

Detailed Proposal on Relocation Plan for Rose Bitterling

Agreement No. CE 13/2014 (CE)

Development of Kwu Tung North and Fanling North New Development Areas

Phase 1 – Design and Construction

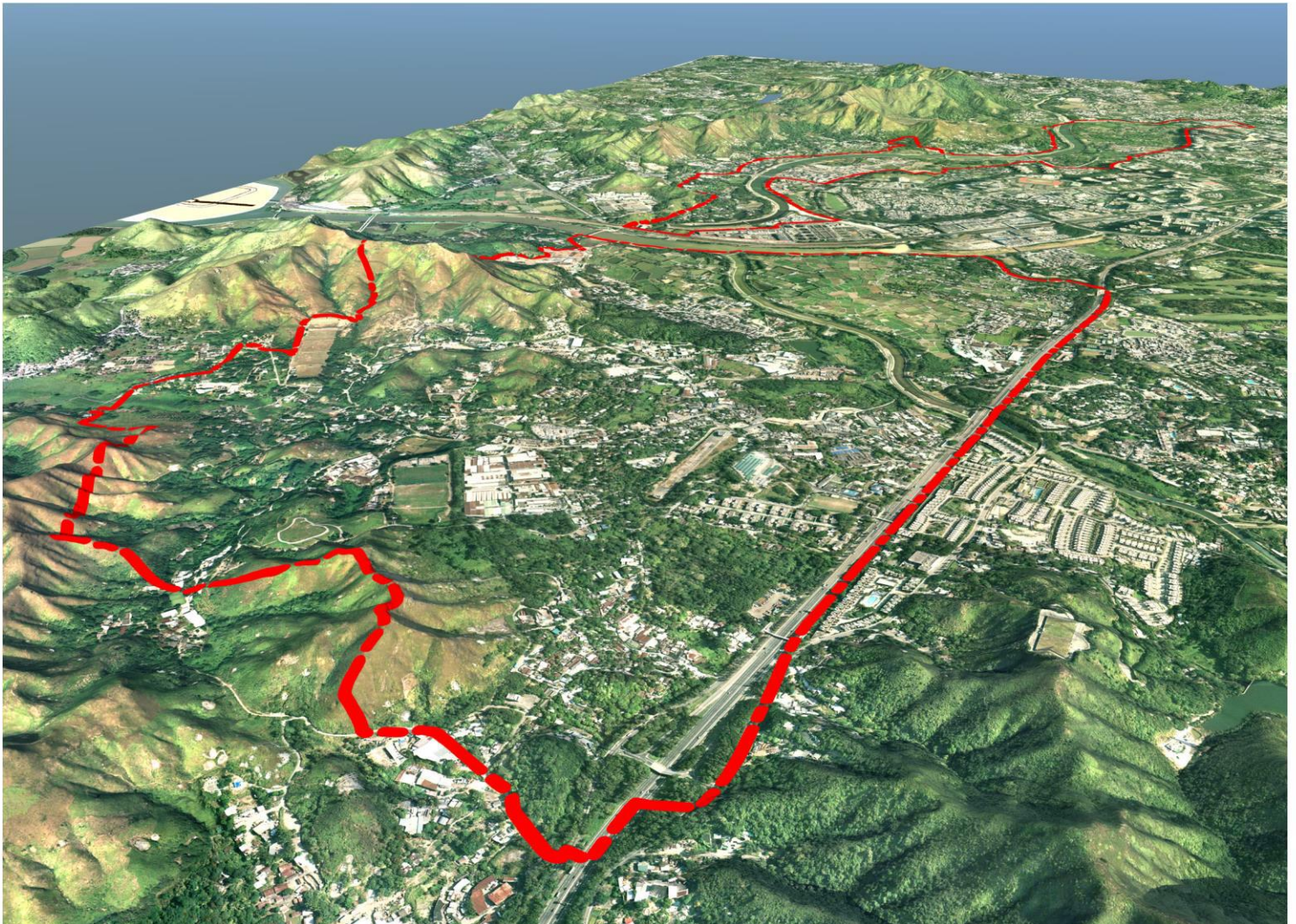


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1 Background

- 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. During the public inspection period of EIA Report, written submissions from non-profit organizations (NGOs) including Kadoorie Farm and Botanic Garden and the Conservancy Association were received with concerns on the presence of fish species of local conservation concern, Rose Bitterling (*Rhodeus ocellatus*), at the meanders north of Ng Tung River which were subject to direct loss. The presence of this species in the Ng Tung River meanders was not recorded until after the EIA Report had been completed.
- 1.3 Taking into consideration the findings and concerns received from various stakeholders, the Advisory Council on the Environment (ACE) endorsed the EIA report with conditions which required two meanders at Ng Tung River (i.e. Fu Tei Au and Sheung Shui Wah Shan) to be retained as habitats for the Rose Bitterling. In addition to retaining these meanders, a detailed proposal on the relocation of Rose Bitterling and subsequent monitoring to demonstrate that the mitigation measures proposed are effective prior to the commencement of construction works would also be required.
- 1.4 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 (a), the Project Proponent is required to submit a Detailed Proposal on Relocation Plan for Rose Bitterling and subsequent monitoring to demonstrate that the mitigation measures proposed are effective before the commencement of the construction of the Fanling Bypass Eastern Section. This requirement is also stipulated in Specific Condition 2.6 of the Environmental Permit (EP) for Fanling Bypass Eastern Section (EP No. EP-473/2013/A).
- 1.5 During the spawning season of Rose Bitterling, female fish will lay egg inside mantle cavity of the Unionid Mussel (*Anodonta woodiana*) through a long and pink oviduct. The eggs hatch in the mussels and larval fish leave the shell via the exhalant siphon. Therefore, both Rose Bitterling and Unionid Mussels have to be translocated together in order to maintain the ecological interactions between these two species and provide medium for Rose Bitterling to lay eggs.
- 1.6 This paper outlines the translocation approach and subsequent monitoring programme of Rose Bitterling and Unionid Mussels prior to the commencement of the construction works.

2 Pre-translocation Site-check at Collection Sites and Receptor Sites

- 2.1 Individuals of Rose Bitterling and unionid mussels would be collected from meanders that would be directly impacted by the NDA development and translocated to receptor sites nearby. All collection sites and receptor sites are meanders which have turned into a pond-like habitat after river training works of Ng Tung River.
- 2.2 There are a total of three collection sites (C1-C3) along Ng Tung River, with their locations marked in **Figure 2.1**. At site C2, Rose Bitterling have been recorded in the past. At sites C1 and C3, no records have been obtained. All three collection sites would be checked prior to the translocation works to confirm the presence/absence of Rose Bitterling and unionid mussels. This will provide information as to how many meanders that are to be directly impacted would require translocation works. Translocation would be proceeded if Rose Bitterling are present at the collection sites. Otherwise, translocation would not be necessary.
- 2.3 Four sites R1-R4 (refer to **Figure 2.1**) along the meanders of Ng Tung River (Fu Tei Au and Sheung Shui Wah Shan) will be retained as stated in the EP and act as potential receptor sites. These meanders have been pre-selected as receptor sites due to the known presence of Rose Bitterling and unionid mussels. The potential receptor sites, R1 and R4, have been zoned as “Conservation Area” under the latest Fanling North Outline Zoning Plan (No. S/FLN/2) in order to protect and retain the existing natural landscape and ecology. These two receptor sites have been stipulated in the Specific Condition 2.6 of the EP as retained meanders for Rose Bitterlings. R2 and R3 are zoned as “Open Space”, they are additional proposed receptor sites which may serve as the fall back option in case R1 and R4 fail to serve as receptor sites. Similarly, the presence of Rose Bitterling and unionid mussels at these four receptor sites would be checked prior to the translocation works. Meanders with presence of Rose Bitterling would be considered as a feasible receptor site. During the checking of the presence of unionid mussels, intrusive monitoring methods like dragging or sweep the bottom of the receptor sites shall be avoided to minimize the disturbance to the receptor sites and the freshwater community therein. In addition to checking the presence of Rose Bitterling and unionid mussels, a general survey of freshwater fish at the receptor sites shall also be carried out to obtain the baseline information of the sites. Additional reasonable effort is suggested if no Rose Bitterling and/or unionid mussel is observed during the Pre-translocation Site-check at Collection Sites and Receptor Sites.
- 2.4 Prior to the preparatory works suggested in **Section 4** of the proposal, a preliminary survey would be conducted on the general physical/ environmental conditions of the receptor sites to ascertain whether any site preparation works, e.g. clearance of invasive vegetation, reprofiling, etc., is/are needed. The identified site preparation works would be undertaken as necessary. Additionally, water quality survey should be undertaken as per specifications in Sections 8.6 to 8.11 at both collection and receptor sites prior to the translocation works.

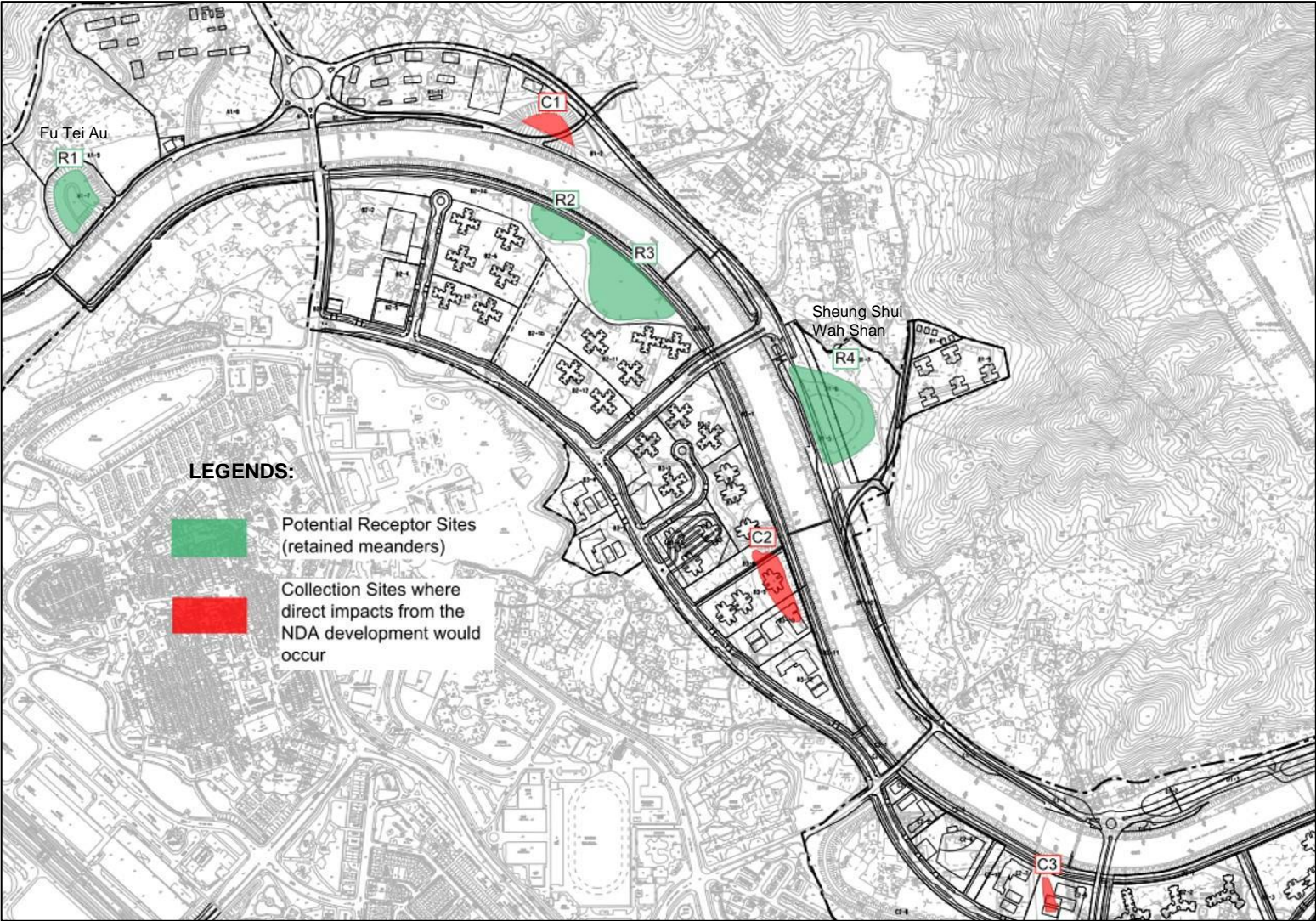


Figure 2.1 Location of Ng Tung River Meander (Fu Tei Au and Sheung Shui Wah Shan) to be Retained

3 Staffing

- 3.1 The translocation works and monitoring surveys should be conducted by experienced ecologists with practical experience related to freshwater fish/communities. The ecologists should be degree holders of related field such as, ecology/biodiversity or biology.

4 Preparation of Receptor Sites

- 4.1 Prior to collecting the fish from the collection sites, preparation works are required at the identified receptor sites for the ease of monitoring. With reference to the translocation trial adopted by AFCD in the Hong Kong Wetland Park, a small-scale set-up would be installed at the receptor sites comprising a square wooden frame sealed with mesh netting on four sides with an opened top and a solid wood bottom (AFCD, 2014). Mud from the receptor site should be deposited inside the wooden frame in order to support the unionid mussels. The purpose of this apparatus is to spatially separate the translocated fish and mussels so that during the monitoring surveys, we can ensure that the recorded Rose Bitterlings are in fact those that were translocated from the collection sites. Upon the completion of post-translocation monitoring surveys, these apparatuses shall be removed.
- 4.2 The fish and mussels would be confined within the wooden frame to allow close and systematic monitoring work to be carried out. Also, as the adult fish tend to inhabit in the deeper waters of the meander, this arrangement eliminates the potential difficulty in locating fish while conducting monitoring surveys.
- 4.3 The size of each of these wooden frames should be catered to suit the number of Rose Bitterling and mussels within the frame to avoid overcrowding. It should also be suitably sized to avoid taking up too much space in the meander and blend in with the habitat. Sufficient free space should be maintained for the habitat use of existing Rose Bitterling.
- 4.4 A water level marker should be installed at each receptor site to aid the monitoring of water levels after the translocation works.
- 4.5 During the construction phase, warning notices and regular inspection or other means, which shall not attract public awareness or contradict the land use intention, should be provided around the receptor sites to prevent wastes from being dumped into the ponds and the surround vegetation for safeguarding potential contamination to the water quality of the receptor sites. Such measures shall be implemented upon agreement with AFCD.

5 Fish Collection

- 5.1 Juvenile fish would be collected in November to December after the spawning season, or at a time within dry season as agreed by AFCD. This is when juvenile fish tend to occur in groups in shallower water along the margin of ponds where vegetation can provide shelter, which makes fish collection easier. Hand nets with small mesh size i.e. < 3mm should be used to catch juvenile fish.
- 5.2 Pot trap with bread bait can also be used to capture adult fish which tend to inhabit deeper waters, however the success rate for capturing adult fish is generally low. More effort and best attempt may be required to collect the adult fish to conserve this uncommon fish species.
- 5.3 Attention should be paid to the fish species that are collected to ensure that no other fish species, especially any exotic/introduced species (i.e. Mozambique Tilapia *Oreochromis mossambicus*) other than Rose Bitterling would be translocated.

6 Mussel Collection

- 6.1 Unionid mussels present at the collection sites should be collected by searching the surface of mud for their presence. Areas of shallow water (up to one feet deep) should be searched by applying a side to side sweeping motion with hands to feel for presence of mussels. As the mussels normally burrow less than 10cm underneath the mud, digging at shallow depths of the mud to check for presence of mussels should also be carried out when necessary.
- 6.2 Should mussels be found, collection can be done by hand picking them out of the mud and transferring them into a container together with source water from collection site.

7 Transportation and Release

- 7.1 Once the fish and mussels are collected, they would be placed in clean containers. Powered air pumps should be used in the containers to keep the water aerated. The water used should be collected from the collection site in order to minimize physiological shock.
- 7.2 The transport containers could be insulated by polystyrene boxes to minimize temperature fluctuation. Sponges should be used to minimise the disturbance due to vibration. Transportation time should be kept to a minimum, in fact, given the small distance between the collection sites and receptor sites, catch and release should be completed within the same day. No fish feeding would be necessary during the transportation as transportation time should be short.
- 7.3 To avoid overcrowding, it is recommended that the number of individuals per container should be no more than 30. EVA (ethylene vinyl acetate) material fish transport containers (refer to **Figure 7.1**) of size no less than 30x20x20cm would be used for transport purposes.



Figure 7.1 Example of EVA Material Fish Transportation Box

- 7.4 Injured individuals beyond recovery during transportation and dead fish should not be released and should be disposed of properly as waste.
- 7.5 Collected Rose Bitterling and unionid mussels should be released into the wooden frame inside the mesh net to keep the translocated and existing individuals separated. The translocated fish and mussels shall be kept in the wooden frame for one week for post-translocation monitoring. After that, the translocated individuals shall be released and the wooden frame shall be removed.

8 Post-translocation Monitoring

- 8.1 The survival rate of the translocated juveniles would be the crucial factor for determining the successful translocation. Intensive post-translocation monitoring would be undertaken for one week upon completion of translocation works to determine its success. The post-translocation monitoring works will be carried out by environmental team commissioned for the Project. Details of the Post-translocation monitoring shall refer to below Paras 8.3 to 8.17.
- 8.2 Further monitoring of Rose Bitterling and unionid mussels is recommended to be carried out after the post-translocation monitoring for continuous monitoring of site environment and the status of Rose Bitterling and unionid mussels within the receptor sites.

Rose Bitterling and Unionid Mussels

- 8.3 Upon translocation of Rose Bitterling and unionid mussels to the receptor sites, Rose Bitterling should be monitored immediately for 2 continuous hours. Particular attention should be paid to behavior of Rose Bitterling, including gasping for air or other signs of stress.
- 8.4 Daily monitoring of Rose Bitterling and unionid mussels at the receptor sites would be conducted within the first week of translocation. The abundance of live Rose Bitterling and unionid mussels inside the mesh net (as discussed in **Section 4.1**) should be recorded. Survival rate and stress related performance of Rose Bitterling within the setting should be closely monitored. Additionally, any dead individual should be recorded. During the checking of the presence of unionid mussels, intrusive monitoring methods like dragging or sweep the bottom of the receptor sites shall be avoided to minimize the disturbance to the receptor sites and the freshwater community therein.
- 8.5 Outside of the mesh net, the presence of Rose Bitterling should be recorded as a control to check for the overall condition of the meander.
- 8.6 Hand nets would be used for collecting organisms during the surveys. All collected organism would be released to the point of collection immediately after identification.

Vegetation

- 8.7 The aquatic vegetation within the receptor sites would be monitored. The vegetation species present and the overall percentage cover of vegetation in the meander would be recorded. The purpose of this is to identify any potential unhealthy growth of aquatic plants, especially those that are invasive (i.e. water hyacinth) and/or overgrowth of aquatic vegetation that would reduce the area of open water that should be retained as habitats for Rose Bitterling. Vegetation monitoring would also be conducted on a daily basis. In case of identification of any potential unhealthy growth of aquatic plants, those invasive species or overgrowth vegetation shall be removed.

Water Quality Parameters

- 8.8 Water quality monitoring parameters including the temperature, pH, salinity, level of dissolved oxygen (DO) and turbidity should be monitored at the receptor sites. All measurements would be done in-situ, each parameter would be measured twice at 3 sampling points at each site.

- 8.9 The instrument for in-situ measurements of temperature, pH, salinity and DO is a portable and weather-proof Multifunctional Meter complete with a cable and uses a DC power source. This instrument is capable of measuring:
- Temperature of -5 to +65°C;
 - pH ranging from 0 to 14;
 - salinity ranging from 0-80ppt; and
 - DO ranging from 0 to 20mg/L and 0 to 200% saturation.
- 8.10 In order to obtain accurate measurements of DO, two consecutive measurements for parameters of DO concentration and DO saturation are required to be taken at each monitoring location. When the difference in value between the first and the second reading is more than 25%, the reading must be discarded and retaken.
- 8.11 A turbidimeter, WTW Turb 430T or equivalent equipment, should be used to measure the turbidity of the water. The instrument would be calibrated within 3 months prior to the monitoring.
- 8.12 Other Parameters to be monitored, include:
- Suspended solids;
 - Total oxidized nitrogen;
 - Ammoniacal nitrogen;
 - Total phosphorus;
 - Total reactive phosphorus (orthophosphate);
 - Oil and grease;
 - Biochemical oxygen demand; and
 - Escherichia coli.
- 8.13 Samples would be taken at the receptor sites. Two replicates would be taken at each sampling location. Water samples would be analysed in a HOKLAS accredited laboratory, following the methods of the APHA Standard Methods for the Examination of Water and Wastewater, 22nd Edition, or equivalent.
- 8.14 Water quality monitoring work should be carried out at least every other day, including the first day of translocation and the last day of monitoring.
- Other Parameters*
- 8.15 As mentioned in **Section 4.4**, water level markers would be installed at receptor sites. During the post-translocation monitoring, the water level should be recorded daily.
- 8.16 General site check at the receptor site should be done every day during the post-translocation monitoring. A fence should be installed in the area and security should be provided in daytime to ensure the wooden frame are not affected. Attention should be paid to any signs of illegal dumping activities. Any irregularities, such as fishing, fish rearing at the meanders, accumulation of rubbish, etc., should be checked each day.
- 8.17 The maintenance of the wooden frame and mesh net would be crucial to the success of translocation works. Checking of the wooden frame and mesh net shall be carried out every day during the post-translocation monitoring to ensure no damage was found to them. In case of any damage or potential damage, they shall be fixed immediately.

9 Reporting

- 9.1 During the monitoring period, survey findings should be recorded in the Monitoring Report. The draft monitoring report should be submitted to CEDD, AFCD and EPD for comments and approval within 10 working days at the end of the post-translocation monitoring period to review the conditions at the receptor sites and Rose Bitterling recorded. A Final Monitoring Report shall also be submitted to record the findings, monitoring parameters, mitigation measures, and overview of the monitoring programme for the monitoring period to CEDD, AFCD and EPD for comments and approval within 1 month upon receiving the comments of the Draft Monitoring Report.
- 9.2 The Draft Monitoring Report and Final Monitoring Report described in Section 9.1 above shall be prepared in compliance with the requirements of the Environmental Permits (EPs) and EIA approval conditions summarizing the findings, ecological parameters, status of implementation of mitigation/management actions, and review of the monitoring programme.
- 9.3 In case there is any substantial variations between the parameter obtained during pre-translocation site checks and post-translocation monitoring, a review together with the remedial measures shall be proposed to CEDD, AFCD and EPD for comments and approval.

10 Follow Up Action

- 10.1 Evaluations based on the data collected during the monitoring would determine whether the translocation works have been effective. Based on the monitoring findings, any problems resulting in the need for adjustment in management can be identified.
- 10.2 The key processes involved in adaptive management are as follows:
- a) the response of Rose Bitterling at the receptor sites will be monitored to evaluate the success of the translocation strategies. The success would be evaluated based on the presence of live Rose Bitterling at receptor sites.
 - b) monitoring data collected from the receptor sites will be reviewed to help determine why the translocation objectives are not achieved. For example, general habitat conditions can be assessed, and water quality monitoring data compared with pre-translocation surveys.
 - c) management strategies such as vegetation control will be examined to determine the changes needed in order to meet the objective.
 - d) refined management strategies will be implemented to address any shortcomings revealed in the review process and to achieve better ecological management.
- 10.3 In the situation where no live Rose Bitterlings are recorded during the monitoring survey, CEDD and AFCD should be contacted immediately. In order to confirm that no Rose Bitterling is present, a second survey should be undertaken to eliminate any potential survey errors in the preceding survey.

11 Summary

- 11.1 This proposal aims to outline the translocation approach and subsequent monitoring programme of Rose Bitterling and Unionid Mussels prior to the commencement of the construction works.
- 11.2 All the recommended mitigation measures were summarized in 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 separately before implementation.

12 Reference

Agriculture, Fisheries and Conservation Department (2014). Hong Kong Wetland Park Newsletter Issue No. 24. Available at:
[http://www.wetlandpark.gov.hk/images/wcms/Newsletter_24_\(2014_12\).pdf](http://www.wetlandpark.gov.hk/images/wcms/Newsletter_24_(2014_12).pdf)

13 Implementation Schedule

13.1 This implementation schedule is to summarize the recommended mitigation measures in this Proposal.

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 Proposal
Pre-translocation Site-check at Collection and Receptor Sites a. All collection sites would be checked prior to the translocation works to confirm the presence/absence of Rose Bitterling and unionid mussels. b. All receptor sites would be checked prior to the translocation work to confirm the presence/absence of Rose Bitterling and unionid mussels. c. Carry out general freshwater fish survey at receptor sites d. Preliminary survey on general physical/ environmental conditions of the receptor sites e. Water quality survey at both collection and receptor sites	a. To find out how many meanders that are to be directly impacted would require translocation works b. To check the condition of the receptor sites before translocation c. Obtain baseline information of the sites d. To ascertain the need of site preparation works e. To compare the water quality	Contractor	Collection sites C1-C3, Receptor sites R1 and R4	Before the translocation works	Refers to para. 2 of the proposal
Preparation works at the identified receptor sites a. Install a square wooden frame at the receptor sites. b. Install a water level marker at each receptor site. c. Provide warning notices at the receptor sites during construction phase.	a. To spatially separate the translocated fish and mussels from those of the collection sites. b. To monitor the water levels after the translocation works. c. To prevent wastes from being dumped into the ponds and the surrounding vegetation of the receptor sites.	Contractor	Receptor sites R1 and R4	Before the translocation works	Refers to para. 4 of the proposal
Fish collection a. To collect juvenile fish in November to December after the spawning season b. To use hand nets with small mesh size i.e. < 3mm to collect juvenile fish c. To use pot trap with bread to capture adult fish	a. To make fish collection easier because the juvenile fish tend to occur in groups in shallower water along the margin of ponds b. To ensure the mesh size is small enough to catch juvenile fish c. To ensure adult fish could be caught in order to conserve this uncommon fish species d. To ensure only Rose Bitterling would be translocated.	Contractor	Collection sites C1-C3	November to December, or at a time within dry season as agreed by AFCD	Refers to para. 5 of the proposal
Mussel Collection a. Searching for mussels by applying a side to side sweeping motion with hands and digging at shallow depths of the mud (less than 10 cm) if necessary. b. Collection of mussels by hand picking and transfer them into a container with source water from collection site.	a. To check for presence of mussels. b. To collect unionid mussel	Contractor	Collection sites C1-C3	November to December, or at a time within dry season as agreed by AFCD	Refers to para. 6 of the proposal

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 Proposal
<p>Transportation and Release of Fish and Mussel</p> <p>a. EVA (ethylene vinyl acetate) material fish transport containers should be used</p> <p>b. Powered air pumps should be used in transport containers with water from the collection site.</p> <p>c. The transport containers should be insulated by polystyrene boxes with sponges.</p> <p>d. Catch and release of fish and mussel should be completed within the same day.</p> <p>e. Injured individuals beyond recovery and dead fish found during transportation should be disposed properly as waste.</p> <p>f. Fish and mussels should be released into the wooden frame inside the mesh net</p>	<p>a. To avoid overcrowding of fish and mussel</p> <p>b. To keep water aerated and minimize physiological shock to fish and mussel.</p> <p>c. To minimize temperature fluctuation and vibration.</p> <p>d. To minimize transportation time</p> <p>e. To avoid contamination to the translocated fish and mussels</p> <p>f. To keep translocated and existing individuals at receptor site separated</p>	<p>Contractor</p>	<p>Collection sites C1-C3 and Receptor sites R1 and R4</p>	<p>On the same day as fish and mussel collection</p>	<p>Refers to para. 7 of the proposal</p>
<p>Post-Translocation</p> <p>a. To keep the translocated fish and mussels in the wooden frame for one week</p> <p>b. Provide fence, day-time security and daily inspection at the receptor sites during post-translocation monitoring.</p>	<p>a. To allow post-translocation monitoring</p> <p>b. To prevent human disturbance, wastes from being dumped into the ponds and the surrounding vegetation of the receptor sites during post-translocation monitoring</p>	<p>Environmental Team</p>	<p>Receptor sites R1 and R4</p>	<p>Upon completion of translocation and last for 7 days</p>	<p>Refers to para. 8 of the proposal</p>