



JOB No.: TCS00694/13

**AGREEMENT NO. CE 45/2008 (CE)
LIANTANG/HEUNG YUEN WAI
BOUNDARY CONTROL POINT AND ASSOCIATED WORKS**

**ECOLOGICAL MONITORING REPORT FOR THE
WOODLAND COMPENSATION AREA
(MAY TO JUNE 2017)**

**PREPARED FOR
CIVIL ENGINEERING AND DEVELOPMENT
DEPARTMENT (CEDD)**

Date	Reference No.	Prepared By	Certified By
13 July 2017	TCS00694/13/600/R1062v2	 Keith Wong (Ecologist)	 Tam Tak Wing (Environmental Team Leader)

Version	Date	Remarks
1	29 June 2017	First Submission
2	13 July 2017	Amended according to the IEC's comments on 7 July 2017



Member of the Surbana Jurong Group

Unit A-C, 27/F Ford Glory Plaza
37- 39 Wing Hong Street
Cheung Sha Wan, Kowloon, Hong Kong
T +852 3995 8100 F +852 3995 8101 E hongkong@smec.com
www.smec.com

14 July 2017

Our ref: 7076192/L22020/AB/AW/MC/rw

AECOM
8/F, Grand Central Plaza, Tower 2
138 Shatin Rural Committee Road
Shatin, N.T.

By Email & Post

Attention: Mr Simon LEUNG

Dear Sirs

**Agreement No. CE 45/2008 (CE)
Liantang/Heung Yuen Wai Boundary Control Point and Associated Works
Independent Environmental Checker – Investigation
Bimonthly Ecological Monitoring Report for Woodland Compensation Area (No. 5) –
May to June 2017**

With reference to the Bimonthly Ecological Monitoring Report for Woodland Compensation Area No. 5 for May to June 2017 (Version 2) certified by the ET Leader, please be noted that we have no adverse comments on the captioned submission. We herewith verify the captioned submission in accordance with Section 8.3.2.2 of the EM&A Manual.

Thank you for your attention and please do not hesitate to contact the undersigned on tel. 3995-8120 or by email to antony.wong@smec.com; or our Mr Man CHEUNG on tel. 3995 8132 or by email to man.cheung@smec.com.

Yours faithfully
for and on behalf of
SMEC Asia Limited



Antony WONG
Independent Environmental Checker

cc	CEDD/BCP	-	Mr LU Pei Yu / Mr William CHEUNG	by fax: 3547 1659
	AECOM	-	Mr Pat LAM / Mr Perry YAM	by email
	CCKJV	-	Mr Vincent CHAN	by email
	AUES	-	Mr TW TAM	by email

Table of Content

1.	INTRODUCTION	1
1.1	General.....	1
2.	MONITORING REQUIREMENTS.....	2
2.1	Monitoring Program of the Initial and Enhancement Planting Phases.....	2
2.2	Monitoring methodology	2
2.3	Quadrat Sampling	2
2.4	Reporting.....	4
3.	RESULTS.....	5
3.1	Transect Inspection	5
3.2	Quadrat Sampling	6

LIST OF TABLES

TABLE 1	TRIGGER AND ACTION LEVELS FOR MONITORING AND ACTION PLAN
TABLE 2	HEALTH CONDITION OF THE ESTABLISHED SEEDLINGS NOTED DURING THE TRANSECT INSPECTION
TABLE 3	THE NUMBER OF SEEDLING RECORDED FOR EACH SPECIES WITHIN THE SAMPLING QUADRATS
TABLE 4	NO. OF INDIVIDUAL RECORDED FOR EACH PLANTED SPECIES IN PREVIOUS MONITORING AND SURVIVAL RATE IN THE REPORTING MONTH (COMPARED WITH THE REFERENCE DATA COLLECTED IN NOVEMBER – DECEMBER 2016)
TABLE 5	RECOMMENDED REMEDIAL ACTIONS FOR THE POOR SURVIVAL RATE OF <i>CASTANOPSIS FISSA</i> AND <i>SAPIUM DISCOLOR</i>
TABLE 6	SUMMARY OF THE RECOMMENDED REMEDIAL ACTIONS FOR SPECIES WITH A SURVIVAL RATE <80%

LIST OF APPENDICES

APPENDIX A	DRAWING NO. 60212563/SK7037 OF THE WOODLAND COMPENSATION PLAN
APPENDIX B	LATEST PLANTING ARRANGEMENT
APPENDIX C	TRANSECT ROUTES AND SAMPLING QUADRATS OF WOODLAND COMPENSATION MONITORING
APPENDIX D	PHOTOGRAPHIC RECORDS

1. INTRODUCTION

1.1 GENERAL

- 1.1.1 The “Liantang/Heung Yuen Wai Boundary Control Point and Associated Works Project” (hereinafter referred to as “the Project”) comprises a new Boundary Control Point (BCP) proposed at Liantang/Heung Yuen Wai (LT/HYW), its connecting road and other associated works; and the Environmental Impact Assessment (EIA) report (Register No.:AEIAR-161/2011) of the Project has identified that ~6.2ha of secondary woodlands will be directly lose due to the construction of the portals of tunnels and some sections of the connecting road. Subsequently, creation of a 18.6 ha compensatory woodland at Cheung Shan has been recommended in the EIA report to avoid residual ecological impacts from the Project.
- 1.1.2 Under the Environmental Permit (EP-404/2011/D), an updated Woodland Compensation Plan (WCP) detailed with the planting strategy and the subsequent maintenance and monitoring requirements of the compensatory woodland has been submitted and approved by the Authority in the 4th Quarter of 2015.
- 1.1.3 The woodland compensation include an initial planting phase and enhancement planting phase over a 6 years period on the grassland and shrubland at Cheung Shan, i.e., the “Woodland Compensatory Area” (WCA) as shown in the **Drawing No. 60212563/SK7037 of the WCP** and included here as **Appendix A**; and the planting works fall within the work scope of Contract No. CV/2013/08 Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 6.
- 1.1.4 As part of the EM&A’s requirements of the Project, this submission presents the findings of the 5th session of vegetation monitoring according to the latest status of the initial planting phase (refer to the **Appendix B** for details) and cover the Reporting Period from May to June 2017.

2. MONITORING REQUIREMENTS

2.1 MONITORING PROGRAM OF THE INITIAL AND ENHANCEMENT PLANTING PHASES

2.1.1 According to the implementation program and Section 6.5 of the WCP, the monitoring frequency for the first year of the initial and the enhancement planting phases would be bi-monthly and subsequently reduced to quarterly from the second year onward.

2.1.2 Change of monitoring frequency if needed will be advised by the Project Ecologist of the ET and approved by Environmental Protection Department (EPD) and Agriculture, Fisheries and Conservation Department (AFCD) before implementation.

2.2 MONITORING METHODOLOGY

2.2.1 An inspection walk monitoring by means of “transect route” and “direct observation” has been undertaken within the WCP as such to provide an overview and observe the general condition of the WCA; After due considerations of the latest planting arrangement within the WCA, the potential trampling damage to the planted seedlings, as well as the limitations in visibility, site access and safety concern when undertaking the monitoring among the steep hillslope, the transect routes has been selected to cover all representative areas where planting has been undertaken within the WCA as far as practicable.

2.2.2 The transect routes are illustrated in **Appendix C**, and the following observations have been made during the inspection walk:

- Weather condition during the time of monitoring
- The general condition of the WCA, including any signs of anthropogenic or natural disturbance/events (such as landslide, lightning strikes, wildlife damage) that has affected the health condition of the planted seedlings, or regeneration or invasive of grassy or self-seeded weedy plants that would or have affected the establishment of the planted vegetation
- The general health condition of each planted species graded in “Good”, “Fair” or “Poor” with the following criteria:
 - i) Phenology – signs of any abnormality in the phenology of the species (such as abnormal flowering/fruitletting/ leaf shedding)
 - ii) Foliage – colour, size and general appearance, signs and severity of insect and fungal infection
 - iii) Branches – presence and extent of die-back, and signs and severity of insect and fungal infection
 - iv) Stem/Trunk - signs and severity of cavities or internal/external decay; signs and severity of insect infection and mechanical damage

2.2.3 Since the monitoring approach adopted for the transect inspection, i.e., “*direct observations*”, would not yield any quantitative information, the survival rate (%) of the planted seedling will be evaluated from the results collected from the quadrat sampling as detailed in next section.

2.3 QUADRAT SAMPLING

2.3.1 A sampling approach has been proposed in the WCP to monitor the survival rate of the planted seedlings by the use of nine 20mx20m quadrats which are to be evenly located within the planted area of the WCA. Based on the latest planting schedule and planting arrangement/pattern provided by the contractor (see **Appendix B**), as well as the local topography of the planted area within the WCA, the practicality in accessing, placing and monitoring nine 20m x 20m fixed quadrats within the planted area of the WCA has been extensively reviewed, 2 of the monitoring quadrats are fixed on the ridgeline of Cheung Shan and 7 of them are located on the north-facing slope of the WCA (see

Appendix C).

- 2.3.2 Information collected within each sampling unit include:
- General condition of the sampling quadrat especially those factors that would or have found affected the survival rate of the planted vegetation, including biological or environmental factors (such as inter-specific competition as well as signs of stress from water, heat, or pest and disease, etc)
 - The total number of established seedlings for each planted tree and shrub species
 - Health condition of each planted species graded in “Good”, “Fair” or “Poor” with the following criteria:
 - i) Phenology – signs of any abnormality in the phenology of the species (such as abnormal flowering/fruitletting/ leaf shedding)
 - ii) Foliage – colour, size and general appearance, signs and severity of insect and fungal infection
 - iii) Branches – presence and extent of die-back, and signs and severity of insect and fungal infection
 - iv) Stem/Trunk - signs and severity of cavities or internal/external decay; signs and severity of insect infection and mechanical damage

2.3.3 Since the quantity of seedlings planted for each species within a particular area (including the sampling units) would be varied and subject to the constraints imposed by the local site condition (e.g., the steepness and presence of rocky outcrops or existing woody vegetation); the survival rate of the planted species will be evaluated against the data collected from the first monitoring session in which 20m x 20m quadrats were applied for the initial planting phase; and if needed the implementation of the measures as detailed in the “Trigger and Action Levels” specified in the **Table 3** of the WCP would be recommended (included here as **Table 1** below) .

Table 1 Trigger and Action Levels for Monitoring and Action Plan

Parameters	Trigger and Action Level	Action Plan
General Health Condition of planted species (i.e. good/fair/poor; based on parameters e.g. wilting, insect attack, disease, fungal infection, browsing damage)	Trigger Level: % of individual plant species in poor health condition >20%	- the ET should inform Contractor and IEC immediately; - identify the causes(s) of the exceedance; - advise Contractor the necessity of replanting
	Action Level: % of individual plant species in poor health condition >30%	- the ET should inform Contractor and IEC immediately; - identify the cause(s) of the exceedance; - advise remedial action and work out solution including change of species in re-planting, re-soiling of the target areas; and seek acceptance from AFCD; - once the remedial action has been accepted by AFCD, the Contractor should implement the remedial action.

Survival of Planted Species (i.e. dead)	Trigger Level: Survival rate of individual plant species <80%	<ul style="list-style-type: none"> - the ET should inform Contractor and IEC immediately; - identify the causes(s) of the exceedance; - advise Contractor the necessity of replanting.
	Action Level: Survival rate of individual plant species <70%	<ul style="list-style-type: none"> - the ET should inform Contractor and IEC immediately; - identify the cause(s) of the exceedance; - advise remedial action and work out solution including change of species in re-planting, re-soiling of the target areas; and seek acceptance from AFCD; - once the remedial action has been accepted by AFCD, the Contractor should implement the remedial action.

2.3.4 Since most of the planted native species are also naturally grown within the WCA and it would be infeasible and impracticable to differentiate whether the individual plant encountered along the transect or within the quadrat is planted, natural recruited, or regenerated after the pre-planting clearance of the site; and hence all established individuals of the planted species found within the sampling unit has been counted during the monitoring.

2.3.5 The WCA monitoring was undertaken by the Environmental Team (ET) and under the supervision of the Qualified Ecologist of the ET, and the Qualified Ecologist has also undertaken a joint transect inspection with representative of the IEC in the reporting.

2.4 REPORTING

Bi-monthly Woodland Compensation Monitoring Reports

2.4.1 During the first year of the initial planting phase and the first year of the enhancement planting phase, the results and findings of the bi-monthly (i.e., once every two months) monitoring will be recorded in a bi-monthly woodland compensation monitoring reports prepared and submitted by the ET Leader within 10 working days from the end of each reporting month. The details to be included in the report will follow the Section 7.3 of the WCP.

Quarterly Woodland Compensation Monitoring Reports

2.4.2 From the second year of the initial planting phase and the enhancement planting phase, the results and findings of the quarterly monitoring will be recorded in the quarterly woodland compensation monitoring reports prepared and submitted by the ET Leader within 10 working days from the end of each reporting month. The details to be included in the report will follow the Section 7.3 of the WCP.

3. RESULTS

3.1 TRANSECT INSPECTION

3.1.1 The transect inspection was carried out on 9th June 2017 with the ecological specialist of the IEC, an overview of the site condition is presented in **Figure 1** of the **Appendix D** and the following presents the observations made during the transect inspection:

- The weather few days prior the transect inspection was mostly rainy, but it was partly cloudy with sunny period on the day of the inspection, and it was fairly windy along the ridgeline of the WCA.
- Most of the seedlings noted were in fair condition, and the growth of some of the re-sprouted seedlings was found to be prominent, in particularly the trees *Phyllanthus emblica*, *Litsea glutinosa* and *Schima superba*. Moreover, as noted previously, most of the planted *Acacia mangium* was infected by powdery mildew in different degree and foliage loss from insect herbivory was noticeable on *Melastoma sanguineum*, *Mallotus paniculatus*, as well as *Castanopsis fissa* and *Litsea glutinosa* (see example photos in **Appendix D - Figure 2a1 and 2a2**).
- On the other hand, as reported previously, signs of disturbance from wild boar, i.e., vegetation trampling, earth ploughing, as well as uprooted seedlings (from planted/self-seeded vegetation) were noticeable along the transect route, in particularly on the north-facing slope of Cheung Shan where the site was densely planted with tree/shrub seedlings (see **Appendix D - Figure 2b**).
- No sign of additional anthropogenic disturbance besides those reported previously was noted within the planted area of the WCA, except the vegetation clearance in the immediate area along the footpath led to a power pole at the northwest corner of the WCA (see **Appendix D - Figure 3**); which may beneficial to the seedlings planted in the proximity area after the removal of the fern *Dicranopteris pedata*.
- Vigorous regrowth of herbaceous vegetation cleared/cut during the pre-planting stage was noted in the whole WCA, except the planting area along the ridgeline where the area was disturbed by hill-fire prior the initial planting work.
- Colonization, re-sprouting and/or regrowth of the woody vegetation, such as the trees *Melicope pteleifolia* and *Cratoxylum cochinchinense*, the shrub *Baeckea frutescens*, *Rhodomyrtus tomentosa* and *Breynia fruticosa*, were found to be generally vigorous; and some of the self-seeded or established plants have out-grown and shadowed the seedlings planted in their vicinity, and may have a negative impact on the establishment of the planted material because of the inter/intra-specific competition
- In addition, despite the re-growth of the natural vegetation as described above has impeded the range of observation that could made along the transect; the density of the planted native tree seedlings was found to be poorer and sparser along the inspection transect, in particularly on the north-facing slope of Cheung Shan.

3.1.2 The general health condition of the planted species, based on the observations made along the transect, is tabulated in the following table.

Table 2 Health condition of the established seedlings noted during the transect inspection

Species	Health Condition		
	Good	Fair	Poor
Trees			
<i>Acacia confusa</i>		√	
<i>Acacia mangium</i>		√ ⁽²⁾	
<i>Castanopsis fissa</i>		√ ⁽¹⁾⁽⁴⁾	

<i>Litsea glutinosa</i>		√ ^{(3), (4)}	
<i>Mallotus paniculatus</i>		√ ^{(3), (4)}	
<i>Phyllanthus emblica</i>		√ ^{(1), (3)}	
<i>Sapium discolor</i>		√ ^{(1), (3)}	
<i>Schima superba</i>		√	
Shrubs			
<i>Gordonia axillaris</i>		√	
<i>Melastoma candidum</i>		√ ⁽³⁾	
<i>Melastoma sanguineum</i>		√ ^{(3), (4)}	
<i>Rhaphiolepis indica</i>		√ ^{(1), (3)}	
<i>Rhodomytus tomentosa</i>	√ ⁽³⁾		

Note:

(1) - re-sprouting of planted seedlings was noted and most of the foliage of this species were found to be smaller in size

(2) - Powdery mildew was commonly noted on the tree seedlings

(3) - self-seeded seedlings or wild population of this species was presence within the planting area of the WCA, and since it is impracticable and sometimes unfeasible to differentiate them from the planted seedlings, the health condition was evaluated as a whole for this species encountered during the transect walk.

(4) - insect herbivory was noticeable

3.2 QUADRAT SAMPLING

3.2.1 The nine 20m x 20m sampling quadrats have been placed within the planted area of the WCA, and at area where the majority of the seedlings were planted and considered suitable for long term monitoring; in which 2 of them were located on the ridgeline and the rest are located on the north-facing slope of Cheung Shan (see **Appendix C**). The quadrat monitoring was conducted on 9th and 23rd June 2017.

3.2.2 According to the information provided by the main contractor and the landscaping subcontractor, the distribution of plant seedlings of different species within the WCA are more or less random and usually in small cluster with spacing in accordance with the latest planting arrangement, i.e. group of 3 to 5 with 1.5m spacing for tree and group of 5 to 8 with 0.75m spacing for shrubs, and the planting density of a particular area would also be varied and subject to the site constraints such as local topography and the abundance/coverage of the retained woody vegetation.

3.2.3 **Table 3** below presents the findings of the quadrat monitoring; and a comparison of the no. of seedling recorded for each planted species between the current and reference data collected in November 2016, as well as the computed survival rate, are presented in **Table 4**.

Table 3 The number of seedling recorded for each species within the sampling quadrats

	Quantity* and General Health^ Condition of the Established Seedling Recorded in Each Sampling Quadrat									Total Qty.
	R1	R2	S3	S4	S5	S6	S7	S8	S9	
Trees										
<i>Acacia confusa</i>	5	19	16	9	14	0	1	6	14	84
<i>Acacia mangium</i>	6	29	33	22	26	0	12	22	32	182
<i>Castanopsis fissa</i>	0	1	0	0	0	20	0	0	0	21
<i>Litsea glutinosa</i>	7	4	18	9	6	1	1	2	6	54

<i>Mallotus paniculatus</i>	12	13	12	8	20	21	6	9	13	114
<i>Phyllanthus emblica</i>	1	11	7	4	15	0	0	4	6	48
<i>Sapium discolor</i>	1	2	2	2	1	1	0	0	1	10
<i>Schima superba</i>	3	4	0	2	0	82	0	0	0	91
Sub-Total	35	83	88	56	82	125	20	43	72	604
Shrubs										
<i>Gordonia axillaris</i>	5	17	47	24	49	0	13	11	19	185
<i>Melastoma candidum</i>	6	30	55	22	60	8	11	27	36	255
<i>Melastoma sanguineum</i>	7	58	57	36	108	2	10	13	37	328
<i>Rhaphiolepis indica</i>	55	36	46	63	93	12	13	11	58	387
<i>Rhodomyrtus tomentosa</i>	85	94	186	94	100	37	45	29	98	768
Sub-Total	158	235	391	239	410	59	92	91	248	1923

Notes: ^ General Health Condition:

- Good - No. in normal font type (e.g., “99”)
- Fair - No. in Italic font (e.g., “99”)
- Poor - No. in italic & underlined (e.g., “99”)

* the quantity include all established individuals of the planted species within the quadrat regardless whether they are self-seeded or planted (see Section 2.3.6)

Table 4 No. of Individual Recorded for Each Planted Species in Previous Monitoring and Survival Rate in the Reporting Month (compared with the reference data collected in November – December 2016)

Species	No. of Individual				Survival Rate (%)
	Nov 16	Jan 17	Apr 17	Jun 17	
<i>Acacia confusa</i>	113	80	84	84	74.34
<i>Acacia mangium</i>	179	162	182	182	100.00 ⁽¹⁾
<i>Castanopsis fissa</i>	39	29	21	21	53.85
<i>Litsea glutinosa</i>	77	58	56	54	70.13
<i>Mallotus paniculatus</i>	80	98	114	114	100.00 ⁽¹⁾
<i>Phyllanthus emblica</i>	48	23	48	48	100.00 ⁽¹⁾
<i>Sapium discolor</i>	18	8	10	10	55.56
<i>Schima superba</i>	82	66	91	91	100.00 ⁽¹⁾
<i>Gordonia axillaris</i>	148	144	185	185	100.00 ⁽¹⁾
<i>Melastoma candidum</i>	352	258	268	255	72.44
<i>Melastoma sanguineum</i>	313	223	328	328	100.00 ⁽¹⁾
<i>Rhaphiolepis indica</i>	438	355	387	387	88.36
<i>Rhodomyrtus tomentosa</i>	824	816	768	768	93.2

(1) As a result of re-sprouting of the planted or self-seeded plants, the total number of individual recorded is higher than the reference data collected in Nov 2016

- 3.2.4 Based on the recorded data and observations made within the sampled quadrat and the data presented in **Table 3** and **Table 4**, the following summaries provide a brief account of the findings from the quadrat monitoring:
- Health condition: most of the recorded seedlings were found in fair to good condition.
 - Survival Rate: The survival rate of 6 of the planted species are higher than the reference data collected in November 2016, including the trees *Acacia mangium*, *Mallotus paniculatus*, *Phyllanthus emblica* and *Superba schima*, as well as the shrub *Gordonia axillaris* and *Melastoma sanguineum*, which could attribute to the re-sprouting of the planted seedlings or self-established/self-seeded plants.
 - Similar to the previous month, 5 of the planted species has recorded with a survival rate less than 80% during the reporting period, including the shrub *Melastoma candidum* and the tree *Acacia confusa*, *Litsea glutinosa*, *Castanopsis fissa* and *Sapium discolor*; and their survival rates are more or less stable when compared to previous monitoring period.
- 3.2.5 The possible cause of the poor survival rate of the 5 planted species has already been postulated in previous report, including:
- poor vigor of the planted seedling
 - animal disturbance including herbivory and trampling (in particularly within and in the proximity of Quadrat R1, S6, S7 and S8)
 - insufficient horticultural maintenance (such as watering/weeding)
 - the seedlings of those species are out-competed (for light and space) by the adjacent planted, self-seeded or retained vegetation, in particularly the *Sapium discolor* where all of the plants recorded are small in size and mostly covered with a few small-sized leave, and hence prone to the shading impact from the neighbor plants.
- 3.2.6 Since the survival rates of the *Melastoma candidum*, *Litsea glutinosa* and *Acacia confusa* were found to be more or less stable during the reporting period, the necessity for replanting of this 3 species would be further reviewed from the findings of future monitoring.
- 3.2.7 Nevertheless, since the *Sapium discolor* only recorded with a survival rate of ~55% and no improvement was noted during the reporting period, remedial actions including replanting of this species is recommended in accordance to the action plan as stated in the Table 1; and the quantity of *Sapium discolor* seedling to be replanted should be ~45% to those originally planted, i.e., 1058. The replanting work should be undertaken within the planting season and in suitable locations within the WCA where pre-planting clearance of herbaceous plants (in particularly the fern *Dicranopteris pedata*) should be undertaken prior the planting work, and the planted seedlings would not be shaded from adjacent plants to avoid competition for light and other resources (see Section 4.7 of the WCP).
- 3.2.8 On the other hand, replanting of *Castanopsis fissa* has already been recommended in the previous report, and the no. of seedling to be replanted for this species should based on the latest monitoring result, i.e., the recorded 51.28% survival rate, and revised to 1609.
- 3.2.9 All of the replanting works should make reference and conform to the Section 5 “Planting Management” of the approved Woodland Compensation Plan (WCP), in

particularly those related to pre-planting site preparation as such to expedite the planting work once the seedlings on-site and facilitate their recovery from the planting shocks and establishment.

3.2.10 As shown in the **Table 1**, the Contractor is responsible for the implementation of the replanting and other remedial measures agreed by AFCD, and it is understood from the Engineer that replanting of the WCA have been scheduled in the 2nd half of 2017, and a detailed replanting plan including the replanting and maintenance programme should be prepared by the Contractor and submitted to the Engineer for prior approval. Table 5 below presents the recommended remedial actions to address the possibly cause of poor survival rate of the *Castanopsis fissa* and *Sapium discolor*.

Table 5 Recommended Remedial Actions for the Poor Survival Rate of *Castanopsis fissa* and *Sapium discolor*

Possible Cause	Remedial Action
Animal disturbance	The necessity for taking any remedial actions to avoid or minimize the impact of wild boar to the <i>Castanopsis fissa</i> seedlings to be further reviewed from the survival rate of this species after replanting.
Poor vigor of the planted seedlings	The Contractor should ensure the size of the seedlings fulfills the requirements of the pertinent specification during replanting
Vegetation maintenance	Strengthen the vegetation maintenance (in particularly weeding) within the WCA
Inter-specific competition	Undertake weeding of herbaceous plants in particularly the fern <i>Dicranopteris pedata</i> around the planted <i>Castanopsis fissa</i> and <i>Sapium discolor</i> within the WCA; and any replacement planting should be strategically planted to minimize the shading effect from other vegetation

3.2.11 **Table 6** below summarize the possible cause of the poor survival rate of the 5 species and recommended actions.

Table 6 Summary of the Recommended Remedial Actions for Species with a Survival Rate <80%

Species	Survival Rate (%)	Possible Cause	Recommended Remedial Action	Replanting
<i>Acacia confusa</i>	74.34	I, III	n/a	To be further reviewed
<i>Castanopsis fissa</i>	53.85	I, II, III, IV	Refer to the bullets in Section 3.2.11	Yes
<i>Litsea glutinosa</i>	70.13	I, II, III, IV	n/a	To be further

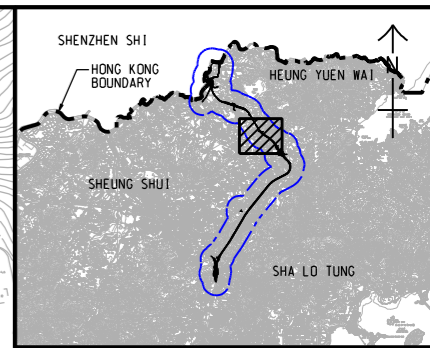
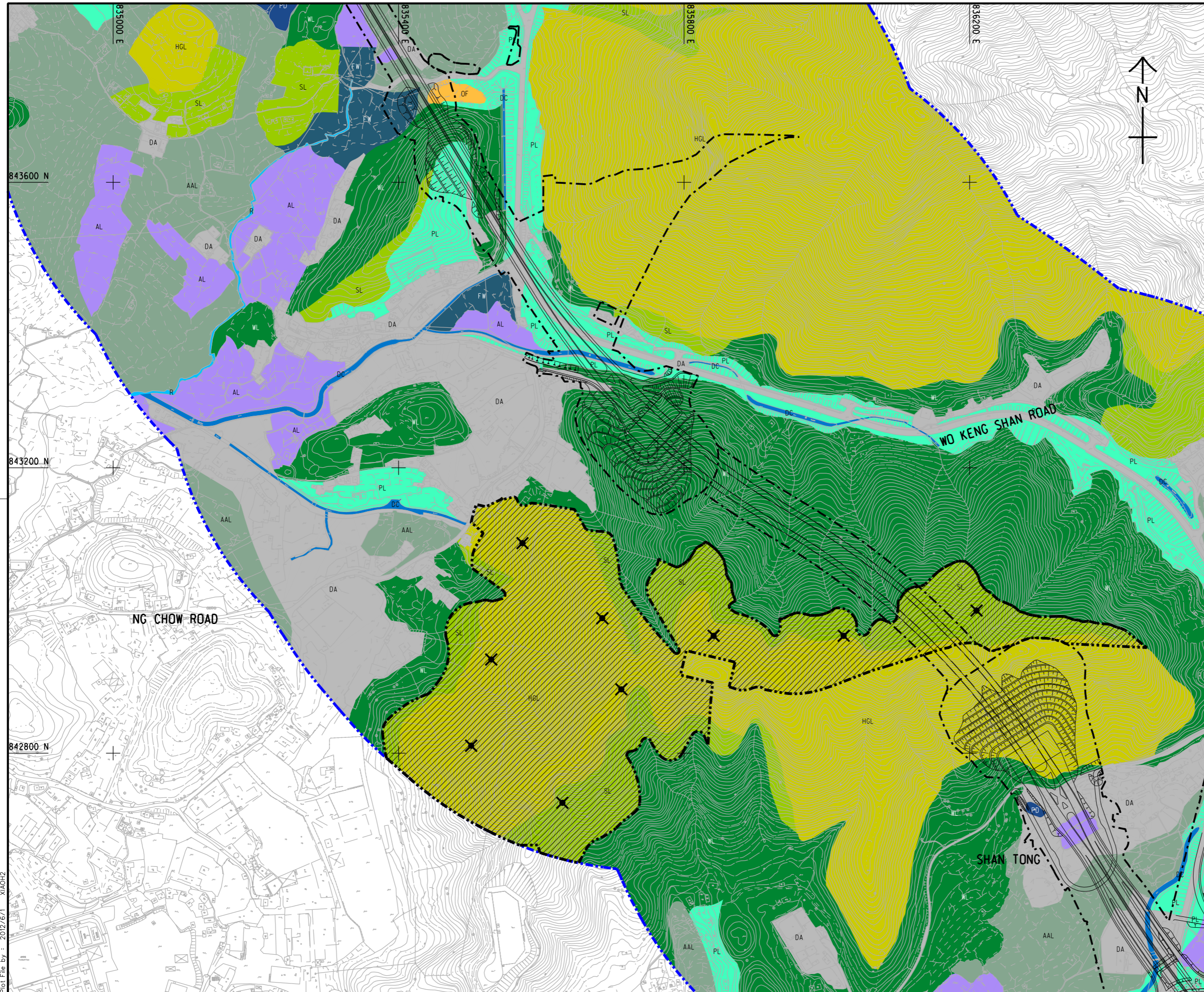
				reviewed
<i>Sapium discolor</i>	55.56	I, II, III, IV	Refer to the bullets in Section 3.2.11	Yes
<i>Melastoma candidum</i>	72.44	I, II, IV	n/a	To be further reviewed

- I : Poor vigor of the planted seedling
 II : Animal Disturbance/Trampling
 III : Insufficient Maintenance
 IV : Out-competed by adjacent plant

-End-

Appendix A

**Drawing No. 60212563/SK7037 of the Woodland Compensation
Plan**



KEY PLAN
SCALE 1 : 150000

LEGEND:

- 500m ASSESSMENT AREA
- TENTATIVE WORKS AREA
- TUNNEL SECTION
- WOODLAND
- SHRUBLAND
- PLANTATION
- FRESHWATER WETLAND [NET AGRICULTURAL LAND (ACTIVE/ABANDONED)]
- ACTIVE AGRICULTURAL LAND
- ABANDONED AGRICULTURAL LAND
- HILLSIDE GRASSLAND
- POND
- DRAINAGE CHANNEL
- WATERCOURSE
- OPEN FIELD
- DEVELOPED AREA
- EXTENT OF WOODLAND COMPENSATION PLANTING AREA
- TENTATIVE WOODLAND MONITORING QUADRAT (THE EXACT LOCATION TO BE DETERMINED BY THE ENGINEER ON SITE)

REV.	DESCRIPTION	DATE	BY	CHKD.	DATE

土木工程拓展署
CEDD
Civil Engineering and
Development Department

LIANTANG/HEUNG YUEN WAI BOUNDARY
CONTROL POINT AND ASSOCIATED WORKS
(SITE FORMATION AND INFRASTRUCTURES)
- DESIGN AND CONSTRUCTION

**PROPOSED WOODLAND
COMPENSATION AREA**

AECOM

DRG. NO. 60212563/SK7037
圖紙編號

DESIGNED BY 設計人	CONTRACT NO. 合約編號	P. Dir. APPROVED 批核人
KW		

DRG. BY 繪圖人	STATUS 圖則
YJP	

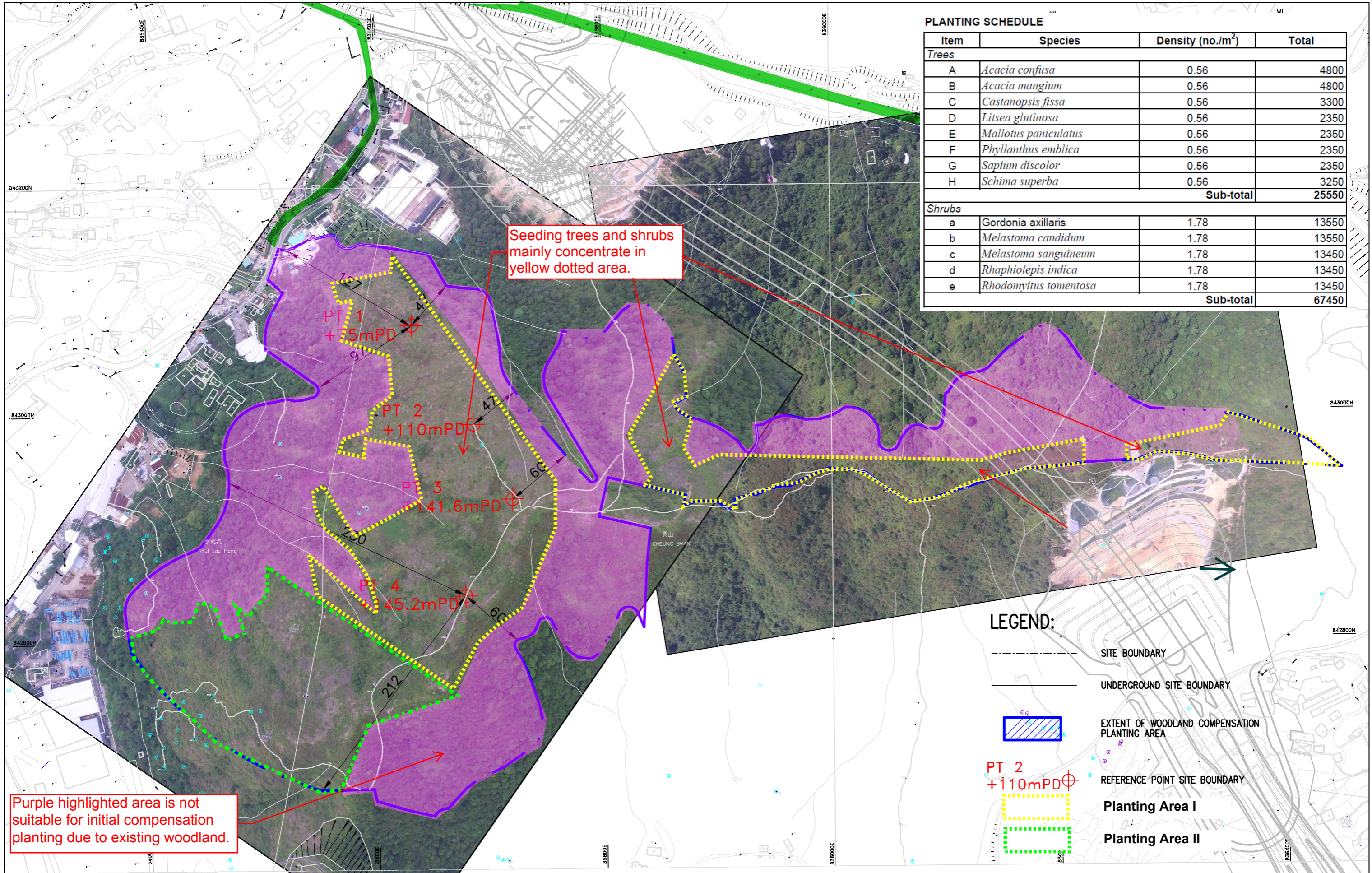
SCALE 比例尺: A1 1 : 2500
DIMENSIONS ARE IN 尺寸單位: METRES

© COPYRIGHT RESERVED
版權所有

Plot File by : 2012/6/1 XIAO12

Appendix B

Latest Planting Arrangement






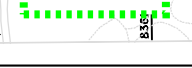
PLANTING SCHEDULE

Item	Species	Density (no./m ²)	Total
Trees			
A	<i>Acacia confusa</i>	0.56	4800
B	<i>Acacia mangium</i>	0.56	4800
C	<i>Castanopsis fissa</i>	0.56	3300
D	<i>Litsea glutinosa</i>	0.56	2350
E	<i>Mallotus paniculatus</i>	0.56	2350
F	<i>Phyllanthus emblica</i>	0.56	2350
G	<i>Sapium discolor</i>	0.56	2350
H	<i>Schima superba</i>	0.56	3250
Sub-total			25550
Shrubs			
a	<i>Gordonia axillaris</i>	1.78	13550
b	<i>Melastoma candidum</i>	1.78	13550
c	<i>Melastoma sanguineum</i>	1.78	13450
d	<i>Rhaphiolepis indica</i>	1.78	13450
e	<i>Rhodomlytus tomentosa</i>	1.78	13450
Sub-total			67450

Seeding trees and shrubs mainly concentrate in yellow dotted area.

Purple highlighted area is not suitable for initial compensation planting due to existing woodland.

LEGEND:

- SITE BOUNDARY
- UNDERGROUND SITE BOUNDARY
-  EXTENT OF WOODLAND COMPENSATION PLANTING AREA
-  REFERENCE POINT SITE BOUNDARY
-  Planting Area I
-  Planting Area II

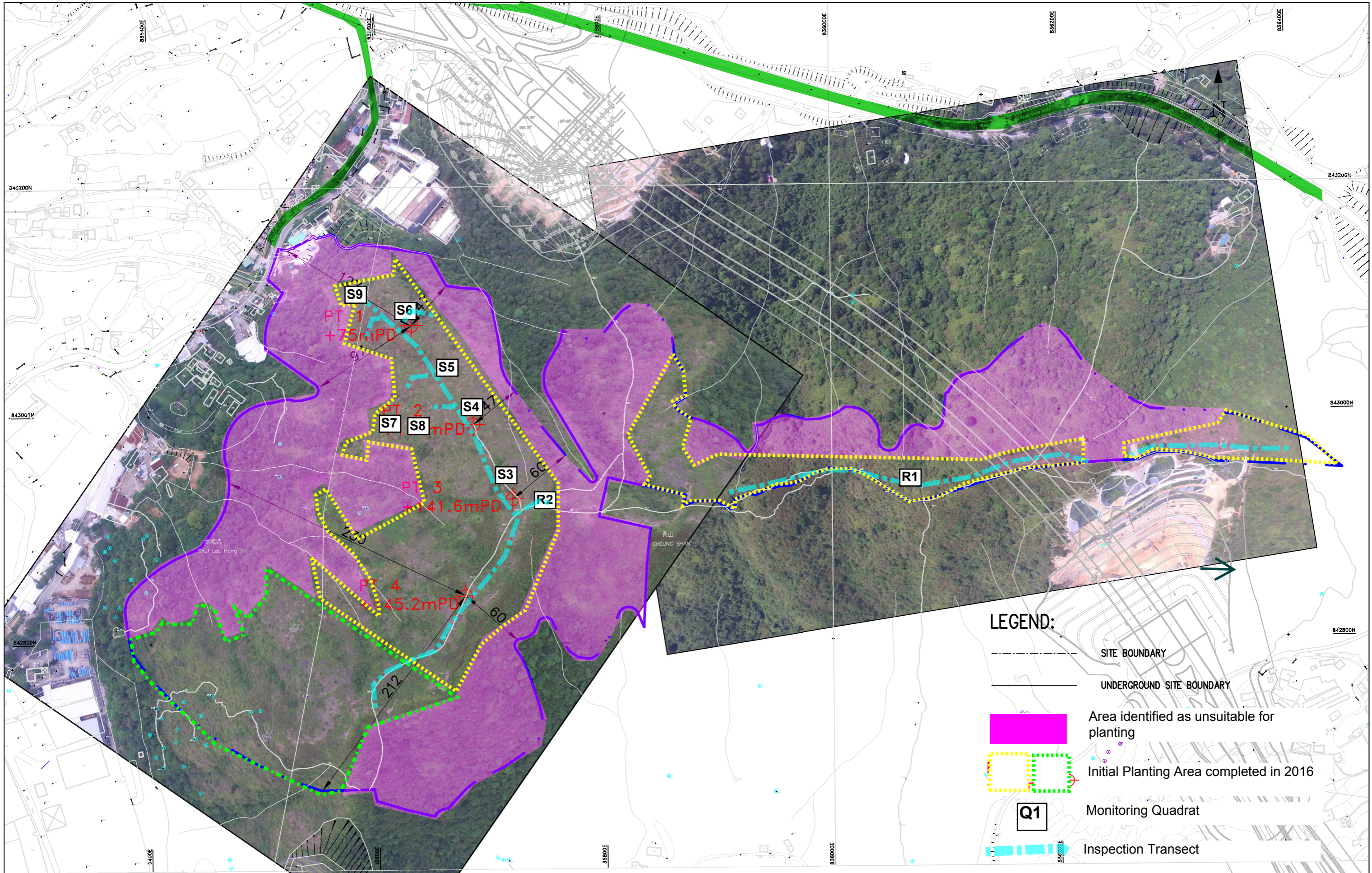
CONTRACT NO. CV/2013/08
LIANTANG/HEUNG YUEN WAI
BOUNDARY CONTROL POINT
SITE FORMATION AND
INFRASTRUCTURE WORKS
- CONTRACT 6

APPENDIX B - SITE CONSTRAINTS AND LATEST PLANTING ARRANGEMENT OF THE INITIAL PLANTING PHASE (2016)




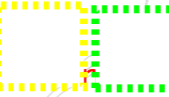


SCALE	1:3000(A3)	SURVEY DATE	8 September 2016
CHECK		DRAWN	K W
JOB NO.		SKETCH NO.	
		REV	-

Appendix C

Transect Routes and Sampling Quadrats of Woodland Compensation Monitoring



LEGEND:

-  SITE BOUNDARY
-  UNDERGROUND SITE BOUNDARY
-  Area identified as unsuitable for planting
-  Initial Planting Area completed in 2016
-  Monitoring Quadrat
-  Inspection Transect

APPENDIX C - LOCATION OF THE THE INSPECTION TRANSECTS AND MONITORING QUADRATS, 2016

CONTRACT NO. CV/2013/08
LIANTANG/HEUNG YUEN WAI
BOUNDARY CONTROL POINT
SITE FORMATION AND
INFRASTRUCTURE WORKS
- CONTRACT 6

SCALE	1:3000(A3)	SURVEY DATE	N/A
CHECK		DRAWN	K W
JOB NO.		SKETCH NO.	WCA_Monitoring Plan-161130
		REV	-

Appendix D

Photographic Records

Contract No. CV/2013/08, Woodland Compensation Area - Vegetation Monitoring



Fig-1a_North Facing Slope



Fig-1b_Eastern Ridgeline



Fig-1c_Western Ridgeline



Fig-2a1_Herbivory Damage



Fig-2a2_Herbivory Damage



Fig-2b_Animal Disturbance



Fig-3_Vegetation Clearane by others



Fig-4a_R1

Contract No. CV/2013/08, Woodland Compensation Area - Vegetation Monitoring



Fig-4b_R2



Fig-4c_S3



Fig-4d_S4



Fig-4e_S5



Fig-4f_S6



Fig-4g_S7



Fig-4h_S8



Fig-4i_S9