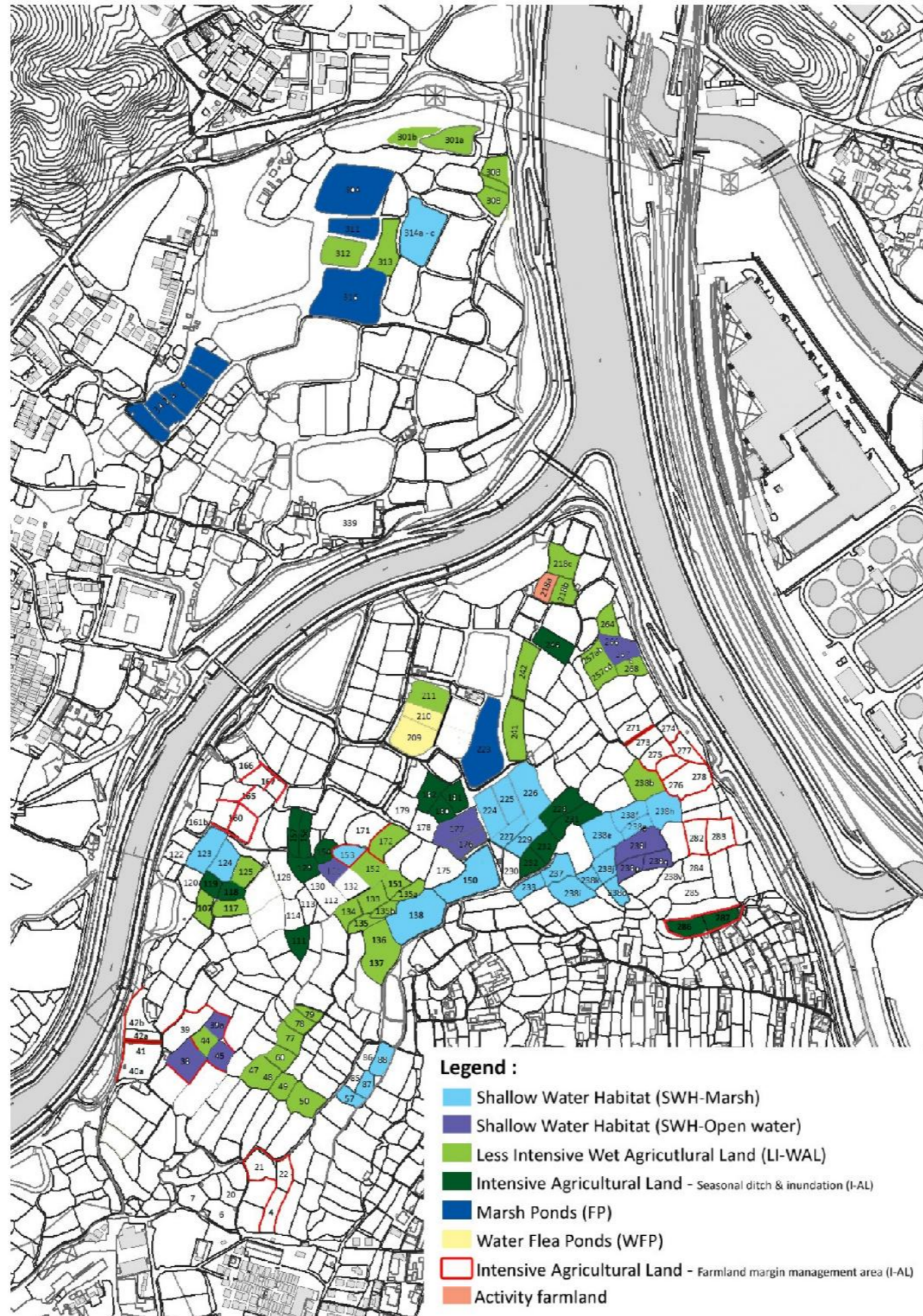
SHEET TITLE

Location of Fields under Existing Management Agreement Scheme

SHEET NUMBER

60335576/HCMP/ Figure 4.2.1

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 階段

SCALE
 比例

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 尺寸單位

N.T.S. METRES

KEY PLAN
 索引圖

PROJECT NO.
 項目編號

CONTRACT NO.
 合約編號

60335576 CE 13/2014 (CE)

SHEET TITLE
 圖名

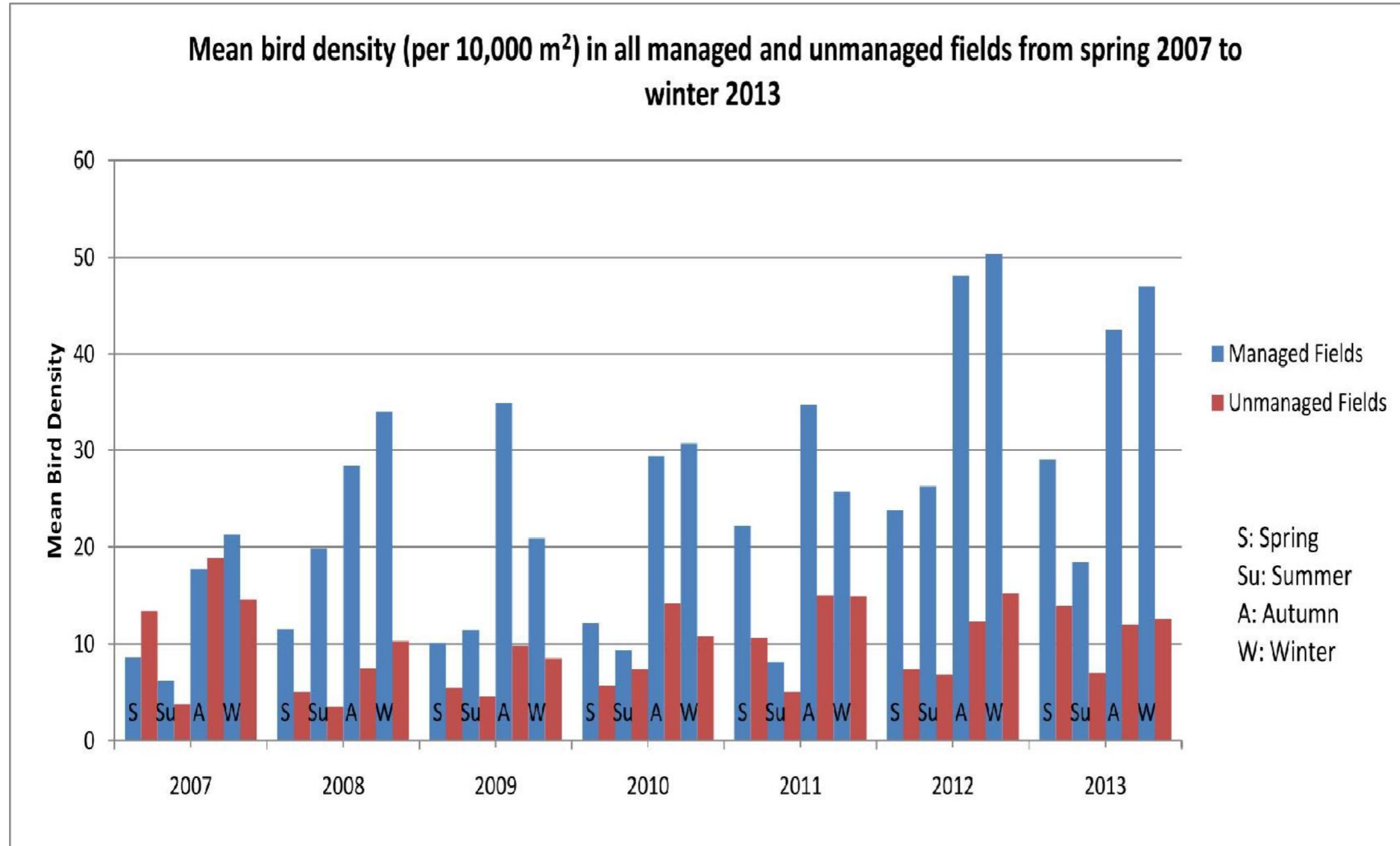
Current MA Agricultural Plan (2014)

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PLATE 1: ECO-TOURS AND WORKSHOPS



PLATE 2: NIGHT SAFARI ACTIVITIES FOR LOCAL SCHOOLS



PLATE 3: RICE PLANTING AND HARVESTING ACTIVITIES

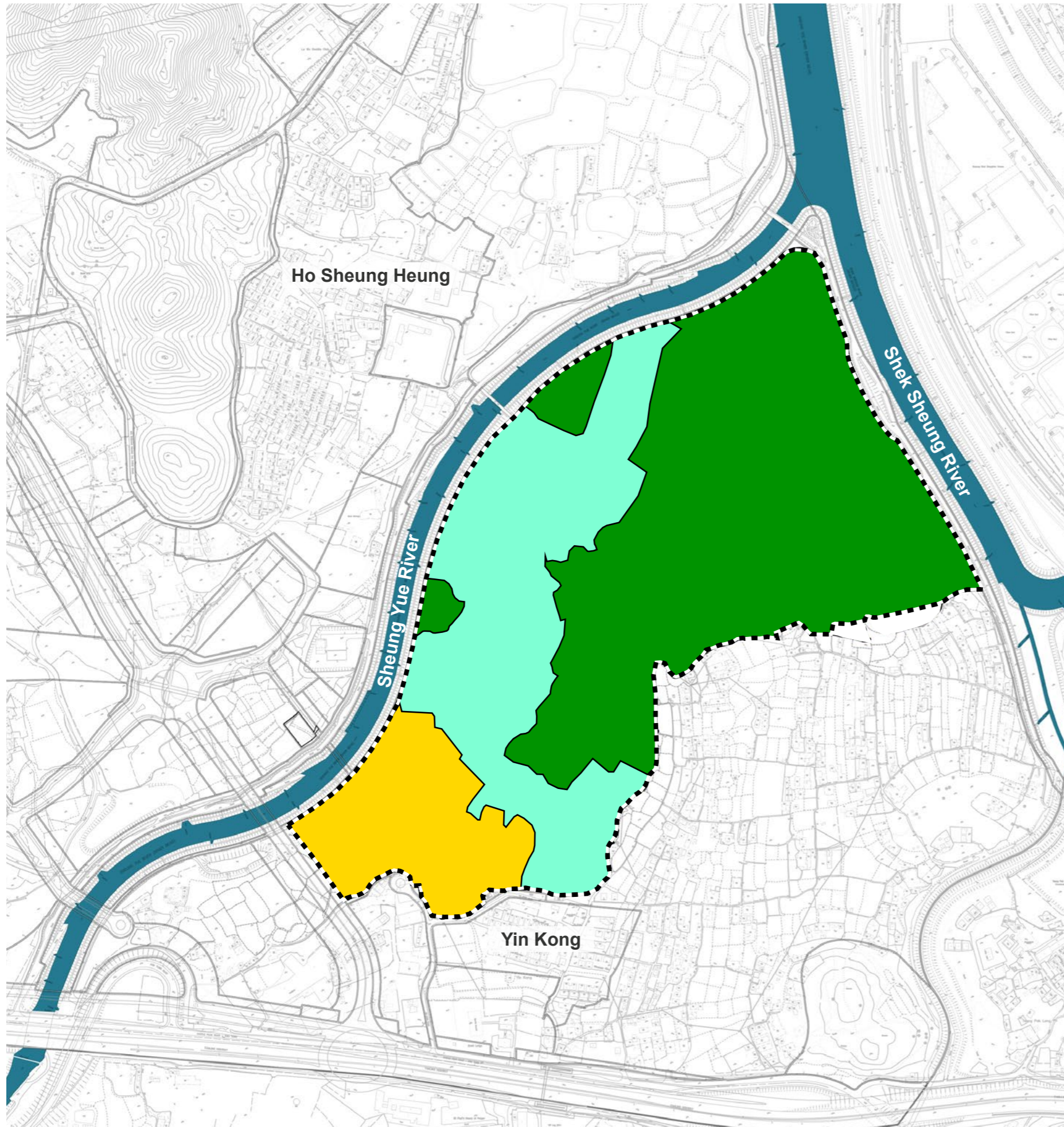


PLATE 4: HARVEST FEST





SOURCE: CONSERVANCY ASSOCIATION

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Legend

-  Current site boundary
-  Visitor Area (4.86 ha)
-  Biodiversity Agriculture Zone (21.24 ha)
-  Agriculture Zone (11.20 ha)



PROJECT

DEVELOPMENT OF
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 FANLING NORTH
 NEW DEVELOPMENT AREAS,
 PHASE 1 - DESIGN AND
 CONSTRUCTION

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KEY PLAN

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LVNP Zoning Plan

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SCALE **DIMENSION UNIT**
比例 尺寸單位

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PROJECT NO.
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CE 13/2014 (CE)

SHEET TITLE
圖紙名稱

WATER MANAGEMENT PLAN

SHEET NUMBER
圖紙編號

60335576/HCMP/FIGURE 8.2.1

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Phragmites australis

Water flow

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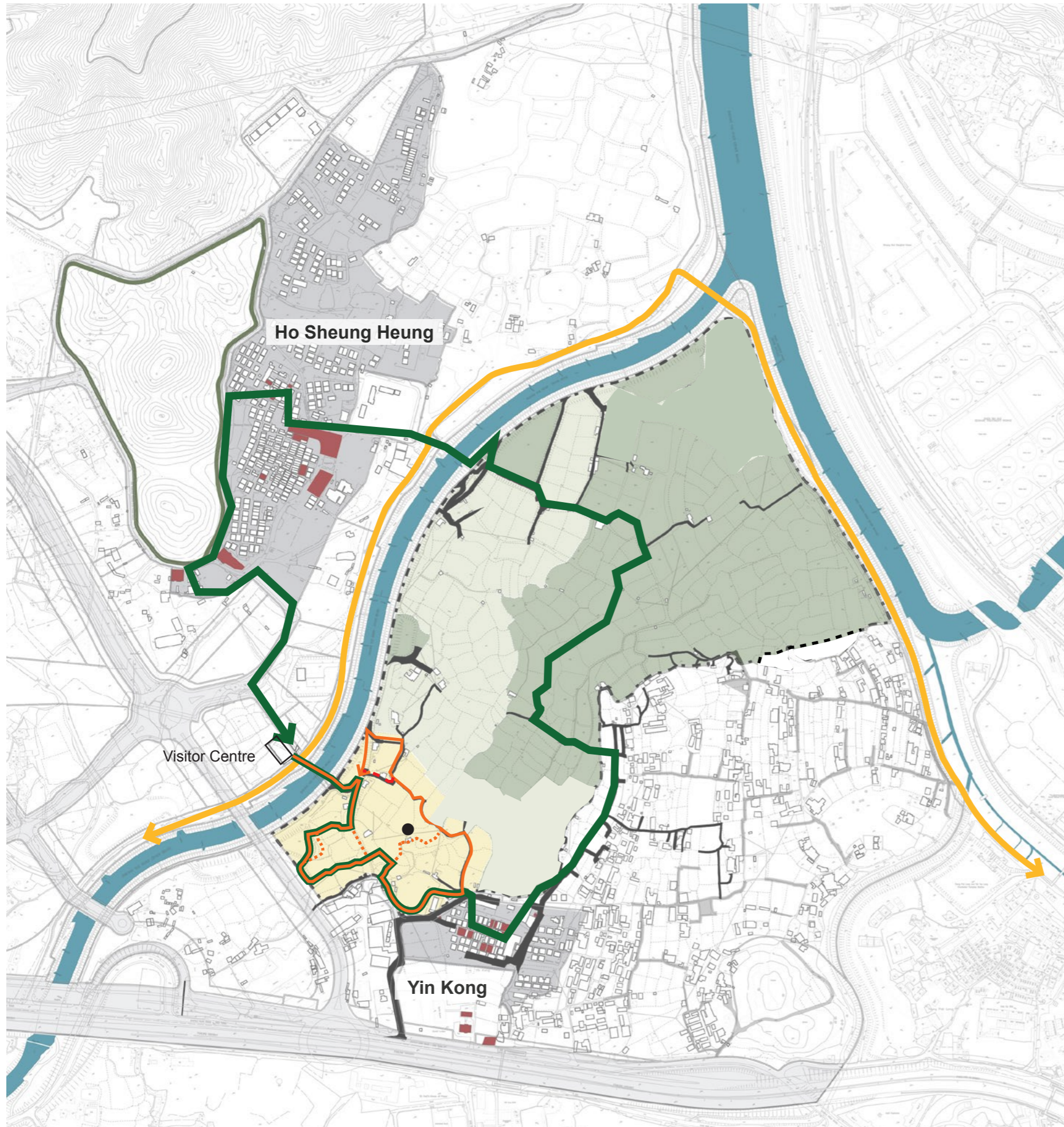
SHEET TITLE

Water Treatment Wetland –
 Concept Plan

SHEET NUMBER

60335576/HCMP/ Figure 8.3.1

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Legend

- Current site boundary
- Declared Monument / Heritage Buildings
- Feng Shui Woodland
- Designated Visitor Loop in Visitor Zone (Approx. 1.2km)
- Educational Guided Tour Route (Approx 3km)
- Cycle Tracks connecting North West NT with North East NT - Tuen Mun to Sheung Shui Section
- Potential bird watching station location

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KEY PLAN

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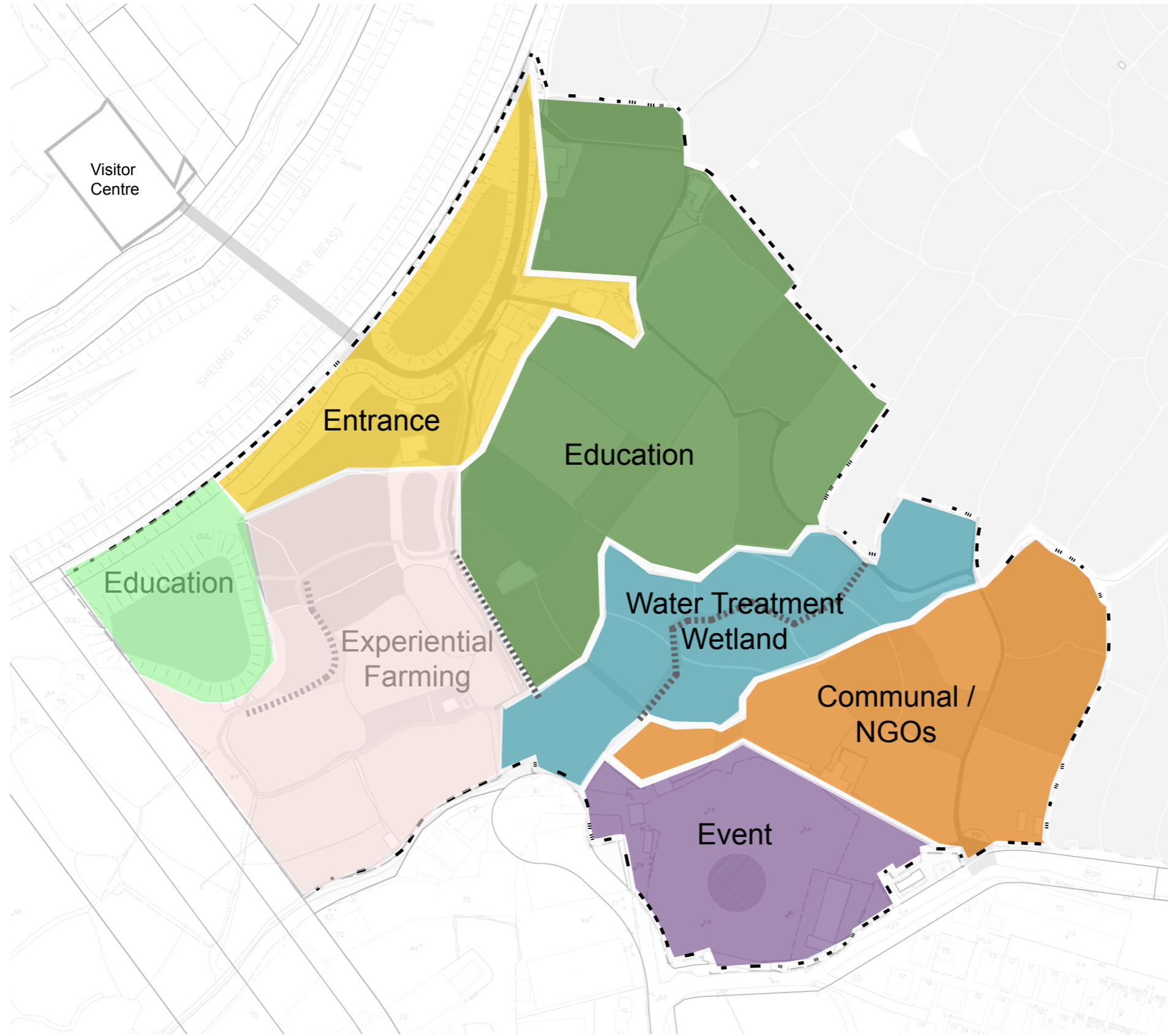
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Proposed Visitor Circulation

SHEET NUMBER

60335576/HCMP/ Figure 8.4.1

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Legend

Current site boundary



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KEY PLAN

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SHEET TITLE
 Visitor Zone Programme Areas

SHEET NUMBER
 60335576/HCMP/ Figure 8.5.1

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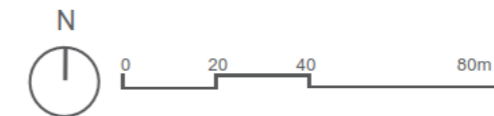
Visitor Area



Legend

- Current site boundary
- River
- Paving Block
- Timber Walkway
- Wetland Walkway
- Compacted Earth Path

- ① Enhanced Meander
- ② Treatment Wetland
- ③ View point
- ④ Farmer's Forum
- ⑤ Tea House
- ⑥ Composting Facilities
- ⑦ Storage Area
- ⑧ Visitor Centre
- ⑨ Footbridge
- ⑩ Fish Pond
- ⑪ Outdoor Classroom
- ⑫ Bird hide
- ⑬ Lodging Facilities



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KEY PLAN

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SHEET TITLE

Visitor Zone Overall Plan

SHEET NUMBER

60335576/HCMP/ Figure 8.5.2

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 11/21/2014

Visitor zone



Visitor circulation route



Irrigation channel



To be upgraded to accessible earth path

Visitor zone - Wetland Treatment Area



Reference image: Westergasfabriek Culture Park, Amsterdam

Biodiversity Agriculture Zone & Commercial Agriculture Zone



Route of guided tour



Potential hazard area



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KEY PLAN

PROJECT NO. CONTRACT NO.

60335576 CE 13/2014 (CE)

SHEET TITLE

Paths

SHEET NUMBER

60335576/HCMP/ Figure 8.6.1

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Permanent bird watching station



Reuse / revamp of existing structures or new structure adopting a Long Valley characteristics

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KEY PLAN

PROJECT NO. 項目編號: 60335576
CONTRACT NO. 合約編號: CE 13/2014 (CE)

SHEET TITLE

Bird Watching Station

SHEET NUMBER

60335576/HCMP/ Figure 8.7.1

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Appendix 8.1

Hong Kong Organic Resource Centre Certification Limited -
Organic Production, Aquaculture and Processing Standard
(IFOAM Accredited Version) 2017

Hong Kong Organic Resource Centre Certification Limited

Organic Production, Aquaculture and Processing Standard (IFOAM Accredited Version)

2017



香港有機資源中心認證有限公司
HONG KONG ORGANIC RESOURCE CENTRE CERTIFICATION LTD

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The terms appeared in Appendix 7.1 Definitions will be marked with asterisk (*) in the text.



Chapter 1

Overview

1.1 About Hong Kong Organic Resource Centre Certification Limited

“Hong Kong Organic Resource Centre Certification Limited” (abbreviated as “HKORC-Cert”) is an independent incorporated certification agent managed by “Hong Kong Organic Resource Centre” (abbreviated as “HKORC”). Its duties include the establishment of a local organic production and processing standard and a certification system; the development and management of “Hong Kong Organic Resource Centre Certification Limited - Hong Kong Organic Production, Aquaculture and Processing Standard” (abbreviated as “this standard”); the processing of applications for organic certification; the award of certificates to organic products that are produced and processed in accordance with this standard and the monitoring and management of the use of HKORC-Cert organic certification seals.

1.2 About Hong Kong Organic Resource Centre

To cope with the increasing demand for healthy food and environmental protection, many countries have been actively developing organic farming since the 1990’s. Coupled with the shrinking growth of the local farming industry owing to urbanization and economic transition, the HKSAR Government has been assisting the local farming community to develop organic farming since 2000. A direction has been charted to develop a new market with higher returns. In order to allow organic market growing healthily and rapidly, a set of organic standards and a certification system is needed. With funding supports from the Agricultural Development Fund of Vegetable Marketing Organization, HKORC was established in December 2002. It is the first local certification body of organic products set up under the Agricultural Development Fund to facilitate the development of organic farming.



We envision HKORC as an independent organic certification agent that works toward the goals of:

- Increasing the awareness of farmers, fisherman, consumers and the general public about the role of certification in the production and marketing of organic products, and
- Promoting the sustainable development of organic farming in Hong Kong so as to ensure a safe and high-quality food supply and an ecologically balanced living environment for our future generations.

We serve with professionalism, dedication and unselfishness in establishing and operating a set of fair, impartial and transparent organic standards and certification system for the organic farming community. In addition, we provide technical support, trade and marketing information to the organic sector; as well as information about organic farming methods and organic foods to the consumers.

1.3 Organizational Structure of HKORC-Cert

HKORC-Cert is comprised of the Board of Directors, Executive Committee, Certification Board, Standard Board and HKORC-Cert staff. Members of the Board of Directors come from HKORC Governing Board. The Board serves as the body for final appeal of certification decisions.

The Standard Board is made up of farmers, fisherman, environmentalists/scientists, government and HKORC founding organization. The Standard Board is responsible for the formulation or revision of a set of organic standards applicable to Hong Kong.

The Certification Board is consisted of farmers, fisherman, retailers, environmentalists/ scientists, consumers, government, worthy personages and HKORC founding organization. The Board is responsible for the formulation or revision of the certification system applicable to Hong Kong. Furthermore, the Certification Board, based on this standard, assesses organic farming and processing operations in compliance with the standards and makes decisions about their certification status.

The Executive Committee is made up of are presentative from each of the 3 HKORC co-organizers. It is responsible for managing HKORC-Cert staff to execute the entire system.



1.4 About “HKORC-Cert – Organic Production, Aquaculture and Processing Standard (IFOAM Accredited Version)”

The formulation and revision of “HKORC-Cert – Organic Production, Aquaculture and Processing Standard (IFOAM Accredited Version)” is a continuous and important duty of the Standard Board. As the number of organic producers, sellers and consumers are increasing and the market for organic products is developing, this standard provides a liable, objective, locally-produced platform which is recognized by all stakeholders in the society.

The operations of all units certified by HKORC-Cert shall meet or exceed this standard. In order to ensure that their operations comply with our standards, HKORC-Cert will arrange periodic and unannounced inspections of the applicants. The system is designed to create mutual trust between the producers and the consumers.

The following organic standards were referenced during the formulation of this standard:

1. *AgriQuality Organic Standard*. New Zealand. 2007
2. *Organic production and labelling of organic products and repealing Regulation (ECC) No 834/2007*. European Union (歐盟). 2007.
3. *Guidelines for The Production, Processing, Labelling and Marketing of Organically Produced Foods (GL32– 1999, Rev.1–2001)*. FAO/WHO Codex Alimentarius (食品法典委員會). 2001.
4. *IFOAM Basic Standards for Organic Production and Processing*. International Federation of Organic Agriculture Movements (國際有機農業運動聯盟). 2005.
5. *Interim Final Report of the Aquaculture Working Group*. U.S. Department of Agriculture. National Organic Program. 2006.
6. *International Certification Standards*. Organic Crop Improvement Association International (國際有機作物改良協會). 2008.
7. *Naturland Standards for Organic Aquaculture*. Naturland 2007.
8. *OMRI Generic Materials List*. Organic Materials Review Institute. 2009.
9. *ACT Organic Agriculture Standards*. Organic Agriculture Certification Thailand. 2009.
10. *Standards for KRAV- certified Production*. Sweden Standard. 2007.
11. *Soil Association organic standards*. Soil Association. 2006.
12. 《有機生產標準》，香港：香港有機農業協會，2002。
13. 《有機作物生產守則》，香港：漁農自然護理署，2000。
14. 《有機耕種守則及有機驗證章則》，香港：幼聯大自然教育中心，2002。
15. 《有機認證標準》，南京：中國國家環境保護總局有機食品發展中心，2007。



This standard is drafted by the Standard Board and is reviewed and approved by the Governing Board after an extensive public consultation. The process of formulation is transparent and representational, with the local conditions and various factors seriously considered. Apart from this, in order to address the changing needs in aspects like knowledge, technology, material supply, environment and law, the standards are subject to review so as to cater for the benefits of producers and consumers.

This standard is a set of operational rules that producers or processors who apply for the organic certification must follow. The standards are not oriented towards the use of laboratory test result as the only indicator for “organic products”. Organic production focuses on whether the procedures for food productions enhance the balance and conservation of the environment. This standard provides regulation of methods and materials used for organic production and processing and, thus certification under the standard provides verification that operators are using practices that have been approved by the HKORC-Cert. Furthermore, the certification system only examines the compliance of the operation of the applicants with this standard. The compliance of the operations with the relevant legal requirements in the territory is out of HKORC-Cert’s legitimate authority.

1.5 Structure

This standard’s chapters are presented in 2 parts, namely principles and standards:

- Principles: Principles are the instructive statements of the chapter. The standards under each principle are the specific ways to actualize that principle. The principle is formatted in *italic* in this standard, and is located between the chapter heading and the standards. In addition, a list of General Principles for Organic Production and Processing are presented in Chapter 2.
- Standards: Standards are the minimum requirements for HKORC-Cert certification. Each standard, located under the chapter heading and principle, is numbered.



1.6 Execution

This standard is the basic requirement for organic production and processing. Applicants for organic certification must sign an agreement with HKORC-Cert to promise and guarantee the fulfilment of every relevant rule in this standard and to cooperate with the inspectors by allowing them to carry out site inspections. The Certification Board awards certificate of organic certification to producers and processors that meet this standard. Certified operators and HKORC-Cert enter into a legal agreement, formalized by a signed contract, which allows the operators to use the seals of HKORC-Cert, according to this standard, on certified products. When there is any discrepancy between English and Chinese versions, the Chinese version shall be taken as the official version.

1.7 Scope

This standard illustrates every requirement in the production, processing and handling, and labelling of organic products. The scope is as follows:

1. Unprocessed agricultural and aquacultural products;
2. Processed comestible products for humans that are made with one or more agricultural ingredients;
and
3. Other products not stated in the above two items but approved by the Certification Board.



Chapter 2

Basic Principles of Organic Production* and Processing*

The basic principles of organic production and processing include:

- 2.1 To produce sufficient food and other products* of high quality.
- 2.2 To work compatibly with natural cycles and living systems through the proper management of soil, plants and animals in the entire production system.
- 2.3 To maintain and promote the recycling of materials within the production and processing systems and to encourage the use of local resources for self-sufficiency and cutting down the demand for external inputs.
- 2.4 To conserve and enhance the long-term fertility and biological activity of soil.
- 2.5 To value the conservation of ecosystem.
 - 2.5.1 Clearing or destruction of sites of conservation importance is prohibited.
- 2.6 To protect biodiversity* within and outside the production systems, including the protection of wild animals, plants and their habitats.
 - 2.6.1 On-farm wildlife refuge habitats must be established to maintain and improve the ecosystem of the farm. Such habitats may include, but are not limited to:
 - 2.6.1.1 Pools which are not used for intensive agriculture;
 - 2.6.1.2 Areas with wild plants.
- 2.7 To use, maintain, and conserve soil, water and other resources in a responsible and sustainable manner.



- 2.8 To encourage a proper balance between crop production and animal husbandry.
- 2.9 To respect animals' biological needs and habits in nature and to provide them with a living environment that suits their natural needs.
- 2.10 To use renewable resources in production and processing systems as much as possible and avoid all sorts of pollution and waste production.
- 2.11 To avoid excessive packaging and to encourage material recycling, and the use of biodegradable* or recyclable materials.
- 2.12 To prohibit the use of any genetically modified organisms* and their derivatives in the organic production and processing systems, except genetically engineered vaccines. All inputs, processing aids and ingredients must be traced back one step in biological chain to the direct source organism from which they are produced to verify that they are not derived from GMOs.
- 2.13 To prohibit the use of nanomaterials* in the organic production and processing systems.
- 2.14 To foster local production and consumption.
- 2.15 To respect, understand, protect and benefit from local knowledge and traditional farming systems.
- 2.16 To ensure that everyone involved in the organic production and processing systems can have sufficient rewards and fulfillment under a safe, secure and healthy working environment.
- 2.17 Production that violates human rights and social justice requirements listed in Laws of Hong Kong and in this standard cannot be certified as organic.
 - 2.17.1 Operators must not use forced or involuntary labour or apply any pressure such as retaining part of the workers' wages, property or documents such as identity and travelling documents, etc.



- 2.17.2 Operators must never require an employee to work who is ill or during medical leave and must not sanction an employee for the sole fact of missing work due to illness.
- 2.17.3 Operators must file employees' personal records. Workers will have access to their own files.
- 2.17.4 Operators with more than 10 employees must have a written employment policy.
- 2.18 To foster organic production, processing and distribution systems that are ecologically responsible, socially just and economically sound.



Chapter 3

Standards for Crop Production

3.1 Conversion Period

Conversion to organic production implies the revival of the ecosystem so that soil fertility can be improved. The farmland will then be developed into a vital and sustainable agro-ecosystem.

- 3.1.1 A conversion period is required before product may be labelled as “organic”.
- 3.1.2 During the conversion period, all the provisions on crop production standards (Chapter 3) must be followed.
- 3.1.3 A farm* may be converted to organic production in stages. Please refer to Section 3.2 Split Production for detail.
- 3.1.4 The conversion periods for the farmland of different types of crops are as follows:
 - 3.1.4.1 In case of farmland cultivating annual crops* (for example, vegetables, cereal, etc.), a conversion period of at least 12 months is required.
 - 3.1.4.2 In case of farmland cultivating perennial crops* (for example, fruit trees), a conversion period of at least 18 months is required.
- 3.1.5 The start of the conversion period is calculated from the date of application. If non-Group I inputs have been applied, the commencement of the conversion period must not be earlier than the date of the last application of those inputs.
- 3.1.6 Annual crops that are sown and perennial crops that are harvested after the end of the conversion period can be sold as organic products.



- 3.1.7 Depending on factors such as previous land use, management practices and the environmental conditions of the land, the Certification Board may extend the conversion period as applicable to an individual farm applying for certification.
- 3.1.8 If there is adequate documentation to prove that organic production has been adopted in the farmland before application for certification, and is verified by inspection, the Certification Board may shorten the required conversion period accordingly.
- 3.1.9 Immediate notification to HKORC-Cert is required if there is any significant change in the land use or production of the conversion farm.
- 3.1.10 Products produced on land in conversion can only be labelled as “organic (in conversion)” *when a period of at least 12 months has elapsed, but must not be labelled as “organic” nor include similar description.
- 3.1.11 If conventional* practices are used on the land that is organic or in conversion, the certification given to the land will be revoked. Reapplication and another conversion period are required for gaining back the organic certification. However, the Certification Board reserves the right to accept or reject such re-applications.
- 3.1.12 Crops harvested less than 36 months after the application of a prohibited input to crop or soil cannot be labelled as “organic” nor include similar description.

3.2 Split Production*

Split production is the term used to describe a farm whose fields are not all certified as organic. The remainder of the fields may be (1) conventional, (2) in conversion, or (3) organic but not certified.

- 3.2.1 When managing split production, producers must clearly separate the certified organic crops from all other types of crops throughout the entire production, harvest, storage, transport, processing and packaging and sales process with complete audit trail* documentation.
- 3.2.2 Producers* must allow inspectors* to access all production and processing areas (including storage area) in order to inspect both organic and non-organic operation and the related records.



The inspector must be granted adequate access to information in order to verify the organic and non-organic products are not being commingled and the certified products are not contaminated by prohibited materials.

- 3.2.3 Genetically modified organisms and their derivatives are prohibited on farms with split production in terms of production, storage and trading.
- 3.2.4 In any farms with split production, producers must not produce the same crops in both organic and non-organic (including organic in conversion) production areas at the same time, except they are visually distinguishable.

3.3 Buffer Zone*

The establishment of buffer zone is to prevent the crops in the production area from external contamination.*

- 3.3.1 If there is a potential for contamination, such as the spread of synthetic* pesticides, herbicides, fungicides or fertilizers, from adjoining areas (including the non-organic fields in farms with split production), a buffer zone of at least 2 metres must be established between the organic and such areas to prevent contamination to the organic production area.
- 3.3.2 If physical barriers such as hedges, barrier plants or drains are available in the buffer zone, the Certification Board may relax the width requirement on the buffer zone on a case by case basis.
- 3.3.3 If necessary, the Certification Board may require a wider buffer zone or additional physical barriers.
- 3.3.4 Plants in the buffer zone must be grown organically but cannot be sold as organic. These plants must be easily distinguishable from the certified organic products grown on the farm.



3.4 Choice of Crops and Varieties

The varieties selected should be adaptable to the local environment and tolerant to local pest/diseases, preferably be local varieties.

- 3.4.1 All seeds or vegetative propagation materials used shall be certified organic.
- 3.4.2 In-conversion materials may be used when organic seed and planting materials are not commercially available*.
- 3.4.3 Conventional materials may be used provided that they have not been treated with post-harvest pesticides not otherwise permitted by this standard when organic or in-conversion sources are commercially unavailable.
- 3.4.4 Treated seeds and vegetative propagation materials may only be used where post-harvest chemical treatment is prescribed by law for phytosanitary purposes. However, prior approval must be sought and the usage must be documented.
- 3.4.5 Annual seedling must be produced according to this standard.
- 3.4.6 Products that are grown from non-organic, perennial seedlings maybe sold as organic only if they have been cultivated according to this standard for at least 12 months.
- 3.4.7 Meristem culture is allowed for propagation.
- 3.4.8 All multiplication practices on the farm, vegetal propagation materials, bedding materials and substrates must conform with HKORC-Cert Standard except meristem culture.
- 3.4.9 Any use of seeds and planting materials* produced by genetic engineering* is prohibited.

3.5 Diversity in Crop Production

The enhancement of diversity in crop production is important for soil conservation and pest/ disease control.



- 3.5.1 A farm must practise crop rotation* for annual crops. Crop rotations must be diverse and include leguminous crop and green manure. Producers of annual crops maybe exempted from this requirement only if they demonstrate diversity in plant production by other means that are found satisfactory by HKORC-Cert.
- 3.5.2 Cover vegetation must be planted in farms growing perennial crops to enhance biodiversity.
- 3.5.3 Aquatic plant culture and greenhouse crops that are not grown on ground maybe exempted from crop rotation requirements but must demonstrate enhancement of biodiversity.
- 3.5.4 Intercropping* must be practiced to avoid monoculture.

3.6 Fertility Management

Organic matter, nutrients and other resources within the production system must be returned to the soil in order to enhance or at least maintain its fertility and biological activity. Fertilizers introduced externally to the production system must be regarded as a complement to rather than a substitute for the nutrient cycle.

- 3.6.1 Operators must return nutrients, organic matter and other resources removed from the soil through harvesting by the recycling, regeneration (such as composting) or addition of organic materials and nutrients.
- 3.6.2 The use of fertilizers must be maintained at a suitable level without causing problems of over-nutrition and pollution. Over-accumulation of heavy metals and other pollutants in the soils must also be prevented.
- 3.6.3 The sources, quality, quantity and application method of fertilizers must cause no adverse effect to the environment.
- 3.6.4 The fertility of the soil can be replenished by allowing the land to lie fallow.
- 3.6.5 Materials of microbial, plant or animal origin shall form the basis of the fertility management



program.

- 3.6.6 Non-synthetic mineral fertilizers can only be used as a supplement to the soil fertility enhancement programmes based on techniques such as addition of organic matter, green manuring, crop rotation and nitrogen fixation by plants. Their use must be justified by appropriate soil and leaf analysis or diagnosed by an independent expert.
- 3.6.7 Non-synthetic mineral fertilizers must be applied in the form in which they are naturally composed. Besides using water for extraction or mixing with other naturally occurring and allowed materials (Appendix 7.2.1), the use of any other means to increase the solubility of the mineral fertilizers is prohibited.
- 3.6.8 Microorganisms or their derivatives may be used to speed up the process of composting.
- 3.6.9 The compost* applied on the farm must comply with the requirements of Appendix 7.2.1.
- 3.6.10 The use of fertilizers containing genetically modified organisms and their derivatives is prohibited.
- 3.6.11 The use of synthetic fertilizers or fertility amendments rapidly available to the plant is restricted. Exceptions maybe granted by the Certification Board for the use of restricted items as specified in the Appendix (Appendix 7.2.1) only when sufficient evidence of deficiency in a specific micro-nutrient of the farmland is provided and as a necessary complement when other fertility building techniques have been applied and are insufficient.
- 3.6.12 The use of human excrement is prohibited.
- 3.6.13 The use of sewage sludge* and chemical waste is prohibited.
- 3.6.14 Raw animal manure may only be applied to perennial crops, crops planted not for human consumption or crops harvested at least four months after application.
- 3.6.15 Materials used in the fertility management (including the adjustment of soil pH) must be in



compliance with the requirements listed in Appendix 7.2.1.

- 3.6.16 For mushroom production, substrates must be made of products of organic agriculture, or other non-chemically treated natural products such as peat, wood, mineral products or soil.
- 3.6.17 The production of terrestrial plants must be soil-based. The production of such crops in hydroponic systems* is prohibited.
- 3.6.18 The farm must take appropriate measures to prevent soil erosion. Such measures may include, but are not limited to: reduced tillage, maintenance of cover plants and other management practices that conserve soil.
- 3.6.19 The removal of soil from the farm is prohibited, except incidental removal when harvesting crops.

3.7 Pest, Disease, Weed and Growth Management

Organic production system shall minimize crop loss by the use of a preventive farm management program.

- 3.7.1 Specific measures must be taken in an organic production system to prevent the invasion of pests, diseases and weeds, such as:
 - 3.7.1.1 Adopting appropriate farming practices, such as crop rotation, intercropping, cultivation, fallowing, plowing or green manure planting, etc.
 - 3.7.1.2 Adopting appropriate fertility and irrigation program.
 - 3.7.1.3 Managing and conserving habitats for natural enemies, such as planting hedges or windbreaks, providing nesting sites or ecological buffer zones.
- 3.7.2 Pests, diseases and weeds can be controlled by means of mechanical, physical or biological measures, including but not limited to the following:
 - 3.7.2.1 Adopting physical measures, such as handpicking, traps, barriers, light, sound, electricity, heat or mechanical methods.
 - 3.7.2.2 Selecting varieties with resistance to pests and diseases.



- 3.7.2.3 Growing crops with pest control function (such as insect repelling or predator attracting).
 - 3.7.2.4 Using mulch.
 - 3.7.2.5 Releasing natural enemies.
 - 3.7.2.6 Using visual or physical traps.
 - 3.7.2.7 Using animals, plants, micro-organisms or their preparations.
- 3.7.3 When preventive, mechanical, physical or biological measures are not effective, the following restricted measures may be adopted:
- 3.7.3.1 To use materials listed in the Appendix 7.2.2 in accordance with the stated requirements.
 - 3.7.3.2 For structure coverings, mulches, insect nets and bags which contain plastic materials, only products made from polyethylene (PE), polypropylene (PP) or polycarbonates (PC) are allowed. All these must be removed completely from the field and cannot be burned.
- 3.7.4 To avoid using the following methods in organic production:
- 3.7.4.1 To avoid burning of weeds so as to prevent contamination of crop and the environment.
 - 3.7.4.2 Thermal sterilization* of soils is prohibited. Unless severe disease or pest infestation happen in crops growing under protected facilities and cannot be remedied through allowed measures in 3.7.1 to 3.7.3. Approval from HKORC-Cert must be sought prior to every usage.
 - 3.7.4.3 Burning of vegetation or crop residues for land preparation is prohibited. Except for pest, disease or weed control. Prior application and approval must be sought for every burning.
- 3.7.5 The use of the following materials is prohibited in organic production:



- 3.7.5.1 Synthetic herbicides, fungicides, insecticides, growth regulators or other pesticides.
 - 3.7.5.2 Materials made from genetically modified organisms and their derivatives.
 - 3.7.5.3 Category III substances listed in Appendix 7.2.2 or all substances that do not appear in Appendix 7.2.2.
- 3.7.6 All formulated inputs must have only active ingredients listed as Category I, or Category II after being approved, in Appendix 7.2.2. All other ingredients must not be carcinogens, teratogens, mutagens or neurotoxins.

3.8 Avoiding Contamination

Effective measures shall be applied to prevent contamination of the products and the environment.

- 3.8.1 Contamination of crop, soil, water, or inputs by prohibited substances or environmental contaminants must be monitored.
- 3.8.2 A buffer zone must be established if the organic farmland maybe contaminated by the adjoining area. The buffer zone must meet the requirements of this standard (please refer to §3.3).
- 3.8.3 Materials containing plastic must be removed completely from the field after use. Burning of such materials is prohibited.
- 3.8.4 Water used for handling non-organic produce must not be used for organic crops.
- 3.8.5 If a farm is accidentally contaminated by GMOs (such as seeds or pollen), its products and other possibly contaminated products must be immediately and completely uprooted. The cleared products are prohibited from being sold as organic or organic (in conversion). Same crop(s) and crops visually undistinguishable from those contaminated ones cannot be grown in the farm and all volunteer plants of the contaminated products must be completely uprooted within one year after clearance. In particular cases, such as long lifespan for seeds of contaminated products, the Certification Board may make further consideration.



- 3.8.6 If a farm is suspected of being contaminated, Certification Board may take samples of soil, water or plants etc. from it for analysis in order to investigate the case.
- 3.8.7 Certification Board may suspend, revoke or deny the certification status or certification application enjoyed by the farm or the contaminated area if the level of heavy metal or other contaminants* in the soil or the products exceeds safety standard*.
- 3.8.8 Operators must prevent or remedy soil and water salinization where these pose a problem.

3.9 Use of Machinery, Equipment and Facility

Producers shall ensure that the use of machinery, equipment and facility will not cause negative impacts to the quality of organic products and the environment.

- 3.9.1 All machinery and equipment that have been used on a non-organic area must be cleaned thoroughly to remove any contaminants (including genetically modified organisms and their derivatives) before being used in organic production.
- 3.9.2 The use and maintenance of machinery should be monitored to avoid contamination to the organic products or the environment by the hydraulic fluid, fuel or lubricant, etc. of the machinery.
- 3.9.3 The use of heavy machinery should be avoided if they may damage soil structure.
- 3.9.4 Artificial light is only allowed for plant propagation and as a complement to sunlight to extend the day length to a maximum of 16 hours.
- 3.9.5 Operators must monitor, record and optimize any energy used for artificial light, heating, cooling, ventilation, humidity and other climate control.



3.10 Irrigation

Water resources should be effectively chosen and utilized to avoid water contamination.

- 3.10.1 Producers must not excessively exploit and deplete water resources. They must where possible recycle rainwater and monitor water extraction.
- 3.10.2 Producers should utilize water sources that meet the safety standard for irrigation (please refer to §3.8.7).
- 3.10.3 Producers should apply water in a way that causes no pollution to surface run-off and underground water.

3.11 Packaging, Storage and Transport

Effective measures should be applied to prevent contamination of the organic products.

- 3.11.1 When producers carry out simple packaging, storage or transport after harvesting, measures to avoid contamination to their products must be implemented at all times (May refer to Chapter 5 Processing and Handling Standards).

3.12 Breeding of organic varieties

Organic plant breeding and variety development aims for new varieties suited for organic production systems, rather than simply use or production of organic seeds from regular (conventional) varieties. It is a holistic approach that respects natural crossing barriers, relies on natural reproductive ability, and always creative, cooperative and open for science, intuition, and new findings, enhances genetic diversity and is sustainable.

- 3.12.1 To produce organic varieties, plant breeders must select their varieties under organic conditions that comply with the requirements of this standard. All multiplication practices except meristem culture must be under certified organic management.
- 3.12.2 Organic plant breeders must develop organic varieties only on the basis of genetic material that



has not been contaminated by products of genetic engineering.

- 3.12.3 Organic plant breeders must disclose the applied breeding techniques. Organic plant breeders must make the information about the methods, which were used to develop an organic variety, available for the public latest from the beginning of marketing of the seeds.
- 3.12.4 The genome is respected as an impartible entity. Technical interventions into the genome of plants are not allowed (e.g. ionizing radiation; transfer of isolated DNA, RNA, or proteins).
- 3.12.5 The cell is respected as an impartible entity. Technical interventions into an isolated cell on an artificial medium are not allowed (e.g. genetic engineering techniques; destruction of cell walls and disintegration of cell nuclei through cytoplasm fusion).
- 3.12.6 The natural reproductive ability of a plant variety is respected and maintained. This excludes techniques that reduce or inhibit the germination capacities (e.g. terminator technologies).

Chapter 4

Standards for Aquaculture* Production

4.1 Conversion

Conversion to organic cultivation is a process to develop an environmentally friendly and sustainable aquaculture production system with special consideration for the thriving and health of the cultivated organisms.

- 4.1.1 Save as is provided in 4.1.5, the length of the conversion period must be at least the life span of the animal or one year, whichever is shorter. Lifespan is defined as the period from birth to sale of the animal.
- 4.1.2 Starting from the conversion period, all the provisions on aquaculture production standards (Chapter 4) must be followed. Relevant requirements of Chapters 3 and 5 must also be complied.
- 4.1.3 The conversion period starts from the date of application for certification.



- 4.1.4 Organic aquafarms must not be switched between organic and conventional management. If conventional practices are reverted to the aquafarm that has been certified organic or in conversion, the certification given to the aquafarm will be revoked. Re-application and another round of conversion are required for gaining back the organic certification. However, the Certification Board reserves the right to accept or reject such re-applications.
- 4.1.5 If there is adequate documentation to prove the aquafarm has been managed using organic methods in compliance with this standard before the application for certification, the Certification Board may shorten the required conversion period.
- 4.1.6 Depending on factors such as previous usage, management practice and environmental condition of the aquafarm, the Certification Board may extend the conversion period.

4.2 Buffer Zone

Organic aquaculture production units must have adequate physical barriers or appropriate distance from contamination sources or conventional aquaculture production units, so as to prevent pollution from the outside of the system.

- 4.2.1 Save as is provided in 4.2.2, the buffer zone of pond culture and marine cage culture must not be less than 2 metres and 100 metres, respectively.
- 4.2.2 If physical barriers such as hedges, barrier plants or drains are available in the buffer zone, the Certification Board may relax the buffer zone requirement in a case by case basis.
- 4.2.3 If necessary, the Certification Board may require the aquafarm to set a wider buffer zone or to introduce additional physical barriers.
- 4.2.4 Any physical barriers should minimize the impact on biodiversity as far as possible.
- 4.2.5 Plant species in buffer zone should be conserved appropriately in order to maintain the biodiversity.
- 4.2.6 Plants in the buffer zone must be grown organically or naturally. The plants cannot be sold or



used as organic.

4.3 Parallel Production

Parallel Production means simultaneous production, preparation or practicing of organic and non-organic aquaculture of the same species within the same aquafarm. Non-organic production modes can be (1) conventional, (2) in conversion or (3) uncertified organic.

4.3.1 Parallel production may be practiced if the following conditions are satisfactorily implemented under an agreement with HKORC-Cert.

4.3.1.1 Buffer zones must be established between the area for organic production and other production modes in accordance with Standard 4.2.

4.3.1.2 Mixing of water body between organic and other aquaculture modes is prohibited.

4.3.1.3 A clear and identifiable separation between the areas for organic production and other production modes must be maintained. Feed, fish products harvested and other inputs for organic production must be stored separately.

4.3.1.4 Organic and non-organic aquatic animals must be visually distinguishable. Exceptions can only be granted by HKORC-Cert on a case-by-case basis.

4.3.1.5 Complete records (including accurate production estimates) and accounting of organic production must be maintained, and must be filed separately from those of other production modes.

4.3.2 At least two inspections annually for aquafarms practicing parallel production, including organic and non-organic production areas.

4.4 Aquatic Ecosystems

Organic aquaculture management shall maintain the health of aquatic ecosystems.

4.4.1 The aquaculture production system should not have negative impact on the environment and



harm other living organisms in the surrounding.

- 4.4.2 In order to maintain the aquatic environment and surrounding aquatic and terrestrial ecosystems, the following production practices should be adopted comprehensively.
- 4.4.2.1 Encouraging and enhancing biological cycles.
 - 4.4.2.2 Utilizing preventive methods for disease control, such as control of stocking density, control of feeding quantity, sun-baking of pond sediment, earth moving, etc.
 - 4.4.2.3 Conserving biodiversity through polyculture.
 - 4.4.2.4 Taking adequate measures to prevent predation on species living in enclosures. These measures must not intend to harm any predators. Toxic substances must not be used.
- 4.4.3 Producers must take appropriate measures to prevent excessive exploitation and use of water resources. They must where possible reuse water, recycle rainwater and monitor water extraction.
- 4.4.4 The quality of water, including the degree of pollution and the dissolved oxygen content, for organic aquaculture should not cause physiological or behavioural symptoms on cultivated animals. Water Source should have minimal or no contaminants such as pesticides or human pathogens.
- 4.4.5 Destruction of primary ecosystems is prohibited.
- 4.4.6 Stocking densities must not pollute water resources.
- 4.4.7 Operators must take verifiable and effective measures to minimize the release of nutrients and waste into the aquatic ecosystem. Quality of drained water must comply with government regulations.
- 4.4.8 Operators must take appropriate measures to prevent escapes of introduced or cultivated species,



and documenting any that are known to occur.

- 4.4.9 Use of chemical fertilizers and pesticides, and genetically modified organisms, technology and products thereof are prohibited.
- 4.4.10 Materials for bund construction should not contaminate the water body of the aquafarm.
- 4.4.11 Operators must prevent or remedy water salinization where these pose a problem.

4.5 Breeds and Breeding

Aquatic animals should begin life on organic units.

- 4.5.1 Destructive fishing method is prohibited for collecting organisms for culture, and the extent of harvesting should not lead to over depletion of the species.
- 4.5.2 Brought-in cultured aquatic animals must come from organic sources. Before Dec 31st, 2017, if organic stock is not available, brought-in conventional stock must spend not less than two thirds of their life span in the organic system.
- 4.5.3 Any brought-in conventional stock must not contain any drug residue.
- 4.5.4 Cultured species must be well adapted to local conditions.
- 4.5.5 Aquatic animals produced by natural spawning must be used.
- 4.5.6 Polyploid stock, artificially sex-reversed stock as well as stock produced by the use of hormones are prohibited.
- 4.5.7 Transgenic and genetically modified culture stocks are prohibited.



4.6 Nutrition

Organic aquatic animals shall receive their nutritional needs from good quality, organic and other sustainable sources. Feeds for aquatic animals shall be formulated taking into account of the natural feeding habit, using organic ingredients, with appropriate ration size, to satisfy the nutritional requirements of the aquatic animal.*

- 4.6.1 Save as is provided in 4.6.2 and 4.6.3, aquatic animals must be fed with organic feed.
- 4.6.2 Based on stocking time of fish fry and dry weight of feed, the following percentage of organic feed must be used in one lifespan or annually, whichever is shorter:
 - 4.6.2.1 50% or above before Dec 31st, 2017
 - 4.6.2.2 75% or above after Dec 31st, 2017
- 4.6.3 When organic feed is of inadequate quantity or quality, other feeds may be used under permission of HKORC-Cert, and comply with the duration and conditions prescribed by HKORC-Cert, and the requirements stipulated from 4.6.4 to 4.6.5.
- 4.6.4 Non-organic aquatic animal protein and oil sources can only be used if the following conditions are satisfactorily implemented:
 - 4.6.4.1 They are harvested from independently verified sustainable sources; and
 - 4.6.4.2 They are verified to have contaminants below safety limits.
- 4.6.5 Animals maybe fed with vitamins, trace elements and supplements* from natural sources. Synthetic vitamins, minerals and supplements not listed under 4.6.6 maybe used when natural sources are not available in adequate quantity or quality.
- 4.6.6 Use of the following materials in diet to aquacultural animals is prohibited:
 - 4.6.6.1 The same cultured species or its slaughter products;
 - 4.6.6.2 All types of excrements including droppings, dung or other manure;



- 4.6.6.3 Feed subjected to solvent extraction;
 - 4.6.6.4 Synthetic amino acids;
 - 4.6.6.5 Urea and other synthetic nitrogen compounds;
 - 4.6.6.6 Synthetic growth promoters or stimulants;
 - 4.6.6.7 Synthetic appetizers;
 - 4.6.6.8 Synthetic preservatives (preservatives based on natural products are allowed);
 - 4.6.6.9 Artificial colouring agents;
 - 4.6.6.10 Genetic modified organisms or their derivatives;
 - 4.6.6.11 Any Antibiotics.
- 4.6.7 Operators should feed animals according to their natural feeding habit.
- 4.6.8 Operators should feed animals efficiently, with minimum losses to the environment.
- 4.6.9 Operators should design systems so that the production area comprises the entire food chain with minimal reliance on outside inputs.

4.7 Health and Welfare

The measures of organic management should be able to promote and maintain the health and well-being of animals through balanced organic nutrition, stress-free living conditions appropriate to the species and breed selection for resistance to diseases, parasites and infections.

- 4.7.1 Production practices must follow the principles below:
- 4.7.1.1 Freedom from malnutrition;
 - 4.7.1.2 Freedom from thermal or other physical discomfort;



- 4.7.1.3 Freedom from injury or disease;
- 4.7.1.4 Freedom from fear or distress;
- 4.7.1.5 Freedom from unnecessary restrictions of behaviour.
- 4.7.2 Water quality, stocking density, health and behaviour of aquatic animals must be monitored regularly and managed properly to maintain the health and well-being of animals.
- 4.7.3 Preventive animal husbandry practices should be implemented to minimize the potential of disease outbreaks.
- 4.7.4 Cause of diseases should be identified as far as possible.
- 4.7.5 Natural methods and medicines must be used as the first choice, when treatment is necessary.
- 4.7.6 Provided that the treatment is prescribed by veterinarian, synthetic substances such as allopathic drugs can be used if preventive measures and natural medicines fail. In case of any treatment prescribed by the veterinarian, a withdrawal period of not less than double of that recommended by veterinarian, or a minimum of 48 hours, whichever is longer, must be taken before selling the stocks.
- 4.7.7 To avoid causing suffering to animals, sick or injured aquatic animals should be treated promptly and adequately and if necessary in isolation. Aquafarms should not withhold medication, even if the use of such medication will cause the animal to lose its organic status.
- 4.7.8 Prophylactic use of veterinary drugs is prohibited.
- 4.7.9 Use of allopathic veterinary drugs and antibiotics is prohibited for invertebrates.
- 4.7.10 Synthetic hormones and growth regulators are prohibited for use to stimulate or suppress natural growth or reproduction of animals.
- 4.7.11 Vaccination of aquatic animals is prohibited unless specified below:



- 4.7.11.1 Under the permission of HKORC-Cert for the purpose of endemic/pandemic disease control;
- 4.7.11.2 As instructed by the local government.
- 4.7.12 All treatments must be documented. Each treatment record shall indicate the type of diseases and possible causes, treatment details and withdrawal period. Records should be retained properly.
- 4.7.13 Stocking densities should not compromise animal welfare.
- 4.7.14 The maximum hours of artificial light used to prolong natural day length must not exceed a maximum that respects the natural behavior and general health of the animals.
- 4.7.15 Mutilations are prohibited.

4.8 Handling, Transport and Slaughter

Organic aquatic animals are subjected to minimum stress during handling, transport and slaughter.

- 4.8.1 Aquafarm must handle live organisms in ways that are compatible with their physiological requirements.
- 4.8.2 Aquafarm should minimize the transport frequencies and distances for the animals. Transportation time must not exceed 4 hours.
- 4.8.3 Aquafarm must ensure that organic aquatic animals are provided with conditions during handling, transport and slaughter that meet animal specific needs and minimize the adverse effects of:
 - 4.8.3.1 Diminishing water quantity or quality;
 - 4.8.3.2 Long transportation time;
 - 4.8.3.3 High stocking density;



- 4.8.3.4 Exposure to toxic substances;
- 4.8.3.5 Escape.
- 4.8.4 The use of chemically synthesized tranquilizers or stimulants is prohibited.
- 4.8.5 Aquafarm should use appropriate equipments to handle and harvest animals so as not to harm the organisms and not to affect the environment.
- 4.8.6 The use of any apparatus that produces or transmits electricity and is capable of stunning aquatic animals completely or partially is prohibited.
- 4.8.7 During the slaughter process, the stresses and pains of the aquatic animals must be minimized. Aquatic animals must be stunned immediately before slaughtering. The equipment used for stunning must be checked periodically to ensure it is in good working condition.
- 4.8.8 No toxic substance should be migrated from transportation equipment and materials. Transportation equipment and materials should be cleaned adequately before use.
- 4.8.9 Each animal or each group of animals must be identified at each step in the handling, transport and slaughter process. Organic and conventional aquatic animals must be slaughtered and stored separately, and must be clearly marked.



Chapter 5

Processing and Handling* Standards

5.1 Processing and Handling

In the entire processes for organic processing, handling and selling, organic integrity of the products should be preserved, and should provide consumers with high quality organic products.

- 5.1.1 If a producer or processor processes or handles certified organic products, the processing/packing operation must be certified by HKORC-Cert before products are labelled with HKORC-Cert seals according to the standards in Chapter 6. Exceptions can be granted to producer of HKORC-Cert certified organic farms in where simple packaging practices are being used.
- 5.1.2 The principles of good manufacturing practices must be followed. This includes implementing appropriate procedures based on identification of critical processing steps.
- 5.1.3 In case of split production, organic and non-organic products must be distinguishable and handled separately and cannot be commingled or substituted. HKORC-Cert must be informed when non-organic products are prepared or stored in the preparation unit. Operators are required to comply also with the standards in Chapter 3.2 where requirements for farms and crops also apply to processing and handling operators and products.
- 5.1.4 Handlers and processors must ensure traceability in the organic processing and handling chain.
- 5.1.5 If prohibited substances or methods are applied to the equipment or facilities, necessary precautionary measures must be taken to prevent contamination of organic products, such as removal of the products or cleaning of the facilities. Documentation is required for every measure taken.
- 5.1.6 Operators must take all necessary precautions to protect organic products against contamination by substances prohibited in organic farming and handling, pests, disease-causing organisms, and foreign substances.
- 5.1.7 Equipment and areas that have been used for conventional processing and handling must be



cleaned thoroughly before being used for organic processing and handling.

- 5.1.8 All processing areas and facilities must be clean and sanitary to avoid contamination to the organic products.
- 5.1.9 Water and cleansers, sanitizers and disinfectants listed in Appendix 7.2.23 are allowed for use in processing and handling facilities and area. Documentation is required for the cleaning procedures and the use of materials if substances other than those listed in Appendix 7.2.3 are used. Rinsing after use of such substances must be thorough to avoid any contamination.
- 5.1.10 Risks of environmental pollution resulting from handling and processing activities must be identified and minimized.
- 5.1.11 The effluents of processing facilities must not have adverse effects on the environment.
- 5.1.12 All repacked food must be certified organic by HKORC-Cert or other recognized organization. Otherwise, HKORC-Cert seals cannot be used.

5.2 Raw Materials*, Food Additives* and Processing Aids*

Organic processing should use organic ingredients entirely.*

- 5.2.1 Ingredients must be HKORC-Cert certified or be certified by a recognized organization* except for those materials listed at Appendix 7.2.3. In case where an ingredient of organic origin is commercially unavailable, a processor may use a non-organic source of the ingredient which must not contain GMOs and their derivatives or nanomaterials. Prior approval for such non-organic ingredient must be sought and every use must be documented with HKORC-Cert “Use of Non-organic Ingredients Record”. The product must be labelled in compliance with Chapter 6 (Labelling of Organic Products and the Use of HKORC-Cert Seals). The non-organic ingredient must be obtained from organic sources as soon as it becomes commercially available.
- 5.2.2 The use of non-organic and organic sources of the same ingredient in a product is prohibited.
- 5.2.3 Water used in organic processing and handling must comply with the requirements of World



Health Organization Guidelines for Drinking-water Quality.

- 5.2.4 The use of minerals (including trace elements) or vitamins are not allowed for enhancing nutrient content of the products. Unless their use is legally required or where severe nutritional deficiency can be demonstrated in the market to which the particular batch of product is destined. Prior approval must be obtained.
- 5.2.5 Materials listed at Appendix 7.2.3 are allowed for use as per the associated annotations in the materials list. The use of GMOs and their derivatives or nanomaterials are prohibited. All materials not listed in Appendix 7.2.3 are prohibited unless otherwise specify.

5.3 Processing Methods

Processing methods should maintain the natural constituents and nutritional value of the products.

- 5.3.1 Substances or techniques used in processing or handling procedures to achieve the following objectives are prohibited:
- 5.3.1.1 Reconstitute properties lost by the processing and storage of products;
 - 5.3.1.2 Conceal negligent processing;
 - 5.3.1.3 Mislead the true nature of products.
- 5.3.2 Water may be used for re-hydration or reconstitution.
- 5.3.3 Biological, physical or mechanical methods (e.g. extraction, heating or fermentation) in organic processing are allowed. Any additives, processing aids, or other substances that chemically react with or modify organic foods shall comply with the requirements of Appendix 7.2.3.
- 5.3.4 Irradiation is prohibited for any ingredient or the final product.
- 5.3.5 Filtering equipment, materials or techniques, which contain harmful substances or may



generate harmful substances, are prohibited. Filtration agents and adjuvants are considered processing aids and therefore must appear in Appendix 7.2.3.

5.3.6 Intentional manufacture or use of nanomaterials is prohibited.

5.3.7 Equipment surfaces and utensils that might come into contact with organic products must be free of nanomaterials.

5.3.8 Solvents used to extract organic products must be either organically produced or food grade substances that appear in Appendix 7.2.3.

5.4 Pest and Disease Control

The prevention of pest and disease within processing and handling areas and facilities should be accomplished through preventive management program such as cleaning and sanitization.

5.4.1 Measures for controlling pest and disease must be used according to the following priorities:

1. Preventive measures such as elimination of habitat and exclusion;
2. If preventive measures are ineffective, mechanical, physical and biological methods may be used;
3. If the above measures are ineffective, allowed materials listed at Appendix 7.2.2 may be used but contact with organic products is prohibited.

5.4.2 Physical barriers, sound, ultra-sound, light, ultra-violet light, temperature control, controlled atmosphere or etc. is allowed for pest and disease control practices.

5.4.3 Irradiation and materials not listed at Appendix 7.2.2 are prohibited as pest and disease control measures.



5.5 Packaging

Packaging methods and materials should be simple so as to avoid unnecessary packaging and negative impact on the environment, and should maintain the quality of the products.

- 5.5.1 Packaging must be based on the principle of waste reduction. The use of materials and methods must minimize the negative impact on the environment.
- 5.5.2 The use of packaging materials that contaminates the products is prohibited. This includes reused bags or containers that have been in contact with any substance likely to compromise the organic integrity.
- 5.5.3 Packaging materials, or storage containers must not contain disinfectants, preservatives, fumigants, insecticides, genetically modified organisms and their derivatives or nanomaterials.
- 5.5.4 Biodegradable, recyclable or reusable packaging materials are recommended.
- 5.5.5 Vacuum packing is allowed.
- 5.5.6 Processors should try to use inks and adhesives which are harmless to human beings.

5.6 Storage

Storage procedures for organic products should preserve product quality.

- 5.6.1 When organic and non-organic products are stored at the same unit, they must be stored in separated, identified places and be labelled or packaged differently to prevent commingling*.
- 5.6.2 The following storage methods are allowed:
 - controlled atmosphere;
 - temperature control;
 - humidity regulation; or
 - drying.
- 5.6.3 All invoice and storage records for the product in and out must be kept.

5.7 Transport



Transportation of organic products should be able to preserve product quality.

- 5.7.1 When transporting organic and non-organic products together, products must be clearly marked and packaged to prevent commingling.
- 5.7.2 Only allowed materials listed at Appendix 7.2.3 are allowed for cleaning conveyances.



Chapter 6

Labelling of Organic Products and the use of HKORC-Cert Seals

Organic products shall be accurately and clearly labelled.

6.1 Labelling of organic products

6.1.1 HKORC-Cert seals and name may only be used by operators holding a valid certificate of registration from HKORC-Cert and only in conjunction with those organic products identified on the certificate.

6.2 Products classification

6.2.1 Unprocessed organic agricultural and aquatic products

6.2.1.1 Agricultural and aquatic products that are certified by HKORC-Cert may be labelled as “organic” with the use of “organic” seal of HKORC-Cert.

6.2.1.2 Agricultural and aquatic products that are certified by HKORC-Cert as being produced in the conversion period may be labelled as “organic in conversion” and use the “organic (in conversion)” seal of HKORC-Cert, but cannot be labelled as “organic” nor use the “organic” seal of HKORC-Cert.

6.2.2 Processed organic products

6.2.2.1 Products with not less than 95% of organic raw materials (excluding water and salt) that are certified by HKORC-Cert or other recognized organization, and processed and handled by HKORC-Cert certified facilities, may be labelled as “organic” and use the “organic” seal of HKORC-Cert.

- 6.2.2.2 Products with not less than 70% but not more than 95% of organic raw materials (excluding water and salt) that are certified by HKORC-Cert or other recognized organization, and processed and handled by HKORC-Cert certified facilities, may use “made with organic” seal of HKORC-Cert and may be labelled as “made with organic”, followed by a clear indication of the proportion of the organic ingredients, but cannot be labelled as “organic”.
- 6.2.2.3 Only single ingredient plant products may be labelled as “in-conversion”.
- 6.2.2.4 Products with less than 70% of organic raw materials (excluding water and salt) that are certified by HKORC-Cert or other recognized organization, which cannot meet the ingredient requirement of HKORC-Cert, cannot be labelled as “organic” and use the name and seal of HKORC-Cert.



Fig 1. “Organic” seal of HKORC-Cert



Fig 2. “Organic (in conversion)” seal of HKORC-Cert



Fig 3. “Made with organic” seal of HKORC-Cert

6.3 Labelling

6.3.1 Seal

- 6.3.1.1 Only organic products that comply with relevant part in this standard may use “organic”, “organic (in conversion)” or “made with organic” seal of HKORC-Cert.
- 6.3.1.2 Using the seals of HKORC-Cert as product brand name is prohibited.
- 6.3.1.3 In case of promotion, HKORC-Cert seals must be clearly referred to products which are being certified by HKORC-Cert. Any misunderstanding shall not be tolerated whatsoever.



6.3.1.4 In the uses of the relevant HKORC-Cert seals, the diameter of the seal shall not be larger than 12.5% of the length or width (whichever is longer) of the product panel. Moreover, the shape, proportion and color of the seal must be followed.

6.3.2 Product Label*

6.3.2.1 The labels of processed and handled organic products must show the certificate* number and comply with the relevant labelling laws in Hong Kong.

6.3.2.2 The label for “organic (in conversion)” must be clearly distinguishable from the label for “organic”.

6.3.2.3 The name of the person, company and certifier responsible for the production or processing of the product must be clearly showed.

6.3.2.4 All ingredients of the product shall be listed on the product label in order of their weight percentage. It shall be clear which ingredients are certified organic and which are not. All additives shall be listed with their full name.

6.3.2.5 Using HKORC-Cert seals or the certification status for the claim of GMO free or similar description is prohibited. Any reference to genetic engineering on product labels must be limited to the production and processing in which GMOs are not used.



Chapter 7

Appendices

7.1 Definitions

Annual crop

A crop that will be harvested or cut within 12 months of when it was planted.

Audit trail

A system of documentation of each process (including but not limited to, purchase, production, harvest, storage, transport, processing, handling, and sales); which is used to verify organic products or organic raw materials if conformity of the product to the organic standard.

Aquaculture

The cultivation of animal species in natural or man-made marine, brackish water or fresh water environment in compliance with this standard.

Biodegradable

Decomposition of a substance into more elementary compounds by the biochemical action of microorganisms.

Biodiversity

The level of variety of life forms and ecosystem types, which includes genetic diversity, species diversity and ecosystem diversity.

Buffer zone

An area, with identifiable boundaries, between an organic and a non-organic production site that is established to protect the organic production site against the contamination from the non-organic production site.



Certificate

A document issued by HKORC-Cert which attests the compliance of the production system of the applicant with the standards of the certification agency. It identifies the name, address of the entity certified, effective date of certification number, types of products and etc.

Commercially unavailable

The documented unavailability of a production input or ingredient in an appropriate form, quality, quantity, or variety due to its supply.

Commingling

The mixing together, or physical contact between organic products and non-organic products during production, processing, handling, transportation or storage other than the processing of multi-ingredient products which contain both organic and non-organic ingredients

Compost

The decomposition product of organic solid substances into stabilized humus by microorganisms under aerobic or anaerobic condition.

Contaminant

A prohibited substance, disease-causing substance, or genetically modified organisms and its derivatives that presents in an organic product, production facility or the environment.

Contamination

The introduction of a prohibited substance, disease-causing substance, or genetically modified organisms and its derivatives to organic products and ingredients through processing, handling or from the environment.

Conventional

Production or processing systems that are not certified organic or organic “in-conversion”.



Crop rotation

The practice of alternating the species or families of plants grown on a specific field in a planned pattern or sequence so as to prevent or control weed, pest and disease, and to improve soil fertility and organic matter content.

Farm

An agricultural production unit with clear boundary which is under control of or managed (including rent) by one person or collective of people.

Food additive

A substance added into the food which may change its characteristics including color, flavour, taste and etc. or may be used for preservation and other specified technical purpose. The substance will persist in the final product.

Genetic engineering

Genetic engineering is a set of techniques from molecular biology by which the genetic material of plants, animals, micro-organisms, cells and other biological units are altered in ways or with results that could not be obtained by methods of natural mating and reproduction or natural recombination. Techniques include, but are not limited to: recombinant DNA, cell fusion, micro and macro injection, encapsulation, gene deletion and doubling. Genetically engineered organisms do not include organisms resulting from techniques such as conjugation, transduction and natural hybridization.

Genetically modified organism, GMO

A plant, animal, or microbe that is transformed by genetic engineering.

Handling

Transportation, storage, packaging, repacking, selection, and distribution of products.

Hydroponic systems

Crop production systems in which suspended or dissociated nutrients used as prime source of nutrient supply are added to inert media (except soil) or liquid. Growing crops in water only is not considered as a hydroponic system.



Ingredient

Any substance including raw material, additive, water and salt that is used in food processing and handling, and will present in the final product although possibly in a modified form.

Inspector

A person who is authorized by HKORC-Cert to perform inspections.

Intercropping

Intercropping is the process of growing two or more crops together on the same farmland.

Label

Any written, printed or graphic representation that accompanies the product or product packaging, or is displayed near the product.

Nanomaterials

Substances deliberately designed, engineered and produced by human activity to be in the nanoscale range (approx. 1-300 nm) because of very specific properties or compositions (e.g. shape, surface properties, or chemistry) that result only in that nanoscale. Incidental particles in the nanoscale range created during traditional processing methods such as homogenization, milling, churning, and freezing, and naturally occurring particles in the nanoscale range are not intended to be included in this definition.

Organic (in conversion)

Products produced during the time between the start of the organic management and the certification of crops as organic.

Organic production

Production system that is in compliance with this standard.

Perennial crop

A crop that can be harvested from the same planting for more than one crop year.



Planting material

Any plant or plant tissue, including vegetative propagation material or seedling used in plant production or propagation.

Processing

Including but not limited to cooking, baking, heating, drying, mixing, grinding, churning, separating, extracting, cutting, fermenting, slaughtering, eviscerating, pickling, preserving, dehydrating, freezing, dyeing, packaging, canning, jarring, or other enclosing method, other than normal post-harvest simple packing of crops within the farm.

Processing aid

Any material intentionally used in processing to fulfil a certain technical purpose which will not persist in the final product or result in the presence of residues or derivatives in the final product.

Producer

A person or an organization who is responsible for crop, feed or livestock production.

Product

Any product, unprocessed or processed, that is marketed for human consumption, animal feed or other use.

Raw material

The main ingredient in final product which is not additive.

Recognized organization

An organization which has gained formal approval of its organic standards and certifying procedures by HKORC-Cert.



Safety Standard

- (1) “The Dutch Standard – Intervention Value” is adopted as the soil safety standard.
- (2) “The China National Standard–Standards for Irrigation Water Quality” is adopted as the irrigation water safety standard.
- (3) The safety standard of products shall be in accordance with relevant legal requirements in Hong Kong of the food safety regulations of FEHD.

Sewage Sludge

A solid, semisolid, or liquid residue generated during the treatment of domestic sewage in a treatment works.

Split production

A farm or a processing or handling operation which is only partially under organic management.

The remainder of the operation can be non-organic (conventional, non-certified organic or organic (in-conversion)).

Supplement

An essential nutrient or nutrients added to feed to improve the nutritive balance or performance of the total ration.

Sustainable sources

The sources capable of being continued with minimal long-term effect on the future providing capacity. The source should come with independent verification.

Synthetic

A substance that is formulated or manufactured by a chemical process or by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources, except for those substances created by naturally occurring biological processes.

Thermal sterilization

A process to sterilize soil by using steam, boiling water, solarisation or other thermal control.

7.2 Materials List

Materials Classification

Group I: Allowed

Materials which may be used in organic production system. Materials must be from a known source and shall contain no contaminants, prohibited substances, GMOs and their derivatives and nanomaterials. Use of some allowed materials may be subject to specific annotations as shown in the Materials List.

Group II: Restricted

Operators must obtain approval for use of the restricted materials from HKORC-Cert prior to the application of the material. In general, the use of these materials is discouraged. Only under special conditions, the use would be approved.

Group III: Prohibited

Materials which are prohibited to be used in organic production system.

7.2.1 Materials for Soil Management and Fertilization

	Materials	Category	Remarks
1	Soy bean meal	I	Must be free from genetically modified organisms and its derivative
2	Peanut cake or peanut cake meal	I	
3	Hoof and horn meal	I	
4	Bone, bone meal, blood meal, meat meal and their mixed produce	I	Sources must be free from contaminants or prohibited materials
5	Wood, bark, sawdust, wood shavings, wood ash, wood charcoal	I	Sources must be free from contaminants or prohibited materials
6	Fish and fish products	I	Sources must be free from contaminants or prohibited materials
7	Seaweed and seaweed products	I	As far as obtained by: 1. physical processes including dehydration,



	Materials	Category	Remarks
			freezing and grinding; 2. extraction with water or potassium hydroxide solutions, provided that the minimum amount of solvent necessary is used for extraction; 3. fermentation.
8	Plant preparations and extracts	I	Sources must be free from contaminants or prohibited materials
9	Feather meal, shell products, wool and fur, hide, hair, dairy products	I	Sources must be free from contaminants or prohibited materials
10	Eggshell	I	
11	Plant residues and green manure from organic farms	I	
12	Compost made from organic materials produced on organic farms	I	
13	Compost made from plant	I	
14	Compost made from animal excrement	I	
15	Commercially produced organic fertilizers, compost and soil conditioners	I	Commercially produced guano is prohibited
16	Plant materials imported from areas outside the farm	I	Source must be free from contaminants or prohibited materials
17	Biodegradable processing by-products, plant, animal or microbial origin, including by-product of food, feed, oil seed, brewery, distillery	I	(i) Free of contaminants, or (ii) composted before bringing onto organic land and free of contaminants
18	Compost made from food waste	I	Must be free from genetically modified organisms and its derivatives
19	Humus from insects	I	
20	Vermicastings / vermicompost	I	Vermicastings and vermicomposting from sewage sludge are not allowed
21	Raw animal excrement	I	(i) Only use on perennials or crops not for human consumptions or applied



	Materials	Category	Remarks
			<p>at least four months before harvesting if the crop is for human consumption.</p> <p>(ii) Shall not constitute the main source of nitrogen in the absence of other nitrogen generating practices on farm</p> <p>(iii) Shall not be from conventional intensive livestock production systems without prior permission from HKORC-Cert.</p>
22	Perlite, vermiculite	I	
23	Mineral zeolite	I	
24	Peat moss	I	Prohibited to be used as soil amendment, only permitted for inclusion in potting mixes. Sources must be free from contaminants or prohibited materials
25	Hydrated lime (calcium hydroxide)	I	Use with moderate amount
26	Natural limestone (calcium carbonate) or gypsum (calcium sulfate)	I	
27	Magnesium rock, kieserite and Epsomsalt (magnesium sulfate)	I	Use with moderate amount
28	Mineral potassium (e.g. sulfate of potash, kainite, sylvanite, rock potash)	I	Use with moderate amount
29	Natural phosphates (e.g. pulverized phosphate rock)	I	Use with moderate amount and cadmium content less than or equal to 90 mg/kg of P ₂ O ₅
30	Carbon dioxide	I	Must be non-synthetic carbon dioxide
31	Natural microbiological preparations	I	Must be free from GMO and their derivatives
32	Spent mushroom compost	I	



	Materials	Category	Remarks
33	Borax	II	Allowed only to correct documented deficiencies determined by soil test. Acceptable only as a necessary complement when other fertility building techniques have been applied and are insufficient, and no natural substitute is available. Use in moderate amount
34	Calcareous and magnesium amendments	II	Allowed only to correct documented deficiencies determined by soil test. Acceptable only as a necessary complement when other fertility building techniques have been applied and are insufficient, and no natural substitute is available. Use in moderate amount
35	Trace elements	II	Allowed only to correct documented deficiencies determined by soil test. Acceptable only as a necessary complement when other fertility building techniques have been applied and are insufficient, and no natural substitute is available. Use in moderate amount. Synthetic micronutrients in ammonium, chloride, nitrate, or polyphosphate forms are prohibited. Micronutrients may not be used as a defoliant, herbicide, or desiccant
36	Synthetic fertilizers (e.g. Nitrophoska 13-13-21, Nitrophoska12-12-17-2, urea)	III	Unless otherwise specifically listed
37	Human excrement	III	1. Standard 3.6.12 states that use of human excrement is prohibited 2. Risk of pathogen spreading
38	Sewage sludge	III	
39	Synthetic phosphate	III	
40	Synthetic potassium salt	III	
41	Synthetic zeolite	III	
42	Commercially produced guano	III	Harmful to the environment when collected and shipped to Hong Kong



	Materials	Category	Remarks
43	Chilean nitrate	III	



7.2.2 Materials for Pest, Disease and Weed Management

	Materials	Category	Remarks
1	<i>Bacillus thuringiensis</i>	I	
2	<i>Spodoptera litura</i> Nuclear Polyhedrosis Virus (SINPV)	I	
3	Entomopathogenic nematodes (e.g. <i>Steinernema</i> spp.)	I	
4	Microbial pesticides	I	Sources must be free from contaminants, prohibited materials or GMOs and its derivatives
5	Pheromones and insect attractants (e.g. DBM sex pheromone, cuelure)	I	Only allowed to use on traps and dispensers
6	Natural enemies (e.g. release of parasitic wasps)	I	Beware of the effect of introduced species on local ecological balance before releasing natural enemies
7	<i>Beauveria bassiana</i>	I	
8	Natural acids (e.g. vinegar)	I	
9	Melia or Melia extracts (<i>Melia azedarach</i> L.)	I	
10	Neem or Neem extracts (<i>Azadirachta indica</i>)	I	
11	Pyrethrum or Pyrethrum extracts (<i>Chrysanthemum cinerariaefolium</i>)	I	Must be free from piperonyl butoxide
12	Plant or natural plant extracts	I	
13	Plant oils	I	
14	Light mineral oils (paraffin oil)	I	Sources must be free from contaminants, prohibited materials and low in phytotoxicity
15	Sulfur	I	
16	Hydrated lime (calcium hydroxide)	I	For application on aerial plant parts only. Use with moderate amount
17	Baking soda (sodium bicarbonate)	I	
18	Bordeaux mixtures	I	
19	Potassium Bicarbonate	I	

	Materials	Category	Remarks
20	Diatomaceous earth	I	
21	Copper salts (e.g. sulfate, hydroxide, oxychlorine, octanoate)	I	Maximum application rate is 6 kg/ha/yr
22	Soft soap	I	
23	Carbon dioxide	I	Must be non-synthetic carbon dioxide. Use as soil treatment is not allowed.
24	Animal and plant products (e.g. honey, milk, coffee grounds and cane sugar, but excluding tobacco and nicotine)	I	
25	Beeswax	I	
26	Natural Chitin	I	Not processed by acid hydrolysis
27	Physical methods (e.g. chromatic traps, mechanical traps)	I	Protection of non-target species shall be the first priority of consideration
28	Rotenone (<i>Derris elliptica</i> , <i>Lonchocarpus</i> spp. <i>Thephrosia</i> spp.)	II	Approval from HKORC-Cert must be sought prior to every usage. Application near water course is prohibited.
29	Synthetic pesticides, including insecticides, fungicides, herbicides etc	III	Unless otherwise specifically listed
30	Tobacco and tobacco extracts (pure nicotine is also forbidden)	III	Highly toxic



7.2.3 Materials for Processing and Handling

	INS	Materials	Category	Type	Remarks
1		Activated carbon	I	Processing aids	
2		Diatomaceous earth	I	Processing aids	For sugar processing, fruit and vegetable products, sweeteners, wine and food filtering only
3		Perlite	I	Processing aids	For filtering only
4		Bleach	I	Cleansers, sanitizers and disinfectants	Only calcium hypochlorite, sodium hypochlorite and chlorine dioxide can be used and allowed as a sanitizer on food contact surfaces. An intervening event or action must occur to eliminate risks of contamination. Residual chlorine levels in wash water treated by bleach shall not exceed the recommendation by WHO Guidelines for Drinking-water Quality (currently 5ppm)
5		Hydrogen peroxide	I	Cleansers, sanitizers and disinfectants	For disinfection of processing equipments only. The equipments must be washed with hot water after use
6		Detergents	I	Cleansers, sanitizers and disinfectants	For cleaning of processing equipments and areas only and must wash with hot water after use
7		Ozone	I	Cleansers, sanitizers and disinfectants	For disinfection of processing equipment only
8		Casein	I	Processing aids	For wine only
9		Isinglass	I	Processing aids	For wine only
10	428	Gelatin	I	Processing aids	
11		Essential oils	I	Food additive; processing aids	Only essential oils produced by means of solvents such as oil, water, ethyl alcohol(ethanol), carbon dioxide can be used
12		Ethyl alcohol (ethanol)	I	Food additives; processing aids; cleansers, sanitizers and disinfectants	As a food additive & processing aid: Only organic source is allowed As a cleanser, sanitizer and disinfectant: Non-organic source may be used and must be rinsed with hot water after use



	INS	Materials	Category	Type	Remarks
13		Vinegar	I	Food additives; processing aids; cleansers, sanitizers and disinfectants	As a food additive & processing aid: Only organic source is allowed; As a cleanser, sanitizer and disinfectant: Non-organic source may be used and must be rinsed with hot water after use.
14		Sulphuric acid	I	Processing aids; cleansers, sanitizers and disinfectants	As a processing aid: For pH adjustment of water in sugar processing only; As a cleanser, sanitizer and disinfectant: For cleaning of equipments only and must be rinsed with hot water after use.
15		Natural flavourings	I	Food additives	All of the constituents used in the natural flavourings must be from natural sources and have not been chemically modified in a way that makes them different from their natural chemical state. The natural flavourings must not have been produced using any synthetic solvent, carrier systems or artificial preservatives.
16		Natural food colourings	I	Food additives	All of the constituents used in the natural food colourings must be from natural sources and have not been chemically modified in a way that makes them different from their natural chemical state. The natural food colourings must not have been produced using any synthetic solvent, carrier systems or artificial preservatives.
17		Natural preservatives	I	Food additives	All of the constituents used in the natural preservatives must be from natural sources and have not been chemically modified in a way that makes them different from their natural chemical state. The natural preservatives must not have been produced using any synthetic solvent, carrier systems or artificial preservatives.
18		Vegetable oils	I	Processing aids	Can be used as greasing agent and releasing agent



	INS	Materials	Category	Type	Remarks
19		Preparations of microorganisms and enzyme	I	Food additives; processing aids	Except those from GMO and its derivatives. Microorganisms shall be grown on substrates consisting entirely of organic ingredients and substances listed in this appendix, if available.
20		Ethylene	I	Processing aids	Allowed for degreening of citrus and ripening
21		Preparations of bark	I	Processing aids	For sugar processing only
22		Salt	I	Food additives; processing aids	As a food additives: Contain no flowing or bleaching agents
23		Water	I	Food additives; processing aids	Must comply with the requirements of World Health Organization Guidelines for Drinking-water Quality
24	170	Calcium carbonates	I	Food additives; processing aids	Not for coloring
25	184	Tannin acid, Food grade	I	Processing aids	Filtration aid for wine
26	220	Sulfur dioxide	I	Food additives	For wine only
27	270	Lactic acid (L-, D- and DL-)	I	Food additives; processing aids	Must be naturally fermented products
28	290	Carbon dioxide	I	Food additives; processing aids	Must be derived from oil-free source
29	322	Lecithins	I	Food additives; processing aids	As a food additive: Extracted without the use of bleaching chemicals and organic solvents
30	330	Citric acid	I	Food additives; processing aids	Must be naturally fermented products
31	331	Sodium citrates	I	Food additives	
32	332	Potassium citrates	I	Food additives	
33	333	Calcium citrates	I	Food additives	
34	334	Tartaric acid (L(+)-)	I	Food additives; processing aids	
35	336	Potassium tartrates	I	Food additives	For cereals, baked goods and confectionery only
36	341(i)	Monocalcium orthophosphate	I	Food additives	For raising flour only
37	400	Alginic acid	I	Food additives	
38	401	Sodium alginate	I	Food additives	
39	402	Potassium alginate	I	Food additives	
40	406	Agar	I	Food additives	



	INS	Materials	Category	Type	Remarks
41	407	Carageenan and its Na, K, NH ₄ , Ca and Mg salts (includes furcellaran)	I	Food additives	
42	410	Carob bean gum	I	Food additives	
43	412	Guar gum	I	Food additives	
44	413	Tragacanth gum	I	Food additives	
45	414	Gum arabic (acacia gum)	I	Food additives	
46	415	Xanthan gum	I	Food additives	
47	440	Pectins	I	Food additives	Must be unmodified
48	500(ii)	Sodium hydrogen carbonate (Sodium bicarbonate, baking soda)	I	Food additives	For baked goods and confectionery
49	501	Potassium carbonates	I	Food additives; processing aids	For cereals, baked goods and confectionery
50	503	Ammonium carbonates	I	Food additives	For cereals, baked goods and confectionery
51	504	Magnesium carbonates	I	Food additives	For cereals, baked goods and confectionery
52	508	Potassium chloride	I	Food additives	
53	509	Calcium chloride	I	Food additives; processing aids	
54	511	Magnesium chloride	I	Food additives; processing aids	As a food additive: For soybean products; As a processing aid: Coagulation agent
55	516	Calcium sulphate	I	Food additives; processing aids	As a food additive: For cakes, biscuits, soybean products and bakers yeast. Carrier; As a processing aid: Coagulation agent
56	524	Sodium hydroxide	I	Food additives; processing aids	As a food additive: For cereals only; As a processing aid: For pH adjustment of water in sugar processing. Prohibited for use in peeling of fruits and vegetables



	INS	Materials	Category	Type	Remarks
57	525	Potassium hydroxide	I	Processing aids; cleansers, sanitizers and disinfectants	As a processing aid: For pH adjustment of water in sugar processing. Prohibited for use in peeling of fruits and vegetables; As a cleanser, sanitizer and disinfectant: For cleaning processing plants where adequate rinsing is provided
58	526	Calcium hydroxide	I	Food additives; processing aids	
59	551	Silicon dioxide (amorphous)	I	Processing aids	
60	553(iii)	Talc	I	Processing aids	
61	901	Beeswax (white +yellow)	I	Food additives; processing aids	As a food additives: Must be from organic source As a processing aids: Releasing agent
62	903	Carnauba wax	I	Processing aids; Releasing agent	
63	938	Argon	I	Food additives	
64	941	Nitrogen	I	Food additives; processing aids	Must be from non-oil source
65	948	Oxygen	I	Food additives; processing aids	Must be from non-oil source
66		Cellulose	I	Processing aids	
67		Asbestos containing filtering material	III	Processing aids	
68		Borax (or sodium tetra borate)	III	Food additives	
69		Saccharin	III	Food additives	
70	621	Monosodium glutamate	III	Food additives	

7.2.4 Materials for Pest and Disease Management in Aquaculture

Aquafarm may use the material(s) listed in the 7.2.3 “Materials for Processing and Handling” (subject to specific annotations shown in the list) and below:

	Materials	Category	Remarks
1	Iodine	I	Use for disease control
2	Lime	I	Allowed to use only during sun-baking of pond sediment or in emergency cases to adjust the water quality during cultivation
3	Sodium bicarbonate	I	
4	Plant materials	I	Use for disease or pest control, e.g. tea meal
5	Physical methods	I	e.g. catching by hand, net, trap
6	Rock Salt	II	Must only be used to maintain product quality and keeping ability and enhance composition, consistency and appearance
7	Sea salt	II	Must be unrefined with no additives and only be used to maintain product quality and keeping ability and enhance composition, consistency and appearance
8	Tobacco and tobacco extracts(pure nicotine is also forbidden)	III	Highly toxic

Appendix 8.2

Approved Materials List by the Hong Kong Organic Resource Centre



List of approved materials

Last update on : 11th Oct 2019

The materials in the list below have been approved by HKORC-Cert and can be used in certified organic farms and processing units. The approval does not imply effectiveness of the product.

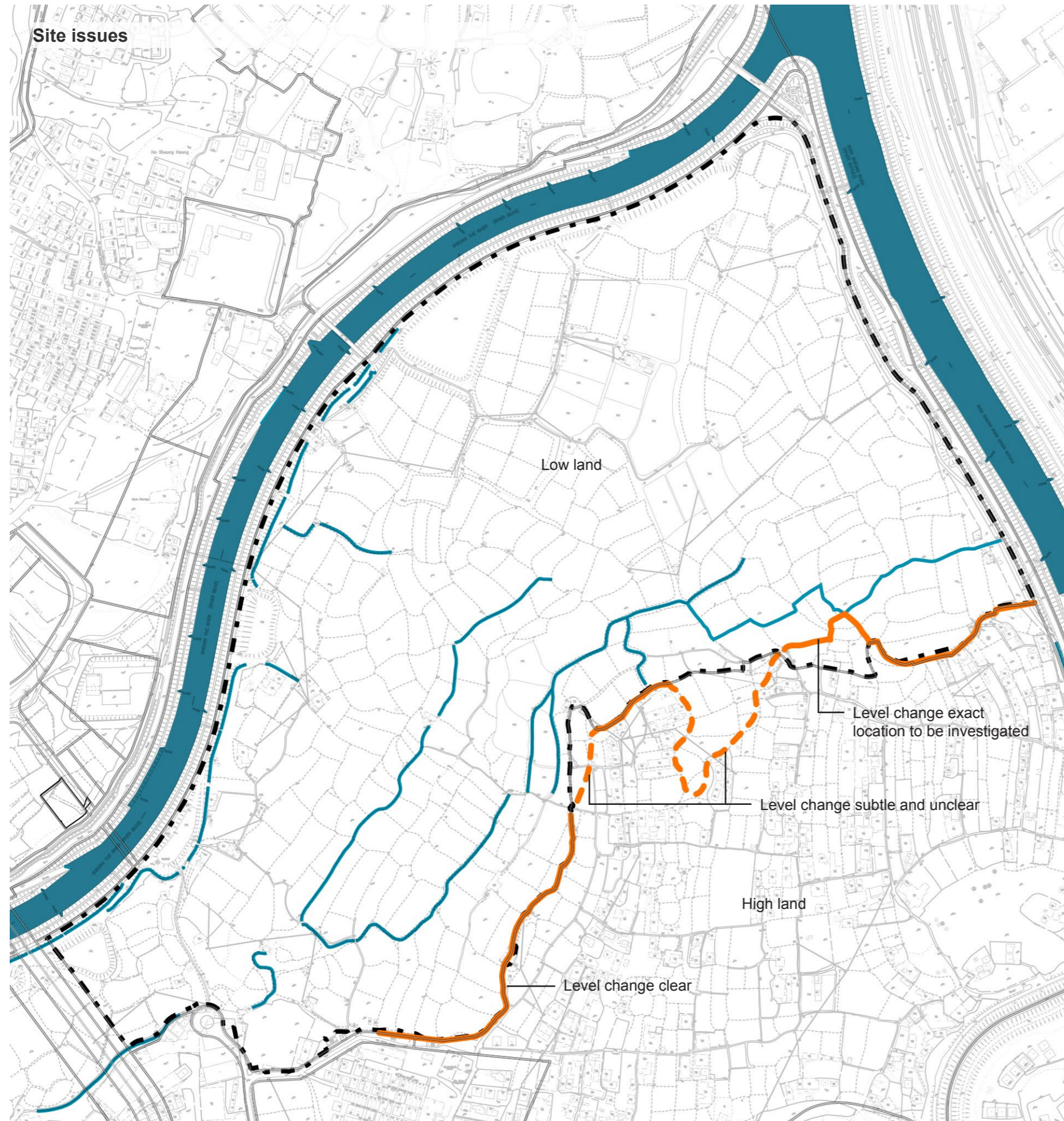
Listing number	Brand name	Category	Purpose	Supplier	Telephone	Expiry date	Remark (Please refer to the instructions and guidelines for each material)
L11004	Fertilife 10-1-5 Organic Liquid Fertilizer	Organic Fertilizer	Fertilizer	Patino Pro Limited	6290 9737	07 Jan 2020	Required to submit an annual testing report
L11005	Natural Salt – Solar Harvested Sea Salt	Salt	Processing Aid	A&L. Company	5313 7491	04 Jul 2020	Required to submit an updated organic cert
L12004	XenTari	Organic Pesticide	Pest control	The Federation of Vegetable Marketing Co-operative Societies. Ltd.	2471 1169	02 Oct 2020	Required to submit an annual testing report
L12005	GROBEL NPK 4-3-3+1MgO	Organic Fertilizer	Fertilizer	Shui Woo Tin	9090 3639	29 Jan 2020	Required to submit an annual testing report
L12007	Sun Gro Propagation Mix Sunshine #5 N&O (Peat Moss)	Peat Moss	Peat Moss	The Federation of Vegetable Marketing Co-operative Societies. Ltd.	2471 1169	24 Oct 2020	Required to submit an annual testing report
L13004	Fertilife 4-3-5 Organic Granulated Fertilizer	Organic Fertilizer	Fertilizer	Patino Pro Limited	6290 9737	10 Mar 2020	Required to submit an annual testing report
L13008	Activit 4-3-2	Organic Fertilizer	Fertilizer	Wong Sam Hing Agricultural Co., Ltd.	2478 1668	31 May 2020	Required to submit an annual testing report
L16002	Fertiplus 4-2-10	Organic Fertilizer	Fertilizer	Wong Sam Hing Agricultural Co., Ltd.	2478 1668	31 May 2020	Required to submit an annual testing report
L17004	Nutri Smart Active Eco-Fertilizer	Organic Fertilizer	Fertilizer	Biocycle Resources Limited	2126 1683	26 Mar 2020	Required to submit an annual testing report

L17005	Midori 366	Organic Fertilizer	Fertilizer	Midori Hong Kong Limited	6113 1223	19 Mar 2020	Required to submit an annual testing report
L17007	<i>Trichoderma Harzianum</i>	Microbial pesticides	Pest control	The Federation of Vegetable Marketing Co-operative Societies. Ltd.	2471 1169	21 May 2020	Required to submit an updated organic cert
L17012	Enspray 99	Organic Pesticide	Pest control	The Federation of Vegetable Marketing Co-operative Societies. Ltd.	2471 1169	30 July 2020	Required to submit an updated organic cert
L17014	BG Soil	Compost	Fertilizer	Baguio Green Technology Ltd	2541 3388	26 Dec 2019	Required to submit an annual testing report
L17016	Aller Classic Organic	Fish Feed	Feed	Hong Kong Organic Resource Centre Certification Limited	3411 2384	17 Oct 2020	Required to submit an annual testing report
L18004	Trilogy (2.5 gallon)	Organic Pesticide	Pest control	Wong Sam Hing Agricultural Co., Ltd.	2478 1668	30 Jul 2020	Required to submit an annual testing report
L18008	三保奇花除蟲菊素	Organic Pesticide	Pest control	Tai Lung Experimental Station, AFCD (trial uses only; not for sales); The Federation of Vegetable Marketing Co-operative Societies. Ltd(CGG) as supplier	2689 7566/ 2471 1169 (CGG)	02 Jan 2020	Required to submit an annual testing report
L19001	Grobel NPK 4-3-3 +1 MgO	Organic Fertilizer	Fertilizer	Fu Kam Organic Farm	6590 9268	17 Jul 2020	Required to submit an annual testing report
L19002	Greenferti 4-3-3-1	Organic Fertilizer	Fertilizer	Wai Lung Agrotech Co.	6647 2369	01 Mar 2020	Required to submit an annual testing report
L19003	Evergreen Pyrethrum Concentrate	Organic Pesticide	Pest control	Gorich Technology Ltd	2889 0637	19 Mar 2020	Required to submit an annual testing report
L19006	Terra Firma 100% Organic Fertilizer	Poultry Compost	Fertilizer	Agrotek	9625 9474	18 Aug 2020	Required to submit an annual testing report





Appendix 8.3

Southern Boundary Investigation

Appendix 8.3 Southern Boundary Investigation



Legend

-  Current site boundary (OZP)
-  Current channel
-  Clear level difference
-  Unclear level difference

Issues

- Current boundary cuts through different levels

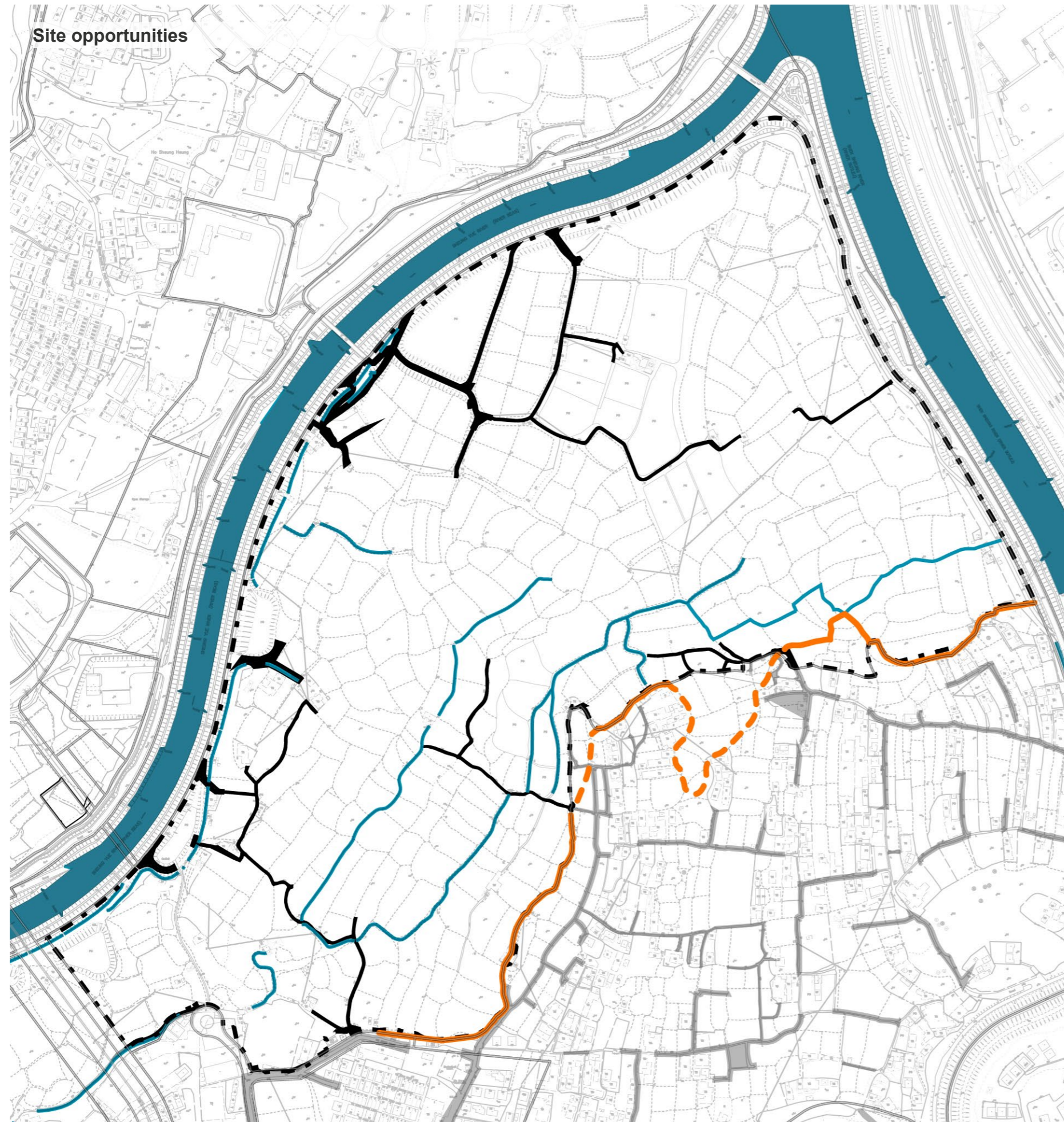


- Boundary cuts through / right adjacent to temporary structures in several occasions








- Level difference not clearly defined in some areas; current boundary cuts through plots which are currently intact.





Legend

-  Current site boundary (OZP)
-  Current channel
-  Clear level difference
-  Unclear level difference
-  Existing path

Opportunities

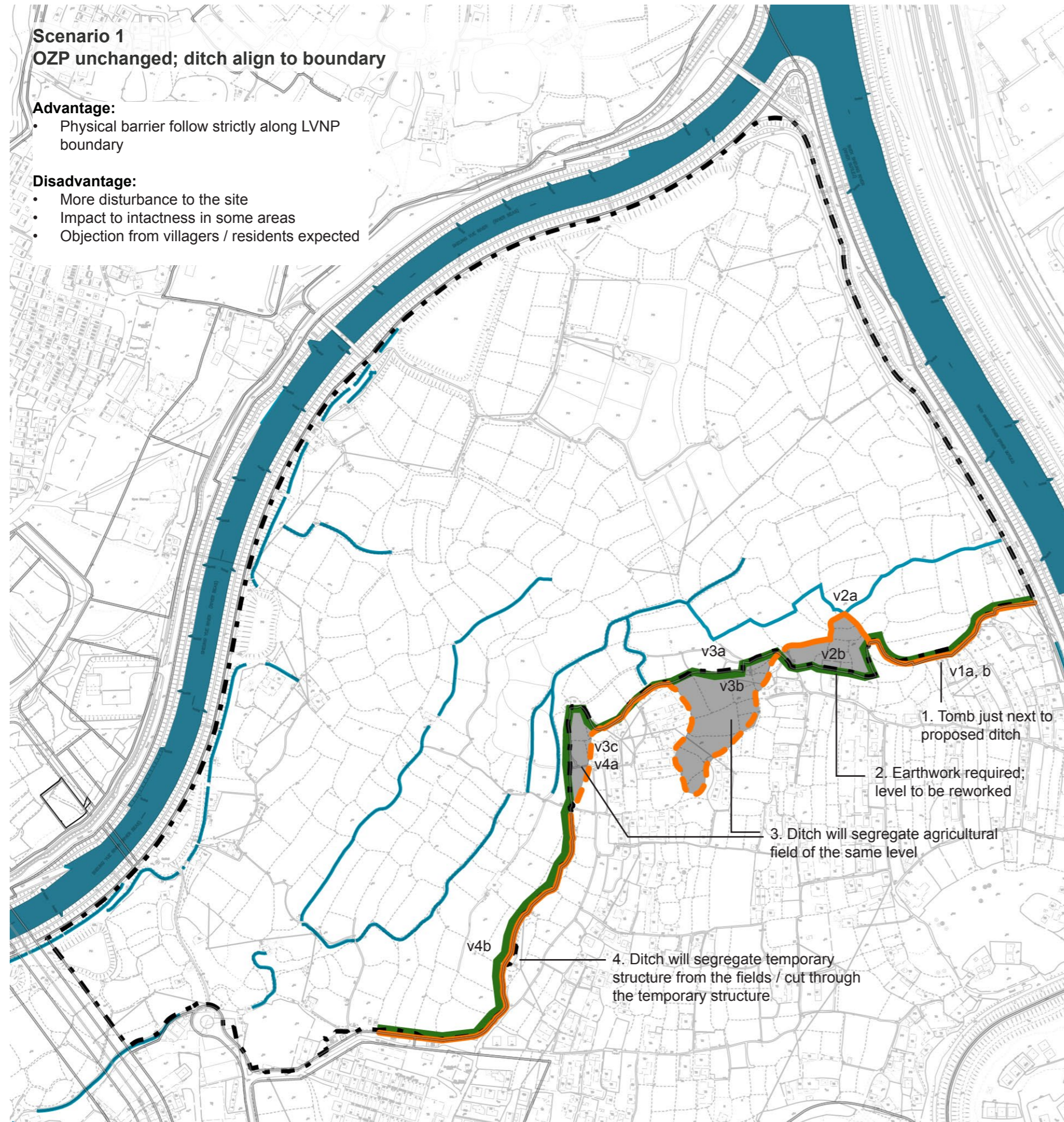
- An existing path runs roughly along southern boundary and clearly defines the space



- An existing channel runs close to the southern boundary



Appendix 8.3 Southern Boundary Investigation



Legend

- Current site boundary (OZP)
- Current channel
- Clear level difference
- Unclear level difference
- Potential ditch alignment
- Issues to consider

Issue 1 (Boundary adjusted to address this issue)



v1a



v1b

Issue 2



v2a



v2b

Issue 3



v3a



v3b



v3c

Issue 4



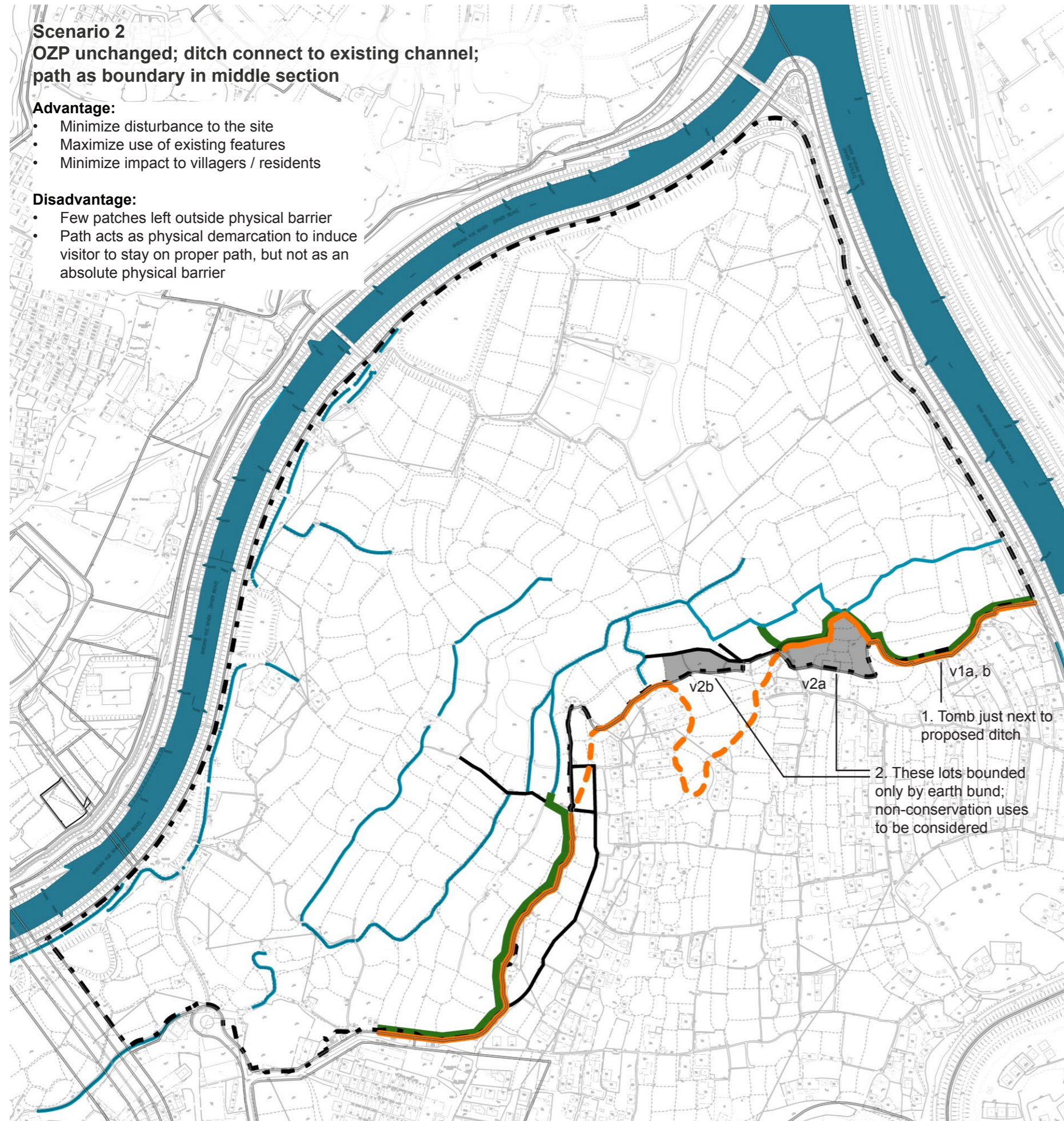
v4a



v4b

- Ditch location
- Approximate ditch location

Appendix 8.3 Southern Boundary Investigation



Legend

- Current site boundary (OZP)
- Current channel
- Clear level difference
- Unclear level difference
- Potential ditch alignment
- Existing path
- Issues to consider

Issue 1 (Boundary adjusted to address this issue)



v1a



v1b

Issues 2



v2a



v2b

- Boundary location
- Approximate boundary location

Appendix 8.4

Reinstatement Proposal for LVNP

APPENDIX 8.4 Reinstatement Proposal for LVNP

1. Based on the latest land resumption boundaries for LVNP, the total area of LVNP was around 369,842m². According to the “Existing Habitat Map of LVNP” extracted from Environmental Impact Assessment (EIA) issued in 2013, most of the site of the LVNP was currently occupied by agricultural land, included both wet and dry fields. The estimated distribution of areas were
 - Total area of LVNP: 369,842m² approx.
 - Total area of wet land: 220,749m² approx.
 - Wet agriculture land: 176,688m² approx.
 - Pond habitat: 44,061m² approx.
 - Total are of dry agriculture land: 149,093m² approx.

Please be advised that these figures above were not exact and might change constantly since the farmers could switch between wet/dry farming practice from time to time.

2. Based on the figures in item 1, the current ratio of wet land to dry land was approximately 60% :40%. It was stated in the HCMP that the future ratio of wet land to dry land had expected to be around 70%: 30%. Since there was no specification for the area of pond habitat to be provided, the current area of 44,061m² would be maintained.
3. The following general assumptions/background were made in order to conduct an assessment of the rough estimate on the reinstatement cost for reverting the disturbed wetlands back to their original conditions if fruit trees (e.g. fruit trees for getting higher EGA rates) were to be planted in LVNP before land resumption:
 - All the fruit trees should have to be removed for reverting the disturbed wetlands and drylands back to their original conditions before land resumption.
 - This rough estimate on the reinstatement cost solely cover the cost for removal of the fruit trees, excavation works for necessary soil replacement. As advised previously, the originated habitats such as birds, fish, amphibians, etc. might leave LVNP. It was clarified that restoration should be “return of an ecosystem to a close approximation of its condition prior to disturbance”. The restoration should include
 - Reconstruction of antecedent physical conditions
 - Chemical adjustment of the soil and water
 - Biological manipulation including reintroduction of absent native flora and fauna.

This rough estimate solely covered the cost for replacement of the fruit trees and soil.

- It was not feasible to estimate the extent of land which would be affected by farmers planting fruit trees. Hence it was assumed that the entire area of LVNP would be affected.
- The fruit trees planted by the farmers in order to obtain higher EGA value would not be retained/transplanted and should be removed/fellen by site clearance; hence the numbers of fruit trees to be planted would not affect the rate/cost of removal works per m².
- For addition of water, the rate adopted was the current water supply charge for construction.
- For excavation, deposition and compaction of soil and addition of water (for pond), the unit cost was calculated the cost per meter of depth.
- The rates adopted for the deposition of materials (e.g. loams, silt, clay and geomembrane) were estimated based on current market price in Q42015, with 25% as Preliminary.
- The rate adopted for site clearance is based on the following:
NENT NDAs Study = \$8 /m² (Sept 2013)
KTN/FLN NDA Study = \$11.36/m² (Sept 2015) + \$2.84/m² (25% of 11.36 as Preliminary)

- The steps of reinstating the land to its original status were only provided for rough estimate of the cost. Moreover, reinstating the land to its original status could not guarantee that the habitat would be reinstated to the close approximation of its condition prior to disturbance.
- The time (estimated to be around 1 year) and cost for maintenance of the land after reinstatement until it can be actually used for cultivation was not included in the rough estimate of the reinstatement cost.
- The amount of manpower required to carry out the reinstatement was not included in the cost estimate.

4. 3 reinstatement scenarios and works involved as follows:

a. *Reinstatement back to **dry agriculture land**:*

- Site clearance
- Deposition of soil (loams 田泥) (1m)
- No compaction should be required

The step “site clearance” would remove all fruit trees planted. During the process, some soil may be lost together with the removed trees hence we have assumed to deposit 1m of soil which is suitable for dry cultivation to compensation the loss due to site clearance.

b. *Reinstatement back to **wet agriculture land**:*

- Site clearance
- Excavation (1m)
- Deposition of soil for wet cultivation (silt 田泥 - 湿土种植) (1m)
- No compaction should be required

The step “site clearance” will remove all fruit trees planted. We have also assumed that 1m of soil is excavated in order to make the wet agriculture land lower than the dry agriculture land. 1m of silt which is suitable for wet cultivation is assumed to be deposited to reinstate the wet lands.

c. *Reinstatement back to **pond habitat**:*

- Site clearance
- Excavation (1m)
- Deposition of a layer of soil for bedding (clay 魚塘淤泥)
- Treatment works (geotextile for retaining the clay)
- Addition of water (1m)

The step “site clearance” will remove all fruit trees planted. Then excavation is assumed to be carried out in order to form a pond. The depth is assumed to be 1m for the calculation of a unit rate since the actual depth of existing ponds in LVNP is unknown. Correspondingly, the addition of water is assumed to be 1m deep as well.

5. Based on the above assumptions, following are the rough estimated rate for the 3 reinstatement scenarios:

a. Reinstatement back to dry agriculture land:

- Site clearance	\$14/m ²
- Deposition of soil (loams)	\$1,265/m ²
Total:	\$1,279/m²

b. Reinstatement back to wet agriculture land:

- Site clearance	\$14/m ²
- Deposition of soil for wet cultivation (silt)	\$1,410/m ²
Total:	\$1,424/m²

c. Reinstatement back to pond habitat:

- Site clearance	\$14/m ²
- Deposition of a layer of soil (clay) for bedding (assume 0.2m /meter deep)	\$124/m ²
- Treatment works (Geomembrane for retaining the clay)	\$10/m ²
- Water (assume 1 meter depth of water)	\$9/m ²
Total:	\$157/m²

*Please note the provision of specialist for reinstating the disturbed ponds back to the pond habitat is not included in the above estimation.

6. Referring to item 1, the total cost of reinstatement can be calculated as follows:

- Total cost for reinstatement of wet agriculture land = \$1,424/m² × 176,688m² = \$251,603,712
- Total cost for reinstatement of pond = \$157 /m² × 44,061m² = \$6,917,577
- Total cost for reinstatement of dry agriculture land = \$1,279/m² × 149,093m² = \$190,689,947
- Total cost for entire LVNP reinstatement = \$449,211,236

The cost of reinstatement following the percentage requirement in HCMP will be as follows:

- Total cost for reinstatement of wet agriculture land = \$1,424/m² × 214,828m² = \$305,915,072
- Total cost for reinstatement of pond = \$157 /m² × 44,061m² = \$6,917,577
- Total cost for reinstatement of dry agriculture land = \$1,279/m² × 110,953m² = \$141,908,887
- Total cost for entire LVNP reinstatement = \$454,741,536

Appendix 8.5

Long Valley Nature Park: Preliminary Management Plan

APPENDIX 13.10 Long Valley Nature Park: Preliminary Management Plan

1 Introduction

1.1 Background

- 1.1.1 In 2003 the Hong Kong SAR Government conducted a review of its nature conservation policy. This review led to the adoption of the New Nature Conservation Policy (NNCP) in 2004. The overall objective of this policy is to 'regulate, protect and manage natural resources that are important for the conservation of biological diversity in Hong Kong in a sustainable manner, taking into account social and economic considerations, for the benefit and enjoyment of the present and future generations of the community'. As an element of this policy, twelve sites, not already protected as Country Parks or Special Areas under the Country Parks Ordinance, were identified as Priority Sites for Enhanced Conservation. One of these sites was the Long Valley and Ho Sheung Heung Priority Site, comprising the *fung shui* wood at Ho Sheung Heung together with Long Valley, a largely agricultural area around the confluence of the Sheung Yue and Shek Sheung Rivers which is widely recognized as being of high ecological value primarily due to the variety of freshwater wetland-dependent bird species that utilize its patchwork of wet agricultural habitats. The Priority Site covers an area of 151.2ha.
- 1.1.2 Subsequently, commencing in 2005 and continuing to the present, Management Agreements (MA) under the NNCP were implemented whereby the conservation value of the Priority Site has been enhanced by non-governmental organizations working with the public and local villagers, utilizing funding from the Environment and Conservation Fund (ECF). These conservation measures have been of direct benefit to species of conservation significance and have also been successful in raising the public's and local villagers' awareness of conservation. However, these voluntary MAs cover only variable portion of the Priority Site and do not provide a permanent means of safeguarding the conservation value of the Site.
- 1.1.3 Meanwhile, under the study of 'Hong Kong 2030: Planning, Vision and Strategy' (the HK2030 Study) completed by Planning Department in 2007, the NDAs previously identified in the 'Planning and Development Study on North East New Territories' (the NENT Study) completed in 2003 were revisited and recommended for implementation. The Project Profile prepared for the consequent study (this NDA Study) indicated that impacts to Long Valley would be avoided where possible, but if unavoidable, further measures to enhance habitats in Long Valley would be examined. It was noted that an option of mitigating for the loss of habitats of ecological importance by converting relatively lower quality habitats with high potential value (agricultural land) to high quality freshwater wetland habitats (marsh) at Long Valley to create a large, ecologically significant and well managed freshwater wetland would be subject to review in the EIA study and planning stage.
- 1.1.4 In accordance with this commitment, therefore, one important element of the EIA study for the NDAs has been to ensure the conservation of and to plan for the future of the Priority Site. In addition, the conservation of the Priority Site is of concern in the wider community. During the Stages One and Two Public

Engagement conducted in 2008 and 2009, comments were received to the effect that the important ecological resources of Long Valley should be protected, but that current MA mechanism as not sustainable in the long term and that landowners' rights were being compromised. Some respondents specifically requested that the opportunity should be taken in the NDA study to provide a more sustainable mechanism for the long-term conservation of Long Valley. In addition, as was indicated in the Project Profile, the ecological enhancement of habitats in the Priority Site provides a means of mitigating for unavoidable impacts to habitats of ecological importance elsewhere in the NDAs.

- 1.1.5 The present document, outlines how the NDA project will ensure that the conservation value of much of the Priority Site will be safeguarded and enhanced in the long term by the creation of the Long Valley Nature Park (LVNP) and how the creation of this Nature Park will meet some of the ecological mitigation requirements for the Project.

1.2 Proposed Nature Park boundaries and proposed zoning for Long Valley under the RODP

- 1.2.1 The Long Valley and Ho Sheung Heung Priority Site covers an area of 151.2 ha. This includes extensive areas which are of limited ecological value, especially in the southwest, Ho Sheung Heung *fung shui* wood, together with an area to the north of the Sheung Yue River which contains a mosaic of fish ponds and agricultural land and is of moderate to high ecological value. However, the area of highest ecological value is the agricultural land north of Yin Kong and Tsung Pak Long and south of the confluence of the Sheung Yue and Shek Sheung Rivers; much of this area is wetland of very high ecological value though pockets of other habitats (largely dry agriculture and orchards) are of lower ecological value. Accordingly, this area of 37.17ha is proposed to be zoned as Other Uses (Nature Park (OU(NP))). Thus, the OU(NP) zone will encompass those areas of Long Valley currently of highest ecological value, together with areas of high potential ecological value which can be enhanced to compensate for habitats lost or impacted elsewhere (see below), and in the process securing both the long term conservation of Long Valley and meeting much of the ecological mitigation requirement for the project under the EIAO. Meanwhile, areas to the south and north would be protected by retaining their existing AGR zoning.

1.3 EIAO requirements under NDA project

- 1.3.1 Under the EIAO, one of the requirements of the EIA study for the NDA project is to describe mitigation measures to avoid, minimise and compensate for impacts arising from the project. Whilst some measures to avoid and minimise direct and indirect impacts to wetland habitats and wetland dependent species of conservation significance have been implemented in the design of the Recommended Outline Development Plans (RODP-13), some residual wetland loss and some disturbance impacts remain. These impacts would require compensation through the creation or enhancement of wetland habitats.

- 1.3.2 As noted in paragraph 1.1.5, the LVNP will provide habitat compensation for the ecological impacts of loss of wetland (other than loss of seasonally wet grassland at Ma Tso Lung which will be mitigated *in situ*) arising from the Project. In addition to direct wetland loss, an area dry agricultural land of low to moderate ecological value for small numbers of some fauna species of conservation significance will be lost in FLN. Most of the species which will be impacted are not dependent on, or associated with, dry agricultural land; rather these are species which are associated with, and utilize, wetland habitats, especially wet agricultural land, more regularly and/or in larger numbers. Habitat loss for these species will also be compensated by habitat provision in LVNP, both in wetland and non-wetland habitats.
- 1.3.3 Finally, disturbance is expected to increase at certain wetland habitats due to the increased levels of human activity in the area. This is particularly the case along Sheung Yue, Shek Sheung and Ng Tung Rivers. Habitat provision for disturbance impacts on some of these species will also be made at LVNP.

1.4 Enhancement Mechanism

- 1.4.1 Mitigation for the direct loss of wetland habitats and increased disturbance to wetland habitats detailed above will be mitigated by compensatory habitat enhancement and management in LVNP. Long Valley is currently a mosaic of wetland and non-wetland habitats, the distribution and type of which changes frequently as crops are harvested and planted, and areas of land are cultivated and left fallow. These habitats are not of equally high ecological value. As such, there is considerable potential to enhance the ecological value of the habitats in LVNP by converting lower value habitats to those of higher value; as well as potential for enhancing the value of LVNP as a whole by managing human activities to reduce disturbance to wildlife. However, it should be noted that the existing mosaic of wetland and non-wetland habitats is intrinsic to the ecological value of Long Valley and that converting all non-wetland areas to wetland habitats is not desirable, or indeed practicable. Furthermore the pattern of land-use within Long Valley is dynamic and any future enhancement measures will need to review habitats present at that time and determine the exact scope of such measures.
- 1.4.2 Management of agricultural land, notably wet agricultural land, in such a way that the ecological value is enhanced is an accepted mechanism in Hong Kong for meeting conservation objectives (e.g. Anon 2010). Specifically, at Long Valley, monitoring of bird use of fields covered by Management Agreements under the ECF by Hong Kong Bird Watching Society and the Conservancy Association during 2006 to 2011 showed that fields under conservation management supported considerably greater numbers of birds than unmanaged fields. Indeed, apart from during the first 15 months of the period, when experimentation with management techniques was perhaps not always beneficial, managed fields supported higher bird numbers at all seasons, the average ratio ranged 1.7 in spring to 2.5 in summer. As well as the number individuals, the number of species present, especially wetland species, also increased. Mitigation for wetland loss and disturbance to wetland fauna by enhancing the value of agricultural land in Long Valley is, therefore, feasible in principle.

Table A13.10.1 Ratios of bird numbers in managed to unmanaged fields in the Long Valley and Ho Sheung Heung Priority Site, 2007 to 2011*.

Year	Spring	Summer	Autumn	Winter*
2007	0.7	1.6	0.9	1.5
2008	2.3	5.6	3.8	3.3
2009	1.9	2.3	3.6	2.4
2010	2.1	1.3	2.1	2.9
2011	1.8	1.5	2.4	2.2
Mean	1.7	2.5	2.6	2.5

Source: Hong Kong Bird Watching Society data at [http://www.hkbws.org.hk/BBS/viewthread.php?tid=12044&extra=page%3D1\)3er1](http://www.hkbws.org.hk/BBS/viewthread.php?tid=12044&extra=page%3D1)3er1)

**Note that seasons are as follows: Spring (March to May), Summer (June to August), Autumn (September to November) and Winter (December to February) Thus Winter 2006 in the table refers to the period from December 2006 to February 2007.

1.4.3 At the present time participation in the MA in Long Valley is voluntary and coverage does not include the whole of Long Valley: the managed area within the boundary of the proposed LVNP is approximately 10ha. There is, therefore, considerable scope to increase the extent of the managed area, approx. 70% currently not being under conservation management.

1.5 Purpose and Scope of the Preliminary Management Plan

1.5.1 The purpose and scope of this Preliminary Management Plan (PMP) is to outline how Long Valley Nature Park (LVNP) will be managed in order to meet the objectives described above. The PMP provides a background to the site, explores concepts for the design of the Nature Park and provides some initial ideas for management of the site. Concepts presented as part of this PMP include habitats to be provided in the LVNP, methods of achieving and maintaining the required habitat objectives, target wetland fauna species and options for managing public access.

1.5.2 It is not intended that this document should provide a detailed design for the site or details of the management procedures and practices required to achieve the aims of the site in terms of habitat provision and visitor access. It is expected that these detailed design and management procedures will be established as part of a later study cumulating in a more detailed Habitat Creation and Management Plan (HCMP).

2 Description of the site of Long Valley Nature Park

2.1 Location of LVNP

2.1.1 Long Valley is located in the northern New Territories, approximately 1 km to the west of Sheung Shui. It is wholly within the area covered by the Kwu Tung NDA and RODP-13.

2.1.2 The site of the LVNP is to the south of Sheung Yue River and to the west of Shek Sheung River, extending from the confluence of these two rivers south to Yin Kong Village. Being located on the former floodplain of these rivers the

land at Long Valley is flat, low-lying and fertile and as a result is suitable for the cultivation of crops.

2.2 Current land use within LVNP site

- 2.2.1 Most of the site of the LVNP is currently occupied by agricultural land. This includes both wet and dry fields, and fields which are actively managed for crop production as well as fields which are left fallow (for various durations). The management of each individual field (water levels, types of crop grown or fields left fallow) varies according to the preferences of the individual farmer and, if covered by a MA, MA habitat objectives.
- 2.2.2 However, a high proportion of the site is generally managed for wetland crops (especially Water Spinach *Ipomoea aquatica* and Water Cress *Nasturtium officinale*). Other wetland crops grown as part of the MA but which are rarely cultivated commercially in Hong Kong include Water Chestnut *Eleocharis dulcis*, Rice *Oryza sativa*, Chinese Arrow-head *Sagittaria sagittifolia* subsp. *leucopetala* and Water Caltrop *Trapa natans*. Some fields are seasonally wet and may be used for cultivation of wetland crops in one season but dryland crops in another.
- 2.2.3 Some fields at Long Valley are used for the cultivation of dryland crops including Chinese Aloe *Aloe vera* var. *chinensis*, Chinese Chives *Allium tuberosum*, Chinese White Cabbage *Brassica chinensis*, Lettuce *Lactuca sativa*, Matrimony Vine *Lycium chinense* and Egg-plant *Solanum melongena*. As mentioned above, the cultivation of these crops may be seasonal and fields may be flooded after harvesting.
- 2.2.4 After harvesting of crops, individual fields may be ploughed or may be left with the remnants of the previous crop (depending upon crop species and future management). These fields may be replanted immediately but are often left fallow for a varying period of time. Fallow fields are progressively colonised by common ruderal herb and grass species. If left inactive for a prolonged period, fields generally become overgrown with vegetation and may lose some value to faunal species associated with agricultural land. Some fallow fields are intentionally flooded, some may be allowed to flood (either fully or partly) during the wet season, and others may be retained in a dry condition. Most of these long-inactive fields are located at the southern and eastern sides of the LVNP.
- 2.2.5 Part of the site is occupied by ponds with permanent open water. These include ponds used for the cultivation of fish and water flea *Moina macrocopa*. Some ponds scattered within the agricultural fields are used for the storage of water for irrigation or for the cultivation of Lily *Nymphaea* spp. or Lotus *Nelumbo nucifera*.
- 2.2.6 The boundary of the LVNP contains former meanders of Sheung Yue River which were isolated during river channelization in the early 2000s. These meanders (with an area of approximately 1.4 ha) are managed by AFCD as ecological mitigation for the channelization. The meanders are used by similar wetland fauna to that found in marsh and pond areas elsewhere in Long Valley.

- 2.2.7 The northern and western perimeters of the site are bounded by the channelized Sheung Yue and Shek Sheung Rivers, with associated access roads. Between the agricultural land and the roads is a strip of plantation trees including *Hibiscus tiliaceus* and *Lophostemon confertus*. Some of the higher bunds within the boundary of the site also support trees, mostly fruit trees including *Litchi chinensis*, *Dimocarpus longan* and *Mangifera indica*.
- 2.2.8 The extreme south of the LVNP, adjacent to existing Yin Kong village, is developed land, most of which is currently used for container storage. The area of this developed land is approximately 0.5 ha.

2.3 Water supply and drainage

- 2.3.1 Water for irrigation of the agricultural land is currently obtained from rainfall plus water extraction from the Long Valley Watercourse (a tributary stream of the Sheung Yue River), the Sheung Yue River proper and from groundwater wells within Long Valley. Future management of the LVNP is likely to rely upon assuring the continued supply of clean water from these sources, however, alternative water supplies, including the retention of water in ponds for irrigation and the provision of clean-up wetlands to polish grey water (for example from the Visitor Centre), may also be considered appropriate for long-term management. The detailed design and HCMP should investigate the reliability and security of the existing water supply and consider mechanisms whereby water can be managed to ensure sufficient water retention for irrigation, especially during the dry season.
- 2.3.2 At present water is largely supplied across the site primarily by gravitational flow through a series of ditches across the site. Water flows from south to north across the site, eventually draining out of the site into the adjacent drainage channels.

2.4 Proposed surrounding land uses under RODP-13

- 2.4.1 Habitats to the north, east and south of LVNP would remain unchanged under the proposed design of the NDA. Current agricultural land to the north and south would retain the existing AGR zoning, while Yin Kong village and Ho Sheung Heung would be zoned as village land (V zoning).
- 2.4.2 Development to the west of LVNP (on the western side of Sheung Yue River) under the NDA would include village expansion site, facilities associated with the railway and commercial, research and development facilities (proposed to include hotel/conference facilities). Mitigation measures (in particular height restrictions, landscape screening and minimization of external lighting) will be implemented to ensure that these facilities would not significantly impact upon the character of the LVNP. To minimize potential disturbance impacts to LVNP public access to the existing maintenance access along the western boundary of Long Valley will need to be restricted.
- 2.4.3 Further to the west are residential developments at Kwu Tung North, including a proposed new railway station located approximately 1km to the west. The main pedestrian access into the LVNP would be from Kwu Tung across Sheung Yue River by a pedestrian bridge.

2.5 Cycle track from Sha Po Tsuen to Shek Sheung River

- 2.5.1 The boundary of the LVNP is adjacent to the route of the proposed cycle track from Sha Po Tsuen to Shek Sheung River. This cycle route would follow the western bank of Shek Sheung River (between the river and LVNP) and the northern bank of Sheung Yue River (across the river from LVNP). The EIA for the cycle track was approved without conditions on 12 March 2009 but construction has not yet commenced.
- 2.5.2 The presence of the cycle track provides both opportunities and constraints for the LVNP. The cycle track will provide a convenient access route for the LVNP permitting visitors to arrive by bicycle via Sheung Shui or Kwu Tung. The presence of cyclists around the perimeter of LVNP will, however, increase the potential for disturbance around the edge of the site. Such disturbance must be mitigated by suitable screening between the cycle track and LVNP as well as the difference in level between the cycle track (which will be at a higher level) and LVNP. Existing mitigation woodland planting along the rivers already provides significant screening, but it may be necessary to enhance this.

2.6 Potentially Hazardous Installation at Sheung Shui Water Treatment Works

- 2.6.1 The Sheung Shui Water Treatment Works (SSWTW) is located to the north of the LVNP. The SSWTW has been identified as a potentially hazardous installation (PHI) due to the storage, use and transport of chlorine for water chlorination. In order to minimise risk to life in the event of accidental release of chlorine, population centres should be located as far as possible from the PHI. The northern part of the LVNP lies within the 1 km consultation zone (CZ) for the SSWTW, within which the population forecast under the NDA requires calculation as part of the Risk Assessment of the EIA.

3 Ecological Background to Long Valley

3.1 Management Agreements under New Nature Conservation Policy

- 3.1.1 The NNCP encourages the conservation and enhancement of Priority Sites through the implementation of Private-Public Partnership (PPP) and Management Agreements (MA). The MA approach has been followed at Long Valley since 2005. Under the MA, funding is provided from the Environment and Conservation Fund (ECF) to a non-governmental organisation to manage the site in such a way that the conservation of the priority site is enhanced. The first MAs at Long Valley were administered by Conservancy Association (CA) and Hong Kong Bird Watching Society (HKBWS) separately from 2005-08. These two organisations have subsequently jointly managed MAs from 2008-10 (Anon 2010) and from 2010-12. The application of the 4th phase of MA at Long Valley commenced in March 2012 and will be completed in February 2015.

3.1.2 The previous MAs have investigated the effects of various agricultural practices and cropping regimes with a view to determining how these affect the ecological value of the site. Subjects previously investigated include the ways in which species are influenced by crop stage, water level, ploughing and application of fertilisers. Such data will be invaluable when determining the management strategy of the LVNP. A variety of crops have been grown under the MAs, some of which are no longer regularly grown elsewhere in Hong Kong; a comparison of the ecological value of these crops will also inform future management regarding the best crop species to be provided in the LVNP. Surveys of Long Valley by fauna, including birds, amphibians, reptiles and mammals conducted for the MAs will also provide important information for the future management of the site.

3.2 Current ecological value of Long Valley

3.2.1 Long Valley contains a diversity of microhabitats including wet and dry, inactive and fallow agricultural fields, ponds, marsh, mitigation meanders mitigation plantation and planted bunds. These diverse habitats form a complex mosaic across the site and have very strong ecological linkages. It is the presence of this diversity of habitats which provides much of the ecological value of the site, by providing wetland species with a diversity of water depths, vegetation and disturbance levels to cover a full range of breeding, foraging and roosting requirements of a high diversity of species.

3.2.2 Long Valley has good ecological links to surrounding wetland areas, especially adjacent wet agricultural land and drainage channels but also extending to the more extensive wetlands at Deep Bay. The LVNP would aim to take advantage of these ecological linkages to maintain and enhance the existing ecological value of the site.

3.3 Presence of egretries

3.3.1 The LVNP is located close to two egretries, at Ho Sheung Heung and Man Kam To Road. Flight-line surveys at these egretries indicate that some of the birds breeding at each site fly to Long Valley to forage.

3.3.2 In some years Ho Sheung Heung egretty is one of the largest egretries in Hong Kong. In 2010, the egretty supported at total of 86 nests including 42 nests of Little Egret, 25 of Cattle Egret and 19 of Chinese Pond Heron, though there were only 49 nests in 2012 (Anon 2011, Anon 2012).

3.3.3 Man Kam To Road egretty will unavoidably be impacted by the NDAs project and compensatory provision of habitat suitable for establishment of an egretty is proposed in area A1-7 of the Fanling North NDA. This location is closer to the LVNP than the existing egretty; hence if egretty re-establishment is successful it is highly likely that birds from there will forage in LVNP.

4 LVNP Management Methods and Objectives

4.1 Site opportunities and constraints

- 4.1.1 Wet agricultural land of the type present in Hong Kong is in nature a very dynamic habitat ecologically. Crop rotation in individual fields is common, with individual fields planted with different crops in different seasons. The different growth stages (from planting to harvesting) of certain crops also require different management methods and water levels. As a result the wildlife associated with agricultural land in Hong Kong is adapted to frequent changes in conditions at a scale of individual fields. This provides considerable flexibility in the management of LVNP so that different crops can be grown at different times. It also provides the opportunity to objectively review the existing composition and distribution of habitats at Long Valley; areas which are currently marsh could easily be drained and ploughed for use in agriculture, whereas fields which are currently active and dry could be flooded and left to evolve marshy conditions. Given this dynamism, a design for the LVNP need not necessarily rely on the existing conditions as a basis for determining the optimum layout.
- 4.1.2 Under the current system, individual fields at Long Valley are under the control of individual land owners or farm operators. As a result the layout of Long Valley has evolved in a somewhat haphazard manner in terms of the distribution of active and inactive fields, wet and dry land, marshes and ponds, and this process of change remains on-going today. Accordingly, the comprehensive plan for the whole of the LVNP will review the overall layout of Long Valley and consider the redistribution of habitats to the most appropriate location. This may involve consolidation of marshy areas into a particular part of the site, redistribution of crops to create either blocks of a single crop or a mosaic of different crops, management of water flow and water levels to maximise wetland areas, or other procedures. The overall management of the site as a single unit therefore has the potential to retain the value of individual fields but enhance the overall value by adjusting the proportion of particular habitats/crops and by redistributing these within the site.
- 4.1.3 Some parts of the site currently have relatively high bunds enclosing ponds and former meanders of Sheung Yue River. These higher areas limit the open country value of the site and may limit the current suitability of the site for some species which prefer open country habitats (especially waterbirds). A comprehensive plan for LVNP would allow for an assessment as to whether these higher bunds are appropriate for the site, and these could be removed during site enhancement works, if desired.

4.2 Ecological value of agricultural land

- 4.2.1 Agricultural land, especially wet agriculture, is of considerable importance ecologically, supporting a faunal community unlike that found in other habitats in Hong Kong. This is particularly notable among birds and amphibians.
- 4.2.2 Wet agricultural land provides shallow water habitats, usually with emergent vegetation and areas which are seasonally wet. The faunal community differs significantly from that found in wetlands in Deep Bay, where wetlands are

derived from areas of deeper water (especially fish ponds and *gei wai*), often with tidal or brackish influence. Although the species occurring in the wet agricultural land at Long Valley are similar to those recorded in Deep Bay, the relative abundance of these species differs according to the conditions present.

4.3 Potential habitat types and target species for LVNP

4.3.1 Potential target species for LVNP include species for which the area covered by the proposed LVNP is currently of importance, species which are particularly associated with agricultural land, especially wet agricultural land, and species where potential significant impacts may arise as a consequence of the NDA project. The EIA has identified a number of Key Species for which habitat management measures in the LVNP are required; Key species were identified according to the following criteria:

- Species of conservation significance based upon criteria detailed in **Section 13.4.3.8**, which have been reported in the impacted areas/habitats (including the proposed LVNP) in numbers considered to be of significance since 1998; or
- Any species that, although not of conservation significance, has been recorded in the impacted areas/habitats in numbers sufficiently high to indicate that the distribution and abundance in Hong Kong or assessment area as a whole would be significantly impacted by the proposed development;

Key Species for LVNP are listed in **Table A13.10.2**.

Table A13.10.2 - Key species requiring mitigation measures in Long Valley

Species	Basis of qualification	Area where significant impacts predicted	Area for mitigation for which species is a Key Target	Mitigation measures for Key Target species
Eastern Cattle Egret	LC as a breeding species: breeds at Ho Sheung Heung egretty and forages in Long Valley.	Long Valley foraging areas; flight-lines from Ho Sheung Heung egretty to foraging areas.	Long Valley foraging areas; flight-lines from Ho Sheung Heung egretty.	Enhancement of wetland habitats and non-wetland habitats at LVNP; measures to minimise disturbance impacts on Long Valley and flight-lines.
Grey Heron	PRC, but moderate numbers use river channels.	Long Valley and Sheung Yue River foraging areas.	Long Valley and Sheung Yue River foraging areas.	Enhancement of wetland habitats at LVNP; measures to minimize disturbance impacts on Long Valley; measures to minimise disturbance impacts on Sheung Yue River.
Great Egret	PRC, but moderate numbers use river channels.	Long Valley and Sheung Yue River foraging areas.	Long Valley and Sheung Yue River foraging areas.	Enhancement of wetland habitats at LVNP; measures to minimize disturbance impacts on Long Valley; measures to minimise disturbance impacts on Sheung Yue River.

Species	Basis of qualification	Area where significant impacts predicted	Area for mitigation for which species is a Key Target	Mitigation measures for Key Target species
Intermediate Egret	RC; small numbers regularly occur at Long Valley.	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP.
Little Egret	PRC; breeds at Ho Sheung Heung and Man Kam To egrettries (latter to be directly impacted by Project); large numbers forage in river channels and in Long Valley.	Long Valley, Sheung Yue and Ng Tung Rivers foraging areas; flight-lines from Ho Sheung Heung egrettry to foraging areas. Man Kam To Road egrettry, (and flightlines and foraging areas).	Long Valley, Sheung Yue and Ng Tung Rivers foraging areas; flight-lines from Ho Sheung Heung egrettry; egrettry relocation site (FLN A1-7).	Enhancement of wetland habitats at LVNP; measures to minimise disturbance impacts on Long Valley, Sheung Yue and Ng Tung Rivers and flight-lines.
Chinese Pond Heron	PRC; breeds at Ho Sheung Heung and Man Kam To egrettries (latter to be directly impacted by Project); large numbers forage in river channels and in Long Valley.	Long Valley and Sheung Yue and Ng Tung River foraging areas; flight-lines from Ho Sheung Heung egrettry to foraging areas. Man Kam To Road egrettry, (and flight-lines and foraging areas).	Long Valley and Sheung Yue and Ng Tung River foraging areas; flight-lines from Ho Sheung Heung egrettry; egrettry relocation site (FLN A1-7).	Enhancement of wetland habitats at LVNP; measures to minimise disturbance impacts on Long Valley and flight-lines.
Black-crowned Night Heron	LC; utilises a variety of wetland habitats in Long Valley, Ho Sheung Heung and Sheung Yue and Ng Tung Rivers.	Long Valley and Sheung Yue River foraging areas.	Long Valley and Sheung Yue River foraging areas.	Enhancement of wetland habitats at LVNP; measures to minimize disturbance impacts on Long Valley and Sheung Yue Rivers.
Yellow Bittern	LC; regularly occurs in densely vegetated wetland areas in Long Valley	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Von Schrenck's Bittern	RC; regularly occurs in densely vegetated wetland areas in Long Valley	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Cinnamon Bittern	LC; regularly occurs in densely vegetated wetland areas in Long Valley	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Eurasian Teal	RC; occurs in pond and watercourses including at Long Valley	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Eurasian Hobby	LC; regularly occurs in open country areas including Long Valley	Long Valley	Long Valley	Enhancement of habitats at LVNP
Japanese Quail	LC; regularly occurs in open country, grassland and dry agriculture including at Long Valley	Long Valley	Long Valley	Enhancement of habitats at LVNP
Ruddy-breasted Crake	LC; regularly occurs in small numbers in heavily vegetated habitats at Long Valley.	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Pheasant-tailed Jacana	LC; regularly occurs in small numbers in heavily vegetated habitats at Long Valley.	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP

Species	Basis of qualification	Area where significant impacts predicted	Area for mitigation for which species is a Key Target	Mitigation measures for Key Target species
Black-winged Stilt	RC; significant numbers forage in Long Valley, some forage in Sheung Yue River.	Long Valley, some in Sheung Yue River.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance impacts on Long Valley and Sheung Yue River.
Pied Avocet	RC; large numbers forage in Long Valley, some forage in Sheung Yue River.	Long Valley	Long Valley	
Greater Painted-snipe	RC; cryptic and not highly sensitive to disturbance but Long Valley is of high significance in a Hong Kong context.	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP.
Oriental Pratincole	LC; regularly occurs in small numbers in wetland habitats at Long Valley.	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Pacific Golden Plover	LC; regularly occurs in small numbers in wetland habitats at Long Valley.	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Little Ringed Plover	LC as a breeding species; qualification because of large numbers using river channels.	Sheung Yue Rivers.	Long Valley and Sheung Yue and Ng Tung Rivers.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance impacts on Long Valley; measures to minimise disturbance impacts on watercourses.
Marsh Sandpiper	RC; regularly occurs in small numbers in wetland habitats at Long Valley	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Common Greenshank	RC; regularly occurs in small numbers in wetland habitats at Long Valley	Long Valley	Long Valley	Enhancement of wetland habitats at LVNP
Wood Sandpiper	LC; significant numbers forage in Long Valley.	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Swinhoe's Snipe	LC; Long Valley is of significance in a Hong Kong context.	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Temminck's Stint	LC; regularly occurs in small numbers in wetland habitats at Long Valley	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Long-toed Stint	LC; regularly occurs in small numbers in wetland habitats at Long Valley	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Pied Kingfisher	(LC); regularly occurs in small numbers in ponds at Long Valley where it probably	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance

Species	Basis of qualification	Area where significant impacts predicted	Area for mitigation for which species is a Key Target	Mitigation measures for Key Target species
	breeds			to Long Valley.
White-throated Kingfisher	LC; regularly occurs in small numbers in wetland habitats at Long Valley	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Citrine Wagtail	LC; regularly occurs in small numbers in wetland habitats at Long Valley	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Red-throated Pipit	LC; regularly occurs in a mixture of wet and dry habitats at Long Valley.	Long Valley.	Long Valley.	Enhancement of habitats at LVNP; measures to minimise disturbance to Long Valley.
Pechora Pipit	LC; regularly occurs in small numbers in wetland habitats at Long Valley	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Buff-bellied Pipit	LC; regularly occurs in a mixture of wet and dry habitats at Long Valley.	Long Valley.	Long Valley.	Enhancement of habitats at LVNP; measures to minimise disturbance to Long Valley.
Bluethroat	LC; regularly occurs in marsh and wet agriculture at Long Valley.	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Pallas's Grasshopper Warbler	LC; regularly occurs in in wetland habitats at Long Valley	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.
Zitting Cisticola	LC; regularly occurs in a mixture of wet and dry habitats at Long Valley.	Long Valley.	Long Valley.	Enhancement of habitats at LVNP; measures to minimise disturbance to Long Valley.
Golden-headed Cisticola	LC; regularly occurs in small numbers in a mixture of wet and dry habitats at Long Valley.	Long Valley.	Long Valley.	Enhancement of habitats at LVNP; measures to minimise disturbance to Long Valley.
Chestnut-eared Bunting	LC; regularly occurs in small numbers in a mixture of wet and dry habitats at Long Valley.	Long Valley.	Long Valley.	Enhancement of habitats at LVNP; measures to minimise disturbance to Long Valley.
Yellow-breasted Bunting	RC, VU. Regularly occurs in a mixture of wet and dry habitats at Long Valley.	Long Valley.	Long Valley.	Enhancement of habitats at LVNP; measures to minimise disturbance to Long Valley.
Japanese Yellow Bunting	GC, VU. Regularly occurs in small numbers in a mixture of wet and dry habitats at Long Valley.	Long Valley.	Long Valley.	Enhancement of habitats at LVNP; measures to minimise disturbance to Long Valley.
Collared Crow	LC, NT. Occurs in small numbers in ponds and watercourse including	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance

Species	Basis of qualification	Area where significant impacts predicted	Area for mitigation for which species is a Key Target	Mitigation measures for Key Target species
	at Long Valley			to Long Valley; measures to minimise disturbance impacts on watercourses.
Reptiles	See Table 13.10 of the EcolIA	See Table 13.10 of the EcolIA	Long Valley	Provision of habitat for snakes species in general to benefit the species of conservation concern recorded from Long Valley (Buff-striped Keelback, Many-banded Krait, Chinese Cobra, King Cobra).
Chinese Bullfrog	PRC; widespread in the Study Area, albeit not in large numbers. Present in a number of locations where direct or indirect impacts are predicted.	Long Valley; Ma Tso Lung; and development areas in KTN and FLN.	Long Valley; Ma Tso Lung.	Enhancement of wetland habitats at LVNP;
Two-striped Grass Frog	LC; uncommon and restricted to a few sites in Hong Kong.	Long Valley.	Long Valley.	Enhancement of wetland habitats at LVNP; measures to minimise disturbance to Long Valley.

4.3.2 The Hong Kong Bird Watching Society (HKBWS) and the Conservancy Association (CA) have been investigating ways to enhance the conservation value of bird and amphibian habitats at Long Valley since 2006. This initiative which is funded by the Environment and Conservation Fund operates via a Management Agreement (MA) with the local farming community and aims to conserve and enhance the agricultural freshwater wetland and habitat diversity for avifauna and amphibians and other freshwater wetland-dependent species in Long Valley.

4.3.3 The results have shown that bird numbers present in those fields which fall under the MA are consistently higher than those fields which do not fall under the MA (see table A13.10.1 above). Furthermore, within the different field treatments adopted, less intensively managed wet agriculture and shallow water habitats had higher species richness than other habitats (Figure A13.10.1 below). Provision of shallow water habitats was identified as a major priority in the future management of Long Valley as it provides important habitats to various target bird species, especially waders and that planting of rice was also effective in increasing numbers of birds including species of conservation importance (Sung *et al.* undated).

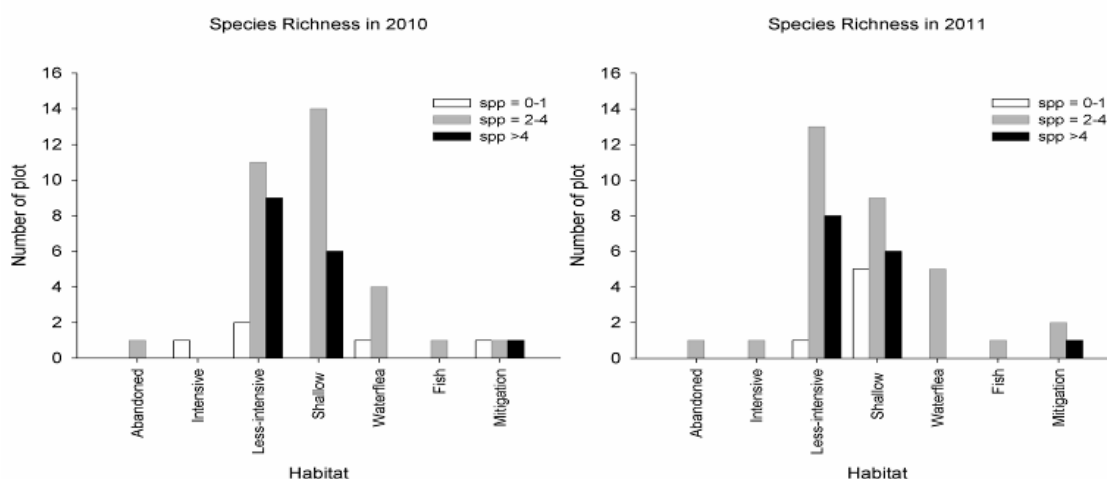


Figure A13.10.1.

Key: Species richness (spp = species number) by each managed habitat type in 2010 and 2011. Habitat types are: **abandoned** farm plots, **intensive** wet agricultural land, **less intensive** wet agricultural land, **shallow** water habitat, **waterflea** pond, **fish** pond and **mitigation** wetland. (Source: CA & HKBWS).

4.3.4 Ten species of amphibian have been recorded at Long Valley Table A13.10.3) with less intensive agriculture and various water crops attracting a relatively high number of species. Waterflea ponds and fishponds were also important for amphibians and important breeding habitats for amphibians were less intensive wet agriculture, shallow water habitats, mitigation wetlands and concrete-lined ponds. Table A13.10.3. Ten amphibian species recorded in Long Valley. Abundance refers to the ease of observation of the species (CA in litt.)

Table A13.10.3 – Ten species of amphibian have been recorded at Long Valley

Species name	Common name	Abundance
<i>Duttaphrynus melanostictus</i>	Asian Common Toad	++
<i>Polypedates megacephalus</i>	Brown Tree Frog	++++
<i>Fejervarya limnocharis</i>	Paddy Frog	++++
<i>Hoplobatrachus rugulosus</i>	Chinese Bullfrog	++
<i>Hylarana guentheri</i>	Günther's Frog	+++
<i>Microhyla fissipes</i>	Ornate Pigmy Frog	++++
<i>Microhyla pulchra</i>	Marbled Pigmy Frog	++
<i>Microhyla butleri</i>	Butler's Pigmy Frog	+
<i>Kaloula pulchra</i>	Asiatic Painted Frog	+
<i>Kalophrynus interlineatus</i>	Piebald Narrow-mouthed Frog	+

4.3.5 Current management measures at Long Valley being undertaken by CA and HKBWS form part of an on-going project covering the period 2012-2015 and draw on the findings of previous studies (CA and HKBWS in litt). Under this project Shallow Water Habitat (including marsh and open water) will have as management targets Wood Sandpiper, ardeids, *Gallinago* snipe, Greater Painted-snipe, crakes and rails and amphibians. Previous MA projects demonstrated that management of shallow water habitats is the most cost

effective way in which to increase bird diversity and abundance. However, it has been demonstrated that this effectiveness starts to drop after about four years and that rotation of habitats is important for attracting birds to Long Valley.

- 4.3.6 Less intensive agriculture is managed for buntings, *Gallinago* snipe, Wood and Green Sandpipers and Chinese Bullfrog. Rice paddy in particular has proved especially effective in attracting buntings including the globally vulnerable Yellow-breasted Bunting and Chinese Bullfrog.
- 4.3.7 Intensively managed agriculture has as targets Yellow and Citrine Wagtails, ardeids, and *Gallinago* snipe. A decrease in the area of watercress fields (due to warmer winters and an increase in fertilizer costs) had been detrimental to wagtail and *Gallinago* snipe numbers and incentives are proposed under the MA to reverse this trend.
- 4.3.8 Fish and marsh ponds are managed for ardeids, crakes and rails and amphibians. Management of fish ponds is effective in attracting ardeids although any such attraction is relatively short-lived (1-2 months) and is dependent upon pond drain-down which in turn requires resources and manpower and hence is less cost-effective than the enhancement of other habitats. Planting of water lilies is proposed for fishponds to further increase bird diversity and to attract amphibians.
- 4.3.9 Water flea ponds are managed to attract Black-winged Stilt and Chinese Bullfrog. This is another habitat type which is declining due to market forces and the MAs are important in ensuring this habitat remains at Long Valley. Further measures to attract amphibians in this habitat are proposed, specifically vegetation management along bunds.
- 4.3.10 Clearly much has been learnt regarding wildlife driven management of habitats at Long Valley under previous MA and the current 2012 -2015 project can be expected to provide additional information which will be critical for the long-term management of Long Valley for birds and amphibians

4.4 Approach to water management

- 4.4.1 Under current hydrological conditions, water for irrigation is derived from a mixture of rainfall, the Long Valley Watercourse (a tributary stream of the Sheung Yue River), the Sheung Yue River and from wells within Long Valley, and is distribution across Long Valley from south to north by gravity via a network of ditches. Provision of water to individual fields and control of water levels within the fields is mostly achieved by temporary dams, sluices and pipe networks. The sustainability of a water supply will be critical for the successful long-term management of the LVNP and whilst it is expected that a similar water control system will be required and this will need to be considered at the detailed design/HCMP preparation stage. Consideration should be given at that stage to the reprofiling of parts of Long Valley (to improve water circulation), upgrading/modifying the existing drainage network (to improve water distribution), provision of water retention ponds (to retain excess wet season surface run-off) and construction of a water treatment system (with the use of wetland for water polishing to be considered).

4.5 Site Security

- 4.5.1 Despite being located on private land, Long Valley can currently be accessed from any direction without restrictions. Under the proposed concept design, the LVNP would require that the boundary of the site is clearly delineated by a fence with access restricted and controlled by AFCD. The entire LVNP will be fenced and as such ecological connectivity with adjoining habitats, including for wild mammals, will need to be considered at the detailed design/HCMP preparation stage. Options for visitor management are discussed further in Section 5 below.

5 Visitor Centre and Management of Access

5.1 Visitor Centre

- 5.1.1 A Visitor Centre, which will be managed by AFCD, will be located on the west side of the Sheung Yue River in RODP-13 area B3-16. This location is appropriate for the reception of visitors arriving by train (at Kwu Tung MTR Station) and also those using the proposed cycle track. Visitor access would then be by means of a pedestrian bridge over the Sheung Yue River.
- 5.1.2 Due to the limited space available at the Visitor Centre and the proximity of public transport access from the proposed station at Kwu Tung it is not expected that a car park would be provided for public access, with visitors to the LVNP encouraged to arrive using public transport or to use nearby parking facilities and arrive on foot. Limited parking facilities (potentially in the basement due to limitations on space) would be available for staff working at the LVNP or for deliveries to the visitor centre. This arrangement is similar to the situation at HKWP, where only limited public parking is provided and visitors are encouraged to arrive by public transport. Given the proximity to the proposed cycle track, it would be desirable to provide bicycle parking space at the visitor centre for visitors arriving along the cycle track.

5.2 Visitor Access

- 5.2.1 Access into the LVNP would be via the Visitor Centre and would be managed and controlled by AFCD. At present, despite the land at Long Valley being privately-owned, there is no restriction on access to most of Long Valley. This lack of restriction on access does result in much of Long Valley being disturbed by visitors, especially at weekends in the winter months when the area is most visited by hikers, bird-watchers and photographers. Control of access and/or is visitor numbers will, therefore, be required in order to protect the ecological value of the LVNP, enable site management and will benefit visitors as it will ensure that the fauna that they wish to observe is present.
- 5.2.2 A decision as to the how access will be managed and controlled will require to be made at the detailed HCMP stage (as it will have both design and management implications) and will require detailed consultation between stakeholders, but is likely to involve a combination of escorted visits for those with a general interest and a controlled number of personal permits for those with a specialist interest (as is currently the case at Mai Po Nature Reserve).

- 5.2.3 The layout of the LVNP site imposes certain opportunities and restrictions related to the location of the visitor centre and the presence of the PHI hazard zone in the north of the site. These affect the number of visitors expected in different parts of the site, which in turn has a knock-on effect on the suitability of habitats to be provided. The exact boundary of each of these zones, access to and within each of the zones, habitat mix and distribution and target species within each zone will need to be determined as part of the detailed design/HCMP preparation stage for the LVNP.
- 5.2.4 Access into the LVNP would be via the visitor centre to be located on the west side of the Sheung Yue River in RODP-13 area B3-16. This site provides easy access to visitors from the Kwu Tung North and is also easily accessible from San Tin Highway or from Sheung Shui. Given the location of the visitor centre immediately to the west of Long Valley, it is expected that most visitor access would be in this part of the site. Consequently, habitats there should be suitable for species tolerant of human disturbance, such as amphibians, dragonflies and butterflies. As part of the cultural experience of LVNP it is also expected that the area close to the visitor should also demonstrate a diversity of agricultural practices and crops.
- 5.2.5 The northern part of LVNP is located within the 1 km CZ for the potential hazard from the chlorine storage facility at SSWTW. It is proposed that only limited access should be permitted within this 1 km CZ, in order to minimise risk of hazard to life arising in the event of a chlorine leak from the SSWTW. By limiting human access into this northern part of the site, this area would be subject to very low levels of human disturbance. This northern part of the site may be suitable as a refuge for more disturbance-sensitive birds such as large waterbirds, including ducks and larger ardeids, when disturbed from the rest of the site. The north of the site has the strongest ecological linkage to Deep Bay (via Hoo Hok Wai) and to the egretty at Ho Sheung Heung, furthering the potential for large waterbirds within this part of the site. Habitat provision should be appropriate for these disturbance-sensitive species and should allow for visitors to view from suitable vantage points.
- 5.2.6 Between the disturbed southern part of the LVNP and the undisturbed northern area lies an area expected to have intermediate levels of public use. It is expected that this area would be accessible to the public in some form. The nature of public access into this zone should be determined as part of the management of the site and could be considered further at the detailed design/HCMP preparation stage. Possible options for access into this area include:
- 5.2.7 **Access for all visitors to the LVNP.** This would permit access by anyone from the visitor centre. Access would not be unrestricted in that visitors would be required to keep to paths and the path network could be managed such that some parts of the area would receive fewer visitors. Such a system might permit the greatest level of public enjoyment of the site, but would give reduced scope for control of the number of visitors (and thus disturbance levels) and may result in high levels of disturbance in this part of the site. This is similar to the system in place at Hong Kong Wetland Park (HKWP).
- 5.2.8 **Access by pre-arranged group visits only.** This would limit the number of people accessing the site, and would therefore permit a control over the levels

of disturbance experienced. The system may be similar to that currently used for most visitors to Mai Po Marshes Nature Reserve (MPNR).

- 5.2.9 **Issue of individual permits.** Certain individuals could apply for permits to freely access this part of the site. This allows a greater freedom for permit-holders through the site but limits access by other members of the public. Again, a similar system is in place at MPNR.
- 5.2.10 **Pre-booked individual permits.** This could involve a limited number of day permits to be issued each day. If all permits for the day have been issued, it would be necessary for the individual to try to obtain a permit for another day.
- 5.2.11 **A combination of some of the systems outlined above.** This may involve limiting numbers of visitors using one entry method, either spatially (by dividing this zone into two or more smaller zones) or temporally (by restricting access from one method to particular days or times).
- 5.2.12 **Figure A13.10.2** provides a summary of this concept for the site layout, showing an indicative access hierarchy for the LVNP. Options for visitor management will need to be considered as an element of the further study.

5.3 Management Access

- 5.3.1 Access for management purposes and vehicle access to materials and equipment store and, if appropriate, staff facilities will be from Yin Kong in the south as the pedestrian footbridge access will not be appropriate for this purpose.

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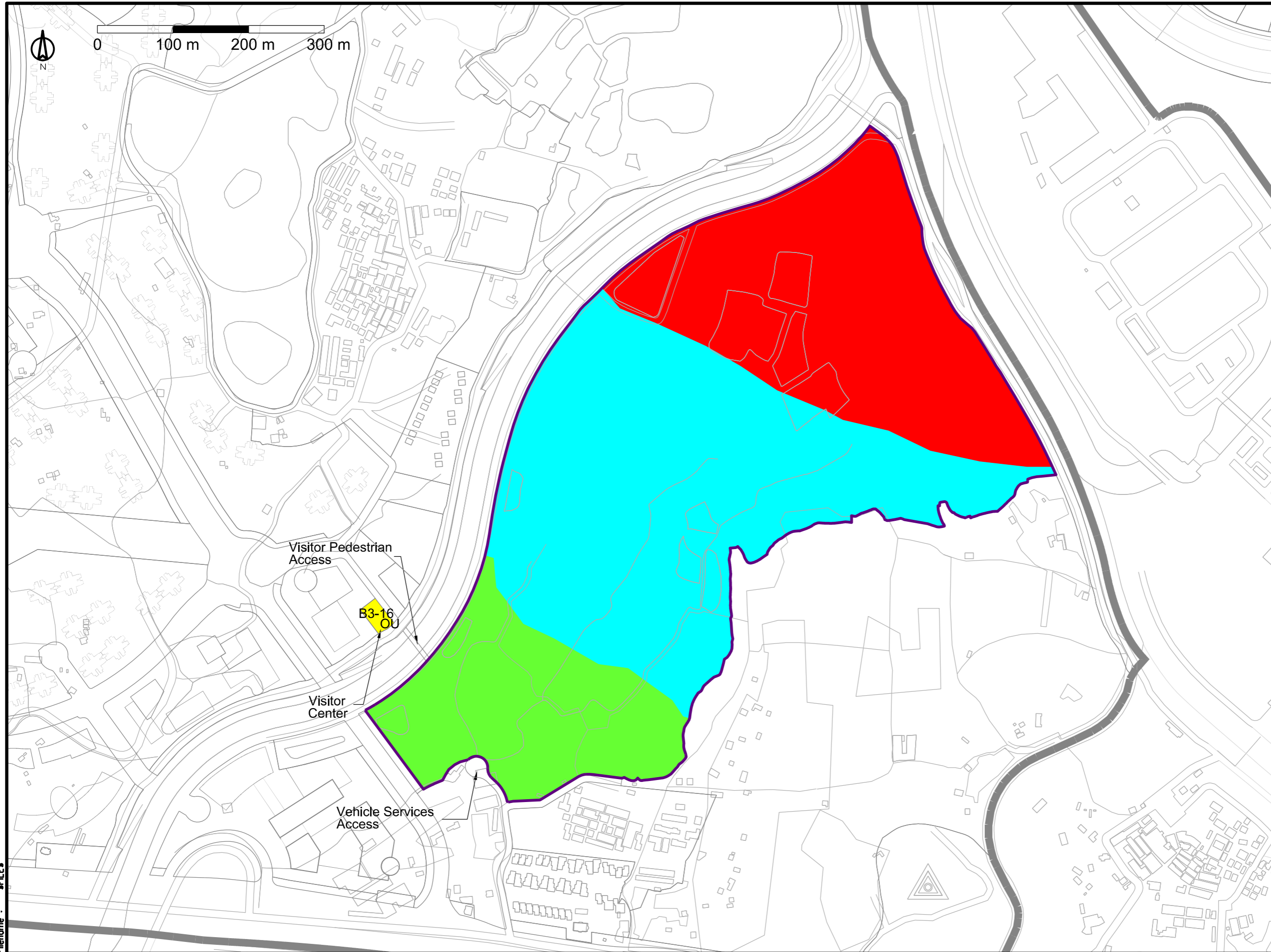
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- LVNP Boundary
- Visitor Centre
- Visitor Zone
- Public Access Zone
- Limited Access Zone

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Job Title
 Agreement No. CE 61/2007 (CE)
 North East New Territories New Development Areas
 Planning and Engineering Study - Investigation

Drawing Title
 Illustration of a Possible
 Access Hierarchy in Long Valley
 Nature Park

Rev	Description	Date

Drawn	EW	Date	04/13
Checked	MRL	Approved	
Scale	AS SHOWN		

Drawing No.
 Figure A13.10.2
 Rev.

Appendix 8.6

Possible Arrangement before and after Land Resumption for LVNP

Appendix 8.6 Possible Arrangement before and after Land Resumption for LVNP

1.1 Possible Arrangement before and after Land Resumption

Mode of management before land resumption

Option 1: Existing practice for land resumption and crop clearance will be adopted.

No change to the existing mode of management, and the existing lease will continue.

There will be land resumption and crop clearance as in existing practice.

Land owners will get compensation whereas tenants will receive EGA for crops and other allowances.

- Problems:
1. Farmers will change to plant crops with higher EGA rates such as fruit trees with a view to getting higher amount of EGA, which will cause adverse ecological impact to Long Valley.
 2. Existing farmers may be forced out if land owners wish to get the EGA themselves.

Option 2: Fast-track the land resumption exercise for early implementation of LVNP.

The transition period is to be shortened as much as possible to minimize uncertainty.

No change to the existing mode of management until the time of land resumption.

Merits: Consistent with existing land resumption policy and practice, and minimize the potential damage to the wetland habitat of Long Valley.

Problems: Subject to policy change and require additional resources and funding approval from LegCo, which may render this option infeasible. Farmers may still change the crops when the plan for fast-track land resumption is made known.

Alternative Options

To avoid the damage to the habitats due to change of crops for higher EGA, all the farmers will be allowed to continue their farming practice at their fields and no clearance of crops will be carried out. Therefore, no EGA will be payable to the farmers. As such, landowners will still get compensation for resumption of their land. However, as the tenants will be allowed to continue their farming and there will be no loss of crops, they will not be eligible for EGA payment for crop farming. Farmers who wish to discontinue their farming business at their own will be given a reasonable time to harvest and sell their crop before leaving, and thus are also not eligible for EGA for crop farming.

Option 3: No change to the existing mode of management, and the existing lease will continue.

Merits: As no EGA will be payable, farmers will not change the crops for higher EGA. The existing habitats of Long Valley will be retained.

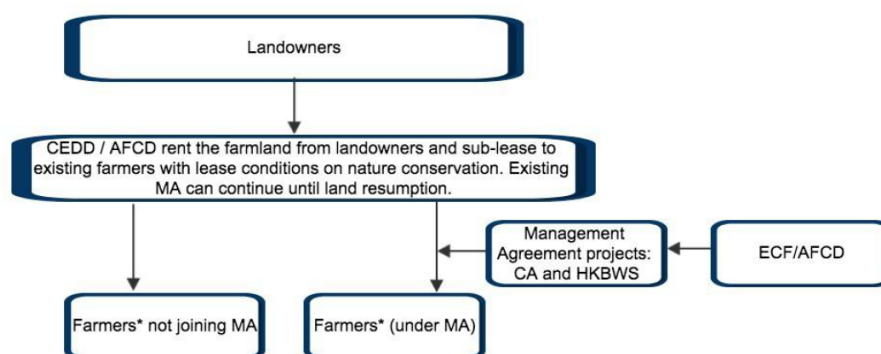
Problems: Land owners and farmers anticipating crop EGA will be disappointed by the arrangement and may take strong actions to press the Government to clear their farms and provide EGA.

Option 4: Early implementation of HCMP by renting the farmlands from landowners and then sub-leasing to the existing tenants. The initial lease conditions may remain the same, and clauses related to habitat management may be added after land resumption / commencement of LVNP.

Merits: As there will not be any crop compensation, land owners and farmers will have no incentives to switch to planting crops with higher EGA rates. The wetland habitats at Long Valley could be conserved.

Farmers will either stay and continue farming or discontinue their farming business at their own will. There will not be additional demand for agricultural re-site/rehabilitation.

Problems: Landowners/farmers may not agree with the arrangement and may not rent the farms to/from CEDD/AFCD.



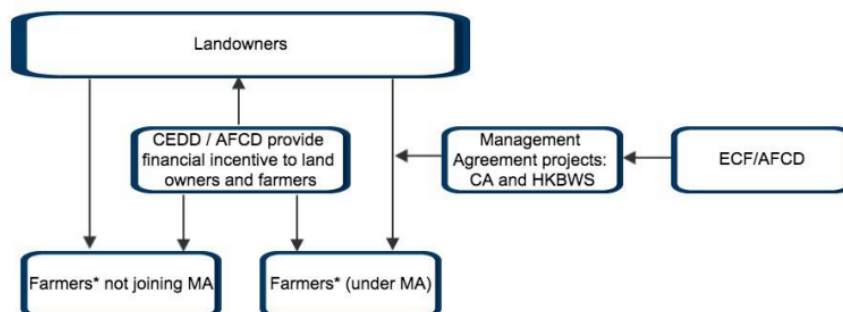
Note (*): including farmers' organisations supporting farmers (e.g. 香港新界本地農協會、古洞蔬菜產銷貸款有限責任合作社) and individual farmers

Option 5: CEDD/AFCD to provide financial incentive to land owners and farmers to maintain existing farming practice and to "compensate" for the loss of EGA.

Merits: Less objection from the landowners/farmers to the "loss of EGA"

Problems: Land owners may not agree with the arrangement especially if the financial

incentive falls short of the anticipated amount of EGA.



Note (*): including farmers' organisations supporting farmers (e.g. 香港新界本地農協會、古洞蔬菜產銷貸款有限責任合作社) and individual farmers

After various discussions with the authorities, it was understood that approaches (i.e. options 3 to 5 above) for adopting new ideas to avoid damage to the habitats due to change of crops for higher EGA should not be adopted. It was because these would be inconsistent with existing land resumption policy and practice. The current practice (i.e. option 1 above) for land resumption and crop clearance should follow.

1.1.1 Mode of management after Land Resumption / commencement of the CEDD's construction contracts

Existing practice for land resumption and crop clearance will be adopted. Land owners will get compensation whereas tenants will receive Ex-gratia compensation (EGA) for crops and other allowances.

Potential/possible Problems:	1. Farmers will change to plant crops with higher EGA rates such as fruit trees with a view to getting higher amount of EGA, which will cause adverse ecological impact to Long Valley.
	2. Existing farmers may be forced out if land owners wish to get the EGA themselves.

A proposal for reinstating the land to its original status is attached in Appendix 8.4 Reinstatement Proposal for LVNP, to cater for the potential/possible problem of farmers switching to plant crops with higher EGA rates and cause adverse ecological impact to Long Valley.

1.1.2 Incorporation of LVNP reinstatement in the Contracts

The farmers might change to plant crops with higher EGA rates such as fruit trees with a view to getting higher amount of EGA, which will damage the current/existing habitats in future LVNP. After completion of the Land Resumption/commencement of the construction contracts, it was anticipated that reinstatement works for reverting the disturbed wetlands back to their original conditions should be required. The restoration should include

- Reconstruction of antecedent physical conditions
- Chemical adjustment of the soil and water
- Biological manipulation including reintroduction of absent native flora and fauna.

So as to return the ecosystem to a close approximation of its condition prior to disturbance. Special landscape subcontractor should be engaged under the CEDD's construction

contracts. Appropriate requirements/specification should be agreed with AFCD before tendering of the construction contracts.

1.1.3 Phased Land Handover within LVNP

The entire LVNP shall be divided into several areas and handed over to AFCD in different phases subject to AFCD's funding application and the works to be carried out.

Appendix 8.7

Resources Requirements for Management and Maintenance for LVNP

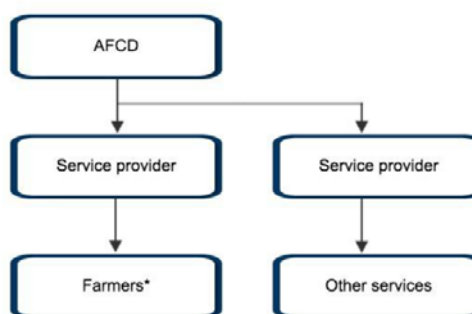
Appendix 8.7 Resource Requirements for Management and Maintenance of LVNP

1.1 Resources Requirements for Management and Maintenance

Permanent Management Structure

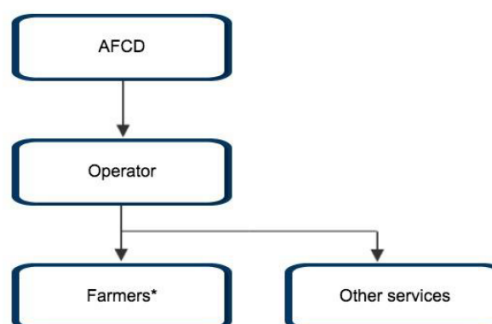
1.1.1 Mode of management after land resumption

Option 1: AFCD will outsource different operations to different service providers. Farming and habitat management will be some of the services to be outsourced. The relevant service provider will employ farmers to farm and to manage the habitats of LVNP to meet AFCD's requirements.



Note (*): including farmers' organisations supporting farmers (e.g. 香港新界本地農協會、古洞蔬菜產銷貸款有限責任合作社) and individual farmers

Option 2: AFCD will outsource the whole management of LVNP to an Operator. The Operator will engage farmers and will be responsible for habitat management works as required by AFCD. The Operator may obtain its own income (rent from farmers, entrance fees from visitors and tours etc) or get a management fee from the Government.



Note (*): including farmers' organisations supporting farmers (e.g. 香港新界本地農協會、古洞蔬菜產銷貸款有限責任合作社) and individual farmers

Establish Management Committee

1.1.2 Management Committee is suggested to be established for management of the future LVNP. The terms of reference of the Management Committee should be as follows:

- To consider and make recommendations to the AFCD on all the nature conservation matters under LVNP and the viability of the proposed facilities, including proposals for

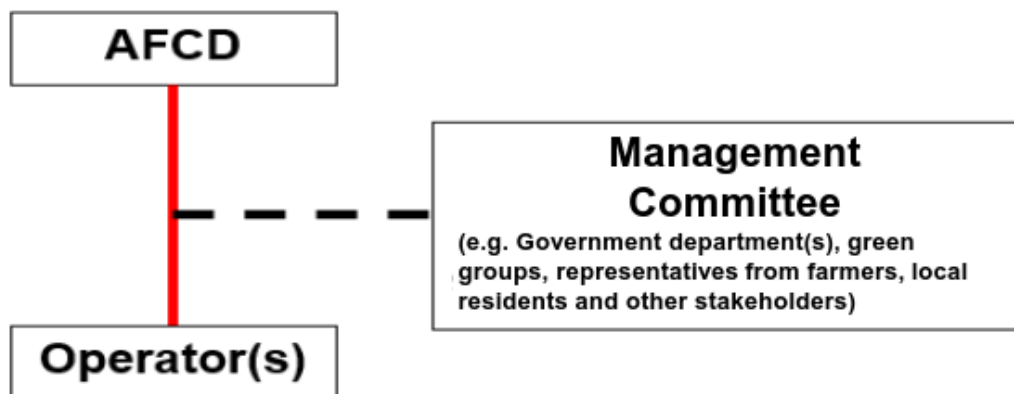
defining scope, feasibility and cost in order to ensure an optimal utilization of resources.

- To consider and recommend to the AFCD a Development Plan for the LVNP.
- To consider and recommend to the AFCD policies related to hiring of Management Agencies and Farmers, their management, and related contractual matters for the planning, design and construction.
- To consider the progress of facilities, and other related or ancillary facilities with reference to the overall objectives of the AFCD.
- To consider and recommend to the AFCD any other matters related to project planning and development of the LVNP.

1.1.3 As AFCD would be responsible for the management of LVNP, the proposed Management Committee should likely be an advisory body or liaison group for various stakeholders to participate and share their knowledge / views with AFCD.

1.1.4 The Committee Organization Chart is further illustrated in **Figure 10.1.3**.

Figure 10.1.3 The Working Relationship Between AFCD and Committee



The Management Committee will be chaired by AFCD and will have members including NGOs, EPD and representatives from farmers and local residents.