11 Ecology

11.1 Introduction

The EIA has evaluated the ecological consequences of the Project and recommended ecological mitigation measures to avoid, minimize and compensate the impact arising from the Project.

11.2 Mitigation Measures

The proposed mitigation measures for ecological impacts are summarised in the Project Implementation Schedule (PIS) in **Appendix 2-2**. In order to mitigate the direct and indirect loss of fishponds and reed marsh, more than 33 ha of wetland mitigation habitat shall be created on-site in the EA and off-site at Hoo Hok Wai and San Tin. Location of the wetland compensation areas is illustrated in **Figure 11.1**.

11.3 Audit Requirement

Site inspections are crucial to monitoring the potential for or occurrence of unforeseen impacts during the construction process. Site audits shall be undertaken during the construction phase of the Project to check that the proposed ecological mitigation measures are properly implemented and maintained as per their intended objectives. Site inspections shall be undertaken by the ET at least once per week during the routine environmental audit as detailed in **Section 13**.

11.4 Monitoring Requirements

11.4.1 LMC Loop

11.4.1.1 Avifauna

Given the importance of the flight line corridor and the significance of potential impacts upon it, its usage should be monitored to identify any impacts from construction activities. The main concern is the number and species composition of birds using the flight line, and to this end construction phase monitoring should comprise a census of the numbers of each species using the flight line, carried out from LMC Lookout. These surveys should last for two hours from 30 minutes before sunrise and be carried out once monthly. Should significant impacts on the flight line be recorded, measures to minimise or reduce these will be devised, where possible. It is considered that such monitoring is required from the beginning of work in LMC Loop until 12 months after establishment of the Ecological Area or completion of work on the Western Connection Road, whichever is the later. Given the uncertainty of project implementation, this requirement should be reviewed at the end of Phase 1 buildings works, if appropriate.

11.4.1.2 Mammals

Monitoring of mammals, including Eurasian Otter, is notoriously difficult due to their secretive, often nocturnal habits in HK. However, Eurasian Otter is potentially the most significant sensitive receiver in terms of conservation significance. The most successful monitoring method for otters in HK has been the use of remote-sensing cameras. For otters, the use of infra-red flash cameras is recommended, as traditional incandescent flash cameras are potentially disturbing to wildlife. To monitor connectivity between the existing reed marsh and the EA, it is recommended that cameras are set up at suitable locations along the north side of the fence (to avoid cameras being tampered with) during the site formation and establishment period of the EA. This would allow monitoring of otters, other mammals and dogs. Once establishment is complete, the cameras would be available for other monitoring activities associated with the EA or off-site compensation areas, as defined in the HCMP.

During the operational phase monitoring of the use of the underpasses below the Eastern Connection Road in both Ma Tso Lung and HHW areas should be carried out via the use of remote-sensing cameras at each site. In addition, monitoring of the use of the overpass above the road should be carried out via the same method. The need for monitoring to continue in the long-term should be reviewed by the authority managing these wildlife passages at suitable intervals and in consultation with AFCD.

Construction phase monitoring of bats is not considered necessary, as the species recorded are common in HK and none are considered to be significantly impacted by the Project.

11.4.1.3 Water Quality

Weekly *in situ* monitoring of water quality in LMC Meander should be carried out. Measurements to be taken are temperature, pH, salinity, turbidity and dissolved oxygen. The monitoring should refer to the water quality monitoring requirement as established in Section 6. Wet and dry season action or limit levels should be reviewed after the first monitoring events in each of these seasons.

11.4.2 Western Connection Road

11.4.2.1 Avifauna

As with the LMC Loop construction phase, given the importance of the flight line corridor and the significance of potential impacts, its usage should be monitored to identify any impacts from construction activities. It is considered that such monitoring is required from the beginning of work in LMC Loop until 12 months after final establishment of the Ecological Area or completion of work on the Western Connection Road, whichever is the later.

With regard to Pond 12, given its use by large waterbirds, numbers of birds using the pond during construction requires monitoring to ensure that no impacts greater than predicted are occurring. Weekly counts of the number and species of birds using the pond should be carried out both before construction work commences

each day and 1 hour after it begins. This would enable an assessment to be made of the impact of construction activities on bird use of the pond.

11.4.2.2 Herpetofauna

The requirement for herpetofauna refers to the only species of conservation significance recorded in this area, Chinese Bull Frog, which was recorded at LMC Tsuen and nearby Pond 12. Monitoring needs to be carried out to ensure numbers of this species are not significantly impacted by construction activities. Both LMC Tsuen and Pond 12, as well as any other wetlands within a radius of 100m into which disturbed bull frogs may move, should be monitored once monthly during the wet season (March to October) prior to commencement of construction and during the whole construction period. The methodology should provide for both day and night-time surveys in each month, and rely on identification of vocalisations and active searching for tadpoles, froglets or adults. Should impacts be identified, remedial measures should be devised in consultation with AFCD and, if necessary, consideration given to translocation.

11.4.2.3 Aquatic Fauna

Monitoring of water quality should be conducted weekly at the stream and associated ponds south of Lung Hau Road where Rose Bitterling is present (**Figure 6.1**), and whole site audit should be carried out at the construction site to identify potential impacts on the stream. This is necessary as Rose Bitterling is highly susceptible to degradation of water quality.

Weekly *in situ* monitoring of water quality in LMC Meander should be carried out. Measurements to be taken are temperature, pH, salinity, turbidity and dissolved oxygen. The monitoring should refer to the water quality monitoring requirement as established in the EM&A Manual. Wet and dry season action or limit levels should be reviewed after the first monitoring events in each of these seasons. This monitoring should be carried out during the construction phase and the first 12 months of operation.

With regard to Rose Bitterling, surveys of the population are required to identify potential impacts. In order to provide baseline data, monthly survey for one year prior to construction should be carried out. Subsequently, monthly monitoring should be carried out during the construction period. The methodology should involve standardised netting at suitable locations in order to provide quantitative data, supplemented by active searching.

11.4.3 Eastern Connection Road

A revised ecological baseline is required ahead of construction monitoring, given that this element of the Project will be constructed some years hence. Standard baseline data surveys appropriate at the time should be conducted, beginning a minimum of 12 months before commencement of construction; findings will inform the detailed design process in respect of mitigation requirements. All relevant faunal groups will require monitoring, including birds, mammals, herpetofauna, dragonflies, butterflies, aquatic fauna, flora and any others considered relevant at the time. The details of the construction phase monitoring

programme may need to be revised after the revised baseline data have been collected.

11.4.3.1 Avifauna

As with other elements of the Project, given the importance of the flight line corridor and the significance of potential impacts, its usage should be monitored to identify any impacts from construction activities. This is particularly the case in respect of the Eastern Connection Road given that reduced disturbance zones compared to LMC Loop will be implemented. Monitoring should commence 12 months prior to the beginning of work until the end of 12 months after, in order that potential operational phase impacts can be monitored.

Disturbance impacts on birds should be monitored via weekly survey of the number and species of birds at wetland habitats within 500m of the alignment.

11.4.3.2 Mammals

Use of the wildlife underpasses and the single overpass should be monitored via the use of remote-sensing cameras to identify their suitability. Such monitoring should commence as soon as practicable after construction of each is completed and continue for 12 months after completion of the ECR. Where issues arise (i.e. they are not apparently in use), these should, if possible, be addressed.

11.4.3.3 Herpetofauna

Monitoring of herpetofauna species and numbers is required to commence in the first full wet season prior to construction beginning in order to determine the baseline. Consideration should be given to the need for and feasibility of translocation of adults or juveniles, which should occur in the early wet season, from directly impacted ponds to nearby suitable wetland habitats.

During construction, daytime and night-time surveys (transect counts) will be conducted in appropriate habitats within 500m of the alignment monthly. Monitoring will in general cover March to October, with night-time survey from March to September. For the upper section of Ma Tso Lung Stream, night-time surveys will cover March to October.

11.4.3.4 Dragonflies and Butterflies

Given the prior establishment of a wetland mitigation area to compensate for impacts on odonata, it is not considered necessary to carry out monitoring in the vicinity of the alignment. The mitigation area will, however, require monitoring to ensure targets are being met. In view of the lack of significant ecological value to butterflies of the areas affected by the Eastern Connection Road, no construction phase monitoring is considered necessary.

11.4.3.5 Aquatic Fauna

Weekly *in situ* monitoring of water quality in LMC Meander, Ma Tso Lung Stream and Ping Hang Stream should be carried out. Measurements to be taken

are temperature, pH, salinity, turbidity and dissolved oxygen. The monitoring should refer to the water quality monitoring requirement as established in the EM&A Manual. Wet and dry season action or limit levels should be reviewed after the first monitoring events in each of these seasons.

Monitoring of aquatic fauna in watercourses potentially impacted by the development (in particular, Ping Hang Stream, Ma Tso Lung Stream and LMC Meander) should be carried out. The survey period for Ping Hang and Ma Tso Lung Streams should begin 12 months before commencement of construction works for the ECR (to establish a baseline profile) and continue until 12 months after completion. The survey period for LMC Meander should commence 12 months before work on the Project commences, and continue until 12 months after completion. The frequency of monitoring should be monthly. The location of said watercourses is shown in **Figure 6.1**. The exact monitoring points should be determined in consultation with AFCD ahead of construction commencing.

11.5 Summary of Ecological Monitoring

LMC Loop

- Monitoring of flight line numbers from the beginning of work until 12 months after final establishment of the Ecological Area or completion of work on the Western Connection Road, whichever is the later;
- Monitoring of mitigation areas to ensure targets are reached;
- Monitoring of connectivity in respect of mammals between the existing reedbed and the Ecological Area during the establishment phase of the latter.
- Water quality monitoring as established in Chapter 6 of this EM&A Manual; and
- Site inspection requirements.

Western Connection Road

- Monitoring of flight line corridor, as noted above;
- Monitoring of avifauna utilising pond 12;
- Monitoring of Chinese Bull Frog in Pond 12 and other wetlands within a 100m radius during the wet season (March to October) prior to commencement of construction and during the whole construction period;
- Monitoring of the stream and associated ponds containing Rose Bitterling
- Monitoring of mitigation areas to ensure targets are reached;
- Water quality monitoring as established in Chapter 6 of this EM&A Manual; and
- Site inspection requirements.

Eastern Connection Road

- At least 12 months of baseline monitoring for birds, mammals, herpetofauna, dragonflies, butterflies, aquatic fauna, flora and any others considered relevant at the time to inform the detailed design process in respect of mitigation requirements;
- Monitoring of avifauna (both flight lines and adjacent wetlands) from beginning of work until 12 months after construction;
- Monitoring in the operation phase of mammal use of underpasses and the overpass;
- Day time and night time transects counts of herpetofauna during the pre-construction and construction phases;
- Monitoring of mitigation areas to ensure targets are reached;
- Water quality monitoring as established in Chapter 6 of this EM&A Manual; and
- Site inspection requirements.

Wetland mitigation shall be established prior to fish pond or reed marsh removal during the construction phase. Monitoring of the wetland compensation areas shall be conducted in implementation and establishment stages. The monitoring shall be conducted by the Environmental Team (ET) and supervised by the Project Ecologist. After establishment stage, AFCD will be responsible for the maintenance and the monitoring works, which is not covered in this manual.