



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
(MARCH 2021 TO MAY 2021)**

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

Date	Reference No.	Prepared By	Certified By
25 June 2021	TCS00694/13/600/R2652v2	 Keith Wong (Ecologist)	 Tam Tak Wing (Environmental Team Leader)

Version	Date	Remarks
1	18 June 2021	First Submission
2	25 June 2021	Amended according to the IEC's comments



Member of the Surbana Jurong Group

local people
global experience

Our ref: 7076192/L27589/AW/MCC/rw

28 June 2021

AECOM

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

By Email & Post

Attention: Mr Eddie LUK

Dear Sir

Agreement No. CE 45/2008 (CE)

**Liantang/Heung Yuen Wai Boundary Control Point and Associated Works
Independent Environmental Checker – Investigation**

**Quarterly Ecological Monitoring Report for Woodland Compensation Area
(Stage 2 Enhancement Planting) (No. 9) – March 2021 to May 2021**

With reference to the Quarterly Ecological Monitoring Report for Woodland Compensation Area (Stage 2 Enhancement Planting) No. 9 for March 2021 to May 2021 (Version 2) certified by the ET Leader and received by IEC on 28 June 2021, please note 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 Arthur CHIU on tel. 3995-8144 or by email to arthur.chiu@smec.com.

Yours faithfully

Antony WONG
Independent Environmental Checker

cc CEDD/BCP - Mr LU Pei Yu / Mr Derek LAU
AECOM - Mr Pat LAM / Mr Anthony WONG
CCKJV - Mr Vincent CHAN
AUES - Mr TW TAM

by fax: 3547 1659
by email
by email
by email

SMEC ASIA LIMITED
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
W www.smec.com



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	LATEST BASELINE QUANTITY REFERENCED FOR EVALUATING SURVIVAL RATE OF THE SPECIES PLANTED FOR INITIAL AND ENHANCEMENT PLANTING PHASE
TABLE 4	THE NUMBER OF SEEDLING RECORDED FOR EACH SPECIES WITHIN THE SAMPLING QUADRATS
TABLE 5	SURVIVAL RATE OF THE SPECIES PLANTED WITHIN THE WCA

LIST OF APPENDICES

APPENDIX A	DRAWING NO. 60212563/SK7037 OF THE WOODLAND COMPENSATION PLAN
APPENDIX B	AS-BUILT PLANTING SCHEDULE FOR INITIAL PLANTING PHASE
APPENDIX C	TRANSECT ROUTES AND SAMPLING QUADRATS OF WOODLAND COMPENSATION MONITORING
APPENDIX D	PHOTOGRAPHIC RECORDS
APPENDIX E	AS-BUILT RECORD OF THE PLANTING WORK

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 lost 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, and a revision of the updated WCP (i.e., WCP Revision 2) has been approved by EPD in 2017.
- 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 In accordance with the EM&A’s requirements and the monitoring schedule stated in the approved WCP (ver. 2) of the Project, as well as the latest status of the planting work that have been undertaken with the WCA, the Stage 2 enhancement planting (Phase 1) work has already covered all the monitoring quadrats in August 2019, as such this submission presents the findings of the 9th vegetation monitoring of the enhancement planting phase and covers the Reporting Period from *March 2021 to May 2021*, so as to address the monitoring frequency specified in S.7.2 of the approved WCP, i.e., quarterly monitoring after the first year of enhancement planting work.
- 1.1.5 Furthermore, since the vegetation monitoring is continuous from those undertaken for the initial planting phase, as such the monitoring has also covered those species previously planted, and if necessary the evaluation of their survival rate will take into account the increased in density or coverage of woody plants and hence changes in micro-climate of the monitoring quadrats (such as the decreased light exposure from the canopy of young trees or other woody plant, or increased competition for light, space and nutrient from the increased density of woody vegetation).

2. MONITORING REQUIREMENTS

2.1 MONITORING PROGRAM OF THE INITIAL AND ENHANCEMENT PLANTING PHASES

2.1.1 According to the Section 6.5 of the WCP (ver. 2), the frequency of the monitoring is proposed to be bi-monthly during the first year of the initial planting and enhancement planting phase and should be reduced to quarterly from the second year.

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 as-built planting plan 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 The survival rate of the planted species during the initial planting phase and enhancement planting phase will be evaluated against the latest updated referenced baseline as shown in the **Table 3** below, 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%	- 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 The results and findings of the bi-monthly (i.e., once every two months) monitoring including the landscape inspection during the first year of the initial planting phase and the first year of the enhancement planting phase 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 Starting from the second year of the initial planting phase and the enhancement planting phase, the frequency of the monitoring is reduced to quarterly basis, the results and findings of the quarterly monitoring as well as the landscape inspection after the first year of the initial planting phase and the first year of the enhancement planting phase shall 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 in a sunny day on 27th May 2021 with the ecological specialist of the IEC, an overview of the site condition is presented in *Appendix D*. According to the information provided by the Main Contractor, planting work within the WCA that covers the Stage 2 of the Phase 2 enhancement planting as well as the replacement planting recommended in previous monitoring report, was completed in late April/early May 2021 (see *Appendix E* for the as-built record for the planting work), as such the transect inspection have covered all the species planted for the initial and enhancement planting phase and the following presents the observations made along the transect route:

- According to Hong Kong Observatory, the monitoring period was much warmer and drier than usual in Hong Kong, in which March and May was the hottest corresponding months in record, and the total rainfall during the period was only ~19.5% of the normal figure.
- Removal of the two exotic tree species planted during the initial planting phase, i.e., the *Acacia confusa* and *Acacia mangium*, was noted throughout within the WCA, and clusters of the removed tree logs were occasionally spotted on the hillslope. Nonetheless, re-sprouting has been observed on some of the remained tree stumps.
- Signs of anthropogenic disturbance from planting/tree felling works, as well as clearance of ground cover (especially the fern *Dicranopteris pedata*) in the planting area, were also noted along the transect route.
- The overall health condition of those species planted for the initial planting phase was generally fair, and the native species *Schima superba*, *Mallotus paniculatus*, *Rhodymyrtus tomentosa* and *Polyspora axillaris* were found in good condition. Vigorous re-sprouting of the deciduous tree *Phyllanthus emblica* has also been noted.
- The tree species planted for the enhancement planting phase were mostly only occasionally encountered along the transect on the hillslope but more commonly found on the eastern ridgeline or near the bottom of the slope; and those established are mostly appeared in fair or good condition, such as the tree *Reevesia thyrsoidea*, the shrubs *Melicope pteleifolia*, *Psychotria asiatica* and *Ilex asprella*.
- Most of the seedlings being replanted within the WCA recently were found wilted or totally defoliated, except for *Bridelia tomentosa*, *Cinnamomum camphora*, *Cinnamomum parthenoxylon*, *Aquilaria sinensis* where they were largely appeared healthy, and re-sprouting was noted for the deciduous tree *Celtis sinensis* and *Liquidambar formosana*.

3.1.2 The general health condition of the species planted in the initial planting phase, 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	Planting Phase (I – Initial/ E - Enhancement)	Health Condition#		
		Good	Fair	Poor
<i>Acacia confusa</i> ^s	I		√	
<i>Acacia mangium</i> ^s	I	√		
<i>Castanopsis fissa</i>	I		√	
<i>Litsea glutinosa</i>	I		√	
<i>Mallotus paniculatus</i>	I	√		

Species	Planting Phase (I – Initial/ E - Enhancement)	Health Condition#		
		Good	Fair	Poor
<i>Phyllanthus emblica</i> *	I		√	
<i>Sapium discolor</i> *	I		√^	
<i>Schima superba</i>	I ⁽⁵⁾ & E	√		
<i>Bridelia tomentosa</i>	E		√^	
<i>Alangium chinense</i>	E	n/a**		
<i>Cinnamomum camphora</i>	E		√^	
<i>Aquilaria sinensis</i>	E		√	
<i>Bischofia javanica</i>	E	n/a**		
<i>Celtis sinensis</i> *	E		√^	
<i>Ficus hispida</i>	E		√^	
<i>Cinnamomum parthenoxylon</i>	E		√^	
<i>Garcinia oblongifolia</i>	E	n/a**		
<i>Reevesia thyrsoidea</i>	E	√		
<i>Schefflera heptaphylla</i>	E		√^	
<i>Sterculia lanceolata</i>	E		√^	
<i>Liquidambar formosana</i> *	I ⁽¹⁾ & E		√	
<i>Polyspora axillaris</i>	I ⁽²⁾ & E	√		
<i>Melastoma candidum</i>	I		√	
<i>Melastoma sanguineum</i>	I		√	
<i>Rhaphiolepis indica</i>	I		√	
<i>Rhodomyrtus tomentosa</i>	I	√		
<i>Ficus hirta</i>	E		√^	
<i>Ilex asprella</i>	I ⁽³⁾ & E		√	
<i>Melicope pteleifolia</i>	E	√		
<i>Psychotria asiatica</i>	I ⁽⁴⁾ & E		√	

Note:

\$ included for information only - exotic trees to be removed before end of the establishment period

It is impracticable and sometimes unfeasible to differentiate self-seeded seedlings or wild population from those planted under the WCP, the health condition was evaluated as a whole for each of the species regardless their possible origin during the transect walk.

^ only occasionally encountered along transect route

* Deciduous species

**Not available - not observed along the transect

(1) Planted as substitution for *Litsea glutinosa* during replacement replanting in Aug 2019

(2) Include newly planted individuals as substitution for *Melastoma candidum* during replacement replanting in Aug 2019 and April/May 2021

(3) Planted as substitution for *Melastoma sanguineum* during replacement replanting in Aug 2019

(4) Planted as substitution for *Rhaphiolepis indica* during replacement replanting in Aug 2019

(5) Also planted as substitution for *Sapium discolor* in the Initial Planting Phase in April/May 2021

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 25th and 27th May 2021, and the weather was rainy and sunny respectively on day of monitoring. Illustration of the quadrats condition during time of monitoring is shown in **Appendix D**.

3.2.2 With respect to the latest status of the planting/replanting works undertaken and completed within the monitoring quadrats, the baseline reference for evaluating survival

rate has been updated by making reference to the revised baseline established in September 2019, the findings of previous monitoring report, as well as the as-built record of the replanting works undertaken in April/May 2021 (see Table 3 below for details).

Table 3 Latest Baseline Quantity Referenced for Evaluating Survival Rate of the Species Planted for Initial and Enhancement Planting Phase

Species	Planting Phase (I – Initial/ E - Enhancement)	Baseline Reference (BR) – updated to Sep '19 [^]	Qty. Presented in Feb '21 Report	Planted Qty. in Apr/May '21 (Replacement Planting) ^{&}	Updated Baseline Reference (BR) – updated to May '21	Note
<i>Acacia confusa</i> [§]	I	113	71	0	N/A	F
<i>Acacia mangium</i> [§]	I	193	115	0	N/A	F
<i>Castanopsis fissa</i>	I	39	33	0	39	A
<i>Litsea glutinosa</i>	I	40	34	0	40	A
<i>Mallotus paniculatus</i>	I	80	186	0	80	A
<i>Phyllanthus emblica</i>	I	64	22	42	64	D
<i>Sapium discolor</i>	I	13	1	0	1	E
<i>Schima superba</i>	I ⁽⁵⁾ & E	202	205	12	214	C
<i>Bridelia tomentosa</i>	E	20	2	18	20	D
<i>Alangium chinense</i>	E	20	2	18	20	D
<i>Cinnamomum camphora</i>	E	20	10	10	20	D
<i>Aquilaria sinensis</i>	E	35	19	16	35	D
<i>Bischofia javanica</i>	E	20	3	17	20	D
<i>Celtis sinensis</i>	E	20	0	20	20	D
<i>Ficus hispida</i>	E	20	3	17	20	D
<i>Cinnamomum parthenoxylon</i>	E	20	2	18	20	D
<i>Garcinia oblongifolia</i>	E	35	5	30	35	D
<i>Reevesia thyrsoidea</i>	E	35	4	31	35	D
<i>Schefflera heptaphylla</i>	E	45	8	37	45	D
<i>Sterculia lanceolata</i>	E	40	7	33	40	D
<i>Liquidambar formosana</i>	I ⁽¹⁾ & E	60	16	44	60	D
<i>Polyspora axillaris</i>	I ⁽²⁾ & E	448	277	54	502	C
<i>Melastoma candidum</i>	I	136	82	0	82	B
<i>Melastoma sanguineum</i>	I	216	155	0	216	A
<i>Rhaphiolepis indica</i>	I	276	232	0	276	A
<i>Rhodomyrtus tomentosa</i>	I	443	376	0	443	A
<i>Ficus hirta</i>	E	200	64	136	200	D
<i>Ilex asprella</i>	I ⁽³⁾ & E	250	88	162	250	D
<i>Melicope pteleifolia</i>	E	30	17	13	30	D
<i>Psychotria asiatica</i>	I ⁽⁴⁾ & E	300	76	224	300	D

& Information provided by the Project Team

§ included for information only - exotic trees to be removed before end of the establishment period

[^] updated in Sep 2019 in accordance with the “as-built” planting plan for the initial/enhancement planting phase as well as the monitoring findings from Jun 2019

include self-seeded plants, and the extra qty. recorded would not be added into the reference baseline for the *Mallotus paniculatus*, *Schima superba* and *Polyspora axillaris*

(1) Planted as substitution for *Litsea glutinosa* during replacement replanting in Aug 2019

(2) Include newly planted individuals as substitution for *Melastoma candidum* during replacement replanting in Aug 2019 and April/May 2021

(3) Planted as substitution for *Melastoma sanguineum* during replacement replanting in Aug 2019

(4) Planted as substitution for *Rhaphiolepis indica* during replacement replanting in Aug 2019

Species	Planting Phase (I – Initial/ E - Enhancement)	Baseline Reference (BR) – updated to Sep '19 [^]	Qty. Presented in Feb '21 Report	Planted Qty. in Apr/May '21 (Replacement Planting) ^{&}	Updated Baseline Reference (BR) – updated to May '21	Note
(5) Also planted as substitution for <i>Sapium discolor</i> in the Initial Planting Phase in April/May 2021						
A Not involved in the replanting work in April/May 2021, no change in BR						
B Substituted by other species during replanting, BR updated to qty. recorded in Feb '21 Report						
C Planted as substitution for other species, BR updated to include qty. planted in April/May 2021						
D Replanted, no change in BR						
E sample size too small to be evaluated in the monitoring						
F Exotic trees to be eradicated from the compensatory woodland in 2021, and hence excluded in the monitoring						

3.2.3 The monitoring result of the reporting period and the survival rate of the species planted are shown in **Table 4** and **Table 5** below.

Table 4 The number of seedling recorded for each species within the sampling quadrats

Species	Planting Phase (I – Initial/ E - Enhancement)	Quantity* and General Health Condition [^] of the Seedling Recorded in Each Sampling Quadrat									Total Qty.
		R1	R2	S3	S4	S5	S6	S7	S8	S9	
Tree											
<i>Acacia confuse</i> [§]	I	2	2	3	0	0	0	0	1	0	8
<i>Acacia mangium</i> [§]	I	0	1	1	0	0	0	0	0	2	4
<i>Castanopsis fissa</i>	I	2	4	0	1	2	5	4	3	3	24
<i>Litsea glutinosa</i>	I	9	3	3	0	3	2	4	2	5	31
<i>Mallotus paniculatus</i>	I	22	13	12	11	19	11	18	16	16	138
<i>Phyllanthus emblica</i>	I	7	5	4	6	7	5	4	2	6	46
<i>Sapium discolor</i>	I	0	0	0	0	0	1	0	0	0	1
<i>Schima superba</i>	I & E	15	30	9	22	8	73	8	4	9	178
<i>Bridelia tomentosa</i>	E	1	3	0	2	0	1	0	0	1	8
<i>Alangium chinense</i>	E	1	1	1	0	0	1	0	1	1	6
<i>Cinnamomum camphora</i>	E	0	0	0	0	0	1	0	1	1	3
<i>Aquilaria sinensis</i>	E	1	3	6	2	0	1	1	1	8	23
<i>Bischofia javanica</i>	E	0	1	1	0	0	1	0	0	1	4
<i>Celtis sinensis</i>	E	6	1	1	0	1	1	0	0	2	12
<i>Ficus hispida</i>	E	0	0	0	0	0	0	0	0	0	0
<i>Cinnamomum parthenoxylon</i>	E	0	0	0	1	1	1	0	0	1	4
<i>Garcinia oblongifolia</i>	E	1	0	1	0	0	0	1	0	0	3
<i>Reevesia thyrsoidea</i>	E	0	1	0	0	0	0	0	1	0	2
<i>Schefflera heptaphylla</i>	E	0	1	0	0	0	0	0	1	0	2
<i>Sterculia lanceolata</i>	E	0	1	1	1	0	0	0	0	0	3
<i>Liquidambar formosana</i>	I & E	4	0	1	2	8	2	1	5	5	28
	Sub-Total	71	70	44	48	49	106	41	38	61	528
Shrub											
<i>Polyspora axillaris</i>	I & E	19	38	45	45	50	26	21	18	36	298
<i>Melastoma candidum</i>	I	0	7	12	13	14	5	4	6	7	68
<i>Melastoma sanguineum</i>	I	0	28	11	18	31	14	10	9	15	136
<i>Rhaphiolepis indica</i>	I	21	22	13	14	20	14	18	16	22	160

Species	Planting Phase (I – Initial/ E - Enhancement)	Quantity* and General Health Condition ^of the Seedling Recorded in Each Sampling Quadrat									Total Qty.
		R1	R2	S3	S4	S5	S6	S7	S8	S9	
<i>Rhodomyrtus tomentosa</i>	I	33	67	28	31	37	18	23	24	37	298
<i>Ficus hirta</i>	E	0	23	4	19	4	6	6	7	6	75
<i>Ilex asprella</i>	I & E	1	5	4	4	12	4	10	14	32	86
<i>Melicope pteleifolia</i>	E	4	1	1	3	3	3	1	3	2	21
<i>Psychotria asiatica</i>	I & E	11	3	9	6	9	3	12	8	13	74
	Sub-Total	89	194	127	153	180	93	105	105	170	1216

Notes: ^ General health condition of the species noted within the monitoring quadrats, and the rating may be different from those

determined under the transect inspection and presented in Table 2:

- 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 individuals of the planted species within the quadrat regardless whether their origin

§ included for information only - exotic trees to be removed before end of the establishment period

Table 5 Survival Rate of the Species Planted within the WCA

Species	Planting Phase (I – Initial/ E - Enhancement)	Reference Baseline ^	Total Qty.# Recorded in Quadrat Monitoring (May '21)	Survival Rate * (%)	Changed in Survival Rate (%) when compared with Previous Monitoring
<i>Tree</i>					
<i>Acacia confusa</i> [§]	I	113	8	7.1	-55.7
<i>Acacia mangium</i> [§]	I	193	4	2.1	-57.5
<i>Castanopsis fissa</i>	I	39	24	61.5	-23.1
<i>Litsea glutinosa</i>	I	40	31	77.5	-7.5
<i>Mallotus paniculatus</i>	I	80	138	100	0
<i>Phyllanthus emblica</i>	I	64	46	71.9	37.5
<i>Sapium discolor</i> [§]	I	1	1	100	0
<i>Schima superba</i>	I & E	214	178	83.2	-16.8
<i>Bridelia tomentosa</i>	E	20	8	40.0	30.0
<i>Alangium chinense</i>	E	20	6	30.0	20.0
<i>Cinnamomum camphora</i>	E	20	3	15.0	-35.0
<i>Aquilaria sinensis</i>	E	35	23	65.7	11.4
<i>Bischofia javanica</i>	E	20	4	20.0	5.0
<i>Celtis sinensis</i>	E	20	12	60.0	60.0
<i>Ficus hispida</i>	E	20	0	0.0	-15.0
<i>Cinnamomum parthenoxylon</i>	E	20	4	20.0	10.0
<i>Garcinia oblongifolia</i>	E	35	3	8.6	-5.7
<i>Reevesia thyrsoidea</i>	E	35	2	5.7	-5.7
<i>Schefflera heptaphylla</i>	E	45	2	4.4	-13.3
<i>Sterculia lanceolata</i>	E	40	3	7.5	-10.0
<i>Liquidambar formosana</i>	I & E	60	28	46.7	20.0
<i>Shrub</i>					

Species	Planting Phase (I – Initial/ E - Enhancement)	Reference Baseline ^	Total Qty.# Recorded in Quadrat Monitoring (May '21)	Survival Rate * (%)	Changed in Survival Rate (%) when compared with Previous Monitoring
<i>Polyspora axillaris</i>	I & E	502	298	59.4	-2.5
<i>Melastoma candidum</i>	I	82	68	82.9	22.6
<i>Melastoma sanguineum</i>	I	216	136	63.0	-8.8
<i>Rhaphiolepis indica</i>	I	276	160	58.0	-26.1
<i>Rhodomyrtus tomentosa</i>	I	443	298	67.3	-17.6
<i>Ficus hirta</i>	E	200	75	37.5	5.5
<i>Ilex asprella</i>	I & E	250	86	34.4	-0.8
<i>Melicope pteleifolia</i>	E	30	21	70.0	13.3
<i>Psychotria asiatica</i>	I & E	300	74	24.7	-0.7

\$ provided for information only - exotic species to be eradicated from the WCA

& provided for information only – see Table 3

^ see Table 3

refer to Table 4

* no. in bold denotes the survival rate of this species reach the trigger level, whereas no. in bold and italic denote the survival rate of this species reach the action level (see Table 1)

3.2.4 Based on the recorded data and observations made within the sampled quadrats and the data presented in **Tables 4** and **5**, the following provides a brief account of the findings from the quadrat monitoring:

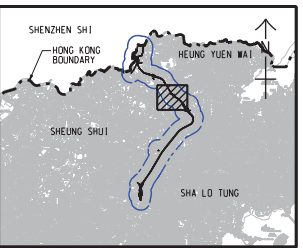
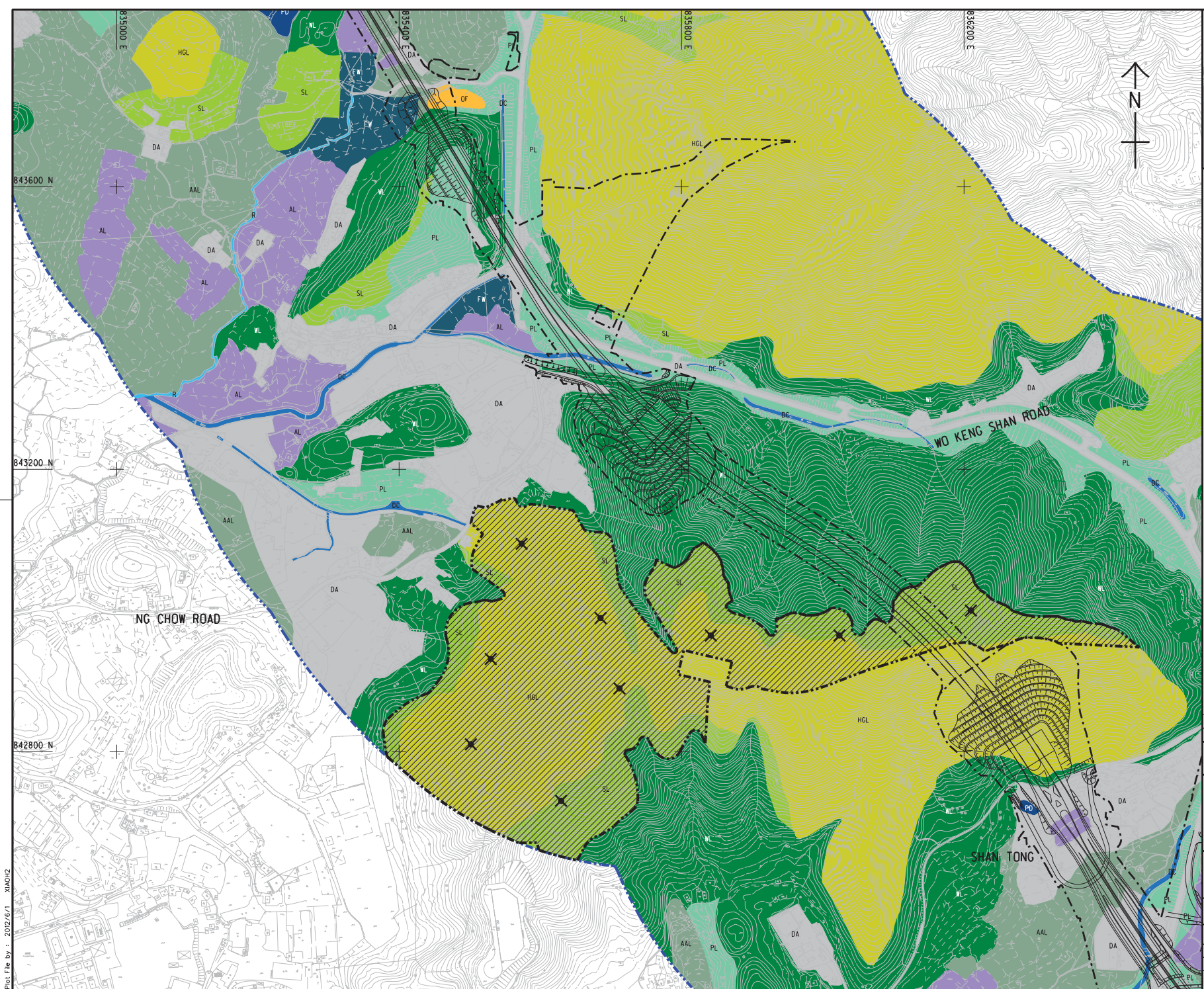
- Health condition: Generally speaking, the health condition of the seedlings planted for the initial or enhancement phase within the quadrats was found either in fair or good condition, except those recently planted where wilting was observed in some of the planted seedlings.
- Survival Rate: Survival rate of the two exotic tree species *Acacia confusa* and *Acacia mangium*, as well as the *Sapium discolor*, will be excluded from the evaluation as the former two species to be eradicated from the WCA and the baseline reference of the latter (1 no.) is too small for any meaningful evaluation.
- The survival rate of the other 27 species is ranged from “0%” (*Ficus hispida*) to 100% (*Mallotus paniculatus*); and an increase in survival rate was recorded for 10 of the species (see Table 5 above).
- As a whole, except the *Mallotus paniculatus* and *Schima superba* where both of their recorded survival rate were >80%, 22 of the remaining 25 species were recorded with a survival rate below 70%, and the other 3 were in between 70% and 80%.
- The poor survival rate of the planted species during the monitoring period may due to the excessive desiccation stress from the exceptional warm and limited rainfall over the monitoring period (see 1st bullet of S.3.1.1), especially for those species where replanting was recently completed as the seedlings may yet acclimatize to the planting site and recovered from the transplanting shock. Nonetheless, re-sprouting of *Celtis sinensis* and *Liquidamber formosana* was frequently observed on the newly planted seedlings.
- Regardless whether the poor survival rate recorded is related to the exceptional water stress, poor vigor of the seedlings, or out-competed by other self-established or planted woody plants, it is recommended to review and confirm the necessity of any replanting work from the data to be collected from next monitoring.

- The Contractor would be responsible for implementing action of replanting and other remedial measures agreed by AFCD. All of the replanting works should make reference and conform to the Section 5 “Planting Management” of the approved Woodland Compensation Plan (WCP), in particular it should be undertaken within the planting season and in suitable planting area based on their habitat/micro-habitat requirements, and should not be shaded from adjacent plants to avoid competition for light and other resources.
- Any pre-planting site preparation work such as clearance of herbaceous plants (in particular the fern *Dicranopteris pedata*), if required to facilitate the replanting work, should be completed prior the delivery of seedlings on-site as such to expedite the planting work and facilitate their recovery from the planting shocks; and the site preparation work should be undertaken with care to avoid any damage caused to the existing woody plants.
- Finally, the Project Team is also recommended to review the measures and planting program to minimize the potential desiccation stress of the seedlings during the transit, storage, as well as before and after replanting work on-site

-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**
- WL WOODLAND
- SL SHRUBLAND
- PL PLANTATION
- FW FRESHWATER WETLAND [NET AGRICULTURAL AND (ACTIVE/ABANDONED)]
- AL ACTIVE AGRICULTURAL LAND
- AAL ABANDONED AGRICULTURAL LAND
- HGL HILLSIDE GRASSLAND
- PD POND
- DC DRAINAGE CHANNEL
- R WATERCOURSE
- OF OPEN FIELD
- DA DEVELOPED AREA
- EXTENT OF WOODLAND COMPENSATION PLANTING AREA
- X TENTATIVE WOODLAND MONITORING QUADRAT (THE EXACT LOCATION TO BE DETERMINED BY THE ENGINEER ON SITE)

NO.	DESCRIPTION	DATE

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

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

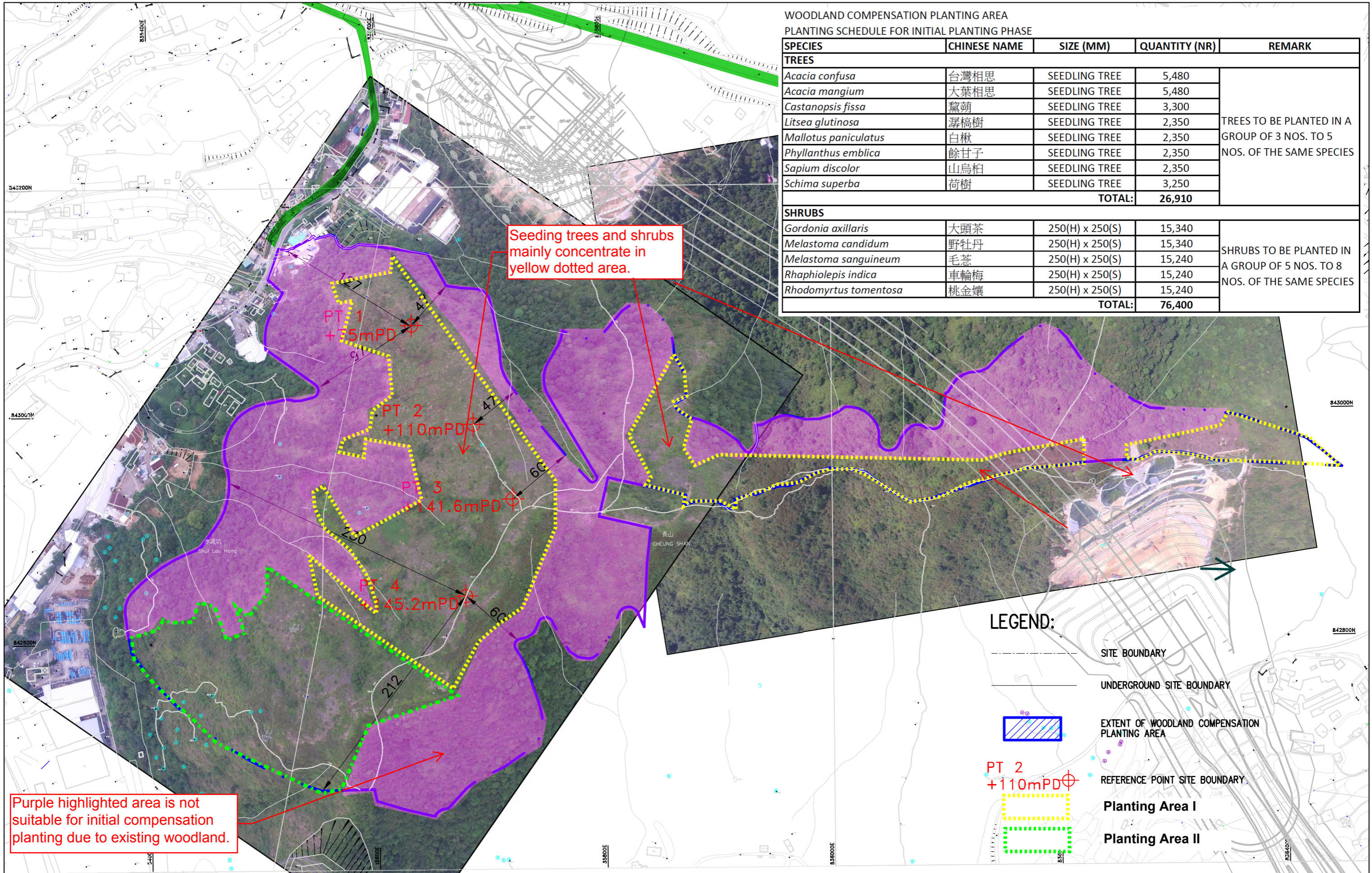
PROPOSED WOOLAND COMPENSATION AREA

DRGNO.
圖紙編號

DESIGNED BY DW: KW	CONTRACT NO. SMBR	P. DCR. APPROVED AREA
DRAWN BY YJP	STATUS REV	
SCALE E.P. 1 : 2500		
© COPYRIGHT RESERVED 版權 所 有		

Appendix B

As-built Planting Schedule for Initial Planting Phase



WOODLAND COMPENSATION PLANTING AREA
PLANTING SCHEDULE FOR INITIAL PLANTING PHASE

SPECIES	CHINESE NAME	SIZE (MM)	QUANTITY (NR)	REMARK
TREES				
<i>Acacia confusa</i>	台灣相思	SEEDLING TREE	5,480	TREES TO BE PLANTED IN A GROUP OF 3 NOS. TO 5 NOS. OF THE SAME SPECIES
<i>Acacia mangium</i>	大葉相思	SEEDLING TREE	5,480	
<i>Castanopsis fissa</i>	蠟菊	SEEDLING TREE	3,300	
<i>Litsea glutinosa</i>	潺槁樹	SEEDLING TREE	2,350	
<i>Mallotus paniculatus</i>	白楸	SEEDLING TREE	2,350	
<i>Phyllanthus emblica</i>	餘甘子	SEEDLING TREE	2,350	
<i>Sapium discolor</i>	山烏柏	SEEDLING TREE	2,350	
<i>Schima superba</i>	荷樹	SEEDLING TREE	3,250	
			TOTAL:	26,910
SHRUBS				
<i>Gordonia axillaris</i>	大頭茶	250(H) x 250(S)	15,340	SHRUBS TO BE PLANTED IN A GROUP OF 5 NOS. TO 8 NOS. OF THE SAME SPECIES
<i>Melastoma candidum</i>	野牡丹	250(H) x 250(S)	15,340	
<i>Melastoma sanguineum</i>	毛萼	250(H) x 250(S)	15,240	
<i>Rhaphiolepis indica</i>	車輪梅	250(H) x 250(S)	15,240	
<i>Rhodomyrtus tomentosa</i>	桃金娘	250(H) x 250(S)	15,240	
			TOTAL:	76,400

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

Seeding trees and shrubs mainly concentrate in yellow dotted area.

LEGEND:

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

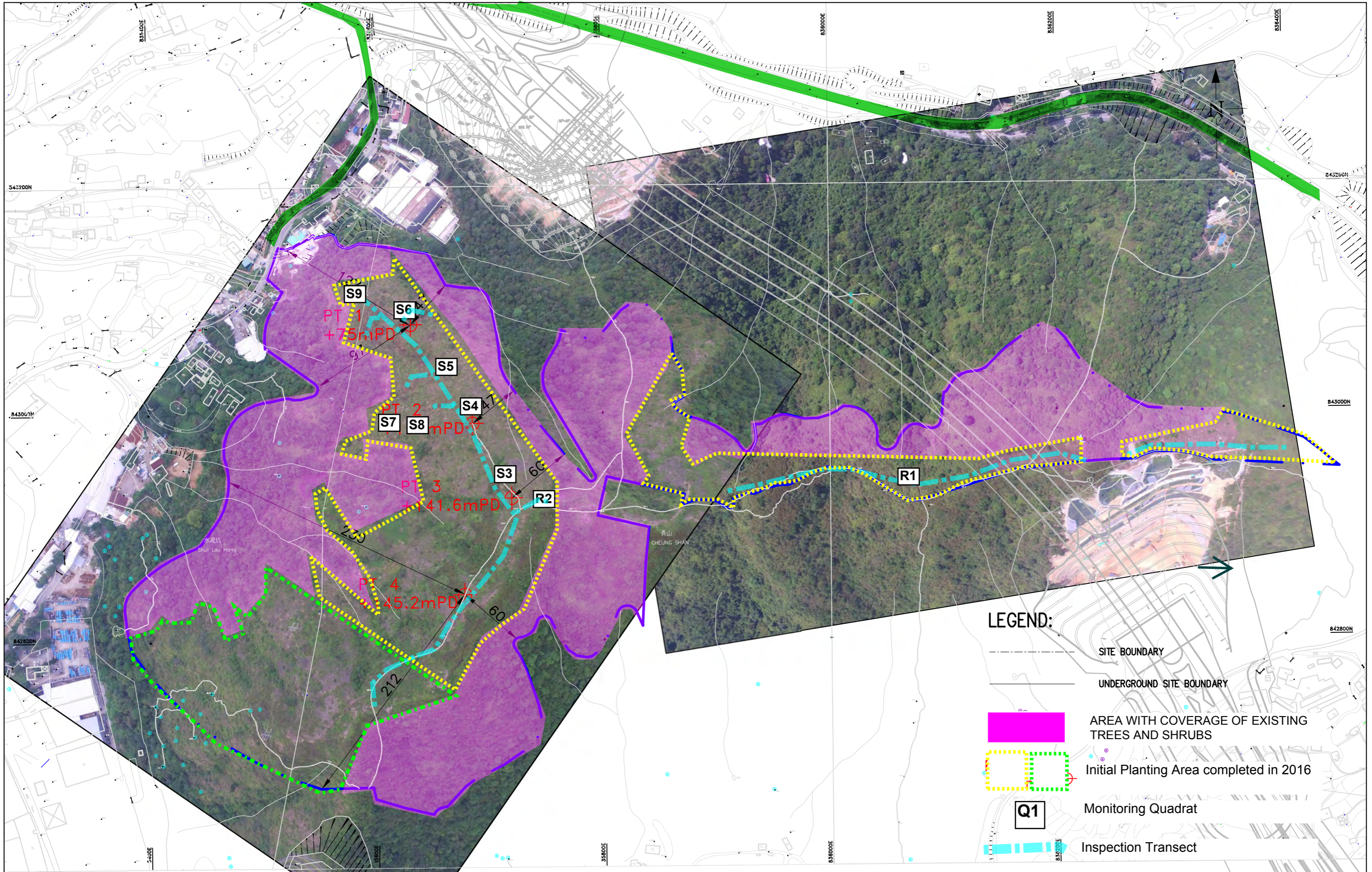
CONTRACT NO. CV/2013/08
LIANTANG/HEUNG YUEN WAI
BOUNDARY CONTROL POINT
SITE FORMATION AND
INFRASTRUCTURE WORKS
- CONTRACT 6

APPENDIX B - As-built Planting Schedule for Initial Planting Phase

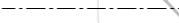


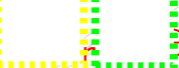


SCALE	1:3000(A3)	SURVEY DATE	8 September 2016
CHECK		DRAWN	K W
JOB NO.		SKETCH NO.	
		REV	-

Appendix C

Transect Routes and Sampling Quadrats of Woodland Compensation Monitoring



LEGEND:

-  SITE BOUNDARY
-  UNDERGROUND SITE BOUNDARY
-  AREA WITH COVERAGE OF EXISTING TREES AND SHRUBS
-  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

Photographic Record of the Woodland Compensation Area



1 - Eastern Ridgeline



2 - Western Ridgeline



3 -North-facing Slope



R1



R2



S3



S4



S5

Photographic Record of the Woodland Compensation Area



S6



S7



S8



S9

Appendix E

As-built record of the planting work

Replanting proposal for species with Low Survival Rate in WCA (March 2021)

Item	Species	Chinese Name	Replanting within Sampling Quadrats										Replanting Outside Sampling Quadrats	Total Replanting Quantity
			R1	R2	S3	S4	S5	S6	S7	S8	S9	Total		
Tree														
1	Phyllanthus emblica	餘甘子	5	5	5	5	5	3	4	5	5	42	1500	1542
2	Schima superba	木荷	2	2	0	0	2	0	2	2	2	12	711	723
3	Bridelia tomentosa	土密樹	4	3	1	3	0	2	2	2	1	18	129	147
4	Alangium chinensis	八角楓	3	4	1	1	1	2	1	2	3	18	276	294
5	Cinnamomum camphora	樟	2	2	0	0	0	2	1	2	1	10	72	82
6	Aquilaria sinensis	土沉香	3	4	2	0	0	2	0	0	5	16	133	149
7	Bischofia javanica	秋楓	4	4	1	0	0	2	1	1	4	17	122	139
8	Celtis sinensis	朴樹	3	3	2	2	2	2	2	2	2	20	143	163
9	Ficus hispida	對葉榕	2	4	2	0	0	2	1	1	5	17	122	139
10	Cinnamomum parthenoxylon	黃樟	2	2	2	2	1	2	1	2	4	18	129	147
11	Garcinia oblongifolia	嶺南山竹子	4	4	1	1	3	3	4	5	5	30	250	280
12	Reevesia thysoides	梭羅樹	4	4	3	2	2	2	5	4	5	31	259	290
13	Schefflera heptaphylla	鵝掌柴	4	4	5	6	4	2	5	4	3	37	232	269
14	Sterculia lanceolata	假蘋婆	4	4	3	3	3	2	4	4	6	33	237	270
15	Liquidambar formosana	楓香	4	4	2	3	4	2	7	10	8	44	926	970
16	Gordonia axillaris	大頭茶	10	4	5	5	10	5	5	2	8	54	2299	2353
TOTAL:												417	7540	7957
Shrubs														
17	Ficus hirta	粗葉榕	28	5	14	20	13	20	12	12	12	136	1531	1667
18	Ilex asprella	梅葉冬青	30	20	14	20	13	20	18	13	14	162	4487	4649
19	Melicope pteleifolia	蜜茱萸	2	4	3	0	0	0	2	2	0	13	199	212
20	Psychotria asiatica	九節木	10	20	20	22	30	30	20	30	42	224	5818	6042
TOTAL:												535	12035	12570