Ocean Park Master Redevelopment Project

Contractor No. CI05 – Site Formation, Funicular Tunnel and Miscellaneous Works

Environmental Monitoring Works (Terrestrial Ecology)

Plant Transplantation Method

August 2007

(Doc. No. OPE/DBJV/PROJ/QSE/0078/D)

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Ocean Park Master Redevelopment Project

Contract No. CI 05

EP-249/2006/A – Condition 2.20(a)

Transplantation Proposal for Uncommon Plant Species

(Rev. D)

Submitted by DBJV on 21-Aug-07

Certified by _____ **on** 22-Aug-07

Terence Kong

Project Environmental Team Leader

Verified by Independent Environmental Checker **on** 22-Aug-07

IEC Certificate attached in the submission? Yes

Submitted to Ocean Park on 24-Aug-07

Ocean Park Master Redevelopment Project

Environmental Permit No. EP-249/2006/A - Condition 2.20a

Uncommon Plant Species Transplantation Proposal (Revision D)

Submitted by Dragages-Bouygues JV on 21-08-2007

This is to verify that

Uncommon Plant Species Transplantation Proposal (Revision D)

Submitted by Dragages-Bouygues JV

On 21-08-2007

Has been verified by the undersigned.

Signed

Dr Anne F Kerr
Independent Environmental Checker (IEC)
Retained by Ocean Park Corporation
pursuant to Environmental Permit No. EP-249/2006/A

Date 22 August 2007

By Fax Only

MEMO

From Director of Agriculture, Fisheries and Conservation

Ref. ( ) *in* AF EA 034/06

Tel No. 2150 6942

Fax No. 2377 4427

Date 17 July 2007

To DEP

(Attn. Ms. Mable CHAN)

Your Ref. ( ) *in* EP2/H16/O/05 Pt.5

dated 4.7.2007 *Fax No.* 2591 0558

Total Pages 2

Repositioning and Long Term Operation Plan of Ocean Park
Environmental Permit No. EP-249/2006A

Condition 2.20 – Transplantation Proposal

I refer to your memo under reference and the captioned document enclosed therein.

2. I have the following comments on the Transplantation Proposal for Uncommon Plant Species (Rev. C):

Responses to Comments (RTC)

Items 5(ii)

According to the draft proposal submitted in November 2006, the survey conducted in August 2006 covered the flowering periods of Long Tentacle Orchid (flowers in August) and Green-flowered Rattlesnake-Plantain (flowers between August and November). Besides Sword-leaved Orchid and Chinese Lily, please review if the individuals of these two plant species found in August 2006 would be affected by the works and requiring transplanting.

Item 5(iii) & 10

Based on the response from the consultants and Table 2 Plant Transplantation Programme of the proposal, field transplantation would be conducted in July and August 2007, i.e. blasting works would commence after August. As August is the flowering period of Long Tentacle Orchid and Green-flowered Rattlesnake-Plantain, the consultants should arrange survey for these two plants and transplant individuals found in the coming August as far as possible.

Item 6

(a) If only the individuals of plant species marked (T) in Figure 1 Layout Plan for Uncommon Species would be transplanted, only 33 nos. of them would be transplanted based on the plan. It is unclear which individual is marked (T) for a group of plants e.g. the group to the north of 'Grand Stand' with 25 nos. of identified plant individuals but only 16 nos. of (T) were marked. According to Table 1 under para. 2.4 of the proposal, it seems that all the individuals (100 nos.) of 3 uncommon plant species identified would be transplanted. If not all identified individuals would be transplanted, please clarify which one and why they would be transplanted but not the others. Figure 1 should be revised to present the picture clearly.

(b) It is stated that only the individuals within the works areas would be transplanted. If the blue lines indicate the extent of the works area, it is noted from Figure 1 that some identified plant individuals outside the boundary of the works area would still need to be transplanted. Please clarify.

Item 7
Please advise on the 'size' of the receptor site and if it is adequate to accommodate all the transplanted plant individuals. Please indicate the location of the receptor site on the photo.

Item 8
Please advise on the pH value of the soil for information.

Plant Transplantation Method (June 2007)
Para. 2.2
According to the previous two proposals submitted in November 2006 and May 2007 respectively, surveys for the 6 nos. of uncommon species were conducted in August 2006 and February 2007. It seems that no vegetation survey was conducted in November 2006.

Para. 2.3
Regardless of the difference in the findings of the two surveys, all identified plant individuals to be affected by the project should be transplanted.

Para. 2.4 Table 1
According to the draft proposal submitted in November 2006, Long Tentacle Orchid and Green-flowered Rattlesnake-Plantain were found in the vegetation survey in August 2006. However, these findings were not presented in the column 'Record History'.

Para. 4.4.3, line 2
Please revise 'plant heath condition' to read 'plant health condition'.

Figure 1 Layout Plan for Uncommon Species
If the purpose of this figure is to show the findings of the survey in February 2007, indication of the Cycad-fern is misleading as none was found during the survey.

(Ms. Karrie WU)
for Director of Agriculture, Fisheries & Conservation

Dragages-Bouygues JV 寶嘉–布依格聯營	Ocean Park Master Redevelopment Project Contract No. CI05 – Site Formation, Funicular Tunnel and Miscellaneous Works	Submission Review Record

Contractor's Submission Reference No.				OPE/DBJV/CSF/20053/C – Plant Transplantation Proposal [June 2007]		For MCAL Use		
Item No	Review By	Document / Drawing Reference	Reply Code	PMR's Comments	DBJV's Response	Action	Action Date	Closed Date
1	AFCD	RTC Item 5(ii)		According to the draft proposal submitted in November 2006, the survey conducted in August 2006 covered the flowering periods of Long Tentacle Orchid (flowers in August) and Green-flowered Rattlesnake-Plantain (flowers between August and November). Besides Sword-leaved Orchid and Chinese Lily, please review if the individuals of these two plant species found in August 2006 would be affected by the works and requiring transplanting.	Noted. During the time of response to comment, an additional survey was undertaking to search the concerned plant species in the comment before the transplanting works were being conducted. The results showed that these two plants have not been found; hence no transplantation was required.			
2	AFCD	RTC Item 5(iii) & 10		Based on the response from the consultants and Table 2 Plant Transplantation Programme of the proposal, filed transplantation would be conducted in July and August 2007, i.e. blasting works would commence after August. As August is the flowering period of Long Tentacle Orchid and Green-flowered Rattlesnake-Plantain, the consultants should arrange survey for these two plants and transplant individuals found in the coming August as far as possible.	Noted. During the time of response to comment, the transplanting works were being undertaken and the survey to the concerned flower species in the list were conducted prior to the transplantation works. The results showed that these two plants have not been found. Consequently, the blasting works have commenced in the second week of August 2007.			

Reply Code: A- Comment must be incorporated into a resubmission. B - Comment to be noted and implemented but does not require resubmission. C – PMR preferred solution, to be incorporated if possible. D - For information only. E - New requirement to be incorporated - variation may be required.

Contractor's Submission Reference No.				OPE/DBJV/CSF/20053/C – Plant Transplantation Proposal [June 2007]		For MCAL Use		
Item No	Review By	Document / Drawing Reference	Reply Code	PMR's Comments	DBJV's Response	Action	Action Date	Closed Date
3	AFCD	RTC Item 6		(a) If only the individuals of plant species marked (T) in Figure 1 Layout Plan for Uncommon Species would be transplanted, only 33 nos. of them would be transplanted based on the plan. It is unclear which individual is marked (T) for a group of plants e.g. the group to the north of 'Grand Stand' with 25 nos. of identified plant individuals but only 16 nos. of (T) were marked. According to Table 1 under para. 2.4 of the proposal, it seems that all the individuals (100 nos.) of 3 uncommon plant species identified would be transplanted. If not all identified individuals would be transplanted, please clarify which one and why they would be transplanted but not the others. Figure 1 should be revised to present the picture clearly. (b) It is stated that only the individuals within the works areas would be transplanted. If the blue lines indicate the extent of the works area, it is noted from Figure 1 that some identified plant individuals outside the boundary of the works area would still need to be transplanted. Please clarify.	Noted. Figure 1 would be updated to make all information clearly. Noted. Please refer to the response in 3(a). Please note that the plant individuals within the green rectangle would be required to be transplanted to the receptor.			
4	AFCD	RTC Item 7		Please advise on the 'size' of the receptor site and if it is adequate to accommodate all the transplanted plant individuals. Please indicate the location of the receptor site on the photo.	Noted. During the time of response to comment, the transplantation works were being undertaken from the original locations to the receptors. The actual size of receptors is approx. 8.0mL x 4.0mW x 2.0mH. The location of the receptor site in photo has included.			
5	AFCD	RTC Item 8		Please advise on the pH value of the soil for information.	Noted. The pH value of soil is ranging from 6.0 to 8.0.			

Reply Code: A- Comment must be incorporated into a resubmission. B - Comment to be noted and implemented but does not require resubmission. C – PMR preferred solution, to be incorporated if possible. D - For information only. E - New requirement to be incorporated - variation may be required.

Contractor's Submission Reference No.				OPE/DBJV/CSF/20053/C – Plant Transplantation Proposal [June 2007]		For MCAL Use		
Item No	Review By	Document / Drawing Reference	Reply Code	PMR's Comments	DBJV's Response	Action	Action Date	Closed Date
6	AFCD	Para. 2.2		According to the previous two proposals submitted in November 2006 and May 2007 respectively, surveys for the 6 nos. of uncommon species were conducted in August 2006 and February 2007. It seems that no vegetation survey was conducted in November 2006.	Noted. This is a typo error.			
7	AFCD	Para. 2.3		Regardless of the difference in the findings of the two surveys, all identified plant individuals to be affected by the project should be transplanted.	Noted. The no. of individuals which presented in Table 1 will be transplanted.			
8	AFCD	Para. 2.4 Table 1		According to the draft proposal submitted in November 2006, Long Tentacle Orchid and Green-flowered Rattlesnake-Plantain were found in the vegetation survey in August 2006. However, these findings were not presented in the column 'Record History'.	Noted. Clear data and findings of all surveys would be summarized in the column of 'Record History' in Table 1.			
9	AFCD	Para. 4.4.3, line 2		Please revise 'plant heath condition' to read 'plant health condition'.	Noted. The text would be amended accordingly.			
10	AFCD	Figure 1 Layout Plan for Uncommon Species		If the purpose of this figure is to show the findings of the survey in February 2007, indication of the Cycad-fern is misleading as none was found during the survey.	Noted. Figure 1 would be updated to make all information clearly.			

Reply Code: A- Comment must be incorporated into a resubmission. B - Comment to be noted and implemented but does not require resubmission. C – PMR preferred solution, to be incorporated if possible. D - For information only. E - New requirement to be incorporated - variation may be required.


Proposed Receptor Location

Ocean Park Master Redevelopment Project

Contractor No. CI05 – Site Formation, Funicular Tunnel and Miscellaneous Works

Environmental Monitoring Works (Terrestrial Ecology)

Plant Transplantation Method

August 2007

Issue and Revision Record

Rev	Date	Originator	Checker	Approver	Description
A	April 07	Dr. Mark SHEA	Dr. Mark SHEA Schroeder TAM	Daniel ALTIER	First Issue
B	May 07	Dr. Mark SHEA	Dr. Mark SHEA Schroeder TAM	Daniel ALTIER	Second Issue
C	June 07	Dr. Mark SHEA	Dr. Mark SHEA Schroeder TAM	Daniel ALTIER	Third Issue
D	August 07	Schroeder TAM	Schroeder TAM	Daniel ALTIER	Fourth Issue

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

Transplanting some species of plants with conservation value in the project affected area is required for the project. China-Hong Kong Ecology Consultants Co (生態及環境顧問) [CHE] has been commissioned to do the uncommon plant transplantation and monitoring.

The purpose of the plant transplantation method is to provide detailed procedures, design of plant receptor and holding structures where necessary within the Ocean Park; measures to reduce plant damage or death rate during plant transplantation and establishment period.

2 PLANT BASELINE INFORAMTION

2.1 According to the Appendix A in Environmental Permit No. EP-249/2006/A, the following uncommon plant species are required to be transplanted before the site formations works; they are:

- Long Tentacle Orchid;
- Sword-leaved Orchid;
- Green-flowered Rattlesnake-Plantain;
- Cycad-fern;
- Balloon Flower; and
- Chinese Lily.

2.2 In the previous survey, which conducted in August 2006, only balloon flower would be affected and required to be transplanted. Follow up surveys have been conducted in February 2007 and August 2007 and the results were presented in Table 1. The plant species require to be transplanted before site formation works includes (a) Sword-leaved Orchid; (b) Balloon Flower; and (c) Chinese Lily.

2.3 The main difference between the findings in the surveys was due to the change of works areas of the Project.

2.4 The plant species with scientific names and quantities to be transplanted was summarised in the Table 1.

2.5 Species distribution for those plants listed in Table 1 was shown in Figure 1.

Table 1: Locally protected, uncommon/restricted plant species with common, Latin names and abundance information found in Summit area of Ocean Park

Common Name	Latin Species	Status	Record History				No of individual to be transplanted
			EIA Stage	Aug '06	Feb '07	Aug '07	
Long Tentacle Orchid	*Peristylus calcaratus*	Protected species	Identified	Found	Not found	Not found	0
Sword-leaved Orchid	*Cymbidium ensifolium*	Protected species	Identified	Found	Found	Found	45
Green-flowered Rattlesnake-Plantain	*Goodyera viridiflora*	Protected species	Identified	Found	Not found	Not found	0
Cycad-fern	*Brainea insignis*	Uncommon/ Restricted species	Identified	Found	Not found	Not found	0
Balloon Flower	*Platycodon grandiflorus*	Protected species	Identified	Found	Found	Found	30
Chinese Lily	*Lilium brownii*	Protected species	Identified	Found	Found	Found	25

3 PROPOSED RECEPTOR SITE

3.1 A site search has been conducted to find the possible receptor site within Ocean Park that have similar ground, conditions and that would not be disturbed by the redevelopment works.

3.2 After the search, it was found that the area adjacent the Contractor site office would be suitable as a receptor site for holding and planting the transplanted plants. The benefits include

(i) The area of the proposed receptor site is approx. 500m away from the original plant species locations;

(ii) The features of the proposed receptor are similar with the original location, such as both are at the hillside with vegetation, trees, shrubs; and

(iii) The soil conditions in both the original location and the proposed receptor are the same, i.e. the appearance is yellow in colour with similar texture which belongs to the same type of habitat on hillside; the drainage ability is good in both places and the pH value is not significantly different.

3.3 The proposed location is shown in Figure 1.

4 PLANT TRANSPLANTATION METHOD

4.1 Pre-transplantation Inspection

4.1.1 A pre-transplantation inspection should be undertaken to verify species distribution identified and recorded during previously conducted baseline vegetation surveys.

4.2 Plant Receptor Set-up

4.2.1 The dimensions of receptor are shown in Figure 2. It is a metal frame structure with standard size of 4m L x 2m W x 2m H and covered with sun bloom net/sheet. If one receptor is not adequate to accommodate all the transplanted plant individuals, additional receptor(s) would be provided for the remaining plant individuals. Photos below are showing the sample of the receptor.

Photo 1 ~ Plant receptor sample

4.2.2 Apart from the receptor for transplanted plants. Plant nursery for plant seedlings or seed germination would be constructed, if necessary. Figure 2 shows the set up of the plant nursery.

Photo 2 ~ Sample of Plant nursery
(for nursery of young plant seedlings or plant propagation by cutting)

4.2.3. In principle, it is better to collect the top soil from the original site where the transplanted plant from, or from similar habitat near the plant receptor site since the appearance and properties of the soil in both locations are similar (refer to Section 3.2(iii)). If the soil condition at both the original site and the receptor site was not good at the time of transplantation, topsoil with the same properties will be used at the receptor site. The depth of soil should be 100mm to 200mm thick since this is a minimum requirement. However careful consideration would be undertaken to make the proper soil depth for different kind of plants after they are planted at the plant receptor.

4.2.4 Composed fertilizer will be applied to the receptor.

Photo 3 ~ Fertilizer

4.2.5 Plant receptor /Plant nursery set up: watering facility

Provision of water to the transplanted plant will be either by the water hose or auto water spring facility.

Photo 4. Set up automatic watering facility

Photo 5. Automatic watering in operation

4.3 Transplanting Procedures (refer to photos 6 to 9 as sample)

Step 1 Qualified ecologist from China - Hong Kong Ecology Consultants (CHEC) will identify and mark the plants to be transplanted. CHEC is an independent environmental consultancy providing professional ecological consultations in Hong Kong and China and Mainland China with accumulative experience via undertaking over 250 projects with ecology component or natural or man-made habitats, flora and fauna in the region mainly in Hong Kong and Mainland China, also working on projects in Taiwan and Macau. They also offer the services as specialists in ecological survey, monitoring, ecological and conservation review, impact assessment, tree survey, plant transplantation and plant plantation. Details of the experience and background of the qualified ecologist are presented in Appendix A.

Step 2 Water individual plants thoroughly one hour prior to transplanting.

Step 3 Digging out plants should be done carefully to avoid damaging plant and should be supervised by ecologist. As retention / protection of roots is of vital importance for the success of the transplanting process, digging procedure should be:

i) digging surrounding area of the plant first;
ii) then digging deep enough to avoid damage major root system of the plant; and
iii) to pick up the detached plant with plant root and soil together to the following step;

Step 4 To bag the plant root ball with plastic sheet or bag to avoid plant dry up and to keep some soil from the original growing location;

Step 5 Translocation of the bagged plant to the plant receptor/holding site within 4 hours of lifting; and

Step 6 To plant the plants to the plant receptor/holding site with 100mm to 200mm spacing between the plants.

Photo 6 ~ Identify and mark plants to be transplanted.

Photo 7 ~ Dig out plants.

Photo 8 ~ To bag plants with plastic bag or sheet.

Photo 9 ~ Planting plants at receptor/ holding site.

4.4 Maintenance

4.4.1 The plant receptor/holding site should be sheltered with sun blocking nets as shown in photos 1 and 2. If the newly transplanted plants are partially damaged in root system and upper ground part, shading will be helpful for plants to re-establish at the receptor site. After establishment of the transplanted plants in half or one year period, the sun-blocking nets would be naturally degraded.

4.4.2 Apart from the above, the plant receptor has been sheltered by some tall scrub vegetation and would be used as the natural sun-blocking facility after the artificial sun-blocking nets has been degraded.

4.4.3 Watering

Frequency of watering at the plant receptor site will depend on weather condition, water saturation characteristics of the soil, water evaporation rate of the soil and plant health condition for different species. The following proposed watering frequency provides general guideline and actual practice would be flexible depend on *in situ* observation and monitoring findings.

- Month 1: twice per day during dry weather condition;
- Month 2: daily watering during dry weather condition;
- Month 2 - 4: twice per week during dry weather condition; and
- Month 5 – 12: weekly watering during dry weather condition.

4.4.4 General maintenance practice (monthly)

- Check and control pests;
- Check and control exotic plants;
- Adding soil to compensate soil erosion by rain and run off; and
- Provide fertiliser.

4.4.5 A monitoring programme will be carried out after plant transplantation. Plants relocated at the receptor site will be monitored on monthly bases for a period of 12 months according to EM&A Manual of the project. A monthly monitoring report will be issued to document results of the monitoring and as well as recommendations on maintenance and management of the plants at the receptor site. Scope of monitoring was specified in the EM&A Manual of the project.

4.4.6 If the transplanted plant is found dead, the experienced ecologist from CHE will investigate and propose the solution in order to avoid further mortality. The remedial proposal include but not limit to applying pesticide, kill invasive plant, control of sunlight and the watering frequency and etc.

5 PROGRAMME

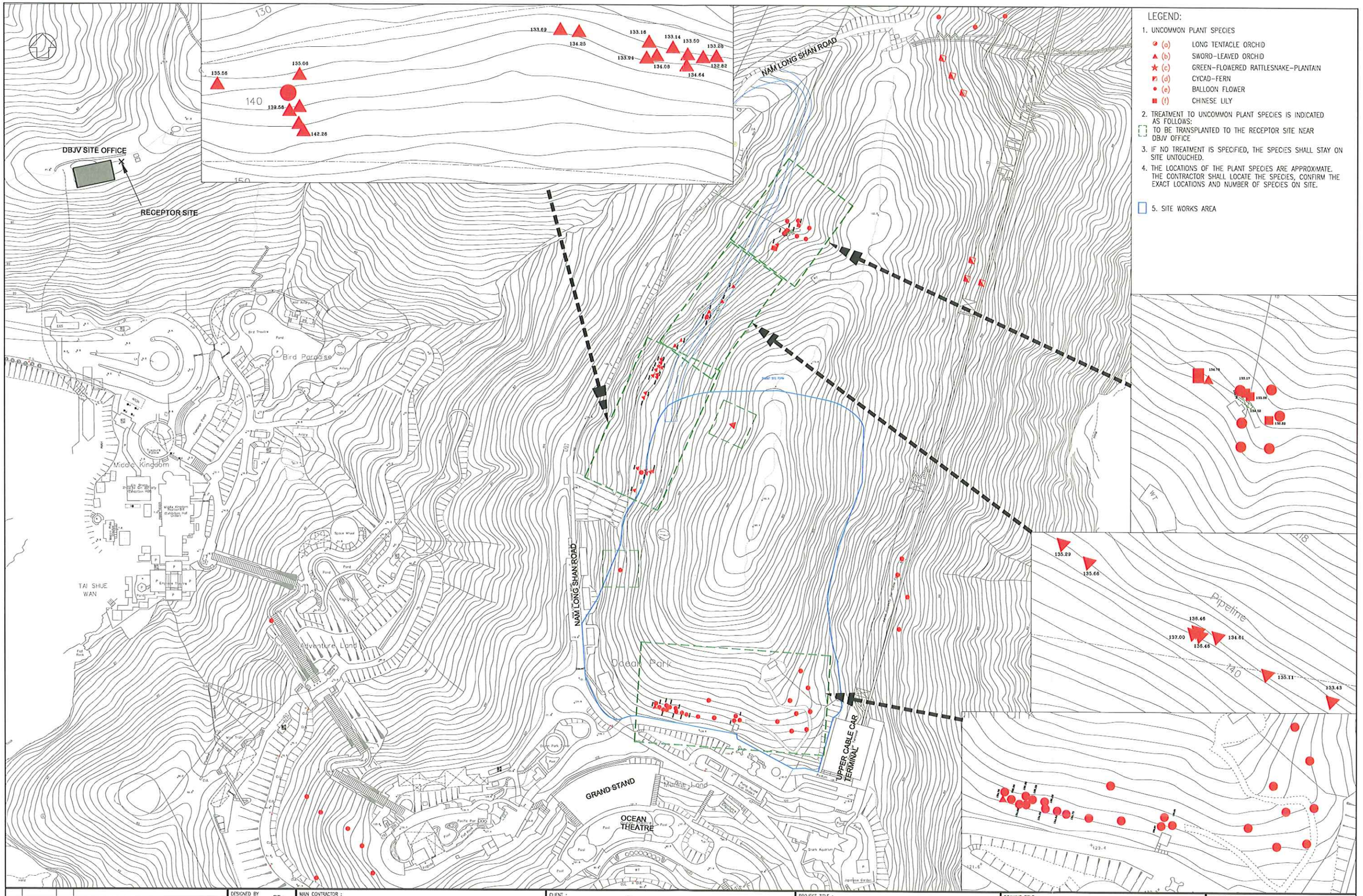
A working programme of plant transplantation is given in the Table 2 below.

Table 2 Plant transplantation programme

Ocean Park Master Redevelopment Project Plant Transplantation Programme																		
No.	Month / Task	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2008	2008	2008	2008	2008	2008
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1	Plant baseline condition	●																
1.1	Review baseline information	●																
1.2	Site visit to verify baseline information	▬	▬															
2	Plant Receptor / Plant Nursery Preparation																	
2.1	Site inspection to select receptor site		●															
2.2	Receptor / Nursery design		●															
2.3	Receptor / Nursery material preparation		●															
2.4	Receptor / Nursery set up					▬												
3	Plant transplantation																	
3.1	Field transplanting						▬	▬										
3.2	Maintenance		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
4	Monitoring						●	●	●	●	●	●	●	●	●	●	●	●

(End)

LIST OF FIGURES



REV.	DATE	BY	DESCRIPTION
A	08-08-2007	STa	FIRST ISSUE

DESIGNED BY	STa
DRAWN BY	Mch
CHECKED BY	STa
IN CHARGE	STa
DATE	08-08-2007

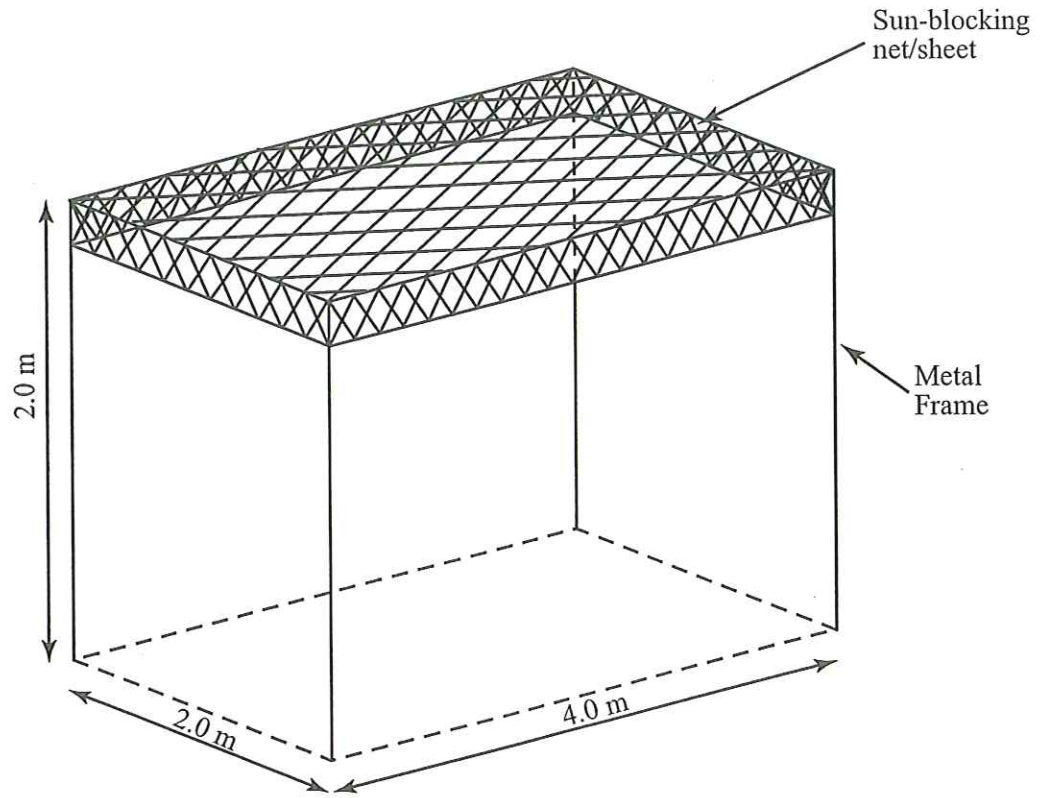
MAIN CONTRACTOR : Dragages-Bouygues JV 寶嘉-布依格聯營

CLIENT : 香港海洋公園 OCEAN PARK HONG KONG

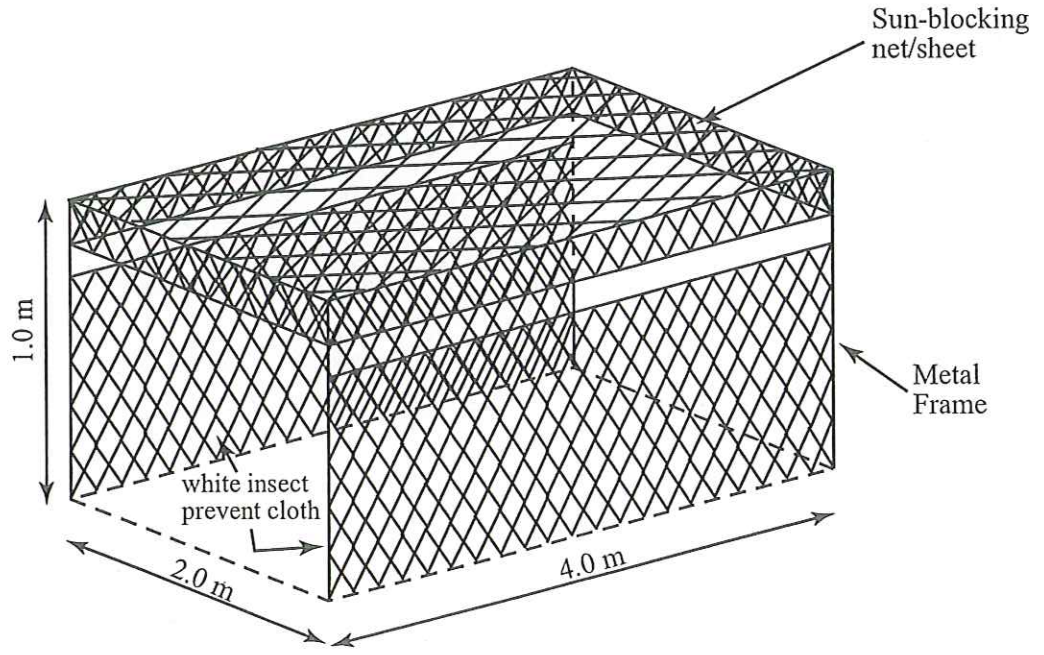
PROJECT TITLE :
OCEAN PARK REDEVELOPMENT
Contract No. CI05
Site Formation, Funicular Tunnel and Miscellaneous Works

DRAWING TITLE :
FIGURE 1 LAYOUT PLAN OF UNCOMMON SPECIES TO BE TRANSPLANTED

CADD FILENAME :	01ENV0022A.DWG
DATE :	08-08-2007
SCALE :	N.T.S.
DRAWING NUMBER :	DBJV/CI05/01/ENV/0022
REV.	A



TRANSPLANTED PLANT RECEPTOR



PLANT NURSERY FOR PLANT SEEDLINGS IR SEED GERMINATION

APPENDIX A

Profile of Qualified Ecologist

CHEC
中港生態顧問公司
China-Hong Kong Ecology Consultants Co
Tel: (852) 2529 9593; Fax: (852) 2574 4822
Website: www.ecology8.com
E-mail: ecology2002@netvigator.com

Company Profile

China-Hong Kong Ecology Consultants Co. (CHEC) is an independent environment consultancy providing professional ecological consultations in environmental impact assessment, field surveys, tree surveys and related service in Hong Kong and China.

CHEC's key in-house expertise in environmental consulting was accumulated via undertaking over 250 projects with ecology component or natural or man-made habitats, flora and fauna in the region in Hong Kong and Mainland China, also working on projects in Taiwan and Macua. CHEC offers clients as specialists' survey, monitoring, ecological and conservation reviews, impact assessment, tree surveys, plant transplantation and plant plantation.

Project Experience

The major project experiences related to the plant transplantation and plant plantation are:

- Lantau Cable Car Project: Feasibility study, tree surveys, EM & A; MTR Corporation & MottConnell – responsible for ecological baseline surveys, impact monitoring and ecological mitigation during stages of feasibility study and construction period, and as well as fauna and flora relocation and transplantation. The project committed in December 1998 and completed in July 2006.
- Contract No. HY/2000/18 Construction of Kam Tin Bypass, ZHUHAI International Economic & Technical Cooperation Corporation – Constructed Marshland. Being appointed as marshland specialist involving marshland surveys, monitoring, advise on construction of marshland habitats and supervision of marsh plant plantation. The works committed in June 2001 and completed in 2005.

Key Staff

Name	Expertise
Dr. Mark SHEA 	Dr. Mark SHEA is an ecologist and environmental scientist with 20 years of experience in the field of biology, ecology and environmental impact assessment (EIA) in Hong Kong and China. He has undertaken over 200 projects with ecological component dealing with terrestrial ecology, wetland ecology, freshwater and marine ecology in Hong Kong and China. Dr. Shea was responsible for ecological baseline surveys, plant transplantation and propagation for Lantau Cable project from 1998 to 2005. Plant transplanted include some protected plant species, such as *Enkianthus quinqueflorus* (吊鐘), *Camellia sinensis* (茶), *Phaius tankervilliae* (鶴頂蘭), *Pavetta hongkongensis* (香港大沙葉), and as well as some rare or uncommon plant species including fern *Brainea insignis* (蘇鐵蕨), *Ehretia acuminate* (厚殼樹).