



Water Supplies Department



## **Woodland Compensation Plan**

**FOR AGREEMENT NO. CE 13/2009 (WS)  
IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS – SOUTH  
WORKS**




**(Rev. 4)**

## WOODLAND COMPENSATION PLAN

FOR

**No. CE 13/2009 (WS)**

**IN-SITU REPROVISIONING OF SHA TIN WATER  
TREATMENT WORKS – SOUTH WORKS**

	NAME	SIGNATURE
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## TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>2. WOODLAND COMPENSATION PROPOSAL .....</b>	<b>3</b>
<b>3. A DETAILED AT LEAST 6 YEARS POST-PLANTING MONITORING AND MAINTENANCE PROGRAMME. PARAMETERS, INCLUDING HEALTH CONDITION, SURVIVAL RATE OF PLANT, CONTROL OF WEEDY PLANT, SHALL BE MONITORED .....</b>	<b>10</b>
<b>4. CONCLUSION .....</b>	<b>12</b>

## LIST OF APPENDICES

Appendix 1	Curriculum Vitae of the Qualified Ecologist
Appendix 2	Compensatory Planting Plan for Sha Tin Water Treatment Works and Sha Tin South Fresh Water Service Reservoir
Appendix 3	Location of Works Areas of the Project and Habitat at the Enhanced Compensatory Woodland Area
Appendix 4	District Lands Office's Approval on Tree Felling for the Project
Appendix 5	Photos of the Enhanced Compensatory Woodland Area
Appendix 6	Compensatory Planting Plan for Sha Tin South Fresh Water Service Reservoir
Appendix 7	Ecological Survey Report of the New Compensation Plant Site
Appendix 8	Tree Survey Report of the New Compensation Plant Site
Appendix 9	Compensatory Planting Plan for Sha Tin West Service Reservoir



## 1. INTRODUCTION

### 1.1. BACKGROUND

- 1.1.1. Pursuant to the Environmental Impact Assessment (EIA) Ordinance, the Director of Environmental Protection (DEP) of the Environmental Protection Department (EPD) granted the Environmental Permit (No. EP- 494/2015) to the Water Supplies Department (WSD) to construct and operate the designated project for “In-situ Re-provisioning of Sha Tin Water Treatment Works - South Works” (“The Project”).
- 1.1.2. Upon the requirement of the Environmental Permit, a qualified ecologist was commissioned to prepare a Woodland Compensation Plan (WCP) with an aim at forming the basis to guide the implementation of the proposed woodland mitigation is recommended to be prepared and submitted to the DEP for approval no later than one month prior to commencement of site clearance.
- 1.1.3. An EIA Report (Register No. AEIAR-187/2015) was approved by DEP in January 2015. As recommended in the approved EIA Report, approximately 0.69 ha of secondary woodland would be affected due to cut-back of the existing engineered slope located to the west of the existing clarifiers for re-provisioning of chemical house to Water Treatment Works Logistics Centre and Construction of new access roads for both construction and normal operation of the plant. The affected secondary woodland habitat of about 0.69 ha would be compensated by the creation of about 0.23 ha on-site of woodland habitat within the Sha Tin Water Treatment Works (STWTW) and about 0.29 ha off-site of woodland habitat at Sha Tin South Freshwater Service Reservoir (STSFWSR) nearby and northwest of Sha Tin West Service Reservoir (STWSR) (a total of about 0.52 ha). In accordance with the Condition 2.5 of the Environmental Permit (No. EP-494/2015), a Woodland Compensation Plan was submitted to EPD in February 2016.
- 1.1.4. In June 2018, the original proposed compensation planting site at STWSR was requested by the Hong Kong Police Force to modify as a carpark in urgent need next to Yau On Street to solve the heavy traffic congestion. Therefore a revised Woodland Compensation Plan is prepared for the new compensation planting site.
- 1.1.5. The affected secondary woodland habitat of about 0.69 ha would be compensated by the creation of about 0.32 ha on-site of woodland habitat within the Sha Tin Water Treatment Works (STWTW) and about 0.29 ha off-site of woodland habitat at Sha Tin South Freshwater Service Reservoir (STSFWSR) nearby and northwest of Sha Tin West Service Reservoir (STWSR) (a total of about 0.61 ha).
- 1.1.6. The locations for woodland compensation are specifically chosen to increase the ecological and structural linkage with the nearby woodland. It also serves as a buffer area to screen out the disturbance arising from the STWTW operation.



## **1.2. OBJECTIVE OF WOODLAND COMPENSATION PLAN**

- 1.2.1. The objective of this Woodland Compensation Plan (WCP) is to compensate for the woodland affected by the Project and to monitor the conditions of the compensatory habitat during the construction phase and the 6-years post-planting monitoring and maintenance period.
- 1.2.2. This WCP forms the basis to guide the implementation of the proposed woodland mitigation as recommended in the EIA Report to provide better quality and diversified secondary woodland areas in the Project Boundary and to ensure the general health condition and survival rate of the plants. As stipulated in Condition 2.5 of the EP, the Woodland Compensation Plan shall include:
  - i. Recommendation of the implementation details, management requirement and inspection arrangement of the woodland compensation area, with due consideration on the potential ecological invasion caused by invasive plant species;
  - ii. Native tree species and size of trees to be selected for planting with justifications;
  - iii. Size of the woodland compensation areas and planting spacing;
  - iv. Schedule for tree planting; and
  - v. A detailed at least 6 years post-planting monitoring and maintenance programme. Parameters, including health condition, survival rate of plant, control of weedy plant, shall be monitored.

## **1.3. PERSONNEL**

The preparation of this Woodland Compensation Plan, in accordance with Condition 2.5 of the Environmental Permit No. EP- 494/2015, has been carried out by a qualified ecologist who has more than 7 years of experience in vegetation survey and woodland monitoring. The qualifications of the qualified ecologists have been certified by Environmental Team (ET) Leader and verified by the Independent Environmental Checker (IEC) as conforming to the information and recommendations contained in the approved EIA Report (No. AEIAR-187/2015). The curriculum vita of the qualified ecologist is in **Appendix 1**.

## 2. WOODLAND COMPENSATION PROPOSAL

### 2.1. SIZE OF THE WOODLAND COMPENSATION AREAS AND PLANTING SPACING

- 2.1.1. As recommended in the approved EIA Report, the affected secondary woodland habitat of about 0.69 ha would be compensated by creation of about 0.23 ha on-site of woodland habitat within the Sha Tin Water Treatment Works (STWTW) and about 0.29 ha off-site of woodland habitat at Sha Tin South Freshwater Service Reservoir (STSFWSR) nearby and northwest of Sha Tin West Service Reservoir (STWSR) (a total of about 0.52 ha). After reviewed the possible sites for compensation, the above recommended sites for woodland compensation are still valid. The size of compensatory woodland area within existing STWTW has been enhanced from 0.23 ha to 0.32 ha and the size of alternative compensatory woodland area off-site at STSFWSR and STWSR has been maintained the same as 0.29 ha when the original compensatory area near STWSR was requested by the Hong Kong Police Force to modify as a carpark in urgent need next to Yau On street to solve the heavy traffic congestion. (i.e. with an updated total of about  $0.32 + 0.29 = 0.61$  ha, with locations as shown in **Appendix 2**, **Appendix 6** and **Appendix 9**). The enhanced area with additional size as shown in **Appendix 2** is suitable for planting and can be better managed within STWTW boundary so as to avoid species of conservation interest/important to be potentially damaged by people from outside STWTW.
- 2.1.2. The enhanced compensatory woodland area like the other two compensatory woodland areas within STWTW with locations marked with in (1) and (2) in **Appendix 2** falls within the Project's works areas as shown in **Appendix 3** (extracted from Figure 8.3 of the approved EIA Report). The existing vegetation within the enhanced compensatory woodland area will be affected by the construction of temporary access road to facilitate the transportation works for the cut-back of the existing engineered slope and the construction of the Water Treatment Works Logistics Centre as mentioned in Section 8.6.1 of the approved EIA Report. Upon completion of the above mentioned works, the affected area for construction of temporary access road together with the other two locations marked within (1) & (2) in **Appendix 2** will turn into the compensatory woodland area within STWTW. The habitat at the enhanced compensatory woodland area is shown in **Appendix 3** and the impacts to plantation had been mentioned in the Section 8.7.4 of the approved EIA Report that "*The Project would unavoidably require removal of the existing vegetation in secondary woodland, plantation and developed area habitats. Vegetation cover in the plantation and developed area is low and the affected vegetation is confined to common and amenity planting.....*" Furthermore, the overall impact evaluation of plantation had been summarized in Table 8.19 of the approved EIA Report and it was concluded that the overall impact was low. Besides, the numbers of tree/vegetation to be affected within the enhanced compensatory woodland area had been taken into account in the approved EIA Report. Approval on tree felling within the enhanced compensatory woodland area has also been granted by the District Land Office in July 2015. The approval letter together with the submitted tree survey plans is in **Appendix 4**. The photos of the enhanced compensatory woodland area are shown in **Appendix 5**. As such, the total numbers of trees to be planted as proposed in the approved EIA Report can be increased from 660 nos. to 731 nos. (i.e. with additional planting within the enhanced compensation area); whereas the details are in Section 2.2.3 & Table 1 below.



2.1.3. In general, the spacing of planting for light and heavy standard trees are approximately 3 metres (centre to centre) and 3.5 metres (centre to centre) respectively. In these specified sites, the above guideline will be followed as far as practicable.

**2.2. NATIVE TREE SPECIES AND SIZE OF TREES TO BE SELECTED FOR PLANTING WITH JUSTIFICATIONS**

2.2.1. A strategy on the native tree species and size of trees to be selected for planting with justifications are proposed as follows:

2.2.2. After conduction of tree survey, the numbers of affected trees were found to be 647 instead of 652 as stated in approved EIA Report. As a result, 5 numbers of trees were excluded from tree felling list and could be retained. The involved trees species were *Citrus maxima*, *Ficus microcarpa* (2 nos.), *Bombax ceiba*, *Schefflera heptaphylla*.

2.2.3. In order to compensate for the affected total 647 nos. of trees, total 731 nos. of compensatory trees including approximate 147 nos. of heavy standard trees with average Diameter at Breast Height (DBH) 110 mm and 368 nos. of light standard trees with average DBH 35 mm as well as 216 nos. of seedling size trees are proposed to compensate the local greenery in the ratio 1:1 to the number. The recommendations for woodland compensation for trees were slightly different from the ones stated in the approved EIA Report, as shown in Table 1 below. The discrepancies were because the actual spaces suitable for planting of heavy standard trees were smaller than before as the site were constrained by some underground utilities and valve covers. The compensatory trees will be planted within STWTW, STSFWSR and STWSR.

Table 1: Differences in the findings/recommendations between this Woodland Compensation Plan and the Approved EIA Report

	<b>Findings &amp; Recommendations in this WCP</b>	<b>Findings &amp; Recommendations in the Approved EIA Report</b>
No. of Trees to be affected	647	652
No. of Heavy Standard Trees to be Planted (a)	147	200
No. of Light Standard Trees to be Planted (b)	368	460
No. of Trees in Seedling Size to be Planted (c)*	216	0
Total No. of Trees to be Planted (a) + (b) + (c)	731	660

Remark: \*the actual number of seedling size trees will be determined during planting period.

### *On-site Planting at STWTW*

- 2.2.4. Construction of STWTW Logistics Centre and the proposed access road and the associated slope stabilization works will involve the slope cutting, stabilization works, site formation and utilities works which affect the existing secondary woodland on slopes. The slope gradient of the slope area for planting tree will be about or less than 35° within STWTW upon works completion. A mixture of seedling size trees will be planted to create habitat of higher structure complexity to provide more ecological niches. Eventually, the proposed seedling size tree planting aims at establishing secondary woodland in long run. Light standard trees are with larger tree crown which can provide necessary greenery on the cut slope in short time after finished the construction work. However, the dimension of light standard trees is about 2-3 meters in height and its root ball is about 30 cm x 30 cm in size. Light standard tree will become unstable and easily resulting in tree failure especially under strong wind after planting on slope area. On the contrary, the dimension of seedling size tree is about 0.15-0.9 meters in height only. Thus, the stability of seedling size tree is higher than light standard tree. In addition, seedling size tree will easily adapt to slope environment when it is growing up to mature tree size. As such, only seedling size trees will be selected for the planting on disturbed slope area. The compensatory planting stock size and density have taken into account to meet the relevant guidelines on steepness of slope, in particular those stipulated in Geotechnical Engineering Office (GEO) Publication No. 1/2011. Please refer to drawing in Appendix 2 for the location marked with (1). The species of light standard trees to be planted are listed in Table 2.
- 2.2.5. Apart from the sloping areas, available planting areas within STWTW (including enhanced compensatory woodland area) will be planted with heavy standard trees where possible, to compensate the affected tree within the STWTW. They will be planted after the concrete removal and soil preparation works. In general, native flora species used for woodland compensation will be either similar to those native species recorded within the woodland nearby or commonly found from secondary woodland in Hong Kong. Please refer to the drawing in **Appendix 2** for the locations marked with (2) and highlighted in blue respectively. The species of heavy standard trees to be planted are listed in Table 3.

### *Off-site Planting at STSFWSR*

- 2.2.6. For STSFWSR, the proposed planting location is gentle flat area and is currently covered by concrete surface. It is proposed to planting light standard trees after removal of concrete surface and soil preparation works. The species of light standard trees to be planted are listed in Table 2. Please refer to the drawing in **Appendix 6**.

### *Off-site Planting at STWSR*

- 2.2.7. In June 2018, the original proposed compensation planting site at STWSR (size 2055 m<sup>2</sup>) was requested by the Hong Kong Police Force to modify as a carpark in urgent need next to Yau On Street to solve the heavy traffic congestion. Therefore the original compensation planting is now proposed to shift backwards. The newly proposed planting site (size 2074 m<sup>2</sup>) would have same capacity for planting 240 Nos. of light standard native trees suggested in the previously approved Woodland Compensation Plan.



- 2.2.8. Preliminary site visits indicated that the habitat of compensation planting site would be shifted from a concreted wasteland to grassland. Both the original and newly proposed sites are enclosed by wire mesh. They are adjacent to Po Fook Memorial Hall on top of vegetated man-made features along Lower Shing Mun Road. In order to assess the ecological value and evaluate any ecological impact to such shifting of compensatory planting site, ecological survey and tree survey were conducted on 5<sup>th</sup> July and 23<sup>rd</sup> July 2018 respectively to verify such habitat, vegetation and wildlife community, with focus on any species of conservation importance inhabiting at this newly proposed site. The Ecological Survey Report and Tree Survey Report are shown in **Appendix 7** and **Appendix 8**. According to the ecological and tree survey results, there is no special treatment required by this alternative compensative area as this open grassland is mixed with spare landscape plantation and existing soil is in good condition for future compensation planting. Planting pits will be dug according to the tree planting plan and any use of mulching of fertilizer for newly planted trees will be decided by the landscape/horticultural contractor, who will also be responsible for watering via water trucks and routine maintaining these compensation plantings during the establishment period.
- 2.2.9. The ecological survey concluded that the proposed shifting of compensatory planting site would be environmentally acceptable with no significant adverse ecological impacts. The site area is small with low number of native species to be affected. Therefore the potential ecological impact at the newly proposed site caused by the shifting should be similar to that of the originally proposed site. Such potential ecological impact is insignificant. Indirect impacts during construction phase such as human disturbance, and other environmental impacts such as construction dust and noise to the nearby habitats are also insignificant as the new site also has low ecological linkage with other habitats.
- 2.2.10. It is proposed to plant light standard trees in this area for better establishment of secondary woodland in long run. The species of light standard trees to be planted are listed in Table 2. Please refer to the drawing in **Appendix 9**.

Table 2: Proposed Light Standard Trees and Seedling Size Trees  
with 3-metres spacing

Chinese Name	Scientific Name	Status
小葉青岡	<i>Cyclobalanopsis myrsinifolia</i>	Native
黃牛木	<i>Cratoxylum cochinchinense</i>	Native
土蜜樹	<i>Bridelia tomentosa</i>	Native
梭羅樹	<i>Reevesia thyrsoidea</i>	Native
三椏苦	<i>Melicope pteleifolia</i>	Native
餘甘子	<i>Phyllanthus emblica</i>	Native
大頭茶	<i>Polyspora axillaris</i>	Native
野漆樹	<i>Rhus succedanea</i>	Native
籐欖	<i>Zanthoxylum avicennae</i>	Native
白背葉	<i>Mallotus apelta</i>	Native

Table 3: Proposed Heavy Standard Trees with 3.5-metres spacing

<b>Chinese Name</b>	<b>Scientific Name</b>	<b>Status</b>
秋楓	<i>Bischofia javanica</i>	Native
陰香	<i>Cinnamomum burmannii</i>	Native
樟樹	<i>Cinnamomum camphora</i>	Native
朴樹	<i>Celtis sinensis</i>	Native
木荷	<i>Schima superba</i>	Native
南酸棗	<i>Choerospondias axillaris</i>	Native
珊瑚樹	<i>Viburnum odoratissimum</i>	Native
潺槁	<i>Litsea glutinosa</i>	Native
鴨腳木	<i>Schefflera heptaphylla</i>	Native
山油柑	<i>Acronychia pedunculata</i>	Native
鼠刺	<i>Itea chinensis</i>	Native
假蘋婆	<i>Sterculia lanceolata</i>	Native
銀柴	<i>Aporosa dioica</i>	Native

### 2.3. SCHEDULE FOR TREE PLANTING

As the Woodland Compensation Area (WCA) is predominantly areas to be temporarily affected by the proposed works and temporal storage of the Project, it is expected that the implementation of the woodland compensation can hardly start until the construction works of the Project is substantially completed. Nevertheless, the tree planting works in the WCA should be undertaken at the earliest possible opportunity in order to shorten the time lag between the occurrence of the ecological impact and establishment of the mitigation measure. Also, the planting works should be undertaken at the right planting season to maximise survivorship. The schedule for tree planting/post-plantation works are shown in Table 4. The details of post-planting monitoring and maintenance program are in Section 3.



Table 4: Schedule for Tree Planting and Post-planting Works

	Year *1				Year* 2				Year* 3				Year* 4			
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr
<b>Pre-planting</b>																
<b>Planting works</b>					R	R										
<b>Establishment***</b>									R	R			R	R		
<b>6-year post-planting monitoring and maintenance (Tree planting) *****</b>																

	Year *5				Year* 6				Year *7			
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr	Qtr
<b>Pre-planting</b>												
<b>Planting works</b>												
<b>Establishment***</b>	R	R			R	R			R	R		
<b>6-year post-planting monitoring and maintenance (Tree planting) *****</b>												

Remarks: R = replacement planting, as required

\* Year refers to the time after completion of construction works or after the identified earliest possible planting opportunity;

\*\* Pre-planting works refer to the preparation works for planting

\*\*\* Establishment include those for replacement planting, if any

\*\*\*\* Details are in Section 3

**2.4. RECOMMENDATION OF THE IMPLEMENTATION DETAILS, MANAGEMENT REQUIREMENT AND INSPECTION ARRANGEMENT OF THE WOODLAND COMPENSATION AREA, WITH DUE CONSIDERATION ON THE POTENTIAL ECOLOGICAL INVASION CAUSED BY INVASIVE PLANT SPECIES**

***IMPLEMENTATION AND MAINTENANCE ARRANGEMENT***

2.4.1. Both the implementation and maintenance of the compensatory planting will be fully funded by WSD, the Project proponent, whose contractor will be responsible for the planting and maintenance works during the planting phase and the 6-year post-planting monitoring period as shown in Table 5.

Table 5: Inspection and Maintenance during Planting and Post-planting periods

	<b>Planting Phase</b>	<b>6-year Post-planting Period</b>
<b>Inspection frequency</b>	Bi-weekly	Bimonthly during the first year of the planting stage, and then reduced to quarterly from the second year.
<b>Maintenance and establishment works</b>	All necessary regular maintenance in accordance with the General Specification for Civil Engineering Works (2006) Section 3 – Landscape Softworks and Establishment Works	As specified in <b>Section 3</b>

#### ***PLANTING MANAGEMENT***

- 2.4.2. The proposed planting management works include monitoring and establishment of softworks which aim to ensure that the compensation meets the planting performance in accordance with the requirements of the planting strategy.
- 2.4.3. The specifications for standard practices of inspection and establishment works will follow the General Specification for Civil Engineering Works (2006) Section 3 – Landscape Softworks and Establishment Works. The inspection of planting works shall be carried out bi-weekly to determine the maintenance / establishment works which are required.
- 2.4.4. To ensure the establishment of the WCA, a 6-year post-planting monitoring is proposed, apart from the standard practices and site inspections regularly conducted by the landscape contractors. The necessity for further monitoring would be reviewed after the 6-year post-planting monitoring programme.
- 2.4.5. The 6-year post-planting monitoring of planting includes parameters of general health condition and survival rate; while establishment works would include basically replacement of dead plants, weeding and watering.
- 2.4.6. Monitoring is proposed to be carried out by means of inspection walk. Monitoring in inspection walk aims to observe the planting within the WCA.

#### ***CONTROL OF INVASIVE PLANT***

- 2.4.7. Invasive species, such as *Leucaena leucocephala* and *Mikania micrantha*, weeds, unwanted species and parasitic plants on the whip tree planting will be removed during weeding.



**3. A DETAILED AT LEAST 6 YEARS POST-PLANTING MONITORING AND MAINTENANCE PROGRAMME. PARAMETERS, INCLUDING HEALTH CONDITION, SURVIVAL RATE OF PLANT, CONTROL OF WEEDY PLANT, SHALL BE MONITORED**

**3.1. POST-PLANTING MONITORING**

- 3.1.1. The post-planting monitoring shall be supervised by a qualified botanist / ecologist (Project Botanist / Ecologist) who will be a member of the Environmental Team (ET).
- 3.1.2. To maximise monitoring effectiveness and provide a more accurate general overview of the planting areas, inspection walk, is proposed for the post-planting monitoring. All planting trees will be tag with number such as T1, T2...and T4 etc.
- 3.1.3. As the post-planting monitoring conducted through inspection walk aims to observe the general condition of the WCA, each of the WCAs (i.e. within STWTW, STSFWSR and STWSR) will be walking through. The general health condition (good / fair / poor / dead) and status of planted trees will be recorded by direct observation for each of WCA. The table as shown in Table 6 should be completed after each inspection walk in order to quantify the percentage of individuals in poor health and survival rate for each species in each of WCA.

Table 6: Inspection Record for Post-planting Monitoring

Tree No.	Species	Health condition (Good, Medium, and Poor)	Status (Dead or alive)	Remark
STWTW				
T1				
T2				
T3				
⋮				
STSFWSR				
T1				
T2				
T3				
⋮				
STSFWSR				
T1				



T2				
T3				
⋮				

### 3.2. POST-PLANTING MAINTENANCE

The detailed maintenance programme for the 6-year post-planting period is shown in Tables 8.

Table 8: Detailed Maintenance Programme for the 6-year Post-planting Period

	1 <sup>st</sup> M	2 <sup>nd</sup> M	3 <sup>rd</sup> M	4 <sup>th</sup> M	5 <sup>th</sup> M	6 <sup>th</sup> M	7 <sup>th</sup> M	8 <sup>th</sup> M	9 <sup>th</sup> M	10 <sup>th</sup> M	11 <sup>th</sup> M	12 <sup>th</sup> M
<b>Watering *</b>	2/W	2/W	2/W	2/W	1/W	1/W	1/W	1/W	2/W	2/W	2/W	2/W
<b>Fertilizing</b>			1						1			
<b>Pruning and selective thinning</b>	R			R			R				R	
<b>Pest Control **</b>	R	R	R	R	R	R	R	R	R	R	R	R
<b>Weeding ***</b>	R	R	R	R	R	R	R	R	R	R	R	R
<b>Replacement planting</b>			R	R	R	R	R	R	R	R		
<b>Refuse collection</b>	R	R	R	R	R	R	R	R	R	R	R	R

Remarks: W = Week; R = as required; M = Month

- \* Frequency of watering as shown is for reference only and should be adjusted according to site conditions and rainfall.
- \*\* To minimize impact on establishing insect communities in the WCA, pest control will be undertaken only as required.
- \*\*\* Invasive species, such as *Leucaena leucocephala* and *Mikania micrantha*, weeds, unwanted species and parasitic plants on the whip tree planting will be removed during weeding.

### 3.3. REPORTING

- 3.3.1 The monitoring findings, site observations, recommendations on woodland management and remedial measures taken shall be reported in the periodic Environmental Monitoring and Audit (EM&A) reports.
- 3.3.2 A 6 years post-planting review report will be submitted within a month after completion of the at least 6 years post-planting monitoring and maintenance. The report will be prepared by qualified ecologist and to recommend the need for further monitoring with justification.



#### 4. CONCLUSION

The Woodland Compensation Plan has been developed to facilitate the establishment of the WCA to mitigate for the affected woodland habitat due to the implementation of the Project. The WCA is divided into three different areas (i.e. within STWTW, STSFWSR and STWSR). In June 2018, the original proposed compensation planting site was requested by the Hong Kong Police Force to modify as a carpark in urgent need next to Yau On Street to solve the heavy traffic congestion. Therefore the original compensation planting is now proposed to shift backwards. The newly proposed planting site would have same capacity for planting 240 Nos. of light standard native trees suggested in the previously approved Woodland Compensation Plan. In order to assess the ecological value and evaluate any ecological impact to such shifting of compensatory planting site, ecological survey and tree survey were conducted on 5<sup>th</sup> July and 23<sup>rd</sup> July 2018 to verify such habitat, vegetation and wildlife community, with focus on any species of conservation importance inhabiting at this newly proposed site. The ecological survey concluded that the proposed shifting of compensatory planting site would be environmentally acceptable with no significant adverse ecological impacts. Different tree planting mixes are proposed in these three areas with reference to their specific site conditions. To ensure the planting works are properly implemented, bi-weekly monitoring is proposed throughout the planting phase. The frequency of monitoring is proposed to be bi-monthly during the 6 years post-planting monitoring. The monitoring findings and recommendations will be included in periodic EM&A reports. A 6 years post-planting review report will be submitted within a month after completion of the at least 6 years post-planting monitoring and maintenance. The necessity for further monitoring shall be reviewed in the 6 years post-planting review report.

## **Appendix 1**

### **Curriculum Vitae of the Qualified Ecologist**



## CURRICULUM VITAE

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### MR. PAK-HO WAN, JAY

Position: Ecologist

Ecological Experience: 13 years

Language: Cantonese (Native), English (Fluent), Mandarin (Fluent)

Email address: jayconservation@gmail.com

#### FIELDS OF COMPETENCE

Ecological Impact Assessment (EcoIA), Landscape & Visual Impact Assessment (LVIA), Preliminary Environmental Review (PER), EM&A, Tree Risk Assessment, Tree Preservation & Removal Proposal (TPRP), BEAM Plus SA5 Ecological Impact Assessment, Mammalogy, Camera Trapping, Aquatic Fauna Survey, Herpetology, Wildlife Management, Terrestrial Ecology, Environmental Education, Conservation

#### PROFESSIONAL SERVICE

**Member**, IUCN Species Survival Commission Small Mammal Specialist Group 2013 – present  
**Regional Implementation Team**, Critical Ecosystem Partnership Fund in Indo-Burma Hotspot (CEPF). May 2013 – September 2014

**Certified Arborist** (HK-1269A) of International Society of Arboriculture 2015

**ISA Qualified TRAQ** 2017 – 2022

**ISA Headquarters & Hong Kong Chapter Member** 2017 – 2018

#### KEY QUALIFICATIONS

Jay is a professional ecologist specializing in mammalogy and plant-animal interaction. He has over 13 years of experience in ecological studies in Hong Kong and overseas. Apart local ecological consultancy, he has conducted extensive *in-situ* ecological studies and managed conservation programmes across wider Austroasiatic region, including tropical and karst region in South and Southwest China, Singapore, Laos, Malaysia (Sarawak), Indonesia (Bali, Sumatra) and Australia.

Jay helps several national-class nature reserves to reinforce conservation mitigations, wildlife monitoring and habitat management. In 2013, he organized the first international workshop of its kind in Hainan, China on camera trapping for wildlife conservation and monitoring, in collaboration with Hainan Wildlife Conservation Bureau and Hainan Provincial Forestry Department. As one of the key conservation team members of Kadoorie Farm & Botanic Garden (KFGB) since 2008, he made significant contributions in conserving critically endangered mammal and reptiles in South China and Hong Kong through field surveys and educational programmes. In 2014-2015, he co-organized and conducted wildlife surveys with an international ecology team for the Cross Island Line railway contracted by Land Transport Authority, Government of Singapore.

Recently Jay has based in Hong Kong, focusing on ecological surveys, assessments, audits; and providing recommendations at different scales, from CEDD's Landslip Prevention and Mitigation Programme (LPMitP), EPD's EcoIA, PER and Project Profiles, AFCD's biodiversity consultancy, to ecological impact of BEAM Plus (SA5) to private clients.

Jay is also a front-line conservationist who has organized various scientific workshops, warden trainings and public awareness raising outreach. He has been managing a 3-million grant for various conservation projects in the Regional Implementation Team of Critical Ecosystem Partnership Fund at Indo-Burma Hotspot.

### EDUCATION

**MPhil** in Terrestrial Ecology and Mammalogy, 2008, Department of Ecology & Biodiversity, The University of Hong Kong  
**BSc (Hons)**, Environmental Life Science, 2006, Department of Ecology & Biodiversity, The University of Hong Kong

### WORKING EXPERIENCES

1. **Ecologist** (July 2017 – present), Acumen Environmental Engineering & Technologies Co. Ltd. Provide ecological consultancy and survey service, participating in ecological assessment under green building certification scheme and carrying out ecological investigation.
2. **Independent Ecologist** (May 2015 – present) Manage ecological research and education programme, provide environmental/ ecological consultancy in Hong Kong and Overseas.
3. **Consultant** (October 2014 – April 2015), Landscape & Ecology Team, ERM (HK) Ltd. Provide consultancy services of EcoIA, LVIA, EM&A and IEC. Act as a key terrestrial ecologist for environmental projects in HK and SE Asia. Design and conduct field surveys on various wildlife groups.
4. **Surveyor** (April 2015 – present), Hong Kong Bird Watching Society. Conduct night surveys for herpetofauna in wetland at the NW New Territories, Hong Kong.
5. **Conservation Officer** (September 2008 – September 2014), Kadoorie Conservation China, Kadoorie Farm and Botanic Garden. Manage herpetofauna and mammal conservation projects. Conduct ecological research and biodiversity surveys in China. Provide training of forest and wetland survey techniques.
6. **Surveyor and report writer** (February 2009 – February 2010), Conservancy Association. Conduct surveys and write reports for parts of mammals and herpetofauna in Long Valley and Ho Sheung Heung, Hong Kong.
7. **Trainee** (February 2008), Ocean Park Conservation Foundation, Hong Kong. University Student Sponsorship Programme – Abundance and Distribution of Tiger and Prey, and Prey Selection by Large Carnivores in a Montane Tropical Forest of Northern Lao PDR. Conduct camera trapping and scat analysis of tiger and occupancy survey of prey.
8. **Vessel surveyor** (2006 – 2007), BMT Asia Pacific Ltd. Conduct vessel survey of marine mammals in the project ‘Hong Kong Offshore Wind Farm in Southeastern Waters’.
9. **Research Assistant** (June – July 2005), Department of Ecology and Biodiversity, The University of Hong Kong. Conducted a 3000-cuttings outdoor experiment at a native tree nursery
10. **Trainee** (January – February 2005) General Education Unit, The University of Hong Kong, Eco-Education & Resources Centre, Peking University – Biodiversity Research Institute. Study tour of White Headed Langur (*Trachypithecus poliocephalus leucocephalus*) conservation in Chongzuo, Guangxi
11. **Trainee** (July – August 2004) Agriculture, Fisheries and Conservation Department and Hong Kong Dolphin Conservation Society. Dolphin Conservation Ambassador Training Program.

**ORGANIZER OR MAIN FACILITATOR OF WORKSHOP**

**International Conservation Planning Workshop for the Hainan Gibbon**, Boao, Hainan, China. (16 – 20 March 2014).

Supporting organizer of Zoological Society of London together with IUCN SCC Conservation Breeding Specialist Group and Fauna & Flora International

**Camera Trap Workshop for Wildlife Conservation and Monitoring**, Yinggeling Nature Reserve, Hainan, China (4 – 8 March, 2013).

In collaboration with Hainan Wildlife Conservation Bureau, Hainan Provincial Forestry Department; 70 delegates from nature reserves in 6 provinces, with experts from Malaysia, Beijing, Hong Kong and Taiwan.

**CONFERENCES PRESENTATIONS**

1. Association for Tropical Biology & Conservation (ATBC) Asia-Pacific Chapter Meeting 2008 (Kuching), 2010 (Bali), 2013 (Sumatra).
2. Conservation of Asian Tortoises and Freshwater Turtles Workshop 2011 - Setting Priorities for the Next Ten Years, Singapore
3. China Primate Specialist Group: International Workshop for the Gibbon Conservation in China 2012. Yunnan, China

**PREVIOUS RESEARCH WORK**

Rehabilitation of degraded landscape through hardwood and semi-hardwood stem cuttings of native tree species and medium-large mammal seed dispersers in Hong Kong, by means of *in-situ* and manipulated experiments.

**SELECTED PUBLICATIONS**

1. **Wan, J.P.H.**, B.P.L. Chan, C. Liao, H. Mi, M.W.L. Lau, F. Li, H. Wang and Y.H. Sung. 2015. Conservation Status of Freshwater Turtles in Hainan Island, China: Interviews and Field Surveys at Yinggeling Nature Reserve. *Chelonian Conservation and Biology* 14(1):100–103.
2. **Wan, J.P.H.**, B.P.L. Chan and H. Wang. 2014. Intake of an ethnomedical shrub by Yellow-bellied Weasel *Mustela kathiah*. *Small Carnivore Conservation* 51: 34–37.
3. Sung Y.H., T. Chen, F. Li, **J.P.H. Wan**, Y. Meng, J.H. Yang. 2014. *Bubo nipalensis* found in Nonggang, Guangxi. *Chinese Journal of Zoology* 6: 903.
4. Chen T., Y.H. Sung, B.P.L. Chan, Y. Meng, **P.H. Wan (corresponding author)**. 2013. Influence of surface water availability on mammal distributions in Nonggang National Nature Reserve, Guangxi, China. *Zoological Research* 34(3): 145–151.

## Selected Recent Job References of Jay Wan

1. **Agreement No. GE/2013/27 Landslip Prevention and Mitigation Programme, 2011, Package A Landslip Prevention and Mitigation Works in Hong Kong Island Batch B - (2017)**

**Transplantation Work** - Need for transplantation of species of conservation importance is identified under this Agreement and this project requires botanists for minimize the ecological impact to the Works Area.

**Ecological Advisor & Botanist:** responsible for the preparation of Orchid Transplantation Protocol and transplantation of species of conservation importance. Supervise and monitor the native seedlings planted for ecological restoration at disturbed area.

**Post-transplantation Work & Ecological Restoration Plantation** - Provide guidance and monitoring of recommended native tree and shrub seedlings planted in disturbed area to restore ecological function as a mitigation measure.

**Ecological Advisor & Botanist:** responsible for post-transplantation monitoring of the transplanted individuals and individuals retained *in-situ*; also responsible for preparation of Ecological Restoration Planting Proposal, on-site supervision, and monitoring of planted seedlings.

2. **Agreement No. CE 37/2013 (GE) Study of Landslides Occurring in Hong Kong Island and Outlying Islands in 2014 and 2015 - Feasibility Study -(2016)** This project involves a plant survey with special focus on rare and precious species at natural hillside above Po Shan Road, Hong Kong Island; and a man-made feature at Shek Pik, Lantau Island.

**Botanist:** responsible for the plant survey and reporting.

3. **Contract No. HY/2017/03 Preventive Maintenance Programme of Roadside Man-made Slopes/ Retaining Walls in Urban Region (Package B) - (2017)**

**Ecological Survey** - Special focus on species of conservation importance on a feature located within Lion Rock Country Park or Conservation Area.

**Ecologist:** responsible for day and night-time on various taxa groups, habitat and vegetation survey, reporting and providing recommendations.

4. **Project No.: 2016-826NB(M), Proposed Composite Re-Development at No. 74, 74 A-C Waterloo Road & No. 15-25 Yau Moon Street, Kowloon, Hong Kong - BEAM Plus New Building Version 1.2 - Ecological Impact (SA5) - (2017)**

**Ecologist:** responsible for ecological field survey under the BEAM Plus Scheme, completion of SA5 Form and prepare an ecological survey report as a supporting document.

5. **Contract No. GE/2016/01, Landslip Prevention and Mitigation Programme, 2016, Package K, Landslip Prevention Works in Hong Kong Island, Kowloon, New Territories and Outlying Islands - (2017)**

**Ecological Survey** - Special focus on species of conservation importance on two features located within Tai Tam Country Park or Conservation Area.

**Ecologist:** responsible for day and night-time on various taxa groups, habitat and vegetation survey, reporting and providing recommendations.

6. **Agreement No. CE45/2014 (GE) Landslip Prevention and Mitigation Programme, 2014, Package B, Landslip Prevention and Mitigation Works and Provision of Emergency Works Services for Natural Terrain Landslides Occuring in Mainland West (South) - Investigation,**

**Design and Construction Feature Nos. 6NE-C/C91, 6NE-C/FR34, 6SW-C/CR587, 6SW-D/FR163 and 11NW-A/C271 (2016)**

**Form 2 Detailed Tree Risk Assessor and Botanist:** responsible for the tree survey, species identification, risk assessment and reporting.

7. **Application No. A/H18/75 Planning Application in Support of Proposed Extension of the Academic Building and Residential Institution of the Swire Institute of Marine Science (SWIMS) at Cape D' Aguilar, Shek O (2017 –ongoing)**

**Ecologist:** responsible for Environmental Monitoring and Audit (EM&A) based on the Project Profile and direct EP conditions on Ecology as part of the Environmental Team (ET).

8. **Agreement No. DC/2014/01 - Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage – (2015 – ongoing)** This project involves Ecological and Landscape & Visual EM&A of a sewage pumping station.

**Ecologist:** responsible for Ecological and LV EM&A in the Environmental Team (ET).

9. **Agreement No. CE 48/2014(GE), Landslip Prevention and Mitigation Programme, 2014, Package E, Landslip Prevention and Mitigation Works – Investigation, Design and Construction – (2017)**

**TPRP –Tree Preservation and Removal Proposal for six man-made features with (TRA) Tree Risk Assessment (Form 1) for selected feature.**

**Arborist:** responsible for inspection, endorsement, reporting and auditing.

**Ecological Survey –** Special focus on species of conservation importance on Feature No. 11SE-D/C104 and 11SE-D/C669

**Ecologist:** responsible for day and night-time on various taxa group, habitat and vegetation survey, reporting and providing recommendations.

10. **Agreement No. CE 50/2014 (GE) Landslip Prevention and Mitigation Programme, 2014, Package G, Landslip Prevention and Mitigation Works – Investigation, Design and Construction (2015 –2017)**

**Special Task: A study with site trial on the hydroseeding specification for slopes –** This project aims at studying and investigating the enhancement of hydroseeding specification for slopes in Hong Kong, with a site trial experiment.

**Botanist:** responsible for slopes inspections, implementation and evaluation of site trial experiment.

11. **Agreement No. CE 51/2014 (GE) Landslip Prevention and Mitigation Programme, 2014, Package H, Landslip Prevention and Mitigation Works – Investigation, Design and Construction (2015 –2017)**

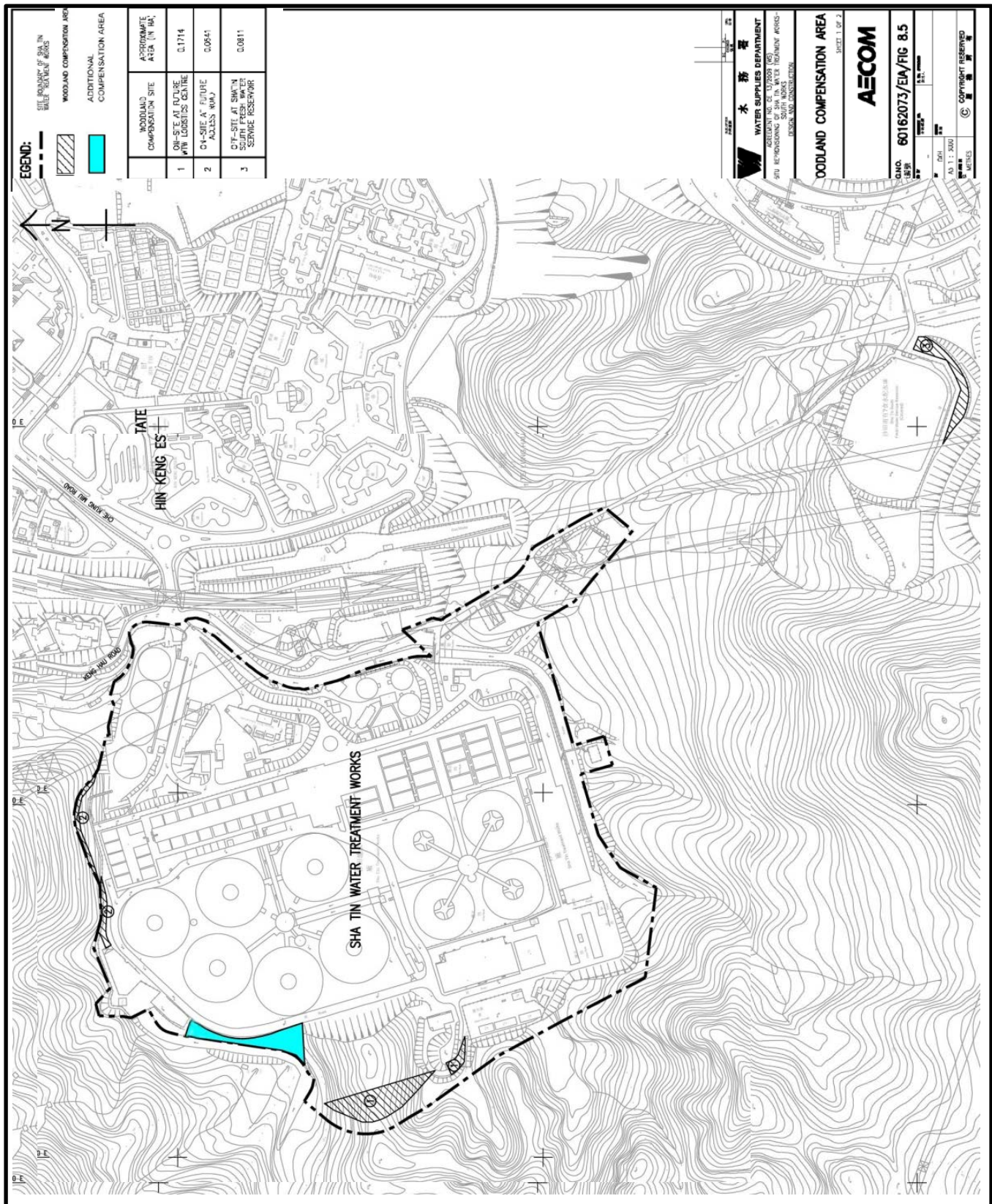
**Special Task: A study on the performance assessment of the proprietary greening techniques on slopes with hard cover –** This project aims at evaluating the vegetation performance after the application of proprietary greening techniques on slopes with hard cover.

**Botanist:** responsible for preparation of technical proposal, vegetation performance evaluation and survey; and preparation of study report.

## **Appendix 2**

### **Compensatory Planting Plan for Sha Tin Water Treatment Works and Sha Tin South Fresh Water Service Reservoir**

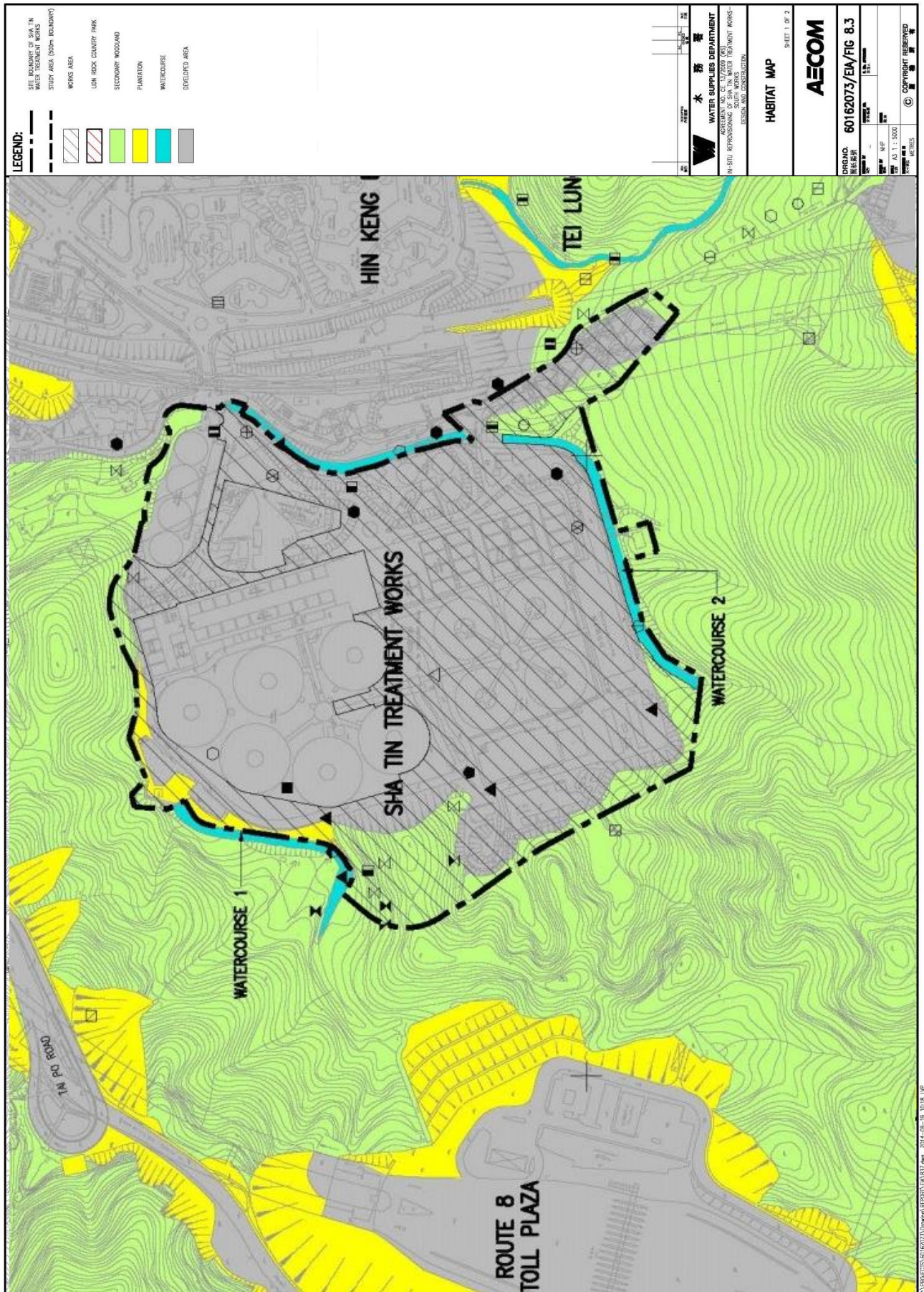
Water Supplies Department  
 In-situ Reprovisioning of Sha Tin Water Treatment Works – South Works  
 Woodland Compensation Plan



## **Appendix 3**

### **Location of Works Area of the Project and Habitat at the Enhanced Compensatory Woodland Area**





## **Appendix 4**

### **District Lands Office's Approval on Tree Felling for the Project**

21-JUL-2015 16:42 LANDS DEPT

+852 3104 1211 P.001/001

Please quote our reference in your reply

MEMO

URGENT BY FAX



From District Lands Officer, Sha Tin  
Ref. (15) in L/M(1) in LD DLO/ST 66/158  
Tel. 2158 4750  
Fax No. 2602 4093  
Email sesstnw@landsd.gov.hk  
Date 21 July 2015

To CE/PM, WSD  
(Attn.: Mr. Leonard K LAM)  
Your Ref. (51) in WSD 4996/R/4/3/3 Pt.1  
dated 16.12.2014  
Fax No. 2586 1696  
Total Pages \_\_\_\_\_

**Tree Felling, Transplanting and Planting Application**  
**In-situ Re provisioning of Sha Tin Water Treatment Works – South Works**  
**Permanent Government Land Allocation No. ST-365**

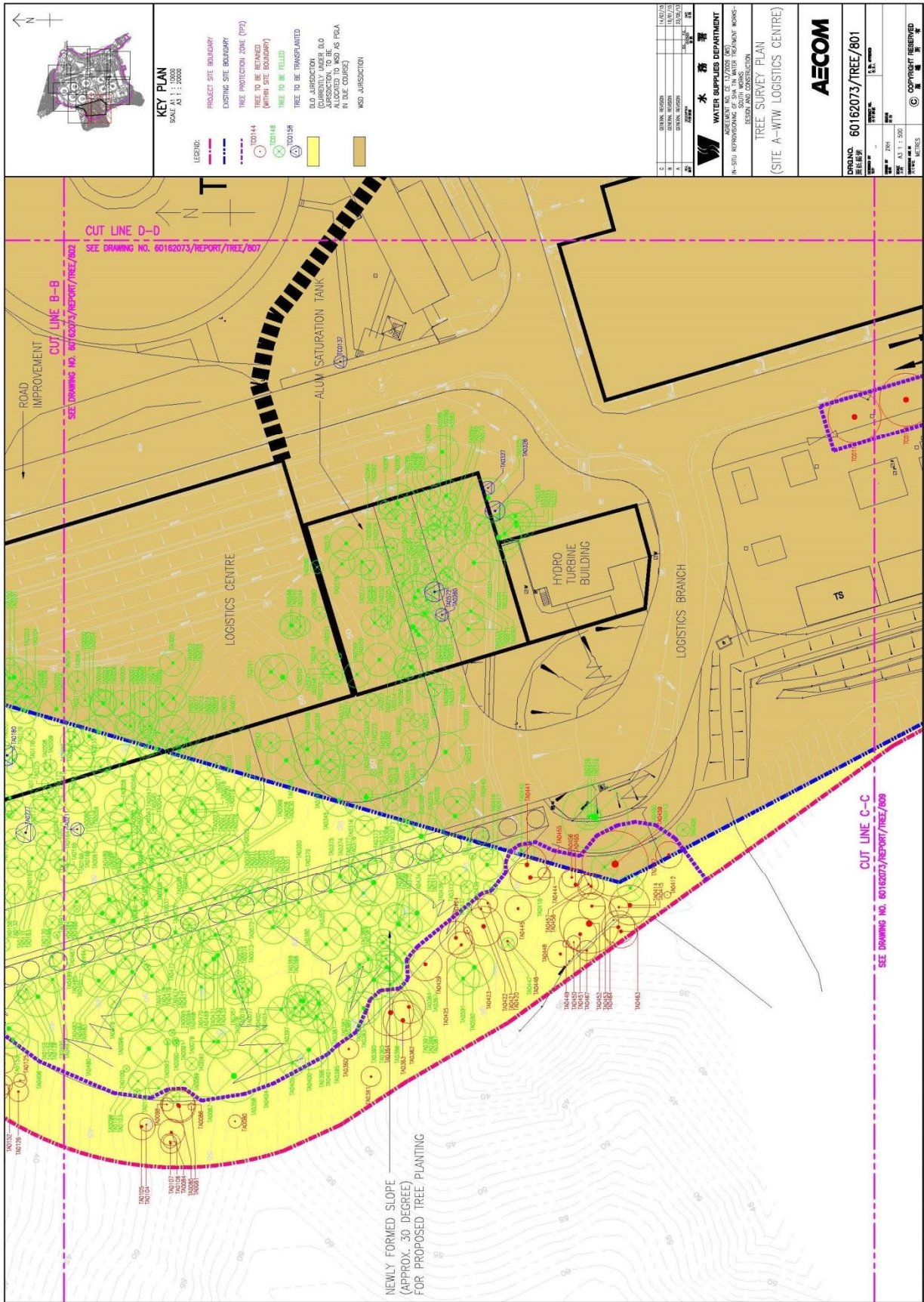
I refer to your MUR and the supplementary information provided in your email of 16 July 2015.

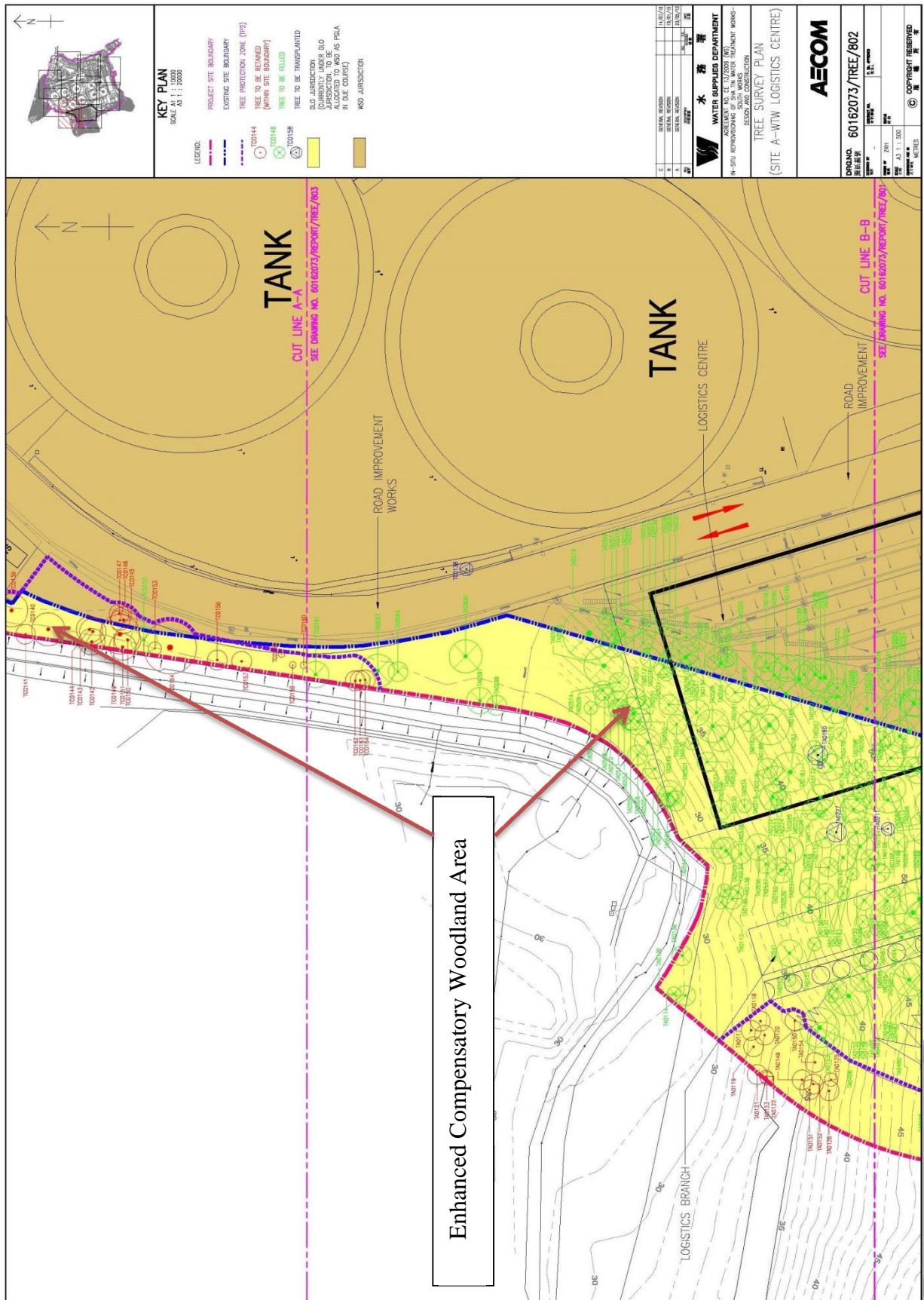
2. Approval is hereby given under Engineering Condition No. (12) of the Permanent Government Land Allocation No. ST-365 for the removal of 678 trees (i.e. 647 existing trees and 31 dead trees), transplanting of 39 existing trees and planting of 731 compensatory trees as shown on Tree Survey Plans and Compensatory Planting Plans of your email dated 16 July 2015.

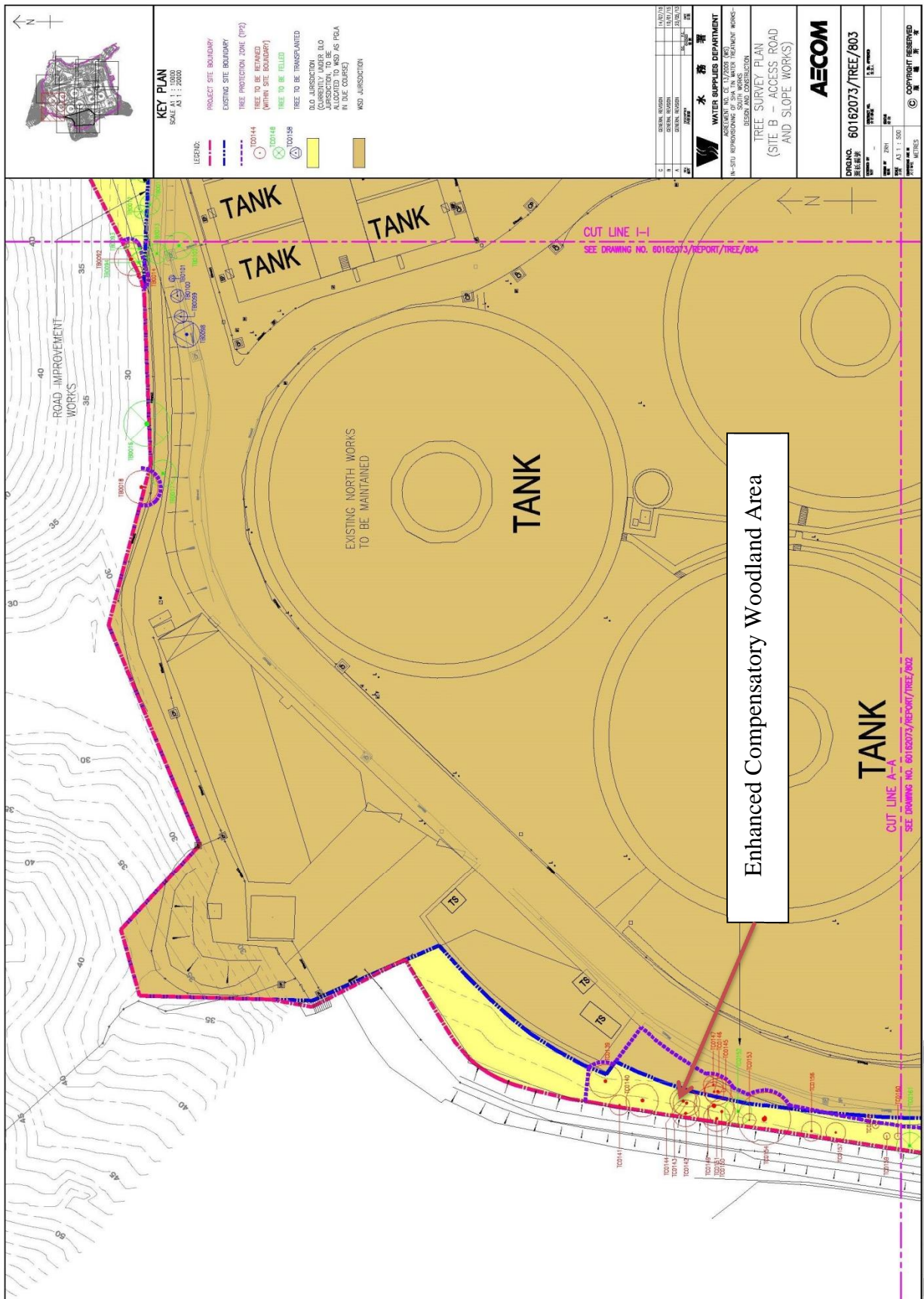
3. As advised by Tree Preservation Board, the tree planting plan should meet the requirements stipulated in TMO's prevalent tree planting guidelines.

( Miss Karen POON )  
for District Lands Officer, Sha Tin

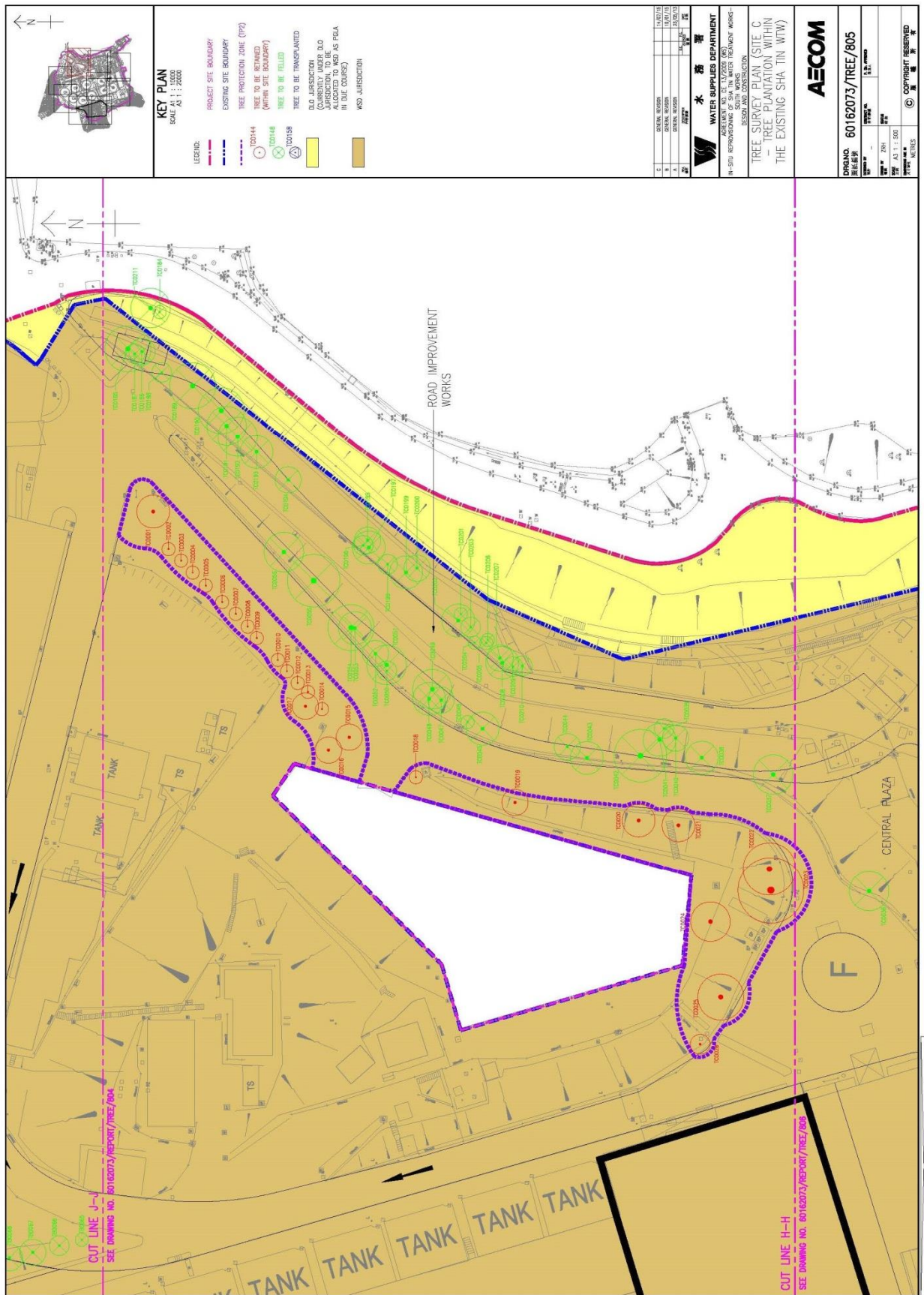
c.c. LD DLO/ST 1/62



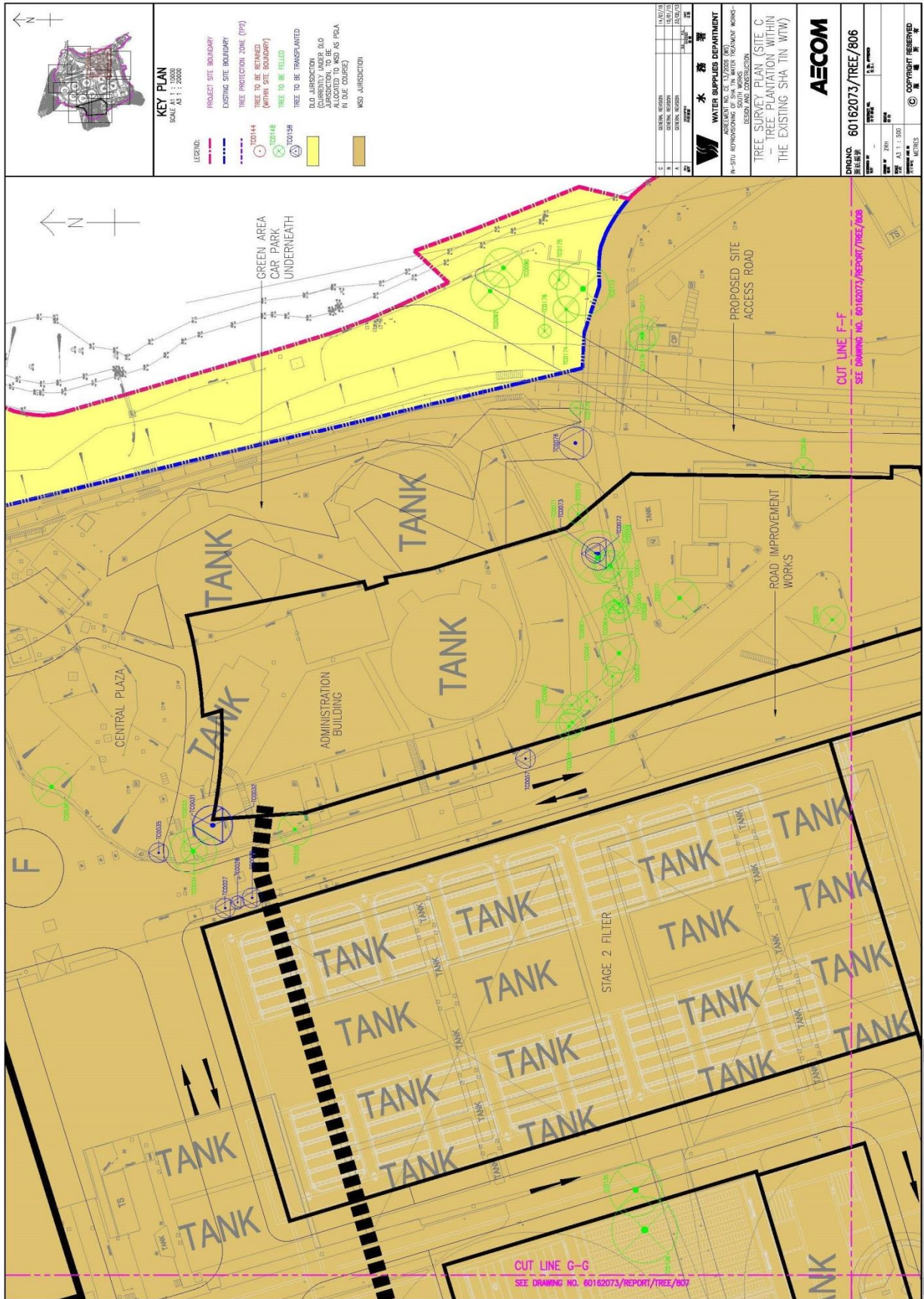




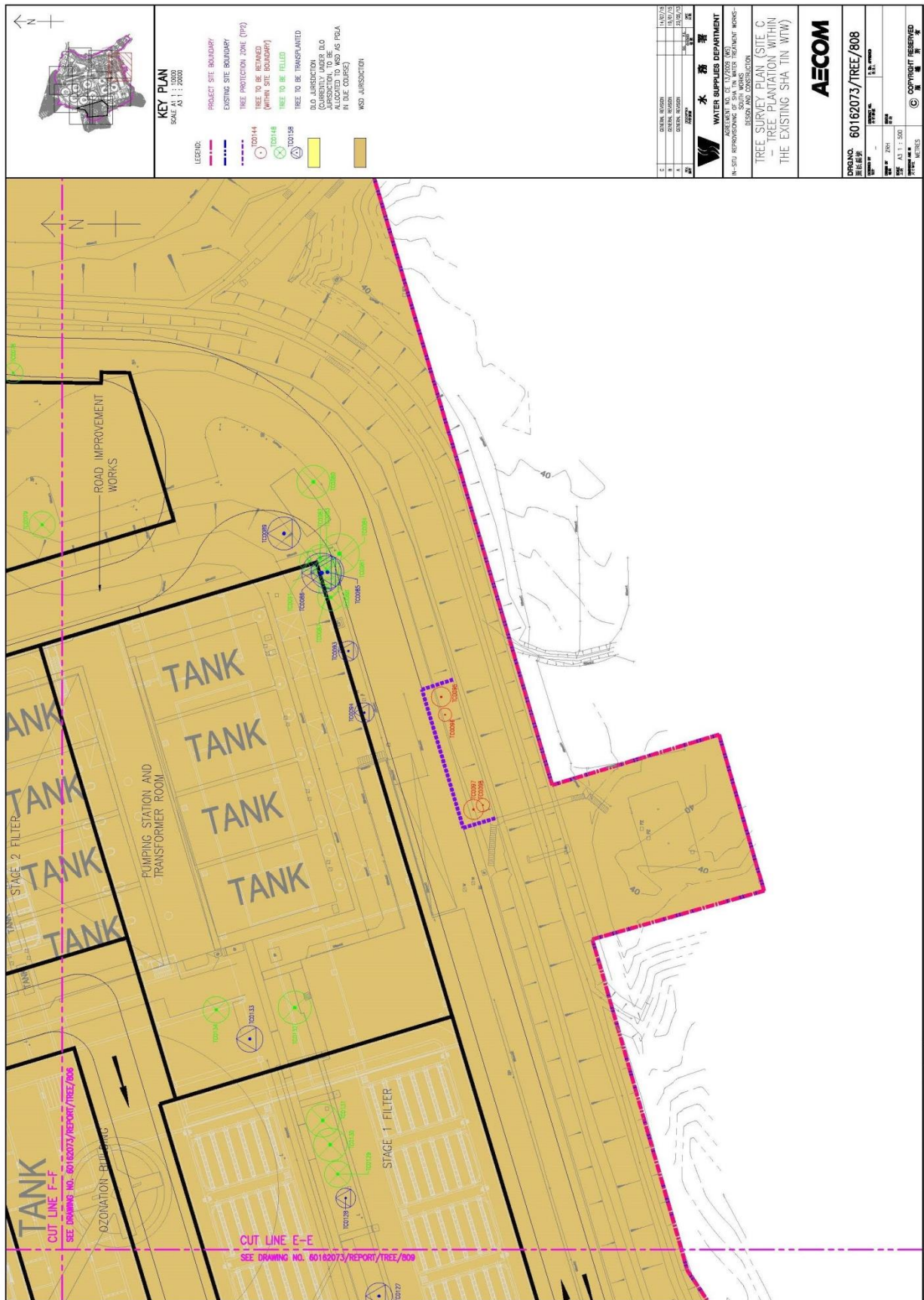


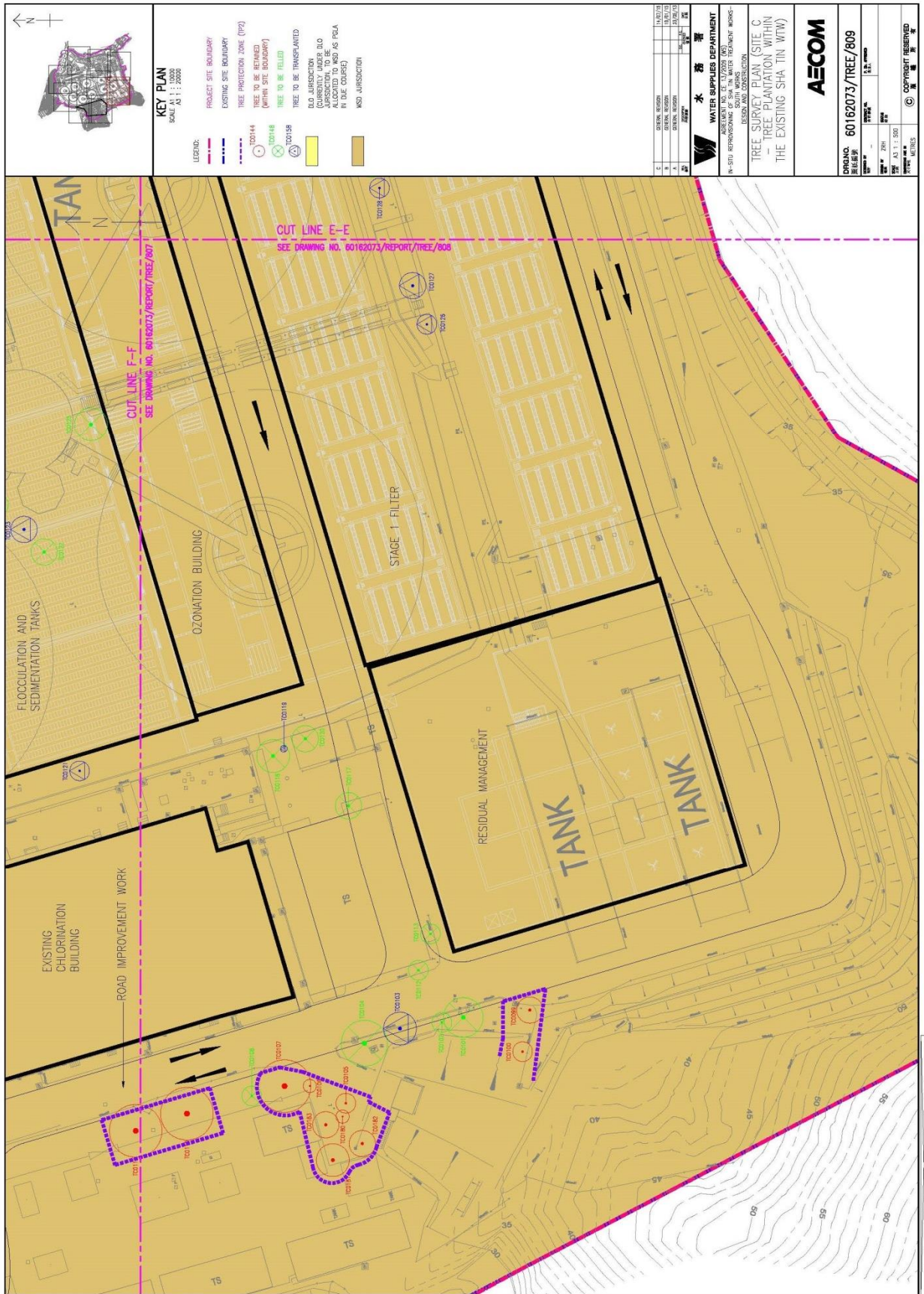












## **Appendix 5**

### **Photos of the Enhanced Compensatory Woodland Area**

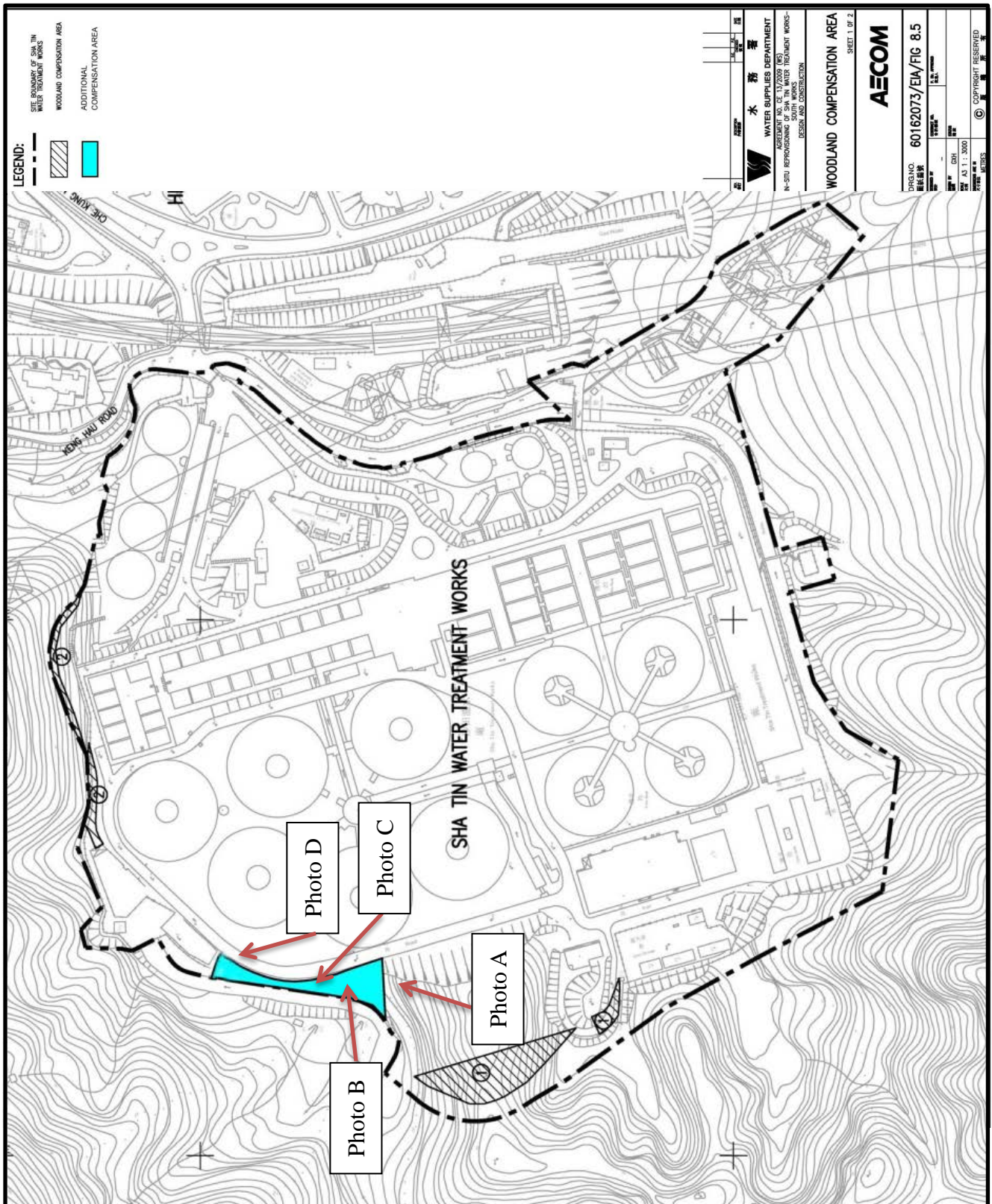




Photo B



Photo D



Photo A

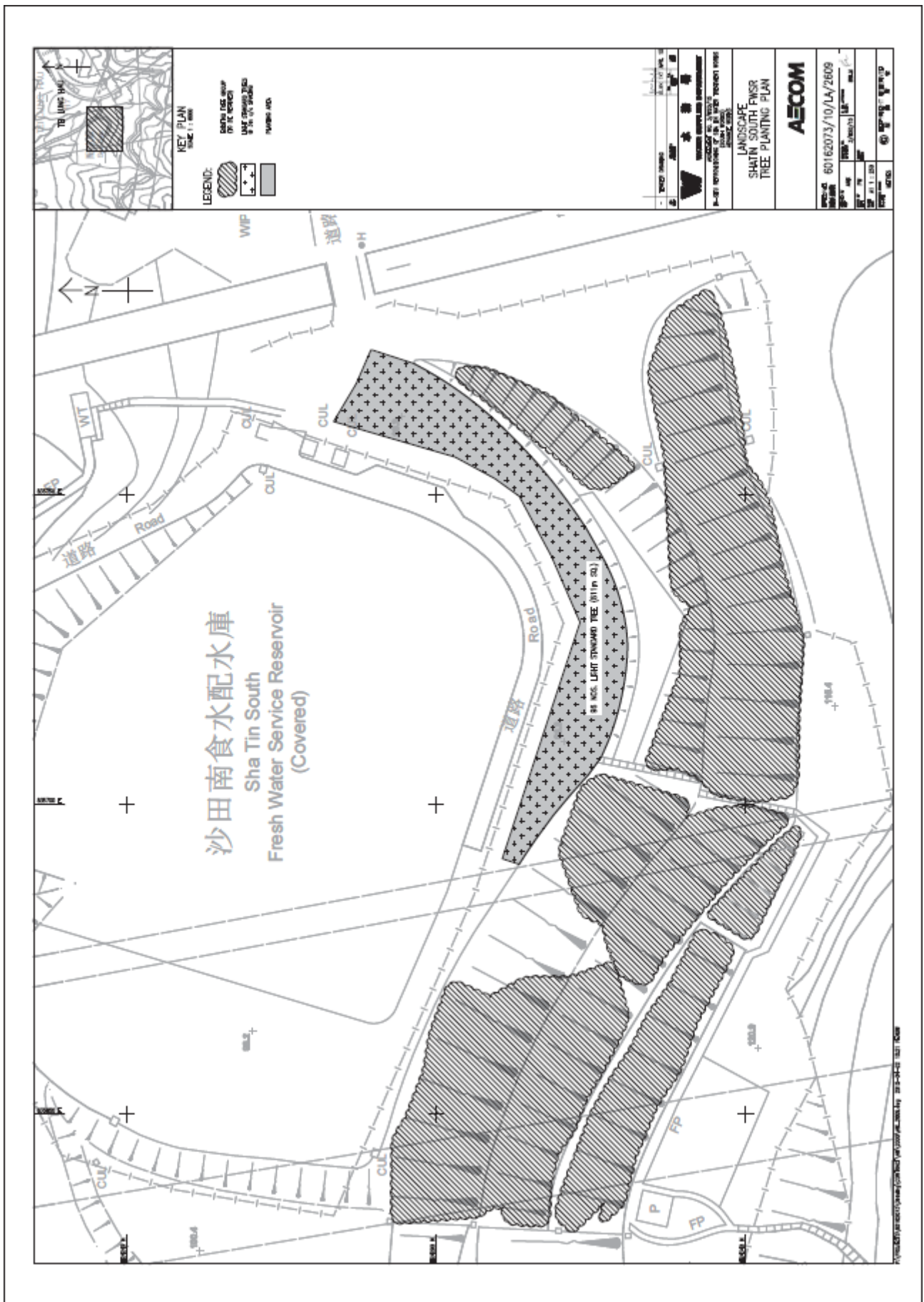


Photo C

## **Appendix 6**

### **Compensatory Planting Plan for Sha Tin South Fresh Water Service Reservoir**





## **Appendix 7**

# Ecological Survey Report of the New Compensation Plant Site



Water Supplies Department



# **Ecological Survey Report**

**July 2018**

**FOR**

**Agreement No. CE13/2009 (WS), In-situ Reprovisioning of Sha Tin Water  
Treatment Works – South Works**

**Ecological Survey at Northwest of Sha Tin West Service Reservoir (STWFWSR)**





**(Rev. 0)**



## Ecological Survey Report

FOR

**AGREEMENT NO. CE13/2009 (WS), IN-SITU  
REPROVISIONING OF SHA TIN WATER  
TREATMENT WORKS – SOUTH WORKS**

	Name	Signature
Prepared by	Mr. Wan, Pak-Ho (Qualified Ecologist)	
Checked & Reviewed by	Ir Leung, Jacky, C. H.	
Approved & Certified by	Ir Dr. Lam, Gabriel, C. K. Environmental Team Leader (ETL)	
Verified & Confirmed by	Mr. Fung, Y. W. Independent Environmental Checker (IEC)	

## 1. INTRODUCTION

Acumen Environmental Engineering and Technology Company Limited was appointed by Water Supplies Department to conduct ecological surveys for the newly proposed compensation planting site of 0.2 ha at northwest of Sha Tin West Service Reservoir (STWFWSR), near Yau On Street, Tai Wai.

In the approved EIA Report (Register No. AEIAR-187/2015), permanent loss of secondary woodland due to constriction works would be compensated by both on-site compensation woodland within the Sha Tin Water Treatment Works (STWTW); as well as off-site compensation at Sha Tin South Freshwater Service Reservoir (STSFWSR) and at northwest of Sha Tin West Service Reservoir (STWFWSR; survey extent covered by this report).

In June 2018, the original proposed compensation planting site at STWFWSR (size 2055 m<sup>2</sup>) was requested by the Hong Kong Police Force to modify as a carpark in urgent need next to Yau On Street to solve the heavy traffic congestion. Therefore the original compensation planting is now proposed to shift backwards as indicated in **Figure 1**. The newly proposed planting site would have same capacity for planting 240 Nos. of light standard native trees suggested in the previously approved Woodland Compensation Plan.

Preliminary site visits indicated that the habitat of compensation planting site would be shifted from a concreted wasteland to grassland (**Plate 1** and **Plate 2**). Both the original and newly proposed sites are enclosed by wire mesh. They are adjacent to Po Fook Memorial Hall on top of vegetated man-made features along Lower Shing Mun Road.

In order to assess the ecological value and evaluate any ecological impact to such shifting of compensatory planting site, an ecological survey is required to verify such habitat, vegetation and wildlife community, with focus on any species of conservation importance inhabiting at this newly proposed site. This provides up-to-date baseline ecological information to justify such shifting and facilitates approval by relevant Departments (e.g EPD and AFCD).

## 2. METHODOLOGY

### 2.1 Habitat and Vegetation

Field survey was conducted on 5<sup>th</sup> July 2018 within the provided survey extent (**Figure 1**). All plants including ferns, gymnosperms and angiosperms found in the feature were recorded by direct observation. Plant individuals which were hard to approach were identified using a pair of 10 x 42 binoculars.

A plant list including growth form is produced, with the relative abundance of each plant species within the survey extent being estimated. Nomenclature for plant species follows AFCD's Hong Kong Herbarium Database. For all the plant species recorded, their local commonness in Hong Kong follows Corlett et al. (2000) and Hong Kong Plant Database managed by the Hong Kong Herbarium. Actual abundance was counted and their locations were recorded for species of conservation importance identified and encountered. Their conservation status follows AFCD (2003), IUCN Red List (2018) and relevant legislations, including Forests and Countryside Ordinance (Cap. 96) and Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

### 2.2 Fauna

Mammals, avifauna, herpetofauna, Odonates, butterflies were covered during the survey. There is no stream within survey extent of the feature. Therefore aquatic fauna is excluded.

Species checklist with abundance is provided. Any breeding or feeding behaviour was also noted. Conservation status, local commonness and distribution of species found was evaluated according to Fellowes et al. (2002), AFCD (2018), IUCN (2018) and Wild Animals Protection Ordinance (Cap. 170), Cap.586, in conjunction with specific literature of each taxa group listed below.

#### 2.2.1 Mammal

Mammal survey was conducted during daytime and night time by direct observation and active searching of traits such as scats, footprints, feeding/ resting signs within the survey extent. All these indirect evidence of the presence of mammals were identified and recorded. Attention to potential roosting sites of bats, e.g. Chinese Fan-palm (*Livistona chinensis*), had been paid. Nomenclature follows Shek (2006).



### **2.2.2 Avifauna**

Transect count was conducted to record bird diversity within the survey extent. All direct and acoustic observations was recorded and identified. Ornithological nomenclature and status follow Viney et al. (2005).

### **2.2.3 Herpetofauna**

Active searching of suitable microhabitats and auditory surveys for breeding amphibians, including ground surfaces, under leaf litter and woody debris, and rock crevices, was conducted. Nomenclature and status follow Karsen et al. (1998) and Chan et al. (2005).

### **2.2.4 Odonates and Butterflies**

Odonates and butterflies was surveyed in daytime align with avifauna survey transect within the survey extent (**Figure 1**). All species observed was identified and counted with an aid of a pair of 10 x 42 binoculars. General distribution and status refer to Wilson (2004), Lo and Hui (2005) and Chan et al. (2011).

### 3. RESULTS

#### 3.1 Habitat

The main habitat type is grassland mixed with landscape plantation (**Plate 1**). About 10 trees were planted at the western corner of the site. Dominant trees species include *Hibiscus tiliaceus* (黃槿), *Senna siamea* (鐵刀木) and the undesirable exotic *Leucaena leucocephala* (銀合歡). The canopy cover is very sparse and reaches about 4 – 10m high on average. The ground was densely covered by *Bidens alba* (白花鬼針草), *Imperata cylindrica* var. *major* (大白茅), *Mimosa pudica* (含羞草), *Panicum maximum* (大黍), *Passiflora foetida* (龍珠果), *Praxelis clematidea* (假臭草) and *Wedelia trilobata* (三裂葉蟛蜞菊). Most of these are exotic and even invasive species. *Wedelia trilobata* (三裂葉蟛蜞菊) is commonly used as ground cover for landscape softwork.

#### 3.2 Flora Composition

A total of 27 plant species were recorded within survey extent. They include 8 tree species, 2 shrubs, 12 herbaceous species and 5 climbers. Relative abundance, composition of all recorded plant species are tabulated in **Table 1**. Around 45% of the recorded species are exotic. Most recorded species is either very common or common in Hong Kong, except *Dalbergia assamica* (南嶺黃檀) restricted to several localities but has been widely cultivated ( Hong Kong Herbarium, 2018).

#### 3.3 Species of Conservation Importance

There was no plant species of conservation importance detected during the survey.

#### 3.4 Fauna Diversity

The newly proposed site is rather isolated by road and developed area, with enclosure of wire mesh. It is dominated by exotic or invasive plants, which is unfavourable to native wildlife (**Plate 1**). Therefore faunal diversity and abundance was found low. The survey did not yield any herpetofauna and Odonate. Such extent of suboptimal habitat is probably used by limited wildlife as passing corridor rather than important resting or breeding ground.

##### 3.4.1 Mammal

Rhesus Macaques (*Macaca mulatta*) is well known to inhabit at Shing Mun and Kam Shan area (Shek, 2006), where the present site is close to. The species was commonly observed passing through man-made structures along street (**Cover Photo; Plate 3**).





A group of Rhesus Macaques (*Macaca mulatta*) was observed climbing along the wire mesh of both the original and newly proposed planting site. They were using such corridor to move among connected canopy at man-made features outside the survey extent (**Plate 3**). No foraging and roosting behaviour was observed within the survey extent.

This locally common species is scheduled under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) and Wild Animals Protection Ordinance (Cap. 170), with a Vulnerable (VU) status in China Red Data Book (AFCD, 2018).

### 3.4.2 Avifauna

Four common or abundant bird species were recorded in the survey extent (**Table 2**; AFCD, 2018). They include Japanese White-eye (*Zosterops japonicas*), Oriental Magpie Robin (*Copsychus saularis*), Spotted Dove (*Spilopelia chinensis*) and Yellow-bellied Prinia (*Prinia flaviventris*). No bird nest was detected.

Despite all wild birds are protected under Wild Animals Protection Ordinance (Cap. 170); no species of conservation importance was detected.

### 3.4.3 Butterfly

A total of 3 very common/ common butterfly species were recorded in the survey extent. They are Common Grass Yellow (*Erema hecabe hecabe*), Lemon Emigrant (*Catopsilia pomona Pomona*) and Pale Grass Blue (*Pseudozizeeria maha serica*) (**Table 3**).

None of them are species of conservation importance.



## 4. DISCUSSIONS

### 4.1 Ecological Value of the Originally Proposed and New Compensatory Planting Site

The originally proposed compensatory planting site is a wasteland with grasses and sparse tree coverage in periphery (**Plate 2**); while the new site is an open grassland mixed with spare landscape plantation. Both sites are dominated by exotic or invasive plant vegetation. Such extent of suboptimal habitat is probably used by limited wildlife as passing corridor rather than important resting or breeding ground.

Species diversity and abundance was found low, without any species of conservation importance. A group of Rhesus Macaques (*Macaca mulatta*) was observed climbing along the wire mesh of both the original and newly proposed planting site without utilising the survey extent as important foraging and roosting ground.

Ecological evaluation of habitats, flora and fauna species of conservation importance are summarised in the following table:

Table 4.1 Habitat Evaluation of the newly proposed compensation planting site against the original site.

Criteria	Wasteland (Original planting site)	Landscape Grassland (Newly proposed planting site)
Naturalness	Man-made habitat	Man-made habitat
Size	Small	Small
Diversity	Low in floral and faunal diversity	Low in floral diversity (27 sp.); low in faunal diversity (7sp.)
Rarity	Common habitat and no rare species recorded	Common habitat and no rare species recorded
Re-creativity	Readily re-creatable	Readily re-creatable
Fragmentation	Isolated by man-made structures and road	Isolated by man-made structures and road
Ecological Linkage	Low ecological linkage with other habitats	Low ecological linkage with other habitats



Criteria	Wasteland (Original planting site)	Landscape Grassland (Newly proposed planting site)
Potential Value	Low due to small size and seclusion any from important habitat types	Low due to small size and seclusion from any important habitat types
Nursery / Breeding Ground	No recorded nursery / breeding sites	No recorded nursery / breeding ground
Age	Recent	Young
Abundance/ Richness of wildlife	Low	Low
Overall Ecological Value	<b>Low</b>	<b>Low</b>

Note: the ranking order of overall ecological value of habitat: High, Medium-High, Medium, Medium-Low, Low

## 4.2 Magnitude of Change of the Proposed Shifting

Ecological impacts associated with the proposed shifting would include direct habitat loss. As indicated from **Table 4.1**, both sites have very similar qualities in each criteria of evaluation. The habitats are both disturbed and of low ecological value. No ecologically important species is present in the site. The site area is small with low number of native species to be affected. Therefore the potential ecological impact at the newly proposed site caused by the shifting should be similar to that of the originally proposed site. Such potential ecological impact is insignificant.

Indirect impacts during construction phase such as human disturbance, and other environmental impacts such as construction dust and noise to the nearby habitats are also insignificant as the new site also has low ecological linkage with other habitats.

## 4.3 Conclusion

The report has concluded that the proposed shifting of compensatory planting site would be environmentally acceptable with no significant adverse ecological impacts. The newly proposed site bears no significant difference to that of the original plan in terms of the extent of ecological impacts thus should be justified.



## REFERENCES

AFCD (2003) Rare and Precious Plants of Hong Kong. AFCD, Friends of the Country Parks and Cosmos Books Ltd. Hong Kong.

AFCD (2018) Hong Kong Biodiversity Database.

<http://www.afcd.gov.hk/english/conservation/hkbiodiversity/database/search.asp?lang=en>.

Accessed on 7th July 2018.

Chan, A., Cheung, J., Sze, P., Wong, A., Wong, E. & Yau, E. (2011) A Review of the Local Restrictedness of Hong Kong Butterflies. Hong Kong Biodiversity AFCD Newsletter, 21. pp 1-12.

Chan, K.F., Cheung, K.S., Ho, C.Y., Lam, F.N, Tang, W.S., Lau, W.N. & Bogadek, A. (2005) Field Guide to the Amphibians of Hong Kong. AFCD, Friends of the Country Parks and Cosmos Books Ltd. Hong Kong.

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**Table 1.** List of all plant species recorded in the newly proposed compensation planting site.

Species Name	Chinese Name	Exotic Species	Growth Form	Commonness in HK <sup>1</sup>	Relative Abundance <sup>2</sup>
<i>Achyranthes aspera</i>	土牛膝	Native	Herb	Common	++
<i>Arachis duranensis</i>	蔓花生	Exotic	Herb	Cultivated	++
<i>Bauhinia glauca</i>	羊蹄甲藤	Native	Climber	Very common	++
<i>Bidens alba</i>	白花鬼針草	Exotic	Herb	Very common	++++
<i>Bridelia tomentosa</i>	土蜜樹	Native	Shrub	Very common	+
<i>Cinnamomum burmannii</i>	陰香	Native	Tree	Common	+
<i>Dalbergia assamica</i>	南嶺黃檀	Native	Tree	Restricted; widely planted	+
<i>Ficus hispida</i>	對葉榕	Native	Tree	Very common	+
<i>Glochidion zeylanicum</i>	香港算盤子	Native	Tree	Common	+
<i>Hibiscus tiliaceus</i>	黃槿	Native	Tree	Very common	++
<i>Imperata cylindrica</i> var. <i>major</i>	大白茅, 絲茅	Native	Herb	Very common	+++
<i>Ipomoea triloba</i>	三裂葉薯	Exotic	Climber	Common	++
<i>Kyllinga nemoralis</i>	單穗水蜈蚣	Native	Herb	Very common	+++
<i>Leucaena leucocephala</i>	銀合歡	Exotic	Tree	Common	+++
<i>Liriope spicata</i>	山麥冬	Native	Herb	Very common	+
<i>Livistona chinensis</i>	蒲葵	Exotic	Tree	Cultivated	+
<i>Mikania micrantha</i>	薇甘菊	Exotic	Climber	Very common	++
<i>Mimosa pudica</i>	含羞草	Exotic	Herb	Very common	++++
<i>Miscanthus sinensis</i>	芒	Native	Herb	Very common	++
<i>Panicum maximum</i>	大黍	Exotic	Herb	Very common	+++
<i>Paspalum conjugatum</i>	兩耳草	Native	Herb	Common	++
<i>Passiflora foetida</i>	龍珠果	Exotic	Climber	Very common	+++
<i>Praxelis clematidea</i>	假臭草	Exotic	Herb	Very common	+++



Species Name	Chinese Name	Exotic Species	Growth Form	Commonness in HK <sup>1</sup>	Relative Abundance <sup>2</sup>
<i>Senna siamea</i>	鐵刀木	Exotic	Tree	Cultivated	++
<i>Spermacoce stricta</i>	豐花草	Native	Herb	Restricted	+
<i>Trema tomentosa</i>	山黃麻	Native	Shrub	Common	+
<i>Wedelia trilobata</i>	三裂葉蟛蜞菊	Exotic	Climber	Common	++++
<b>TOTAL SPECIES</b>					<b>27</b>

Note:

1. Commonness follows Corlett et al. (2000) Hong Kong Vascular Plants: Distribution and Status; Hong Kong Plant Database
2. Relative abundance: ++++ = abundant, +++ = common, ++ = uncommon and + = scarce

**Table 2.** List of all avifauna recorded in the newly proposed compensation planting site.

Common Name	Scientific Name	Chinese Name	Distribution in Hong Kong <sup>1</sup>	Status in Hong Kong <sup>2 3</sup>	Conservation Status	Abundance
Japanese White-eye	<i>Zosterops japonicus</i>	暗綠繡眼鳥	Abundant	R	-	4
Oriental Magpie Robin	<i>Copsychus saularis</i>	鵲鳩	Abundant	R	-	1
Spotted Dove	<i>Spilopelia chinensis</i>	珠頸斑鳩	Abundant	R	-	2
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	黃腹鷦鷯	Common	R	-	1
<b>TOTAL SPECIES</b>						<b>4</b>

Note:

1. Commonness as per AFCD Biodiversity Database  
<https://www.afcd.gov.hk/english/conservation/hkbiodiversity/database/search.asp>
2. Status according to Viney et al. (2005):  
R=resident; S= summer visitor; W=winter visitor; M=migrant; A=autumn;  
P=present all year, exact composition unknown.
3. All wild birds are protected under Wild Animals Protection Ordinance (Cap. 170)

**Table 3.** List of all butterflies recorded in the newly proposed compensation planting site.

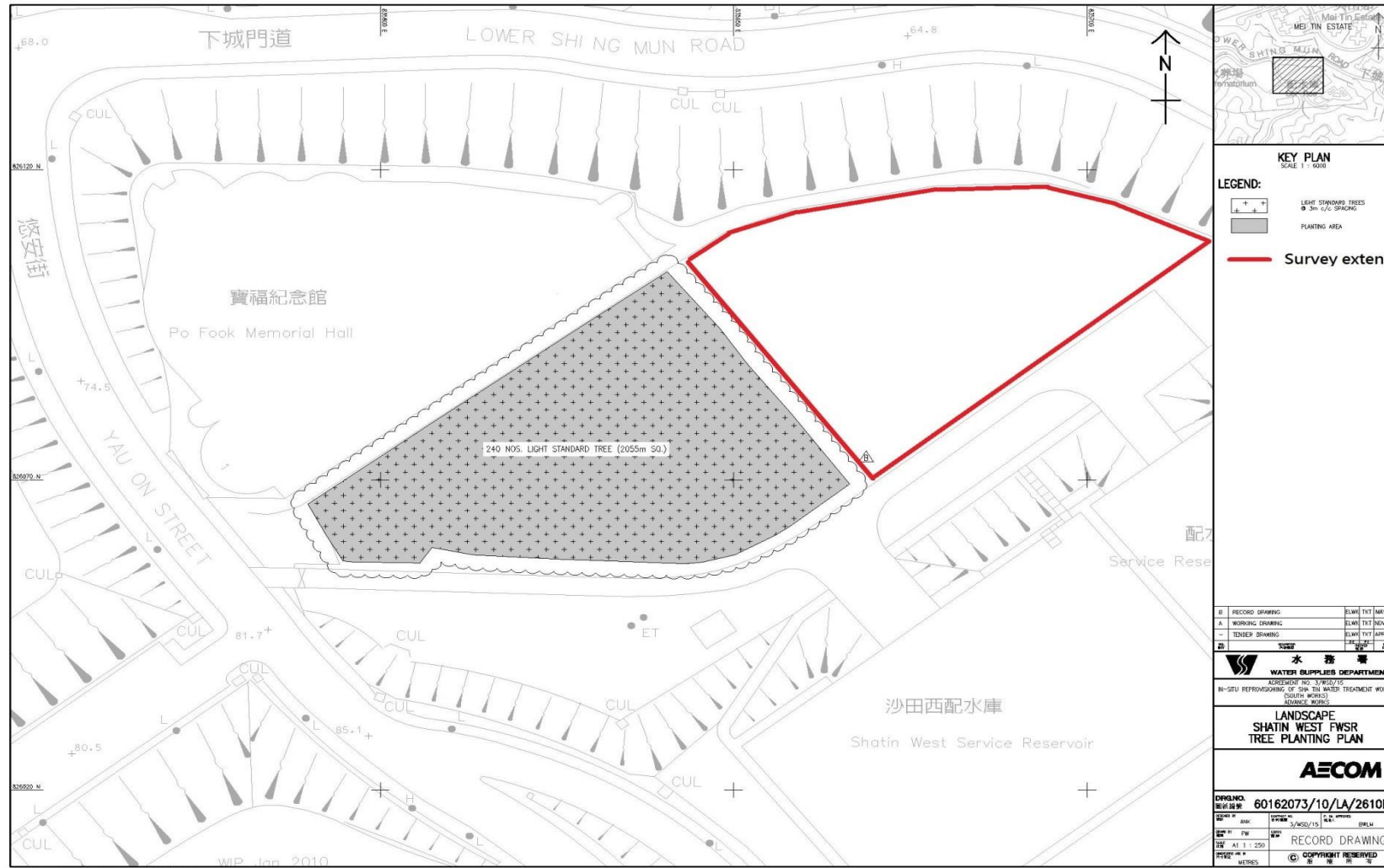
Common Name	Scientific Name	Chinese Name	Family	Distribution	Conservation	Abundance
				in Hong Kong <sup>1</sup>	Status <sup>2</sup>	
Common Grass Yellow	<i>Erema hecabe hecabe</i>	寬邊黃粉蝶	Pieridae	Very Common	-	1
Lemon Emigrant	<i>Catopsilia pomona pomona</i>	遷粉蝶	Pieridae	Common	-	5
Pale Grass Blue	<i>Pseudozizeeria maha serica</i>	酢漿灰蝶	Lycaseniidae	Very Common	-	4
					<b>TOTAL SPECIES</b>	<b>3</b>

Note:

1. Commonness as per AFCD database. Available at <http://www.afcd.gov.hk/english/conservation/hkbiodiversity/database/search.asp?lang=en>
2. Species of conservation concern according to Chan et al (2011)



**Figure 1.** Ecological survey extent for the newly proposed compensation planting site (red), which is behind the original concreted wasteland (grey).





**Plate 1.** General view of the newly proposed compensation planting site. It is a grassland mixed with landscape plantation of spare trees.





**Plate 2.** General view of adjacent habitats of the newly proposed compensation planting site. Vegetated man-made slopes (above) and the originally wasteland proposed for compensation planting (below).





**Plate 3. Rhesus Macaques (*Macaca mulatta*) observed around the survey extent.**



## **Appendix 8**

### **Tree Survey Report of the New Compensation Plant Site**

**TREE SURVEY REPORT  
FOR  
CONTRACT NO. 3/WSD/15**

In-situ Re-provisioning of Sha Tin Water Treatment  
Works (South Works) - Advance Works

Location: Proposed Compensation Planting Site  
near Shatin West Service Reservoir

**Contractor:** Ming Hing – Ming Hing Civil –  
Vasteam Joint Venture

**Prepared by:** Greenland Resources Limited

**Submission Date:** 23 July 2018

# Contents

Part I. Tree Survey Schedule

Part II. Tree Survey Reports

Part III. Tree Survey Plan

Part I  
Tree Survey Schedule



**Greenland Resources Ltd.**

**Tree Survey Schedule**

Contract No.: 3/WSD/15

Contract Title: In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works) – Advance Works

Location: Proposed Compensation Planting Site near Shatin West Service Reservoir

Date of Report: 23-Jul-18

Tree No.	Species: Information provided by Greenland Resources Ltd.		Size: Information provided by Greenland Resources Ltd.			Current Status: Comment by Greenland Resources Ltd.			Amenity Value (High, Medium, Low)	Proposed treatment as specified in the contract (Retain / Transplant / Fell)	Observable Defects / Damages of Trees	Remarks
			Overall Height (m)	Diameter at breast height of the tree (mm)	Average Crown Spread (m)	Health Condition (Good, Fair, Poor, Dead)	Form (Good, Fair, Poor)	Survival of Transplantation (High, Medium, Low)				
T1	<i>Senna siamea</i>	鐵刀木	13	390	5	F	F	L	L	Retain	Dead stub; broken branches	
T2	<i>Senna siamea</i>	鐵刀木	13	360	8	F	F	L	L	Retain	Dead stub; dead twigs	
T3	<i>Senna siamea</i>	鐵刀木	10	325	5	F	F	L	L	Retain	Broken branches; dead stub	
T4	<i>Hibiscus tiliaceus</i>	黃槿	6	175	6	F	F	L	L	Retain	Multi trunks; cavity on branches; broken branches and hanger	
T5	<i>Cinnamomum burmanni</i>	陰香	7	145	4	F	F	L	L	Retain	Co-dominant trunks; vines	
T6	<i>Hibiscus tiliaceus</i>	黃槿	5	135	4	F	F	L	L	Retain	Leaning tree; large cavity on lower trunk	
T7	<i>Senna siamea</i>	鐵刀木	8	285	5	F	F	L	L	Retain	Vines on crown	
T8	<i>Hibiscus tiliaceus</i>	黃槿	5	125	4	F	F	L	L	Retain	Leaning tree; broken branches and hanger	
T9	<i>Hibiscus tiliaceus</i>	黃槿	7	260	5	F	F	L	L	Retain	Leaning tree; broken branches and hanger	
T10	<i>Ficus hispida</i>	對葉榕	4	95	2	F	F	L	L	Retain	Dead branches; broken branches and hanger	
T11	<i>Hibiscus tiliaceus</i>	黃槿	4	134	4	F	F	L	L	Retain	Leaning tree	
T12	<i>Hibiscus tiliaceus</i>	黃槿	4	128	4	F	F	L	L	Retain	Multi trunks; cavity on lower trunk	
T13	<i>Senna siamea</i>	鐵刀木	8	265	6	F	F	L	L	Retain	Vines; broken branches	
T14	<i>Hibiscus tiliaceus</i>	黃槿	4	139	6	F	F	L	L	Retain	Multi trunks	
T15	<i>Hibiscus tiliaceus</i>	黃槿	4	192	4	F	F	L	L	Retain	Leaning tree; broken branches and hanger	
T16	<i>Dalbergia assamica</i>	南嶺黃檀	9	233	7	F	F	L	L	Retain	Co-dominant trunks; dead twigs	
T17	<i>Dalbergia assamica</i>	南嶺黃檀	6	170	4	F	F	L	L	Retain	Dead twigs	
T18	<i>Hibiscus tiliaceus</i>	黃槿	2	105	2	F	F	L	L	Retain	Large decay on trunk; dual trunks	
T19	<i>Hibiscus tiliaceus</i>	黃槿	4	150	4	F	F	L	L	Retain	Crossed branches; leaning tree	

**Greenland Resources Ltd.**

**Tree Survey Schedule**

Contract No.: 3/WSD/15

Contract Title: In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works) – Advance Works

Location: Proposed Compensation Planting Site near Shatin West Service Reservoir

Date of Report: 23-Jul-18

Tree No.	Species: Information provided by <b>Greenland Resources Ltd.</b>	Size: Information provided by <b>Greenland Resources Ltd.</b>			Current Status: Comment by <b>Greenland Resources Ltd.</b>			Amenity Value (High, Medium, Low)	Proposed treatment as specified in the contract (Retain / Transplant / Fell)	Observable Defects / Damages of Trees	Remarks
		Overall Height (m)	Diameter at breast height of the tree (mm)	Average Crown Spread (m)	Health Condition (Good, Fair, Poor, Dead)	Form (Good, Fair, Poor)	Survival of Transplantation (High, Medium, Low)				

Notes:

Health Condition

Good- Tree of good form, moderate to large size and health

Fair- Trees of reasonable form, with few or visible defects or health problem:

Poor- Trees that are of poor, badly damaged or suffering from decay, dieback or the effects of very heavy vine growth;

Form Condition

Good - Tree of good form, upright, evenly branching, well-formed head and general in accordance with the standard form for its species;

Fair - Trees with general balance form and compensated by loss of branches or leaning trunks;

Poor- Trees with every unbalance leaning, contorted, benking trunk, suffering from loss of major branches with general damage and growing close to adjacent trees;

Survival Rate After Transplant

High - 86% to 100%

Medium - 61% to 85%

Low - 0 to 60%

Part II  
Tree Survey Reports

Contract Title: 3/WSD/15

Location: Proposed Compensation Planting Site near Shatin West Service Reservoir

Photos Taken On 23 July 2018



Tree No. T1



Tree No. T2



Tree No. T3



Tree No. T4

Contract Title: 3/WSD/15

Location: Proposed Compensation Planting Site near Shatin West Service Reservoir

Photos Taken On 23 July 2018



Tree No. T5



Tree No. T6



Tree No. T7

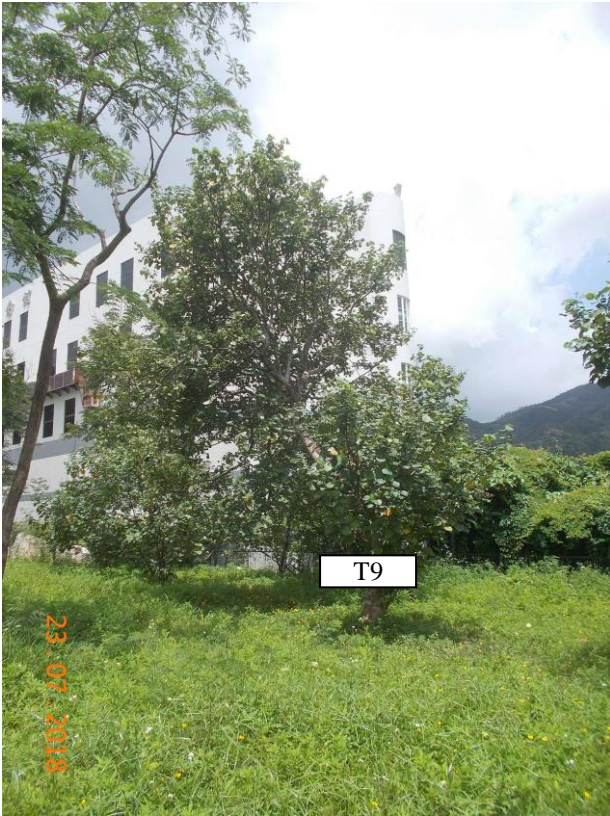


Tree No. T8

Contract Title: 3/WSD/15

Location: Proposed Compensation Planting Site near Shatin West Service Reservoir

Photos Taken On 23 July 2018



Tree No. T9



Tree No. T10



Tree No. T11



Tree No. T12

Contract Title: 3/WSD/15

Location: Proposed Compensation Planting Site near Shatin West Service Reservoir

Photos Taken On 23 July 2018



Tree No. T13



Tree No. T14



Tree No. T15



Tree No. T16

Contract Title: 3/WSD/15

Location: Proposed Compensation Planting Site near Shatin West Service Reservoir

Photos Taken On 23 July 2018



Tree No. T17



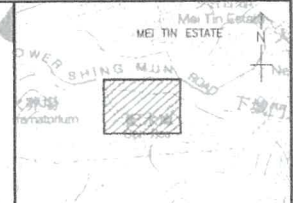
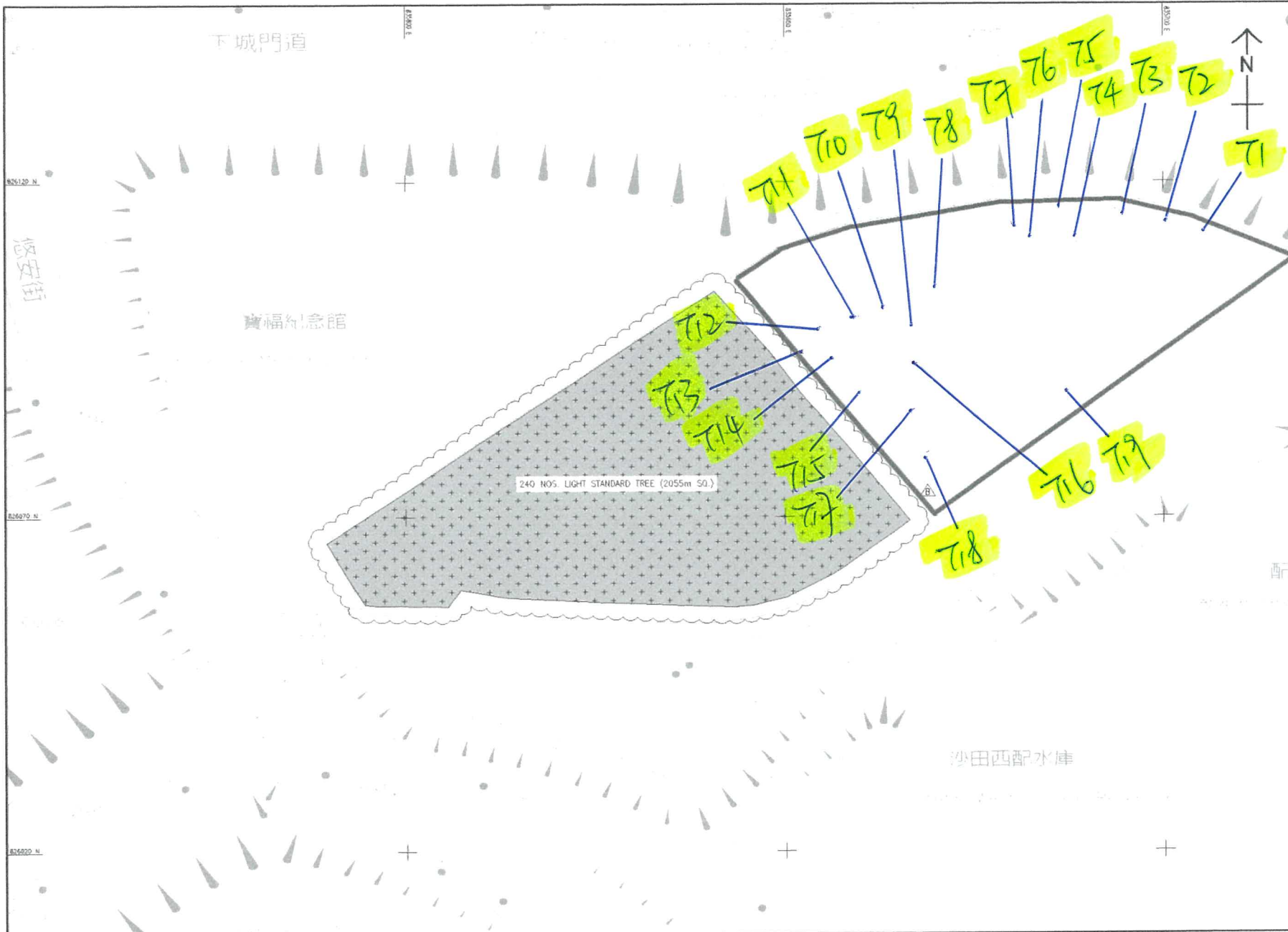
Tree No. T18



Tree No. T19



Part III  
Tree Survey Plan



KEY PLAN  
SCALE 1 : 6000

LEGEND:

- LIGHT STANDARD TREES @ 3m c/c SPACING
- PLANTING AREA

Survey extent

RECORD DRAWING	ELM/TXT	MAY 17
WORKING DRAWING	ELM/TXT	NOV 15
TENDER DRAWING	ELM/TXT	APR 15

**水務署**  
WATER SUPPLIES DEPARTMENT  
AGREEMENT NO. 3/WSD/15  
IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS (SOUTH WORKS) ADVANCE WORKS

**LANDSCAPE**  
SHATIN WEST FWSR  
TREE PLANTING PLAN

**AECOM**

DRGNO. 圖號	60162073/10/LA/2610B	
DATE 日期	DATE 日期	DATE 日期
BY 由	BY 由	BY 由
CHK 查	CHK 查	CHK 查
SCALE 比例尺	A1 : 1 : 250	
UNIT 單位	METRES	

RECORD DRAWING

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## **Appendix 9**

### **Compensatory Planting Plan for Sha Tin West Service Reservoir**

