

**Egretry Habitat Creation and Management Plan**

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 Background

- 1.1 The North East New Territories (NENT) New Development Areas (NDAs) Study, after consideration and incorporation of comments from the three-stage public engagement programme, planned to proceed with development in Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDAs) to accommodate future population of 174,900. The NENT NDAs Study is a major designated project under Item 1 Schedule 3 of the Environmental Impact Assessment Ordinance (EIAO), and covers a total of thirteen individual designated projects which require environmental permits under Schedule 2 of EIAO.
- 1.2 An EIA Report was prepared by Ove Arup & Partners Hong Kong Limited (Arup) to assess the environmental impacts associated with the proposed construction and operational works of the NENT NDAs. Findings of the EIA study revealed that there would be impacts arising from the development to the existing Man Kam To Egretry (the egretry) due to the provision of the Fanling Bypass Western Section roundabout (the roundabout). Alternatives to avoid or minimize impacts to the egretry by adjusting the location of the roundabout were considered, but all options were constrained by existing infrastructure and the Ng Tung River to the south. As stated in Section 13.11.2.4 of the EIA Report, in order to mitigate for the ecological impact of the egretry loss, an existing meander in A1-7 FLN has been identified as a compensation site for the loss of the egretry. Additionally, another compensation site was also identified at B1-7 FLN during the approval period of the EIA as requested by an ACE member. Recommendations to enhance the existing Ho Sheung Heung Egretry was also suggested during the ACE meeting. As proposed in the EIA Report, compensatory planting and measures to attract egrets should be provided before the existing egretry would be impacted. Furthermore, the provision of compensation sites is also intended to provide suitable habitat for dragonfly species Dingy Dusk Hawker (*Gynacantha subinterrupta*) (Section 13.9.3 of the EIA Report), a local concern species in Hong Kong.
- 1.3 The EIA Report (Register No. AEIAR-175/2013) was approved by the Director of Environmental Protection (DEP) on 18 October 2013 with approval conditions stipulated in the Director's letter (Reference: (45) in EP2/N7/S3/57 Pt.3). Under the approval condition (c), the Project Proponent is required to submit a detailed proposal for the establishment of alternative egretry sites before the commencement of construction works of Fanling Bypass Eastern Section. This requirement is also stipulated in Condition 2.7 of the Environmental Permit (EP) for Fanling Bypass Eastern Section (EP-473/2013A), in which an Egretry Habitat Creation and Management Plan shall be submitted before the commencement of the construction works of Fanling Bypass Eastern Section.
- 1.4 This Egretry Habitat Creation and Management Plan is to establish the alternative egretry sites and a monitoring programme to assess and confirm the effectiveness of the relevant mitigation measures. The Egretry Habitat Creation and Management Plan shall also include practicable steps to enhance the existing egretry site at Ho Sheung Heung and/or its vicinity.

## **2 Relevant Legislation and Guideline**

- 2.1 The Wild Animals Protection Ordinance (Cap. 170) provides for the protection of all wild birds, including egrets and herons, as well as their eggs and nests against hunting, trapping and willful disturbances in Hong Kong.
- 2.2 References to relevant requirements from the, “Guidelines for Planning and Carrying out Construction Works at Egrettries” (HKBWS, 2018) have been made during the formulation of this management plan.

### 3 Background of Man Kam To Egretty

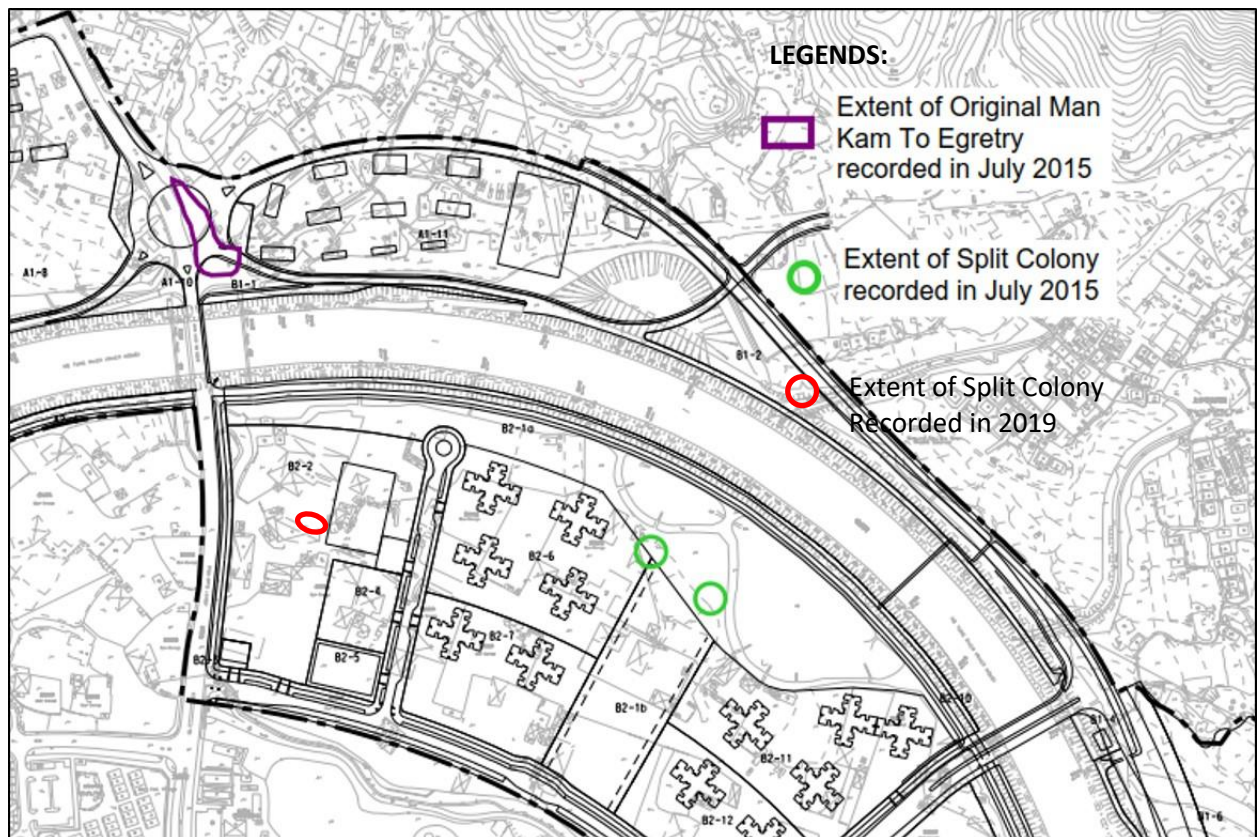
3.1 Man Kam To Egretty was first discovered in 2009 during the course of the fieldwork for the EIA study. Chinese Pond Heron (*Ardeola bacchus*) was the only species nesting at the egretty at the time. Since the years following its discovery, Chinese Pond Heron (*Ardeola bacchus*) and Little Egret (*Egretta garzetta*) have been recorded nesting at this colony. The number of nests recorded since its discovery are presented in **Table 3.1** below.

**Table 3.1 Number of Nests Recorded at Man Kam To Egretty**

Bird Species Present	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Chinese Pond Heron ( <i>Ardeola bacchus</i> )	15	22	20	21	19	27	25	33	18	24
Little Egret ( <i>Egretta garzetta</i> )	-	2	3	6	1	5	6	8	14	15
<b>Total</b>	<b>15</b>	<b>24</b>	<b>23</b>	<b>27</b>	<b>20</b>	<b>32</b>	<b>31</b>	<b>41</b>	<b>32</b>	<b>39</b>

Source: Anon (2009; 2010; 2011; 2012; 2013; 2014; 2015; 2016) and AFCD (2017; 2018)

3.2 In 2013, the egretty had split to a new location at the meanders just on the south side of Ng Tung River. Since then nests have been recorded at both the original site where the colony was first discovered, as well as the meanders across Ng Tung River (refer to **Figure 3.1**). As there would be no direct impact to the split location under the Project, the compensatory egretty is intended to mitigate for the direct impact at the original location only.



**Figure 3.1 Extent of Man Kam To Egretty Recorded in July 2015 and 2019**

- 3.3 Plant species utilized by ardeids as nesting substrate at the egretry includes bamboos, as Da Ngan Bamboo (*Bambusa eutuldoides*), Househoof Bamboo (*Bambusa lapidea*), Chinese Thorny (*Bambusa sinospinosa*), Weavers Bamboo (*Bambusa textilis*), and Verdant Bamboo (*Bambusa tuldooides*). And Ear-leaved Acacia (*Acacia auriculiformis*), Lebbek Tree (*Albizia lebbek*), Candlenut Tree (*Aleurites moluccana*), Autumn Maple (*Bischofia javanica*), Chinese Hackberry (*Celtis sinensis*), Bottlebrush (*Callistemon viminalis*), Lidded Cleistocalyx (*Cleistocalyx nervosum*), Longan (*Dimocarpus longan*), Weeping Fig Tree (*Ficus benjamina*), Opposite-leaved Fig (*Ficus hispida*), Big-leaved Fig (*Ficus virens*), Lychee (*Litchi chinensis*), White Popinac (*Leucaena leucocephala*), Cajeput Tree (*Melaleuca cajuputi subsp. cumingiana*), China Berry (*Melia azedarach*), Noble Bottle Tree (*Sterculia nobilis*), Kassod Tree (*Senna siamea*). These are general plant species used by breeding egrets in egretries.
- 3.4 During a site visit conducted in July 2015, ardeids were also recorded nesting in Ear-leaved Acacia (*Acacia auriculiformis*) and Microcos (*Microcos nervosa*). Ear-leaved Acacia (*Acacia auriculiformis*), Autumn Maple (*Bischofia javanica*), Bottlebrush (*Callistemon viminalis*), Big-leaved Fig (*Ficus virens*), Kassod Tree (*Senna siamea*) and Da Ngan Bamboo (*Bambusa eutuldoides*) were identified as nesting substrate at Man Kam To Egrettry (CEDD, 2016).

#### 4 Existing Conditions at Compensation Site

##### A1-7 FLN

- 4.1 This compensation site proposed in the EIA is located approximately 370m southwest of the existing egretty, along the north side of Ng Tung River. Vegetation present at the compensation site include planted trees such as, Ear-leaved Acacia (*Acacia auriculiformis*), Lidded Cleistocalyx (*Cleistocalyx nervosum*), Chinese Hackberry (*Celtis sinensis*) and Big-leaved Fig (*Ficus virens*). Foraging grounds in the surrounding area include Ng Tung River, Shek Sheung River, Sheung Yue River and agricultural lands in Long Valley (which would be retained in the future Long Valley Nature Park), all of which are located within 1km from the compensation site. The future landuse surrounding the compensation site has been zoned as agriculture (AGR) under the Recommended Outline Development Plan (RODP) for the NDA. Land use across Ng Tung River would remain the same as the existing condition as it falls outside of the NENT NDA project boundary.
- 4.2 The site comprises a former meander of Ng Tung River before river training works were done. There is an existing waterbody in the shape of an upside-down “U”, within the “U” lies a raised bund along the water where scattered trees are present. Inside the raised bund, it slopes down slightly where a patch of shallow pond is present, this area is covered in herbs such as Blunt Signal-grass (*Brachiaria mutica*) and *Polygonum* spp. The waterbody surrounding the centre is ideal for attracting ardeids as it creates a semi-island, which provides safety to the nests (refer to Figure 4.1). Other previous studies have proved that waterbodies surrounding breeding colonies provides safety against land predators (White et al., 2008). This provides a physical barrier to protect nests from potential human disturbances. Refer to Plates 1 to 3 below for the existing condition of the A1-7 FLN.

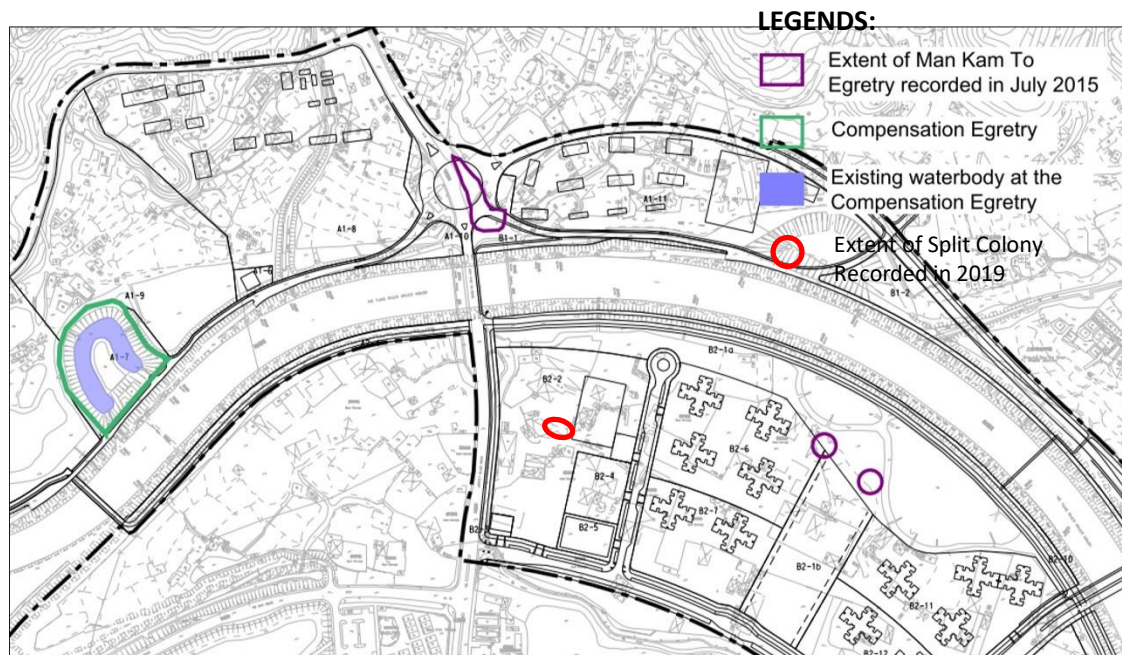


Figure 4.1 Existing Egretty and Compensation Site A1-7 FLN



**Plate 1 Existing Condition of Compensation Site A1-7 FLN**



**Plate 2 Existing Bund and Shallow Pond at Compensation Site A1-7 FLN**

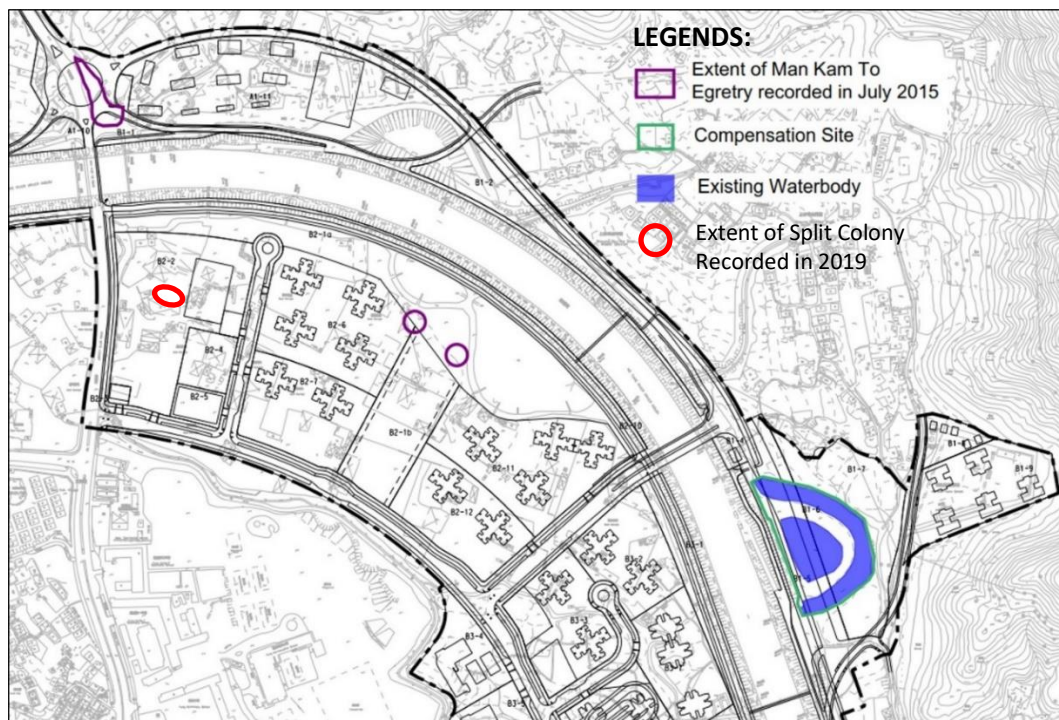


**Plate 3 Existing Waterbody at Compensation Site A1-7 FLN**



### B1-7 FLN

- 4.3 This compensation site was identified as an alternative compensation site during the approval process of the EIA (after the EIA was completed) and therefore was not discussed in the EIA report. Compared to A1-7 FLN, this meander is larger in size and is relatively more disturbed by human activities. It is located approximately 880m southeast of the existing Man Kam To Egretty. Vegetation present include grass, shrub (*Ficus hispida*, *Lantana camara*), short bamboo clump, occasional trees such as *Ficus virens*, *Macaranga tanarius* var. *tomentosa*, *Acacia mangium* and *Flueggea virosa*. Similar to A1-7 FLN, this meander has been zoned as Conservation Area (CA), surrounding areas are zoned as Green Belt (GB) and AGR.
- 4.4 The outline of the meander is made up of a narrow strip of water, on the inside of the water grassland with a few shrubs and trees are scattered throughout. The centre of the meander is a shallow waterbody with areas of emergent aquatic vegetation. Part of the embankment of the water channel collapsed as a result of typhoon Mangkhut. The majority of the waterbody is covered with vegetation with some areas of open water. Dense woodland vegetation, with trees ranging from 5m to 15m in height, exists southeast of the compensation site. Village houses also exist along the edges of the compensation site. The meander provides limited foraging opportunities due to the presence of an invasive alien floating aquatic herb (*Eichhornia crassipes*). Refer to **Figure 4.2** and **Plates 4 to 6** below for the existing condition of the B1-7 FLN.



**Figure 4.2 Existing Egretty and Compensation Site B1-7 FLN**



**Plate 4 Pond at Compensation Site B1-7 FLN**



**Plate 5 Abandoned Meander and Woodland adjacent to B1-7 FLN**



**Plate 6 Village Activities adjacent to B1-7 FLN**

## 5 Habitat Enhancement Works at Compensation Site

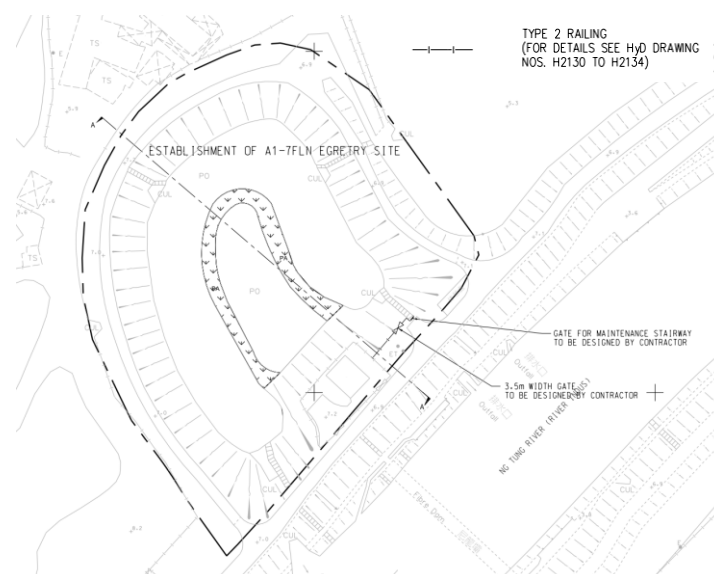
### Major Habitat Enhancement Works at A1-7 FLN

- 5.1 Enhancement works to improve the conditions at the compensation site for the purpose of ardeid breeding include, planting of trees, provision of decoys and broadcast of bird sounds to attract birds, and providing a physical barrier to discourage unauthorized public access.
- 5.2 The primary enhancement works at A1-7 FLN would be planting of trees and bamboo to provide additional nesting opportunities. Planting would be conducted on the strip of land between the existing meander and shallow pond. Large tree species such as Chinese Banyan and bamboos should be planted, as these plant species are known to be suitable nesting substrate based on other existing egretries in Hong Kong. Refer to **Table 5.1** below for the recommended tree species to be planted. It is recommended that planting works should take place as soon as possible to maximize the time for establishment of newly planted vegetation. As agreed by AFCD, they would help with early planting of suitable bamboos/ trees at the compensation site before the commencement of the construction works of relevant EP. The contractor of project proponent would carry out subsequent planting as necessary, and post-planting establishment works (including but not limited to weeding, fertilizing, grass cutting, mulching, forking over, pruning) for all the trees and bamboo planted for the enhancement works at A1-7 FLN, including those early planted by AFCD before handing over to AFCD in 2023 tentatively to ensure the enhancement could be well established. Such that AFCD shall further maintain the planting of the compensatory egretry habitat.

**Table 5.1 Proposed List of Plants at the Compensation Egretty**

Common Name	Scientific Name	Growth Form
Da Ngan Bamboo	<i>Bambusa eutuldoides</i>	Bamboo
Househoof Bamboo	<i>Bambusa lapidea</i>	Bamboo
Chinese Thorny	<i>Bambusa sinospinosa</i>	Bamboo
Weavers Bamboo	<i>Bambusa textilis</i>	Bamboo
Verdant Bamboo	<i>Bambusa tuldooides</i>	Bamboo
Autumn Maple	<i>Bischofia javanica</i>	Tree
Chinese Banyan	<i>Ficus microcarpa</i>	Tree
Big-leaved Fig	<i>Ficus virens</i>	Tree

- 5.3 Type 2 railing with gate should be provided to discourage unauthorized public access. The exact alignment shall be determined on site and agreed with AFCD (refer to **Figure 5.1**).



**Figure 5.1 Proposed Habitat Enhancement Works at A1-7 FLN**

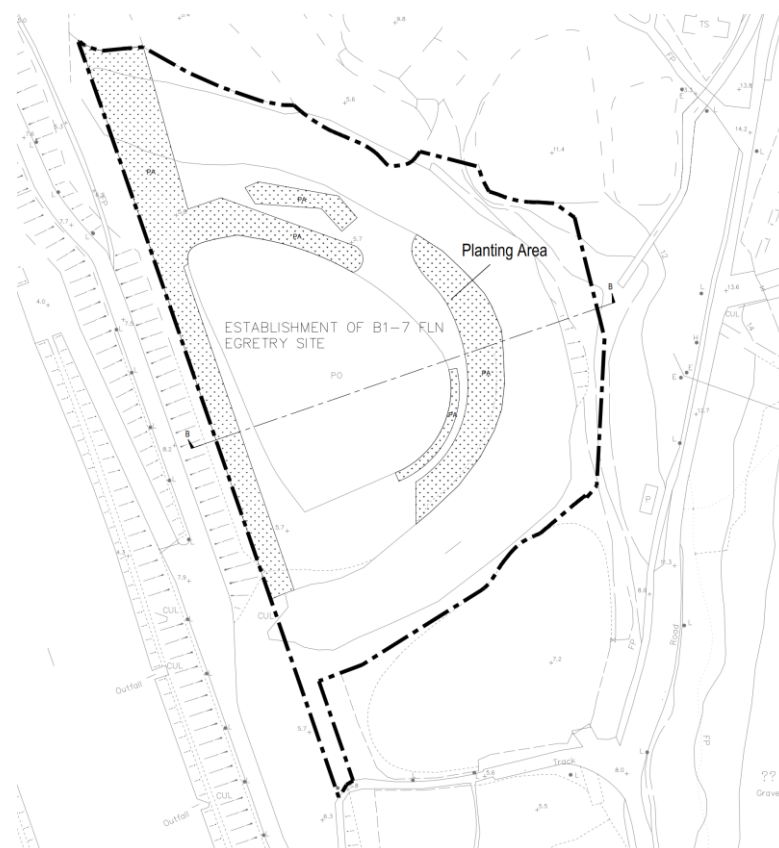
- 5.4 Once the major habitat enhancement works as mentioned above are completed, minor habitat enhancement measures, as described below, can be implemented.

*Minor Habitat Enhancement Works at A1-7 FLN*

- 5.5 Most waterbirds are social species that forage and nest in groups with other species, which means the presence of other birds is used as a cue for suitable breeding habitat (Crozier and Gawlik, 2003). Therefore, the use of bird decoys may be an effective way to attract birds to a new breeding location.
- 5.6 Findings from previous studies have revealed that decoys that are three-dimensional and white in color are the most successful in attracting birds. Plastic flamingos painted white have proven to be a successful decoy to attract birds (Crozier and Gawlik, 2003). Decoys resembling the actual target species (i.e., little egret, Chinese pond heron) should be used, placed 1m to 4m apart and be arranged to represent both paired (two decoys placed close together, facing the same direction) and unpaired (solitary) individuals (Leumas 2010). The decoys will be placed on existing mature trees at the compensation site. The provision of decoys should be done prior to the start of the breeding season. Once they are put in place securely, minimum maintenance would be required. Comment from relevant authorities on the prototype of the decoys should be sought before the production/procurement of decoys.
- 5.7 Pre-recorded vocalizations from other existing egretty should be obtained. It is recommended that records should be taken from an existing egretty where Little Egret and Chinese Pond Heron have been previously recorded (e.g. Mai Po Lung Village, Tung Shing Lane, Mai Po Village, etc.) to attract these species. It is preferred that only sounds of Little Egret and Chinese Pond Heron should be recorded to ensure that the targeted species would return. However, should there be technical difficulties in obtaining these sounds, recordings including Little Egret, Chinese Pond Heron and other ardeids species could be considered acceptable. Based on the latest programme for the development of the NDA, the recordings would need to be obtained during the breeding months.
- 5.8 Call broadcasting should commence prior to the start of the breeding season (which is variable from year to year, but typically occurs in March). This is the time when courting and nesting behaviours have been observed at the existing Man Kam To Egretty. A previous overseas study suggested broadcasting of bird songs to be taken place three times a day (Boscolo et al. 2006) during the following three periods: (1) during the two hours after sunrise (07:00 – 09:00); (2) at about two hours around noon (11:00 – 13:00); and (3) during the two hours before sunset (16:00 – 18:00). A timing device could be used to play calls at predetermined intervals. Nighttime broadcasting is not encouraged as it would disturb any ardeids that have been attracted to the site and want to roost there overnight. In order to minimize the level of human disturbance due to maintenance of the site, it is recommended that the machine used for broadcasting should be automated so that it starts and ends broadcasting each day on its own without the need of a person on-site to turn on and off the machine. It is recommended to commence the call broadcasting from February until the end of breeding season, i.e. August.
- 5.9 In addition, broken branches collected from the fallen trees under nearby construction contract could also be provided and placed in a certain location for allowing construction of nests.

### Major Habitat Enhancement Works at B1-7 FLN

- 5.10 Enhancement measures such as screen planting, restricting access, weed removal, reprofiling of meander and pond bund would be adopted to enhance its suitability for breeding of ardeids.
- 5.11 Screen/barrier planting along the periphery of the meander where the existing walkway is located would reduce human disturbance arising from pedestrian traffic as well as to restrict access. Planting of bamboo clumps at sparsely vegetated areas, especially those near the woodland area, would discourage human access to/through the meander, provide nesting substrate for birds, and form a visual screen (refer to **Figure 5.2**). The collapsed embankment would be reinstated.
- 5.12 Regular weed removal works within the meander would increase areas of open water and control their population and distribution. The pond will be maintained and its bund be partially reprofiled to form similar gentler landing area/island for ardeids (refer to **Figure 5.2**).
- 5.13 As agreed by AFCD, they would help with early planting of suitable bamboos/ trees at the compensation site before the commencement of the construction works of relevant EP. The contractor of project proponent would carry out subsequent planting as necessary, and post-planting establishment works (including but not limited to weeding, fertilizer, grass cutting, mulching, forking over, pruning) for all the trees and bamboo planted for the enhancement works at B1-7 FLN, including those early planted by AFCD before handing over to AFCD in 2023 tentatively to ensure the enhancement could be well established. Such that AFCD shall further maintain the planting of the compensatory egretty habitat. Refer to **Table 5.1** for recommended plant species to be planted.



**Figure 5.2 Proposed Habitat Enhancement Works at B1-7 FLN**

*Minor Habitat Enhancement Works at B1-7 FLN*

- 5.14 As described in **Section 4.4**, an area of woodland is located adjacent to the compensation site. Since this area of woodland is located further away from the areas where human disturbances are present, opportunities for minor enhancement measures such as deployment of decoys and broadcasting of calls mentioned in **Sections 5.5** to **5.8** above should be explored. The decoys should be placed in the tree canopies of the woodland adjacent to the site. Similar to A1-7 FLN, broadcasting of calls should also be implemented upon deployment of decoys. As the site is in close proximity to village houses, broadcasting of calls may attract public concerns. While call broadcasting could still be explored, broadcasting frequency and time might be adjusted should there be public concerns expressed. For example, the start of broadcasting time could be postponed from 07:00 to 09:00. Adaptive measures should be considered if public complaint is received.
- 5.15 In addition, broken branches collected from the fallen trees under nearby construction contract could also be provided and placed in a certain location for allowing construction of nests.

## 6 Ho Sheung Heung Egretty

### *Background of Ho Sheung Heung Egretty*

- 6.1 Ho Sheung Heung Egretty is one of the most historic egrettries in Hong Kong. Ardeids have been recorded breeding at the Ho Sheung Heung egretty in the 1990s and this egretty has been active since 1999. This colony supports a stable group of ardeids made up of Eastern Cattle Egret, Chinese Pond Heron and Little Egret. The number of nests recorded in the recent years are presented in **Table 6.1** below. Nesting substrate is mainly bamboo where most nests are observed, however during a site visit in 2017, a few nests were also found on *Sterculia nobilis* near the bamboo.

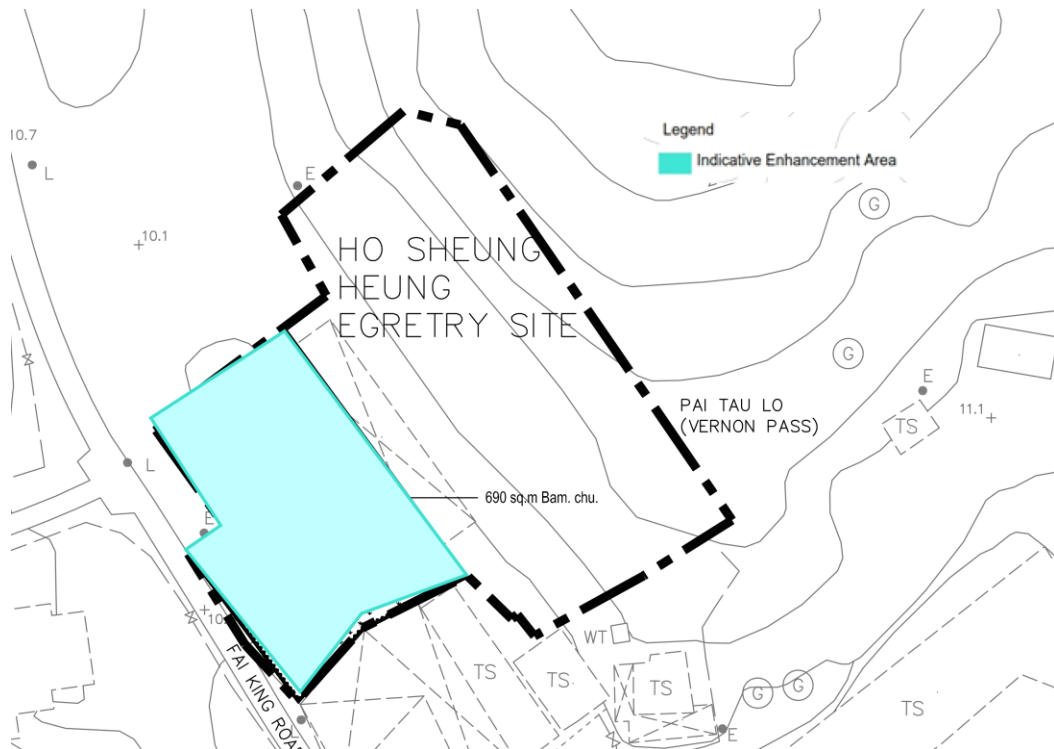
**Table 6.1 Number of Nests Recorded at Ho Sheung Heung Egretty**

<b>Bird Species Present</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Eastern Cattle Egret ( <i>Bubulcus coromandus</i> )	14	25	12	12	39	16	30	27	28	22
Chinese Pond Heron ( <i>Ardeola bacchus</i> )	23	19	2	4	12	18	16	12	12	5
Little Egret ( <i>Egretta garzetta</i> )	34	42	36	33	29	36	28	18	18	10
<b>Total</b>	<b>71</b>	<b>86</b>	<b>50</b>	<b>49</b>	<b>80</b>	<b>70</b>	<b>74</b>	<b>57</b>	<b>58</b>	<b>37</b>

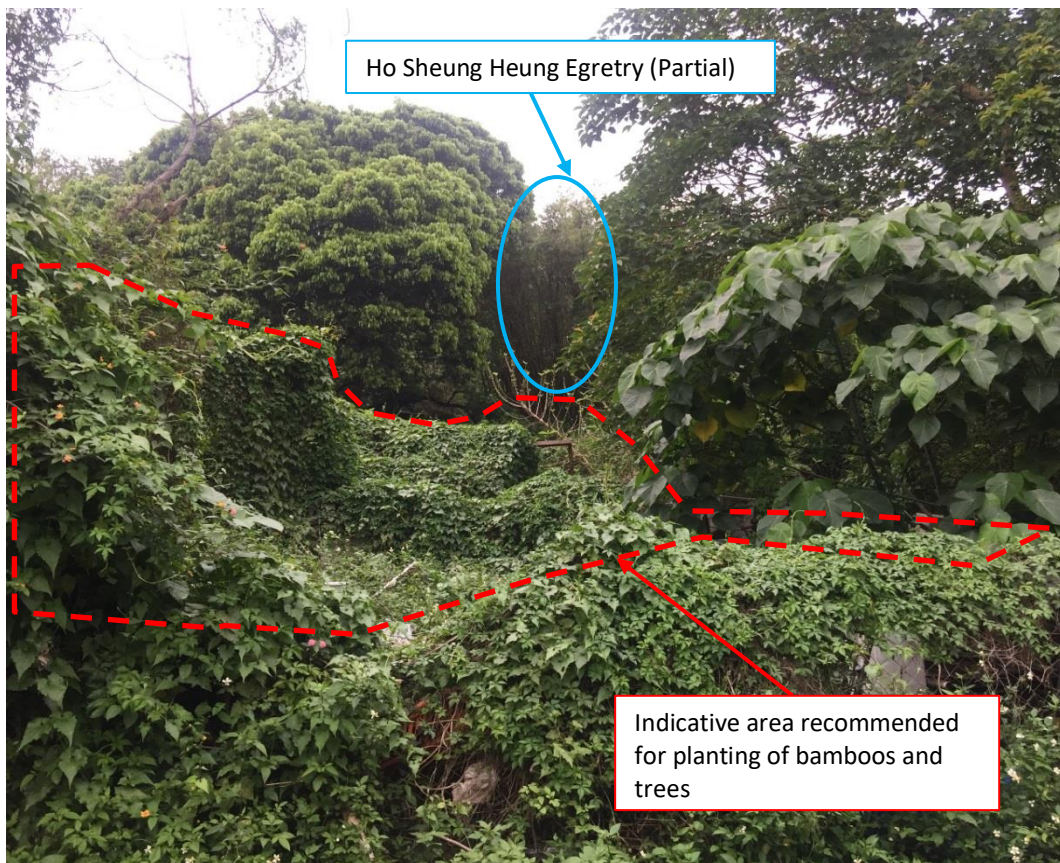
Source: Anon (2009; 2010; 2011; 2012; 2013; 2014; 2015; 2016) and AFCD (2017; 2018)

### *Practicable Enhancement Works at Ho Sheung Heung Egretty*

- 6.2 Proposal to enhance Ho Sheung Heung Egretty was raised during the ACE meeting when a member suggested planting appropriate tree species in its surroundings. The planting of bamboo should take place in areas where trees are absent. As the existing condition of the colony is mostly densely vegetated, a small treeless area between the egretty and Fai King Road has been identified for opportunities to plant bamboos (**Figure 6.1**), subject to land status. Land resumption will be carried out to enable the implementation of enhancement works at the concerned site. It is recommended that bamboos (e.g., Da Ngan Bamboo (*Bambusa eutuldoides*); Househoof Bamboo (*Bambusa lapidea*); Chinese Thorny Bamboo (*Bambusa sinospinosa*); Weavers Bamboo (*Bambusa textilis*); and Verdant Bamboo (*Bambusa tuldooides*)) are used to provide short-term nesting opportunities (as bamboo is relatively fast-growing). Tree species found at the current Ho Sheung Heung Egretty (e.g., Lidded Cleistocalyx (*Cleistocalyx nervosum*); Longan (*Dimocarpus longan*); Lychee (*Litchi chinensis*); and Noble Bottle Tree (*Sterculia nobilis*)) should also be planted. Planting should be undertaken prior to the breeding season to minimize potential disturbance to breeding activities. Planting of bamboos / trees at the late dry season (i.e. February) is recommended, and water / minor vegetation maintenance (without using machinery) shall be then carried out after planting. Although no machinery will be used during watering / minor vegetation maintenance, workers may have to get close to the breeding colony while conducting works. These may induce disturbance to the breeding ardeids during the breeding season due to the close proximity to the breeding colony. As such, the contract managers or supervisors should maintain good site management practices so that the egretty will not be disturbed during the breeding season. Refer to **Plate 7** below. Practicable steps to enhance Ho Sheung Heung Egretty are summarized in **Table 6.2**.



**Figure 6.1 Proposed Habitat Enhancement Works at Ho Sheung Heung Egret**



**Plate 7 Areas for Bamboo Planting near Ho Sheung Heung Egret**



**Table 6.2 Summary of Practicable Steps to Enhance Ho Sheung Heung Egretty**

Land Resumption Works	Land resumption to enable implementation of bamboos plantation at the small treeless area between Ho Sheung Heung Egretty and Fai King Road
Weed Removal	Removal of invasive weed / plants
Bamboo and Tree Plantation	Planting of bamboos / trees species suggested at the late dry season (i.e. February) to minimize potential disturbance to breeding activities
Vegetation Maintenance	Watering / minor vegetation maintenance (without using machinery) carried out by contract managers or supervisors after planting with good site management practices to prevent disturbance to the egretty during the breeding season

## **7 Habitat for Dingy Dusk Hawker**

- 7.1 As this dragonfly species is known to utilize marshy areas, pools and ponds, the existing condition of the meander at A1-F FLN is considered to be suitable habitat for this species to forage and breed. Retaining and enhancing this meander would provide additional suitable habitat for its uses.

## **8 Egret Monitoring**

- 8.1 Egret monitoring would be undertaken at the enhancement site at Ho Sheung Heung egret and compensation sites A1-7 FLN and B1-7 FLN for three ardeid breeding seasons (i.e. March – August) upon the completion of enhancement works to determine its effectiveness. A review should be carried out at the end of the monitoring period to review the effectiveness of the enhancement site at Ho Sheung Heung egret and compensatory egrets and propose recommendations, if any. Since AFCD has commissioned annual monitoring surveys at egrets throughout Hong Kong in recent years, the proposed monitoring duration should be sufficient to provide information on whether the Ho Sheung Heung egret and compensation site supports breeding colonies. Further monitoring is considered unnecessary as AFCD commission annual monitoring of egrets in Hong Kong, therefore should breeding activities be present at the site, the sites would be included as part of wider monitoring programme. On the other hand, in the case where no evidence of breeding is detected, the need for further monitoring/additional enhancement measures can be assessed as part of the review. Although a comprehensive review on the effectiveness of the compensatory/enhanced egrets is proposed to be carried out three ardeid breeding seasons (i.e. March – August) after the completion of enhancement works, adaptive enhancement measures should be carried out over this monitoring period to enhance the effectiveness of the egrets when necessary.
- 8.2 The monitoring survey area should include the enhancement site at Ho Sheung Heung, compensation sites and meanders of the split colony. As the location of the split colony has been a nesting site for the birds, it is possible they will still prefer to nest there in the future. Attention should also be paid to signs of breeding in the surrounding natural areas, this includes the nearby ponds and wet agricultural land surrounding the compensation site and across Ng Tung River of the compensation site. Since the boundary of egret may change before the start of the monitoring, it is recommended that the monitoring survey area should include the compensation sites and any split colonies recorded before the start of the monitoring.
- 8.3 Monitoring surveys would be undertaken during the months of March to August. This covers the core months of the breeding season (April to July), as well as the month of March where courting and nesting behaviours begin and the months after where fledglings from late breeders are still present. Monitoring should take place once a month during this time. The number of active nests, species present and tree/bamboo locations and species where nests are present would be recorded.
- 8.4 In addition to monitoring egret usage, the habitats and planted bamboos/ trees at the compensatory sites should also be monitored. Direct observation of the habitats and planted bamboos/ trees is recommended during the monitoring surveys. Follow-up actions and mitigation measures would be recommended, where necessary.

### *Staffing*

- 8.5 It is recommended that the egret monitoring surveys would be conducted by ecologists with over five years of practical experience related to avifauna. The ecologists should be degree holders of related field such as, ecology/biodiversity or biology. Practical experiences related to avifauna should include avifauna surveys, ideally related to breeding waterbirds.

## **9 Management of Compensation Egretry**

- 9.1 The project proponent shall identify a management party for three ardeid breeding seasons (i.e. March – August) after the completion of enhancement works for regular monitoring and maintenance to ensure that the proposed enhancement measures have been put to practice. Also, the management party shall monitor habitat conditions, carry out a review to assess the effectiveness of the compensatory egretries and propose recommendations if necessary. The management party would be mainly responsible for:
- Monthly checking of installed decoys, to ensure they have remained in place and to reinstall decoys if they have fallen down (reinstallation of decoy when active nests are present is not recommended) from March to August;
  - Twice weekly check of the broadcasting equipment to be in operation from March to August;
  - Provision of branches as nesting materials from March to August.
  - Monthly checking of the conditions of the newly planted trees throughout the year; and
  - Vegetation maintenance such as clearance of weeds if necessary throughout the year.
- 9.2 The management party should report to the relevant authority of any suspicious findings at the site as well as any required maintenance.
- 9.3 At the time of writing, works at the compensatory egretries is expected to be completed before 2021 breeding season. The three breeding seasons covered by works described in this section would therefore run until the end of the 2023 breeding season.

## **10 Reporting**

- 10.1 During the monitoring months (March to August) of the monitoring period, the survey/monitoring should be recorded in a Monthly Monitoring Report. The monitoring report would be deposited within 10 working days of the end of each reporting month to CEDD, AFCD and EPD. An Annual Monitoring Report and a Final Monitoring Report, reviewing the conditions of the compensatory egrettries would be deposited to CEDD, AFCD and EPD at the end of each of the first two years and at the end of the three-year monitoring period respectively. A review should be carried out at the end of the three-year monitoring period to review the effectiveness of the compensatory egrettries and propose recommendations, if any.
- 10.2 The Monthly Monitoring Reports, Annual Monitoring Report and Final Monitoring Report described in Section 11.1 above shall be prepared in compliance with the requirements of the Environmental Permits (EPs), EIA approval conditions and Environmental Monitoring and Audit (EM&A) Manual.

## **11 Follow Up Action**

- 11.1 Evaluations based on the data collected during the monitoring would determine whether the habitat enhancement works have been effective. Based on the monitoring findings, any problems resulting in the need for adjustment in management can be identified.
- 11.2 The key processes involved in adaptive management are as follow:
- a) Monitoring of relevant habitat components – the response of ardeids will be monitored to evaluate the success of the remedial strategies. The success of the remedial strategies would be evaluated based on the presence of nesting ardeids.
  - b) Review of components – monitoring data collected will be reviewed to help determine the successfulness of the proposed management techniques.
  - c) Review of management techniques – management strategies such as timing and volume of broadcast of bird calls and/or positioning and number of decoys will be examined to determine the changes needed in order to meet attract ardeids.
  - d) Implementation of revise management techniques – refined management strategies will be implemented.
- 11.3 Discussion on the need of updating management strategies/techniques and follow up actions, if necessary, will be conducted monthly and the findings will be included in the following Monthly Monitoring Reports.

## 12 Summary

12.1 This Egretry Habitat Creation and Management Plan aims to:

- Establish the alternative egret sites (A1-7 FLN and B1-7 FLN) as stated in the EIA
- Develop a monitoring programme to assess and confirm the effectiveness of the relevant mitigation measures.

12.2 All proposed enhancement measures are summarized in **Table 12.1** below and the Implementation Schedule under Section 13 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.

**Table 12.1 Summary of Practical Steps to Enhance Ho Sheung Heung Egretry**

	<b>Enhancement Measures</b>
Establishment of Compensation Egretry Site at A1-7 FLN	<p><u>Major Habitat Enhancement Works</u></p> <ul style="list-style-type: none"> <li>• Planting of trees and bamboo to provide additional nesting opportunities</li> <li>• Provision of physical barrier by providing Type 2 railing with gate to discourage unauthorized public access</li> </ul> <p><u>Minor Habitat Enhancement Works</u></p> <ul style="list-style-type: none"> <li>• Decoys resembling the target species will be provided on existing mature trees</li> <li>• Broadcast of bird call/ songs from February until the end of breeding season during daytime at predetermined intervals, using automated machines</li> <li>• Provision of broken branches collected from fallen trees under nearby construction contract at a certain location to allow construction of nest</li> </ul>
Establishment of Compensation Egretry Site at B1-7 FLN	<p><u>Major Habitat Enhancement Works</u></p> <ul style="list-style-type: none"> <li>• Screen/ barrier planting along the periphery of the meander to reduce human disturbance and restrict human access</li> <li>• Regular weed removal works within the meander to increase areas of open water</li> <li>• Reprofile of meander and pond bund to create gentle landing area/ island for ardeids</li> </ul> <p><u>Minor Habitat Enhancement Works</u></p> <ul style="list-style-type: none"> <li>• Decoys resembling the target species will be provided in tree canopies of the woodland adjacent to the site</li> <li>• Broadcast of bird call/ songs during daytime at predetermined intervals using automated machines to be explored as the site is in close proximity to village house</li> <li>• Provision of broken branches collected from fallen trees under nearby construction contract at a certain location to allow construction of nest</li> </ul>
Enhancement Works at Ho Sheung Heung Egretry	<p><u>Land Resumption Works</u></p> <ul style="list-style-type: none"> <li>• Land resumption to enable implementation of bamboos plantation at the small treeless area between Ho Sheung Heung Egretry and Fai King Road</li> </ul> <p><u>Weed Removal</u></p> <ul style="list-style-type: none"> <li>• Removal of invasive weed / plants</li> </ul> <p><u>Bamboo and Tree Plantation</u></p> <ul style="list-style-type: none"> <li>• Planting of bamboos / trees species suggested at the late dry season (i.e. February) to minimize potential disturbance to breeding activities</li> </ul>

	<b>Enhancement Measures</b>
	<p><u>Vegetation Maintenance</u></p> <ul style="list-style-type: none"> <li>Watering / minor vegetation maintenance (without using machinery) carried out by contract managers or supervisors after planting with good site management practices to prevent disturbance to the egretry during the breeding season</li> </ul>
Habitat for Dingy Dusk Hawker	Retaining and enhancing the meander at A1-7 FLN, which existing condition is considered to be suitable habitat for this species to forage and breed
Egretry Monitoring	<ul style="list-style-type: none"> <li>Egretry monitoring to be conducted at enhancement site at Ho Sheung Heung Egretry and compensation sites A1-7 FLN and B1-7 FLN upon completion of enhancement works to determine its effectiveness</li> <li>Review to be carried out at the end of the third year to review effectiveness of enhancement sites, compensatory egretries and propose recommendations</li> </ul>

## 13 Reference

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## 14 Implementation Schedule

14.1 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
<b>Habitat Enhancement Works at Compensation Site A1-7 FLN</b> a. Planting of trees and bamboo. b. Provision of physical barrier by providing Type 2 railing with gate.	a. To provide additional nesting opportunities for ardeids. b. To discourage unauthorized public access.	Contractor	Compensation Egret Site at A1-7 FLN	As soon as possible to maximize the time for establishment of newly planted vegetation	Refers to para(s). 5 of the EHCMP
<b>Habitat Enhancement Works at Compensation Site B1-7 FLN</b> a. Screen/ barrier planting along the periphery of the meander. b. Regular weed removal works within the meander. c. Reprofile of meander and pond bund.	a. To reduce human disturbance and restrict human access. b. To increase areas of open water. c. To create gentle landing area/ island for ardeids.	Contractor	Compensation Egret Site at B1-7 FLN	As soon as possible to maximize the time for establishment of newly planted vegetation	Refers to para(s). 5 of the EHCMP
<b>Minor Habitat Enhancement Works at Compensation Site</b> a. Installation of bird decoys and commencement of call broadcasting b. Provision of broken branches collected from fallen trees	a. To attract target ardeids species to breed at compensation sites b. To facilitate nest building by ardeids	Contractor	Compensation Egret Sites at A1-7 FLN and B1-7 FLN	Prior to the start of breeding season of ardeids	Refers to para(s). 5 of the EHCMP

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
<p><b>Enhancement Works at Ho Sheung Heung Egretty</b></p> <p>a. Removal of invasive weed / plants</p> <p>b. Planting of bamboos/ trees between the existing Egretty and Fai King Road at the late dry season prior to breeding season (i.e. February)</p> <p>c. Watering/ minor vegetation maintenance with good site management practices</p>	<p>a. Provide nesting opportunities for ardeids while minimizing potential disturbance to breeding activities</p> <p>b. Prevent disturbance to the egretty during the breeding season</p>	<p>Contractor</p>	<p>Ho Sheung Heung Egretty</p>	<p>Planting should be undertaken prior to the ardeid breeding season; Watering/ minor vegetation maintenance to be carried out after planting</p>	<p>Refers to para(s). 6 of the EHCMP</p>
<p><b>Egretty Monitoring</b></p> <p>a. Egretty monitoring to be conducted at enhancement site at Ho Sheung Heung Egretty and compensation sites A1-7 FLN and B1-7 FLN.</p> <p>b. Adaptive enhancement measures to be carried out when necessary</p> <p>c. Comprehensive review to be carried out at the end of monitoring period.</p>	<p>a. To determine effectiveness of enhancement works</p> <p>b. To enhance the effectiveness of the egretties</p> <p>c. To review effectiveness of enhancement works and propose recommendations</p>	<p>ET</p>	<p>Ho Sheung Heung Egretty, A1-7 FLN and B1-7 FLN</p>	<p>Three ardeid breeding seasons (March – August) upon completion of enhancement works</p>	<p>Refers to para(s). 8 of the EHCMP</p>