

Our Ref: TCS00874/16/300/L0086

Welcome Construction Co., Ltd.

Flat 01, 19/F, Westley Square,
48 Hoi Yuen Road,
Kwun Tong, Kowloon.

Attn: Mr. Lucas Wong

11 January 2018

By e-mail

Dear Sir,

**Re: CEDD Contract No. CV/2012/05 - Bathing Beach at Lung Mei, Tai Po
Seahorse Translocation Plan (Version 1)**

We herewith certify the captioned submission in accordance with Section 7.2.3.3 of the Updated EM&A Manual.

Should you have any queries, please feel free to contact the undersigned at Tel: 2959-6059 or Fax: 2959-6079 or E-mail: twtam@fordbusiness.com.

Yours sincerely,

For and on Behalf of

Action-United Environmental Services & Consulting

T. W. Tam
Environmental Team Leader
TW/nh

CEDD

ERM

Mr. K F Chan

Mr. Jovy Tam

via email

via email

Environmental Permit No. EP-388/2010

Development of a Bathing Beach at Lung Mei, Tai Po

Independent Environmental Checker Verification


Reference Document/Plan

| | |
|--|------------------------------|
| Document/Plan to be Certified/ Verified: | Seahorses Translocation Plan |
| Date of Report: | 11 January 2018 |
| Date received by IEC: | 11 January 2018 |

Reference EP Condition / Updated EM&A Manual Requirement

| | |
|---|-----------------|
| Environmental Permit Condition / Updated EM&A Manual Reference | Section 7.2.3.3 |
| The Seahorses Translocation Plan includes the method, sequence, programme and associated information shall be submitted prior to commencement of the translocation. | |

IEC Verification

| | |
|--|---|
| I hereby verify that the above referenced document/plan complies with the above referenced condition of EP-388/2010. | |
| Mr Jovy Tam | Date: 12 January 2018 |
| Independent Environmental Checker |  |

Our ref: P:\Projects\0206709 IEC for Lung Mei EM&A\07_ET Submission\15_MS for Seahorse Translocation\20180111

Seahorses Translocation Plan

1. Pre-Translocation Survey

Prior to the translocation, pre-translocation monitoring will be undertaken at the impact area at Lung Mei and its 50m buffer zone as well as the Ting Kok East reception site (Figure 1 & 2) at least one month before the commencement of marine construction works. Should any changes in circumstances be identified during the monitoring (e.g. identification of seahorse species other than *Hippocampus kuda* (*H. kuda*) that would require to be translocated, absence of the concerned seahorse species at the reception site), the ET shall revise the translocation procedures for approval by the IEC before implementation of the translocation exercise. Species other than *H. kuda* will also be translocated if being identified during the pre-translocation survey. If concerned seahorse species is absent at the reception site, efforts on the pre-translocation survey at the reception site will be doubled. Divers will dive in a zigzag-like survey route to search for the target seahorse species.

(a) Intertidal Survey

Intertidal survey for seahorses will be undertaken by active search at the impact area at Lung Mei and its 50m buffer zone as well as the reception site at Ting Kok East. Active searches of seahorses will be conducted at each site during both day and night time covering the high tide only (>1.5 m CD), and thus a total of two active search surveys will be undertaken at each site.

The active search will cover the intertidal and subtidal zones of approximately 50 m × 200 m (Figures 1 and 2). Direct observations and active search of seahorses will be conducted in all major habitat/substrate types and in potential hiding places such as among litter/debris, inside holes/crevices and under cobbles/boulders. Hand-netting will be used to collect seahorses for data collection such as Torso length and sign of injury. Head light and hand torch will be used during the night time surveys. The effort of searching at each site will be standardized to facilitate comparison of occurrence of seahorse using the number per standard unit effort approach (i.e. number of man-hours). A total of six man hours will be spent on each day survey and night survey. Each day/night survey will be conducted in two days (i.e., 3-man hours day survey and 3-man hours night survey per day). The actual man-hours spent during each survey will be recorded.

(b) Subtidal Dive Survey

Standard Underwater Visual Census (UVC) surveys will be conducted at the impact area at Lung Mei and its 50 m buffer zone as well as the reception site at Ting Kok East. Four subtidal dive surveys will be conducted at each site, two in day time and two in night time. During the survey, marker buoys will be deployed to indicate the four corners of the targeted survey area (Refer to Figures 1 and 2 for the survey area). GPS readings of the four corners will be recorded. UVC will be performed on belt transects of 5 m width covering the whole survey area. UVC surveys will be performed at least 10 minutes after deployment of the buoys and transects. For night time surveys, only underwater qualitative surveys within the survey area will be performed. Four man-hours will be

spent for each day survey and night survey, and the actual man-hour spent will be timed and recorded. At each site (Lung Mei and Ting Kok East), the two day/night surveys will be conducted in two separate days (i.e., 4-man hours day survey and 4-man hours night survey per day). The survey effort at Ting Kok East will be doubled (i.e. extra 2 day surveys and 2 night surveys) if no seahorse is found during the first pre-translocation survey at Ting Kok East, in order to increase the probability to find seahorses at the reception site and obtain baseline data about the original seahorse population.

Once a seahorse is found during the intertidal survey or subtidal dive survey, focusing survey for additional seahorses will be conducted by searching in increasing concentric circles of 10 m interval within an area of 50 m from the spotted individual.

(c) Data Collection

When a seahorse is found during the survey, the following data will be recorded:

- Species;
- Sex;
- Reproductive status;
- Torso length (Figure 5) to nearest 0.5 cm (Refer to Section 2(b) precautionary measures for measurement);
- Sighting location, depth and holdfast;
- Proximity to the nearest seahorse; and
- Sign of stress or injury.

Four to six SCUBA divers will be parallel to each other and dive in a zic-zac route (Figure 3 and 4) along the survey areas to locate any seahorses encountered during each dive survey. All seahorses will be released to their natural habitat after data collection. Specimens will be handled with care to reduce disturbance to seahorses as low as reasonably practicable. At least two photos, comprising both side profile of the seahorse and close-up of the side profile of the head, will be taken. Video footage will also be taken for each individual countered. Sample of the monitoring sheet for data recording is shown in Appendix B.

Timing:

Two-days survey of at least 28 man hours at each site (i.e. 28 man hours for Lung Mei and 28 man hours at Ting Kok East)

Intertidal Survey

Survey time: At least 12 man hours, 6 man hours during day and night time respectively for each survey at each site

Subtidal Survey

Survey time: At least 16 man hours, 8 man hours during day and night time respectively for each survey at each site

The translocation area will be updated base on the pre-translocation monitoring results.

2. Seahorses Translocation

(a) Capture of Target Seahorse Species

Given that silt curtain will be in place at Lung Mei Project Site before conducting any searches for seahorses in the area, subtidal and intertidal surveys within the impact area in Lung Mei in the depth range of 0.5m to -6m CD by SCUBA diving (see attached Figure 1 the area within the Site Boundary) will be conducted by the translocation team until saturation is reached (when additional seahorse sightings per unit search effort reaches zero). At least three dive surveys will be conducted.

The total search effort will not be less than 28 man hours (16 man hours day survey/12 man hours night survey). The day/night survey will be conducted in two days (i.e., 8-man hours day survey and 6-man hours night survey per day). If pregnant seahorse is found OR if no seahorse is found and captured during the first 28 man-hours, the search effort will be doubled (i.e. total 56-man hours) in order to search the breeding partner and any additional seahorses in the area.

Both day and night dives survey will be conducted when the subtidal zone is submerged underwater. For day time search, it will commence in early morning to increase the chance of finding breeding pairs in the close proximity which will be translocated together. Hand torch will be used for searching during the night time translocation.

During the active search, marker buoys will be deployed to indicate the vertices of the target search area. GPS readings of the marker buoys will be recorded.

When a seahorse is encountered, the translocation team member will unhook the tip of its tail until it releases its grasp. Details of the seahorse will then be recorded. A pro forma of the translocation record is shown in Appendix A.

Once a seahorse is found, active search will be conducted within an area of 50m from the spotted individual by searching in increasing concentric circles of 10m interval in order to look for additional seahorses.

Photos and video footage will be taken for each individual encountered. At least two photos, comprising both side profile of the seahorse and close-up of the side profile of the head, will be taken. The side profile of seahorse will include a ruler for scale reference with facial spines and the coronet being clearly showed on the photo. The close-up of the side profile of the head will clearly show the facial spines, especially check spines, and coronet. The encountered individual(s) will be tagged following Section 2(f).

The seahorse will be captured by hand and placed into a Kordan Breathable Bag, unless otherwise approved by the IEC. Inside the bag, appropriate substrates/ holdfasts (e.g. PVC rod, plastic plant or substrate that the seahorse is found attached to) will be provided to the seahorses. The Kordon Breathable Bag with the captured seashore will be taken to

the surface at a slow ascending rate. The bag will be tied off at the water surface. Each Kordon Breathable Bag will only keep one captured seahorse.

After leaving water, the Kordon Breathable Bags with the captured seahorses will be placed in robust containers with continuous aeration. Individuals of different seahorse species will not be placed in the same bag or container unless species are known to be compatible with each other. The Kordon Breathable Bags will not be in contact with each other in the container.

(b) Handling, Transportation of Captured Seahorse

Each captured seahorse will be translocated to the reception site at Ting Kok East immediately during the same day of capture. The container with the Kordon Breathable Bags will be transported to Ting Kok East on-land, or by marine vessel. Care will be taken during the whole handling process in order to ensure no harm and/or sedation to the captured individuals during transport, with the following precautionary measures to be implemented:

- If more than one seahorse were captured, at least two seahorses (in two separate Kordon Breathable Bags) will be placed together in a container, only if species are known to be compatible with one another
- Empty inflated bags will be put in the container to ensure the Kordon Breathable Bags do not move within the container during transportation.
- The containers will be secured properly to the vehicle/vessel to avoid any movement during transportation.
- The containers will be properly covered to avoid overheating of sea water, particularly during daytime. Heat/ cool packs will be used to maintain the temperature of seawater during transit.
- Depending on the length of time it takes to capture and relocate the captured seahorses, containers will be checked at 30-minute intervals or less and such checking will be recorded properly in the pro forma of translocation record shown in Appendix A.

The following precautionary measures will be implemented when handling the seahorse during the translocation process:

- When capturing the seahorse from the holdfast, the tail of the seahorse will be unhook and the seahorse will be removed from the holdfast after it releases its grasp;
- When measuring the length of the seahorse, the seahorse will be held in one hand with its tail curled around a temporary holdfast such as little finger of the translocation team member. The trunk of the seahorse will be held between the thumb and forefinger. The length of the seahorse will then be measured with a caliper held in the other hand, while the seahorse lies passively.

Translocation might be expedited by dividing the translocation team into two sub-teams: one for capturing seahorses at Lung Mei, one for transport and release of the seahorses at Ting Kok East

(c) Release of Captured Seahorse

The target release area will be marked by marker buoys with the GPS location recorded. At the reception site, the captured seahorses will be released into the habitat type and depth at which they are found.

The information for the release process will be in the pro forma of translocation record as shown in Appendix A. The following precautionary measures will be implemented when releasing the captured seahorse at the reception site:

- Only two seahorses will be released at a time, with breeding pair released together. An hour interval will be allowed for between consecutive release events.
- Except for individuals of the putative breeding pair, the captured individuals will be released at different locations of at least 50 m separation distance.
- Breeding pairs, if any, will be released together in the same area.

The released seahorses will be monitored underwater from a distance of 1-2 m until they settle onto holdfasts.

(d) Seahorse in Potentially Sensitive Stage

Pregnant, breeding or injured seahorses found at the search area are considered as in potentially sensitive stage. The following precautionary measures will be implemented for seahorses at sensitive stage:

- Pregnant seahorses will be handled with care to ensure that they settle to a holdfast on release at the reception site.
- The potential breeding pairs will be kept together when captured, transported and released at the reception site.
- If breeding pair is exhibiting breeding/ courting behaviour, they will be left undisturbed and the breeding pair will only be collected for translocation after completion of their breeding/ courting behaviour.
- Seahorses that are injured will be translocated if they are found at the search area.

Seahorses that become sick or injured (with noticeable infection or hurt) will receive veterinary treatment as soon as possible. A record of any such occurrences will be kept. The sick or injured seahorses will be transported to Simon F. S. Li Marine Science Laboratory, The Chinese University of Hong Kong or Aquatic Laboratory, The Hong Kong Baptist University. The sick or injured seahorse will be monitored daily (may apply medication if needed) until it is fully recovered. Recovered seahorses will be transported back to Ting Kok East immediately.

(e) Translocation Record

Proper records will be maintained by the translocation team during the translocation exercise (see Appendix A).

The qualified Fish Expert will be responsible for checking the record against the translocation measures to audit the proper implementation of the translocation exercise. The records will then be certified as complying with the translocation plan by the IEC. Should non-compliance of the translocation procedure be observed, the qualified Fish Expert will notify the IEC within 24 hours and be responsible for proposing corrective actions which will be agreed by the IEC and implemented by the translocation team during the next translocation day. The qualified Fish Expert and the IEC will check the proper implementation of the corrective actions by the translocation team.

(f) Seahorse Tagging

The captured seahorses from Lung Mei before released into the reception site of Ting Kok East will be tagged. The tags will allow differentiation of the translocated seahorse from Lung Mei and the seahorse(s) originally found at Ting Kok East.

(i) Collar Tags (Preferred)*

A non-invasive external tagging technique involving collar tags (oval PVC disc (3X5mm) with a 3-digit number on one side, Figure 6) will be attached around the neck of a seahorse with cord (Figure 7), to provide individual identification. (seahorse has to be over 4cm in length for tagging). Reference will be made to the Project Seahorse Technical Report No. 6 – Selected Techniques for Tagging Seahorse as shown in Appendix C.

This tagging method has been applied to various seahorse species worldwide, including the U.K., South Africa, Brazil and the Philippines. It was found to be a non-invasive and a successful tagging method by Project Seahorse, (Morgan & Martin-Smith, 2004; Morgan & Bull, 2005), as proven by a study by Seahorse Trust in which a tagged individual was deliberately kept in an obstacle-ridden captive environment for 4 years.

In 2013, this collar tagging method was adopted by Ocean Park Conservation Foundation at its Seahorse Survey Project to tag local seahorse species *H. kuda* and successfully used in the field.

Timing:

Lung Mei

Survey time: At least 28 man-hours including day and night diving (survey time will be doubled - 56 hours, if pregnant seahorses were found during the translocation survey)

Frequency: One

*Reasons for using Collar Tag over VIFE methods:

1. Collar Tag is non-invasive but VIFE is an invasive method
2. Risk of infection and increased mortality when using VIFE
3. Collar Tag can last for years (4 years) but VIFE can only last for 6 months to 1 year
4. Collar Tag has been using in Hong Kong for tagging local *H. kuda* by OPCF
5. No previous experiences in using VIFE in Hong Kong as well as *H. kuda*, pilot study of using VIFE in Hong Kong should be needed

3. Post-Translocation Monitoring at Ting Kok East

After translocation is completed, the reception site will be monitored regularly by the qualified fish expert over a period of one year, following the same survey methodology for the pre-translocation monitoring.

The following information will be provided in the post-translocation monitoring report:

- Seahorse species recorded;
- Seahorse abundance;
- Size structure;
- Sex ratio;
- Population estimates through mark/ recapture of the tagged seashores;
- Observation of any temporal / seasonal fluctuations;
- Reproductive status;
- Habitat preferences; and
- Presence of putative pairs.

To evaluate the success of the translocation exercise, the population of seahorse at the reception site of Ting Kok East, which would include the original seahorse individuals found at the reception site and the translocated individuals from Lung Mei, will be estimated regularly in order to determine any changes to the seahorse population. Translocation exercise will be evaluated as successful if (i) more than 80% of the translocated seahorses were recorded alive for at least one time during the first month of the post-translocation monitoring (i.e. during the daily and weekly monitoring in the first month), and (ii) more than 50% of the translocated seahorses were recorded alive for at least one time during the monthly post-translocation monitoring, and (iii) no significant decline in the original seahorse population at Ting Kok East is observed at the end of the 1-year post-translocation monitoring period. In addition to the population trend of post-translocation, the metrics presented in the table below will also be assessed and considered for the evaluation. The evaluation will be presented in the Post-translocation Monitoring Report. The evaluation of success in achieving objective of translocation mentioned above should be fine-tuned for a pragmatic approach based on the records of pre- and post- translocation monitoring and the actual result of the seahorses translocation exercise, and shall be subject to the agreement of EPD and AFCDD.

| Item No. | Metrics |
|----------|---|
| 1 | Any translocated individuals observed? |
| 2 | Any individuals observed injured or under sign of stress? |
| 3 | Any breeding behaviour observed? |
| 4 | Any pregnant seahorses observed? |
| 5 | Any juvenile seahorses observed? |
| 6 | Any change in habitat quality? |

The Post-translocation Monitoring Report will be submitted monthly and will present findings of all seahorse surveys undertaken in the reporting month. Each monthly Post-translocation Monitoring Report will be submitted within two weeks of completion of the last seahorse survey in the reporting month.

Plan of post-translocation monitoring

Option 1 – Translocated seahorse(s) is/are recorded at first week’s daily monitoring

Timing

- (i) First Week (Daily Survey):
Survey time: At least 28 man-hours, 14 man hours during day and night time respectively for each survey
Frequency: Seven
- (ii) Second to Fourth Week (Weekly Survey):
Survey time: At least 28 man-hours, 14 man hours during day and night time respectively for each survey
Frequency: Three
- (iii) Second to Twelve Month (Monthly Survey):
Survey time: At least 28 man-hours, 14 man hours during day and night time respectively for each survey
Frequency: Eleven

Option 2 – NO Seahorses recorded at first week’s daily monitoring

Timing

- (i) First Week (Daily Survey):
Survey time: At least 28 man-hours, 14 man hours during day and night time respectively for each survey
Frequency: Seven
- (ii) Second to Fourth Week (Three Time per Week):
Survey time: At least 28 man-hours, 14 man hours during day and night time respectively for each survey

Frequency: Nine

- (iii) Second to Fourth Months (Weekly Survey):
Survey time: At least 28 man-hours, 14 man hours during day and night time respectively for each survey
Frequency: Thirteen
- (iv) Fifth to Twelve Months (Monthly Survey):
Survey time: At least 28 man-hours, 14 man hours during day and night time respectively for each survey
Frequency: Eight (monthly survey until one year post-translocation)

Remarks: The monitoring plan mentioned above is an ideal approach and should be fine-tuned for a pragmatic approach based on the records of pre- and post- translocation monitoring and actual result of the seahorses translocation exercise. Any updated plan shall be subject to the agreement of EPD and AFCD.

4. Post-Construction Monitoring at Lung Mei

Post-construction monitoring will be undertaken at the installed shark net during the maintenance period of the Project. The shark net will be inspected by the qualified fish expert using SCUBA to search for the presence of any seahorse species. Data collection procedure as stated in Section 1(c) will be followed. Monitoring will commence three months after installation of the shark net. Quarterly monitoring will be undertaken until the end of the maintenance period of the Contract. A Quarterly Post-construction Monitoring Report will be submitted within two weeks after the completion of the quarterly monitoring survey to present ecological information of the seahorse found, if any, along the shark net.

Timing

Survey time: At least 28 man-hours including day and night diving
Frequency: To be determined (quarterly monitoring until completion of the maintenance period of the Contract)

5. Seahorse Translocation Programme

The actual translocation schedule shall be recorded separately in the monthly EM&A report.



Figure 1. Proposed Survey Area of Lung Mei



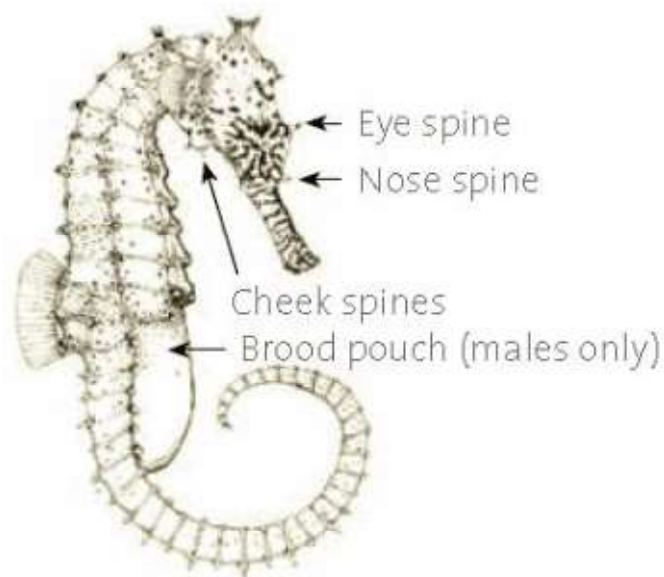
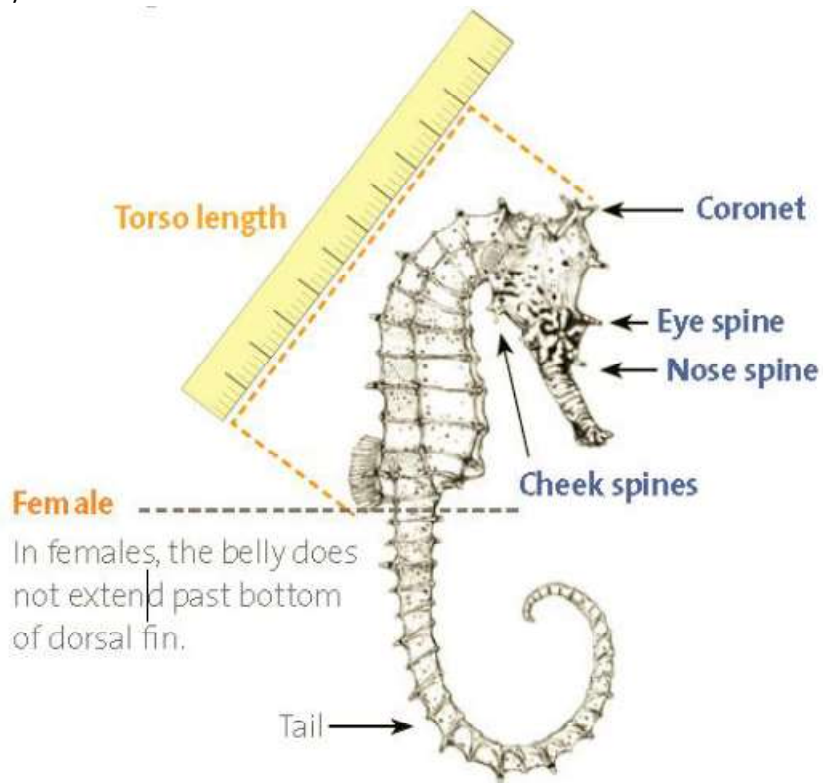
Figure 2. Survey Areas for Ting Kok East



Figure 3. Proposed Dive Survey Route at Lung Mei



Figure 4. Proposed Dive Survey Route at Ting Kook East



Male

Figure 5. Torso Length Measurement (Extracted from “The life history and ecology of seahorses in the Philippines)



Figure 6. Collar Tags



Figure 7. Seahorses with Collar Tag (Photos from OPCF)

Seahorses Translocation Plan
Version 1
11 January 2018
Survey Time Summary

| Pre-translocation Survey | Man-hours | Frequency |
|--|-----------|-----------|
| <i>Intertidal + Subtidal</i> | | |
| Lung Mei | 28* | 1 |
| Ting Kok East | 28* | 1 |
| Extra Survey at Ting Kok East (reception site) if no seahorse was found in the first pre-translocation survey | 28* | 1 |
| Seahorses Translocation | | |
| <i>Subtidal</i> | | |
| Lung Mei | 28* | 1 |
| Extra Survey at Lung Mei if pregnant seahorses were found OR if no seahorse was found during the first 28 man-hours search | 28* | 1 |
| Post Translocation Survey | | |
| <i>Option 1 (seahorse found at the first week)</i> | | |
| First One Week (Daily Survey) | | |
| Ting Kok East | 28 | 7 |
| Second to Fourth Week (Weekly Survey) | | |
| Ting Kok East | 28 | 3 |
| Second Month to Twelve Month (Monthly Survey) | | |
| Ting Kok East | 28 | 11 |
| <i>Option 2 (seahorses were absence at the first week)</i> | | |
| First One Week (Daily Survey) | | |
| Ting Kok East | 28 | 7 |
| Second Week to Fourth Week (3 times per week) | | |
| Ting Kok East | 28 | 9 |
| Second Month to Fourth Month (Weekly Survey) | | |
| Ting Kok East | 28 | 13 |
| Fifth Month to Twelve Month (Monthly Survey) | | |
| Ting Kok East | 28 | 8 |
| Post-Construction Monitoring | | |
| Quarterly to completion to the maintenance period | | |
| Lung Mei (Quarterly Monitoring) | 28 | TBD |

Remarks:

1. Man-hours with asterisk will be split into two days to increase the probability to relocate the affected seahorses in Lung Mei project site and set up a more reliable baseline at Ting Kok East before translocation.
2. The post translocation monitoring plan mentioned above is an ideal approach and should be fine-tuned for a pragmatic approach based on the records of pre- and post-translocation monitoring and the actual result of the seahorses translocation exercise. Any updated plan shall be subject to the agreement of EPD and AFCDD.

Number and Type of Manpower and Apparatus Involved Per 28 Man Hours

| Type | Number |
|---|---------------|
| Dive Boat | 1 |
| Sampan | 1 |
| Scuba Divers (at least advanced Level) | 5 |
| Rescue Divers | 1 |
| Safety Captain | 1 |
| Underwater Camera with still and video function | 5 |
| Underwater Torch | 5 |
| GPS | 2 |
| Dive Computers | 6 |
| Diving Gears (including mask, snorkel, fins, regulator and BCD) | 6 |
| Scuba Tanks | 20 |
| Underwater calipers | 6 |
| Kordon Breathable Bags | TBD |
| Collar Tags | TBD |
| Plastic Containers (570x430x325mm) | 3-4 |
| Air Pumps | 3-4 |
| Multi-water Meter (for measuring pH, DO, Temperature) | 1 |
| Refractometer (for measuring salinity) | 1 |
| Turbidity Meter (for measuring turbidity) | 1 |