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 (SEPTEMBER TO NOVEMBER 2020)

PREPARED FOR
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT (CEDD)

Date	Reference No.	Prepared By	Certified By
22 December 2020	TCS00694/13/600/R2577v2	 Keith Wong (Ecologist)	 Tam Tak Wing (Environmental Team Leader)

Version	Date	Remarks
1	14 December 2020	First Submission
2	22 December 2020	Amend according to the IEC's comment on 14 December 2020

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22 December 2020

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

By Email & Post

Attention: Mr Owen NG

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. 7) – September 2020 to November 2020

With reference to the Quarterly Ecological Monitoring Report for Woodland Compensation Area (Stage 2 Enhancement Planting) No. 7 for September 2020 to November 2020 (Version 2) certified by the ET Leader and received by IEC on 22 December 2020, 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

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Table of Content

LIST OF TABLES

LIST OF APPENDICES

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 7th vegetation monitoring of the enhancement planting phase and covers the Reporting Period from Sep 2020 to Nov 2020, 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, lighting 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/fruiting/ 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/fruiting/ 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%	- 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 on ***24th November 2020*** 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 1 of the Phase 2 enhancement planting as well as the replacement planting of the initial planting work, was completed in the 2nd half of August 2019 (see ***Appendix E*** for the as-built record of 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:

- The transect inspection was undertaken on a sunny day. According to Hong Kong Observatory, the autumn mean temperature in Hong Kong for the period from September to November 2020 was one of the fourth warmest autumns on record; and despite the accumulated rainfall this year up to November was slightly more than the normal figure for the same period, November was also drier than usual and total rainfall recorded was only about 14 percent of the normal figure.
- Signs of anthropogenic or wildlife disturbance within the WCA were relatively sparse along the transect route on the hillslope, and vigorous growth of the ground cover (especially the fern *Dicranopteris pedata*) was noted on the hillslope of Cheung Shan, and some of the planted seedlings were found shaded by the fond of the fern or other herbaceous plants.
- The overall health condition of those species planted for the initial planting phase was generally fair, and the native species *Schima superba*, *Phyllanthus emblica Melastoma sanguineum Rhodomytrus tomentosa* and *Gordonia axillaris*, as well as the exotic *Acacia mangium*, were found in good condition.
- The tree species planted for the enhancement planting phase were mostly occasionally encountered* as a single individual or in cluster along the transect, and they are mostly appeared in fair condition with the tree *Schefflera heptaphylla*, *Reevesia thyrsdidea* shrubs *Melicope pteleifolia,Psychotria asiatica* and *Ilex asprella* appeared to be well established and generally in good condition. Nonetheless, besides the planted deciduous tree species *Celtis sinensis*, saplings of the planted tree *Alangium chinense* and *Bischofia javanica*,also have not been noted along the transect. (*note: whereabouts exactly the seedlings of each of the planted species were planted within the WCA was unknown to the Environmental Team, and their locations could beyond the coverage of the visual inspection along the transect).

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
Acacia confusa	I		√	
Acacia mangium	I	√		
Castanopsis fissa	I		√	
Litsea glutinosa	I		√	
Mallotus paniculatus	I		√	
*Phyllanthus emblica**	I	√		
*Sapium discolor**	I		√^	
Schima superba	I(5) & E	√		
Bridelia tomentosa	E			√^

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

Note:
 # 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
(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

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 23rd and 24th November 2020, and the weather was dry and sunny on both days. ***Appendix D*** illustrates the condition of the quadrats during the time of monitoring.

3.2.2 With respect to the latest status of the planting works undertaken and completed within the monitoring quadrats, the baseline reference for evaluating survival rate has already been updated in previous report by making reference to the as-built record of planting works in Aug 2019, and shown in the Table 3 below for reference.

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) ^	Qty. Presented in Jun '19 Report	Planted Qty. in Aug '19 (Replacement Planting/ Enhancement Planting)/	Updated Baseline Reference (BR)	Note
Acacia confusa	I	113	89	0	113	A
Acacia mangium	I	193	161	0	193	A
Castanopsis fissa	I	39	43	0	39	A
Litsea glutinosa	I	79	40	0	40	B
Mallotus paniculatus	I	80	162#	0	80	A
Phyllanthus emblica	I	64	34	30	64	F
Sapium discolor	I	39	13	0	13	B
Schima superba	I(5) & E	82	108#	120	202	C
Bridelia tomentosa	E	n/a	n/a	20	20	E
Alangium chinense	E	n/a	n/a	20	20	E
Cinnamomum camphora	E	n/a	n/a	20	20	E
Aquilaria sinensis	E	n/a	n/a	35	35	E
Bischofia javanica	E	n/a	n/a	20	20	E
Celtis sinensis	E	n/a	n/a	20	20	E
Ficus hispida	E	n/a	n/a	20	20	E
Cinnamomum parthenoxylon	E	n/a	n/a	20	20	E
Garcinia oblongifolia	E	n/a	n/a	35	35	E
Reevesia thyrsoidea	E	n/a	n/a	35	35	E
Schefflera heptaphylla	E	n/a	n/a	45	45	E
Sterculia lanceolata	E	n/a	n/a	40	40	E
Liquidambar formosana	I(1) & E	n/a	n/a	60	60	D
Gordonia axillaris	I(2) & E	148	213#	300	448	C
Melastoma candidum	I	352	136	0	136	B
Melastoma sanguineum	I	313	216	0	216	B
Rhaphiolepis indica	I	438	276	0	276	B
Rhodomyrtus tomentosa	I	824	443	0	443	G
Ficus hirta	E	n/a	n/a	200	200	E
Ilex asprella	I(3) & E	n/a	n/a	250	250	D
Melicope pteleifolia	E	n/a	n/a	30	30	E
Psychotria asiatica	I(4) & E	n/a	n/a	300	300	D

^ updated in Sep 2017 in accordance with the "as-built" planting plan for the initial planting phase as well as the monitoring findings between Aug 2017 and Nov 2017

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

(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

A Not involved in the replanting/enhancement planting work, no change in BR

B Substituted by other species during replanting, BR updated to qty. recorded in Jun '19 Report

C Planted as substitution for other species and enhancement planting, BR updated to include qty. planted in

Species	Planting Phase (I – Initial/ E - Enhancement)	Baseline Reference (BR) ^	Qty. Presented in Jun '19 Report	Planted Qty. in Aug '19 (Replacement Planting/ Enhancement Planting)/	Updated Baseline Reference (BR)	Note
Aug '19 *D Planted for enhancement planting and as substitution for species used in initial planting phase, BR referred to qty. planted in Aug '19* *E Planted for enhancement planting work, BR referred to qty. planted in Aug '19* *F Replanted, no change in BR* *G Replanted completed outside the monitoring quadrats(see **Appendix E)** , BR updated to qty. recorded in Jun '19 Report*						

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											
Acacia confusa#	I	*16*	*9*	*7*	*5*	*14*	*7*	*6*	*4*	*16*	**84**
Acacia mangium#	I	*20*	*19*	*17*	*14*	*18*	*0*	*8*	*12*	*18*	**126**
Castanopsis fissa	I	*4*	*3*	*1*	*3*	*5*	*4*	*5*	*4*	*5*	**34**
Litsea glutinosa	I	*5*	*3*	*4*	*3*	*5*	*3*	*6*	*4*	*4*	**37**
Mallotus paniculatus	I	*30*	*18*	*16*	*14*	*29*	*15*	*23*	*19*	*26*	**190**
Phyllanthus emblica	I	*4*	*5*	*4*	*3*	*6*	*4*	*7*	*1*	*6*	**40**
Sapium discolor	I	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	**1**
Schima superba	I & E	*21*	*31*	*13*	*29*	*13*	*77*	*11*	*7*	*12*	**214**
Bridelia tomentosa	E	*1*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*1*	**4**
Alangium chinense	E	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	**3**
Cinnamomum camphora	E	*2*	*1*	*4*	*3*	*2*	*1*	*1*	*0*	*1*	**15**
Aquilaria sinensis	E	*2*	*2*	*8*	*1*	*1*	*1*	*2*	*1*	*2*	**20**
Bischofia javanica	E	*0*	*0*	*1*	*1*	*0*	*1*	*1*	*0*	*1*	**5**
Celtis sinensis	E	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	**0**
Ficus hispida	E	*0*	*0*	*1*	*1*	*1*	*0*	*1*	*1*	*0*	**5**
Cinnamomum parthenoxylon	E	*0*	*0*	*0*	*0*	*1*	*0*	*2*	*0*	*0*	**3**
Garcinia oblongifolia	E	*1*	*1*	*1*	*1*	*1*	*0*	*1*	*1*	*0*	**7**
Reevesia thyrsoidea	E	*1*	*0*	*1*	*0*	*1*	*0*	*1*	*1*	*0*	**5**
Schefflera heptaphylla	E	*1*	*1*	*1*	*1*	*1*	*3*	*1*	*1*	*0*	**10**
Sterculia lanceolata	E	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0*	**8**
Liquidambar formosana	I & E	*3*	*2*	*2*	*2*	*1*	*4*	*3*	*3*	*2*	**22**
	Sub-Total	**112**	**96**	**82**	**83**	**100**	**121**	**82**	**61**	**96**	**833**
Shrub											
Gordonia axillaris	I & E	*21*	*38*	*40*	*43*	*59*	*27*	*19*	*23*	*40*	**310**
Melastoma candidum	I	*5*	*13*	*19*	*23*	*16*	*9*	*6*	*8*	*7*	**106**
Melastoma sanguineum	I	*8*	*29*	*16*	*25*	*39*	*13*	*15*	*13*	*17*	**175**
Rhaphiolepis indica	I	*33*	*30*	*25*	*21*	*30*	*22*	*26*	*21*	*27*	**235**

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	
Rhodomyrtus tomentosa	I	*44*	*83*	*35*	*30*	*67*	*23*	*29*	*32*	*46*	**389**
Ficus hirta	E	*3*	*4*	*7*	*14*	*8*	*9*	*8*	*10*	*9*	**72**
Ilex asprella	I & E	*0*	*6*	*7*	*8*	*9*	*9*	*16*	*19*	*28*	**102**
Melicope pteleifolia	E	*3*	*3*	*0*	*2*	*3*	*3*	*0*	*2*	*2*	**18**
Psychotria asiatica	I & E	*7*	*9*	*14*	*9*	*8*	*6*	*16*	*13*	*9*	**91**
	Sub-Total	***124***	***215***	***163***	***175***	***239***	***121***	***135***	***141***	***185***	***1498***

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., "*<u>99</u>*")

***** the quantity include all individuals of the planted species within the quadrat regardless whether their origin

\# it is assumed that thinning has been undertaken during the enhancement planting work

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 (Nov'20)	Survival Rate * (%)	Changed in Survival Rate (%) when compared with Previous Monitoring
Tree					
Acacia confusa	I	113	**84**	**74.3**	**0.9**
Acacia mangium	I	193	**126**	***65.3***	**-1.0**
Castanopsis fissa	I	39	**34**	**87.2**	**5.1**
Litsea glutinosa	I	40	**37**	92.5	**2.5**
Mallotus paniculatus	I	80	**190**	100.0	**0.0**
Phyllanthus emblica	I	64	**40**	***62.5***	**-3.1**
Sapium discolor	I	13	**1**	**7.7**	**0.0**
Schima superba	I & E	202	**214**	100	**0.0**
Bridelia tomentosa	E	20	**4**	***20.0***	**-5.0**
Alangium chinense	E	20	**3**	***15.0***	**-5.0**
Cinnamomum camphora	E	20	**15**	**75.0**	**-5.0**
Aquilaria sinensis	E	35	**20**	***57.1***	**0.0**
Bischofia javanica	E	20	**5**	***25.0***	**-5.0**
Celtis sinensis	E	20	**0**	***0.0***	**0.0**
Ficus hispida	E	20	**5**	***25.0***	**0.0**
Cinnamomum parthenoxylon	E	20	**3**	***15.0***	**-5.0**
Garcinia oblongifolia	E	35	**7**	***20.0***	**0.0**
Reevesia thyrsoidea	E	35	**5**	***14.3***	**0.0**
Schefflera heptaphylla	E	45	**10**	***22.2***	**-4.4**
Sterculia lanceolata	E	40	**8**	***20.0***	**0.0**
Liquidambar formosana	I & E	60	**22**	***36.7***	**3.3**
Shrub					
Gordonia axillaris	I & E	448	**310**	***69.2***	**2.5**

Species	Planting Phase (I – Initial/ E - Enhancement)	Reference Baseline ^	Total Qty.# Recorded in Quadrat Monitoring (Nov'20)	Survival Rate * (%)	Changed in Survival Rate (%) when compared with Previous Monitoring
Melastoma candidum	I	136	**106**	**77.9**	**-0.7**
Melastoma sanguineum	I	216	**175**	81.0	**-0.9**
Rhaphiolepis indica	I	276	**235**	85.1	**3.6**
Rhodomyrtus tomentosa	I	443	**389**	87.8	**0.2**
Ficus hirta	E	200	**72**	***36.0***	**-3.0**
Ilex asprella	I & E	250	**102**	***40.8***	**-2.4**
Melicope pteleifolia	E	30	**18**	***60.0***	**3.3**
Psychotria asiatica	I & E	300	**91**	***30.3***	**-3.0**

^ 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.
- Survival Rate: According to the last 2 columns of the Table 5, among the 30 species planted, except the *Celtis sinensis* where it never recorded within the quadrat since planted, the survival rate of the planted species was ranged from 7.7% (*Sapium discolor*) to 100% (*Mallotus paniculatus* and *Schima superba*).
- No change in the survival rate of 8 of the planted species was recorded during the monitoring period, including the trees *Mallotus paniculatus, Sapium discolor, Schima superba, Aquilaria sinensis, Ficus hispida, Garcinia oblongifolia, Reevesia thyrsoidea* and *Sterculia lanceolata*
- On the other hand, increase in the survival rate (ranged from 0.2% to 5.1%) was recoded for the following 8 species: *Acacia confusa, Castanopsis fissa, Litsea glutinosa, Liquidambar formosana, Gordonia axillaris, Rhaphiolepis indica, Rhodomyrtus tomentosa and Melicope pteleifolia*; whereas the survival rate of the remaining 13 species was recorded with a drop from 0.7% (*Melastoma candidum*) to 5% (including *Aauilaria sinensis* and 4 other species). Details refer to Table 5 above.
- As a whole, except 7 species where their survival rates are all above 80%, i.e., *Castanopsis fissa, Litsea glutinosa, Mallotus paniculatus, Schima superba, Melastoma sanguineum, Rhaphiolepis indica* and *Rhodomyrtus tomentosa*, 3 of the planted species (*Acacia confusa, Cinnamomum camphora* and *Melastoma candidum*) were recorded with a survival rate in between 70% and 80%, and the remaining 20 species all recorded with a survival rate below 70% during the monitoring period.
- Among the 20 species with survival rate <70%, except the *Acacia mangium,, Phyllanthus emblica, Sapium discolor* and *Gordonia axillaris*, the other 16 species were planted during the enhancement planting phase, and the poor survival rate of the latter group may due to the poor vigor of the planted seedlings or poor recovery of the seedlings from the transplanting shock, especially under the unusual drier weather in Hong Kong since the seedlings was planted in Sep '19 as

well as during the growing season in 2020.

- Nonetheless, regardless whether the poor survival rate of those species recorded with survival rate <70% is related to usual drier weather condition or the seedlings were out-competed by other self-established or planted woody plants, the updated replanting arrangements as detailed in Table 6 and 7 below are recommended, in which *Schima superba* has been recommended to substitute *Sapium discolor* and the necessity for replanting the *Gordonia axillaris*, which is one of the plant species well-established of the planting program, will be further reviewed from future monitoring.
- On the other hand, action for both *Acacia sp*. would not be unnecessary as they were planned for thinning in the planting program, and the necessity for taking any remedial actions for *Melastoma candidum* and *Cinnamomum camphora* will also be further reviewed in the future 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 particularly 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.
- On the other hand, where pre-planting site preparation work such as clearance of herbaceous plants (in particularly the fern *Dicranopteris pedata*) is required to facilitate the replanting work, it 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 establishment; and the site preparation work should be undertaken with care to avoid any damage caused to the exiting woody plants.
- Finally, with respect to the timing of this reporting and the replanting program, it is recommended to carry out the replanting work at the onset of next growing season, i.e., March 2021 as such to safeguard and increase the chance of recovery of the planted seedlings from the transplanting shock, and hence the survival rate of the planted seedlings.

Table 6 Recommended Replanting Quantity for Species Recorded with Survival Rate <70%

Species	Survival Rate % (Nov. 2020)	Reference Quantity ^	Qty. to be Replanted
Phyllanthus emblica	62.5	2350	881
Sapium discolor	**7.7**	783	723 *(to be substituted by Schima superba)*
Bridelia tomentosa	20.0	163	130
Alangium chinense	15.0	327	278
Aquilaria sinensis	57.1	327	140
Bischofia javanica	25.0	163	122
Celtis sinensis	0.0	163	163
Ficus hispida	25.0	163	122
Cinnamomum parthenoxylon	15.0	163	139
Garcinia oblongifolia	20.0	327	262
Reevesia thyrsoidea	14.3	327	280
Schefflera heptaphylla	22.2	327	254
Sterculia lanceolata	20.0	327	262
Liquidambar formosana	36.7	1323	838

Ficus hirta	36.0	2451	1569
Ilex asprella	40.8	7174	4247
Melicope pteleifolia	60.0	490	196
Psychotria asiatica	30.3	8088	5635
^ Except Sapium discolor where the reference qty. would be the qty. planted for the initial planting phase minus those that has been substituted during the replacement planting in 2019 (i.e., 2350-1567=783), the reference quantity of the others refer to the qty. planted during the enhancement planting work at Aug 2019			

Table 7 Recommended Replanting Quantity for Each of the Quadrat to Restore the Reference Baseline in the Monitoring Program

Species	**Qty. to be Replanted#**	**Quantity ***								
		R1	**R2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
Phyllanthus emblica	24	2	3	0	2	2	3	4	4	4
*Schima superba^*	12	2	2	0	0	2	0	2	2	2
Bridelia tomentosa	16	3	3	1	3	0	2	2	2	0
Alangium chinense	17	3	4	1	1	1	2	1	1	3
Aquilaria sinensis	15	2	2	0	0	2	1	2	2	4
Bischofia javanica	15	3	2	0	1	2	2	1	1	3
Celtis sinensis	20	3	3	2	2	2	2	2	2	2
Ficus hispida	15	2	2	1	2	2	2	1	1	2
Cinnamomum parthenoxylon	17	3	3	2	0	0	2	2	3	2
Garcinia oblongifolia	28	3	2	2	2	3	3	4	4	5
Reevesia thyrsoidea	30	3	3	4	4	4	3	3	3	3
Schefflera heptaphylla	35	6	6	2	2	3	5	3	3	5
Sterculia lanceolata	32	4	4	3	3	3	3	3	3	6
Ficus hirta	38	4	4	0	0	4	4	4	8	10
Ficus hirta	128	20	20	10	12	10	20	10	10	16
Ilex asprella	148	20	20	10	20	20	18	20	10	10
Melicope pteleifolia	12	2	2	3	1	0	0	3	1	0
Psychotria asiatica	209	33	30	20	20	20	20	20	23	23

 # qty. from the difference between those shown in col.3 and 4 of Table 5

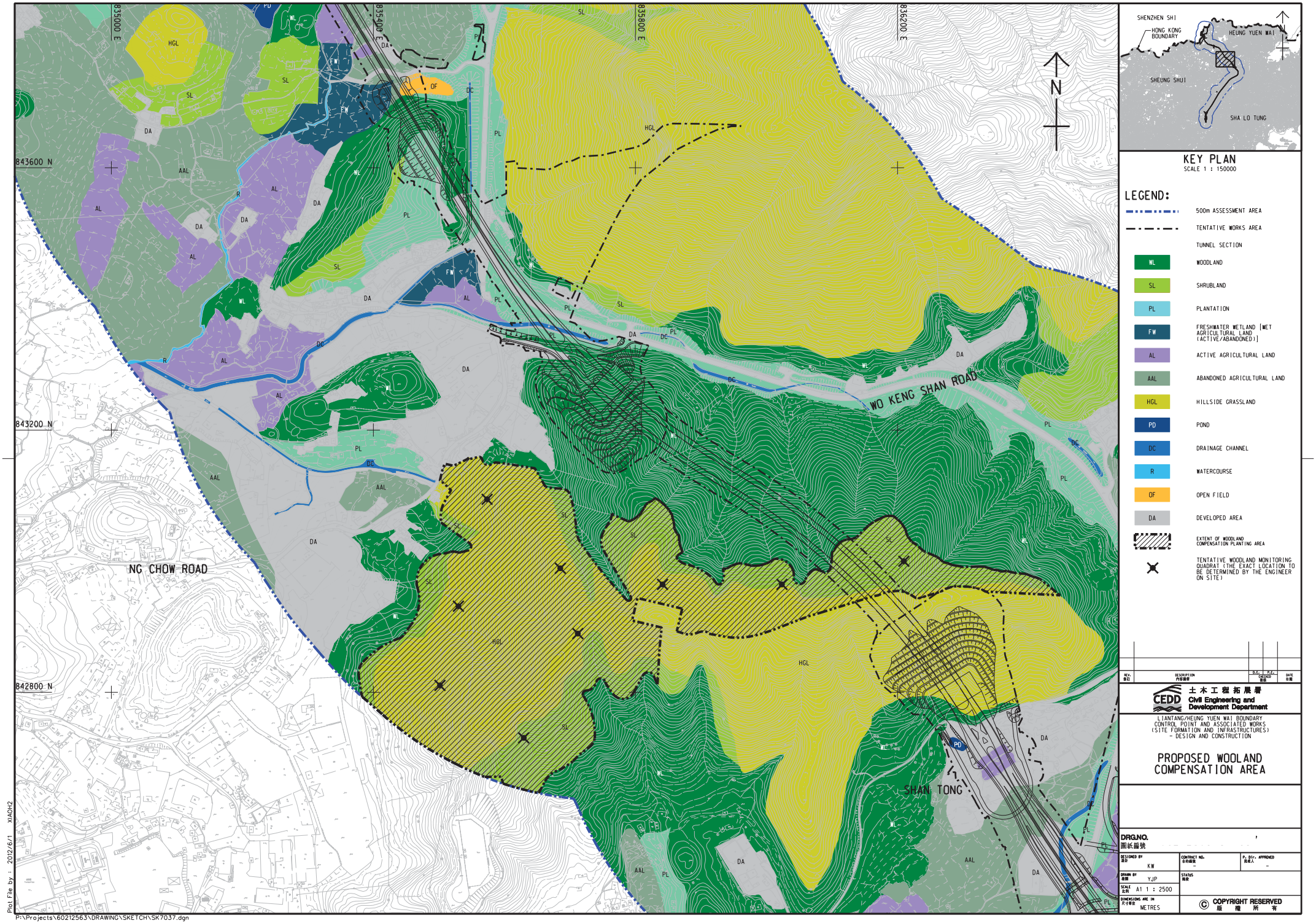
**Since the number of each plant species planted in each quadrat has not been made available for reference, the recommended quantity for each species in each quadrat is allocated by making reference to the updated baseline reference for quadrat monitoring as shown in Table 3, quantity of the respective species recorded in each quadrat in Sep 2019, i.e., the data collected after the completion of the planting work at Aug 2019 and current monitoring, as well as the observed plant density and site condition of each of the quadrat,*

^to be planted as substitute of Sapium discolor

-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 (WET AGRICULTURAL LAND (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
- TENTATIVE WOODLAND MONITORING QUADRAT (THE EXACT LOCATION TO BE DETERMINED BY THE ENGINEER ON SITE)

REV. 修訂	DESCRIPTION 內容摘要	D.E. 設計	P.E. 核准	DATE 日期

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

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

PROPOSED WOOLAND COMPENSATION AREA

DRG.NO. 圖紙編號

DESIGNED BY 設計	CONTRACT NO. 合約編號	P. Dir. APPROVED 負責人
KW	–	–
DRAWN BY 繪圖	STATUS 狀態	
YJP		
SCALE 比例 A1 1 : 2500		
DIMENSIONS ARE IN 尺寸單位 METRES	© COPYRIGHT RESERVED 版權所有	

Plot File by : 2012/6/1 XIAOH2

P:\Projects\60212563\DRAWING\SKETCH\SK7037.dgn

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				
Acacia confusa	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
Acacia mangium	大葉相思	SEEDLING TREE	5,480	
Castanopsis fissa	黧蒴	SEEDLING TREE	3,300	
Litsea glutinosa	潺槁樹	SEEDLING TREE	2,350	
Mallotus paniculatus	白楸	SEEDLING TREE	2,350	
Phyllanthus emblica	餘甘子	SEEDLING TREE	2,350	
Sapium discolor	山烏桕	SEEDLING TREE	2,350	
Schima superba	荷樹	SEEDLING TREE	3,250	
		TOTAL:	**26,910**	
SHRUBS				
Gordonia axillaris	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
Melastoma candidum	野牡丹	250(H) x 250(S)	15,340	
Melastoma sanguineum	毛菶	250(H) x 250(S)	15,240	
Rhaphiolepis indica	車輪梅	250(H) x 250(S)	15,240	
Rhodomyrtus tomentosa	桃金孃	250(H) x 250(S)	15,240	
		TOTAL:	**76,400**	

Seeding trees and shrubs mainly concentrate in yellow dotted area.

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

PT 1 +75mPD

PT 2 +110mPD

PT 3 141.6mPD

PT 4 45.2mPD

LEGEND:

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

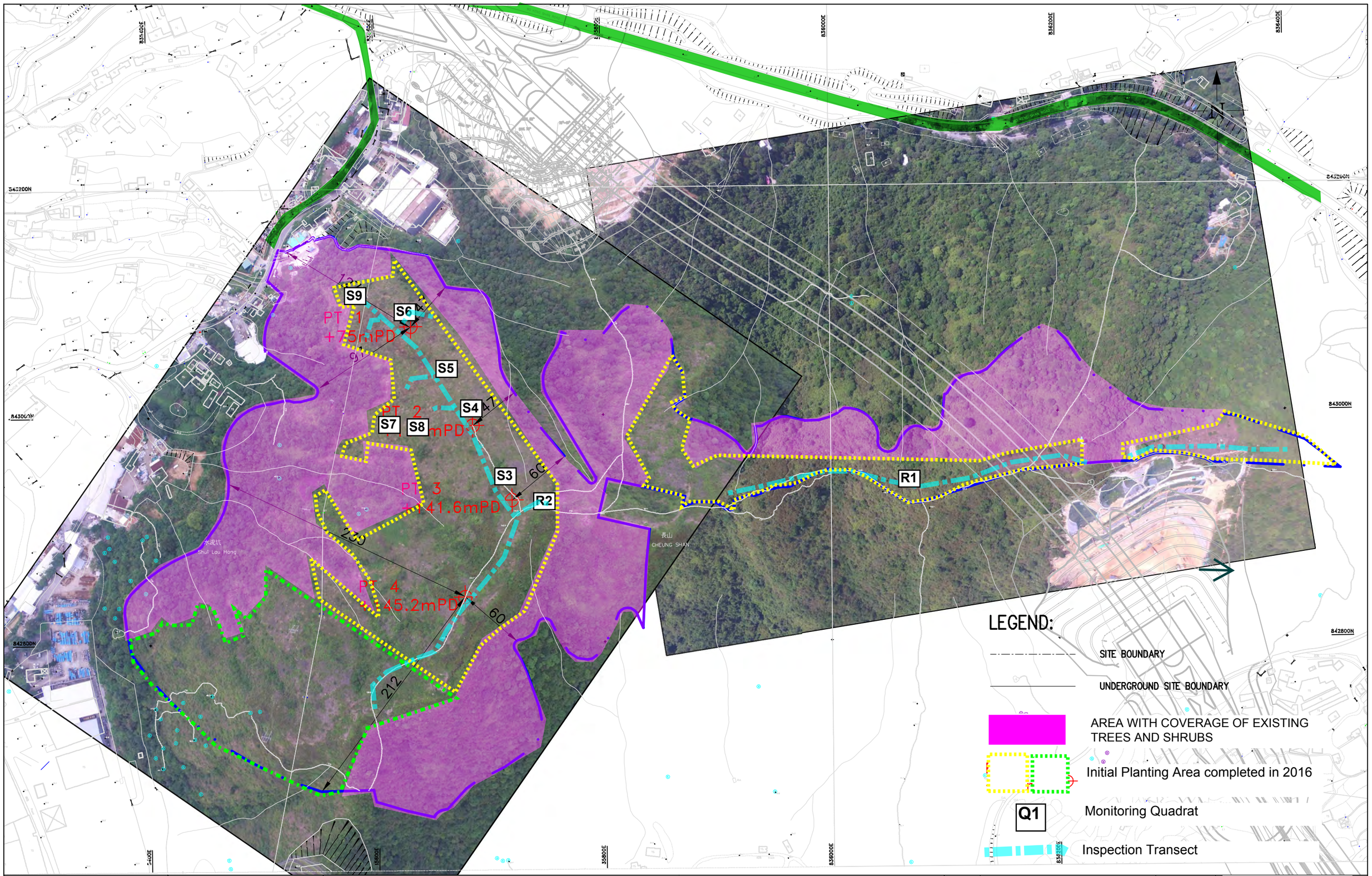
CONTRACT NO. CV/2013/08
LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT SITE FORMATION AND INFRASTRUCTURE WORKS – CONTRACT 6

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



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

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

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- 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

As-built record of planting works in WCA (August 2019)

Species		Stage II Enhancement Planting (Phase I) Quantity (nr.)	Replanting for Initial Planting Phase Quantity (nr.)	Total Planted Quantity (nr.)	Total Planted Within 9nr Monitoring Quadrats (nr.)	Total Planted Outside 9nr Monitoring Quadrats (nr.)
Bridelia tomentosa	土密樹	163		163	20	143
Alangium chinese	八角楓	327		327	20	307
Cinnamomum camphora	樟	163		163	20	143
Aquilaria sinensis	土沉香	327		327	35	292
Bischofia javanica	秋楓	163		163	20	143
Celtis sinensis	朴樹	163		163	20	143
Ficus hispida	對葉榕	163		163	20	143
Cinnamomum parthenoxylon	黃樟	163		163	20	143
Garcinia oblongifolia	嶺南山竹子	327		327	35	292
Reevesia thyrsdidea	梭羅樹	327		327	35	292
Schefflera heptaphylla	鵝掌柴	327		327	45	282
Sterculia lancedlata	假蘋婆	327		327	40	287
Liquidambar formosana	楓香	163	1160	1323	60	1263
Schima superba	木荷	164	1567	1731	120	1611
Phyllanthus emblica	餘甘子		1102	1102	30	1072
Ficus hirta	粗葉榕	2451		2451	200	2251
Ilex asprella	梅葉冬青	2451	4723	7174	250	6924
Melicope pteleifolia	蜜茱萸	490		490	30	460
Psychotria asiatica	九節木	2451	5637	8088	300	7788
Polyspora axillaris	大頭茶	1961	9413	11374	300	11074
Rhodomyrtus tomentosa	桃金娘		7047	7047	0	7047
TOTAL		13071	30649	43720	1620	42100