

MTR Corporation Limited

South Island Line (East)

Monitoring on the Implementation of
Ecological Planting & Landscape Plan
during 3-year Post-Planting Care and Maintenance Period

(January 2016 – December 2018)


Final Monitoring Report

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Verified by:  _____

Sam Tsoi

Independent Environmental Checker

Date: 25.2.2019



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(January 2016 – December 2018)

Final Monitoring Report (Issue 1)

Date of Submission

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1 INTRODUCTION

1.1.1 The SIL(E) Environmental Permit (EP) Condition 2.13(a) specifies that the Permit Holder/ Qualified Ecologist shall deposit with EPD an Ecological Planting and Landscape Plan (EPLP) showing the compensatory planting at the lower course of Wong Chuk Hang (WCH) Nullah, habitat compensation/ enhancement works at the nullah side and a 3-year post-planting care and maintenance plan. According to the latest approved EPLP (June 2016), the results and findings of the monitoring along the proposed habitat compensation/ enhancement work areas have been reported in the quarterly compensatory planting monitoring reports and submitted to EPD on regular basis.

1.1.2 The implementation of the planting works proposed in the approved EPLP was carried out in phases by the landscape contractor appointed by the Works Contractor of SIL(E), and the planting works were completed by January 2016. Accordingly, the 3-year post-planting care and maintenance period had commenced in January 2016 and was ended by December 2018. Due to the completion of the construction phase of SIL(E), the role as an Environmental Team Leader (ETL) to undertake the ETL services and comply with the requirements as stipulated in Clause 2.13(c) of the EP of SIL(E) has been changed from MTR to AEC Ltd. The Qualified Ecologist and Independent Environmental Checker (IEC) have remained unchanged in both construction and operation phases of SIL(E).

1.1.3 According to the EP Condition 2.13(c) and the approved EPLP, a Final Monitoring Report should be prepared and deposited by the Qualified Ecologist upon the completion of the 3-year post-planting care and maintenance period. The Report should include:

- A summary record of the monitoring results (including the survival rate and percentage coverage of the planted vegetation, any invasive species in the compensatory plantation, and monitoring of ardeid species using the planted vegetation along the Wong Chuk Hang (WCH) Nullah);
- A summary record of the monitoring and maintenance works undertaken; and
- Assessment of the effectiveness of the planting measures in enhancing the ecological and amenity values of the areas along the WCH Nullah, and the compensatory planting in attracting the ardeid.

1.1.4 This Report will summarise and evaluate the monitoring findings on the planted vegetation and ardeid species along the habitat enhancement area and compensatory planting area collected from January 2016 to December 2018.

2 SUMMARY OF INSPECTION FINDINGS

2.1 Monitoring and maintenance works taken on planted vegetation along WCH Nullah

2.1.1 The general objective of the approved EPLP is to mitigate and compensate ecological impacts to ardeid roosting sites resulting from the construction of SIL(E) at WCH Nullah. Design of the habitat enhancement area and compensatory planting area had considered the plant composition and structure in the degraded

woodland where it was used by egrets as night roosting site, as well as the habitat requirements of the avifauna and other site and engineering constraints (e.g. size and shape of the compensation area, and geology, soils and steepness of the slope area). Habitat enhancement area and compensatory planting area were designed along WCH Nullah (**Figure 1**), with proposal of the latest management and maintenance matrix as proposed in **Figure 2**.

- 2.1.2 Site inspection along the whole EPLP area was conducted on monthly basis with the representatives of MTR, the Qualified Ecologist, and the landscape contractor. Quarterly inspection was conducted together with the Independent Environmental Checker (IEC) and the Environmental Team Leader (ETL). Additional site inspections were arranged after the cancellation of tropical cyclone warning signal No. 8 or above, or severe rainstorm warning signals.
- 2.1.3 The habitat enhancement area (from Zones A to E except compensatory planting area as shown in **Figure 1**) was proposed on the south side of WCH Nullah for ecological compensation and enhancing the amenity values along the pedestrian link and the woodland mix on the slopes by the nullah side. This area comprises woodland mix areas (planted with native whip trees and shrub seedlings, together with hydroseeding within this woodland mix), purely hydroseeded area on the slopes, hydromulched area with erosion control mat, undisturbed areas with preserved vegetation on the slopes, and planting areas of native trees and palms. Grasses used in the hydroseeded and hydromulched areas are common grass species (such as Bermuda Grass *Cynodon dactylon*) following the CEDD's *General Specification For Civil Engineering Works*. The native whip trees, shrub seedlings, trees and palms proposed in the approved EPLP are summarised in **Table 1** below. However, planting of ornamental shrubs (including but not limited to *Allamanda cathartica*, *Alpinia zerumbet* cv. 'Variegata', *Ixora chinensis*, *Monstera deliciosa*, *Philodendron selloum* and *Schefflera arboricola*) along the planting beds to the south of the Nullah is not under the monitoring and management regime of the approved EPLP. Such shrub planting has been carried out for amenity purposes only.

Table 1 Tree/ Palm/ Shrub Species for planting along the Nullah and on Slope.

Species ^[1]	Type ^[1]	Location ^[1]	Planted locations in EPLP area
<i>Bischofia javanica</i> (BIS. JAV.)*	Heavy Standard Tree	Nullah side	Compensatory planting area for ardeid night roosting site
<i>Bauhinia x blakeana</i> (BAU. BLA.)*	Heavy Standard Tree	Nullah side	Along nullah side (only in Pet Garden)
<i>Celtis sinensis</i> (CEL. SIN.)*	Heavy Standard Tree	Nullah side	Compensatory planting area for ardeid night roosting site
<i>Cleistocalyx nervosum</i> (CLE. NER.)*	Heavy Standard Tree	Nullah side	Compensatory planting area for ardeid night roosting site (including Pet Garden)
<i>Ilex rotunda</i> (ILE. ROT.)	Heavy Standard Tree	Nullah side	Compensatory planting area for ardeid night roosting site and along nullah side
<i>Liquidambar formosana</i> (LIQ. FOR.) *	Heavy Standard Tree	Nullah side	Compensatory planting area for ardeid night roosting site and along nullah side
<i>Macaranga tanarius</i> var. <i>tomentosa</i> (MAC. TAN.)*	Heavy Standard Tree	Nullah side	Compensatory planting area for ardeid night roosting site
<i>Mallotus paniculatus</i> (MAL. PAN.)*	Heavy Standard Tree	Nullah side	Along nullah side

Species ^[1]	Type ^[1]	Location ^[1]	Planted locations in EPLP area
<i>Sapium discolor</i> (SAP. DIS.)*	Heavy Standard Tree	Nullah side	Compensatory planting area for ardeid night roosting site and along nullah side
<i>Schima superba</i> (SCH. SUP.)*	Heavy Standard Tree	Nullah side	Compensatory planting area for ardeid night roosting site
<i>Caryota ochlandra</i> (CAR. OCH.)	Palm	Nullah side	Along nullah side * <i>Caryota mitis</i> with the same ecological function was planted to replace <i>Caryota ochlandra</i>
<i>Chrysalidocarpus lutescens</i> (CHR. LUT.)	Palm	Nullah side	Along nullah side
<i>Roystonea regia</i> (ROY. REG.)	Palm	Nullah side	Along nullah side
<i>Aquilaria sinensis</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Bichofia javanica</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Castanopsis fissa</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Celtis sinensis</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Ficus microcarpa</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Litsea glutinosa</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Machilus breviflora</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Mallotus paniculatus</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Polyspora axillaris</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Reevesia thyrsoidea</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Schefflera heptaphylla</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Sterculia lanceolata</i> *	Whip	On Slope	Woodland mix area along the nullah side
<i>Ilex asprella</i> *	Shrub	On Slope	Woodland mix area along the nullah side
<i>Litsea rotundifolia</i> var. <i>oblongifolia</i> *	Shrub	On Slope	Woodland mix area along the nullah side
<i>Ligustrum sinense</i>	Shrub	On Slope	Woodland mix area along the nullah side
<i>Psychotria asiatica</i> *	Shrub	On Slope	Woodland mix area along the nullah side
<i>Rhaphiolepis indica</i> *	Shrub	On Slope	Woodland mix area along the nullah side
<i>Rhododendron simsii</i> *	Shrub	On Slope	Woodland mix area along the nullah side
<i>Rhodomyrtus tomentosa</i> *	Shrub	On Slope	Woodland mix area along the nullah side

Notes:

1. Extracted from the approved EPLP
2. *Native species
3. The plant composition includes the proposed heavy standard trees to be planted in compensatory planting

2.1.4 Within the habitat enhancement area, particular portions of the existing vegetation (including herbaceous vegetation, shrubs and trees) on the slopes and within the wooded area to the south of WCH Nullah have been retained and

preserved *in situ*. During the construction phase of SIL(E), the wooded area on slopes or to the south of the Nullah between viaduct columns “D8” and “D11” was protected within a Tree Protection Zone (TPZ). Preservation of these and other undisturbed areas has been incorporated into the design of both habitat enhancement and compensatory planting areas.

- 2.1.5 Compensatory planting area was proposed at the lower course of the WCH Nullah, approximately 200m to the west of the historical ardeid night roosting site identified in the EIA Report of SIL(E). This area is designed with reference to the plant composition of the historical ardeid roosting site to the south of the Nullah, as well as the plant species often used by ardeids for roosting. Compensatory trees of common tree species, as shown in the below **Table 2**, were planted in staggered pattern within the compensatory area for ardeid roosting site (location shown in **Figure 1**).

Table 2 Tree Species for Compensatory Planting at lower course of the Nullah.

Species ^[1]	Type ^[1]	Location ^[1]	Planted locations in EPLP area
<i>Bischofia javanica</i> (BIS. JAV) *	Heavy Standard Tree	Lower course of Nullah side	Compensatory planting area for ardeid night roosting site
<i>Bauhinia x blakeana</i> (BAU. BLA.)*	Heavy Standard Tree	Lower course of Nullah side	Along nullah side (only in Pet Garden)
<i>Celtis sinensis</i> (CEL. SIN.)*	Heavy Standard Tree	Lower course of Nullah side	Compensatory planting area for ardeid night roosting site
<i>Cleistocalyx nervosum</i> (CLE. NER.)*	Heavy Standard Tree	Lower course of Nullah side	Compensatory planting area for ardeid night roosting site (including Pet Garden)
<i>Ilex rotunda</i> (ILE. ROT.)	Heavy Standard Tree	Lower course of Nullah side	Compensatory planting area for ardeid night roosting site and along nullah side
<i>Liquidambar formosana</i> (LIQ. FOR.) *	Heavy Standard Tree	Lower course of Nullah side	Compensatory planting area for ardeid night roosting site and along nullah side
<i>Macaranga tanarius</i> var. <i>tomentosa</i> (MAC. TAN.)*	Heavy Standard Tree	Lower course of Nullah side	Compensatory planting area for ardeid night roosting site
<i>Mallotus paniculatus</i> (MAL. PAN.)*	Heavy Standard Tree	Lower course of Nullah side	Along nullah side
<i>Schima superba</i> (SCH. SUP.)*	Heavy Standard Tree	Lower course of Nullah side	Compensatory planting area for ardeid night roosting site

Notes:

1. Extracted from the approved EPLP
2. *Native species

- 2.1.6 By the end of the 3-year post-planting care and maintenance period (31st December 2018), a total of 200 compensatory trees and palms have been planted and maintained in the habitat enhancement and compensatory planting areas (**Table 3**), while all native whip trees and shrub seedlings were planted in different planting quantities at the woodland mix areas designed on the engineered slopes, flat ground to the south of the nullah, as well as within the compensatory planting area. Photographic records of selected compensatory trees, palms, whip trees and shrub seedlings are shown in **Appendix 1**.

2.1.7 More compensatory trees were planted in the habitat enhancement and compensatory planting areas. The number is higher than the proposed number (i.e. 179) in the approved EPLP. This is because an additional 15 trees of *Lagerstroemia speciosa* and *Podocarpus macrophyllus* were planted in the EPLP area, as well as additional trees planted by the landscape contractor within these three years (including *Liquidambar formosana*, *Sapium discolor* and *Schima superba*). Both *Lagerstroemia speciosa* and *Podocarpus macrophyllus* are not included in the approved EPLP and were planted to compensate for tree loss and to provide visual screening for the SIL Project. In addition, as reported in the submitted quarterly reports, 15 palms of *Caryota ochlandra* (new scientific name for *Caryota maxima*) were replaced by another palm *Caryota mitis* due to a stock problem. *Caryota mitis* shares similar ecological characteristics to *Caryota ochlandra*, and the former species showed fair survival rate and growth performance in the EPLP areas.

Table 3 Summary of the compensatory trees and palms planted along Wong Chuk Hang Nullah.

Scientific Name	Chinese Name	No. of trees should be planted based on the approved EPLP	No. of planted trees planted in the EPLP area by 31 st Dec 2018
<i>Chrysalidocarpus lutescens</i>	散尾葵	58	58
<i>Liquidambar formosana</i>	楓香	21	22
<i>Schima superba</i>	木荷	16	18
<i>Caryota mitis</i> ¹	短穗魚尾葵	0	15
<i>Celtis sinensis</i>	朴樹	11	11
<i>Ilex rotunda</i>	鐵冬青	11	11
<i>Macaranga tanarius</i> var. <i>tomentosa</i>	血桐	9	9
<i>Mallotus paniculatus</i>	白楸	9	9
<i>Cleistocalyx nervosum</i>	水翁	9	9
<i>Lagerstroemia speciosa</i> ²	大花紫薇	0	8
<i>Podocarpus macrophyllus</i> ²	羅漢松	0	7
<i>Bauhinia x blakeana</i>	洋紫荊	6	6
<i>Bischofia javanica</i>	秋楓	5	5
<i>Roystonea regia</i>	王棕	2	2
<i>Caryota ochlandra</i> (former scientific name was <i>Caryota maxima</i>)	魚尾葵	15	0
<i>Sapium discolor</i>	山烏柏	7	10
Total no. of trees:		179	200

Notes:

- 15 palms of *Caryota ochlandra* (new scientific name as *Caryota maxima*) were replaced by another palm *Caryota mitis* due to a stock problem. *Caryota mitis* shares similar ecological characteristics to *Caryota ochlandra*.
- Trees of *Lagerstroemia speciosa* and *Podocarpus macrophyllus* have been planted in the habitat enhancement area between columns "D8" and "D11". They were not included in the approved EPLP, and were planted for tree compensation and/or amenity purposes for SIL(E).

Habitat enhancement area (Zones A to E except compensatory planting area)

2.1.8 Except the defined delineation of the compensatory planting area close to columns "D13" to "D16", the remaining planting areas were planted with three species of compensatory palms (*Caryota mitis*, *Chrysalidocarpus lutescens* and

Roystonea regia), five species of compensatory trees (*Bauhinia variegata*, *Ilex rotunda*, *Liquidambar formosana*, *Mallotus paniculatus* and *Sapium discolor*), 12 species of whip tree and seven species of shrub seedlings (refer to **Table 1**). Two additional tree species *Lagerstroemia speciosa* and *Podocarpus macrophyllus* were planted for tree compensation and/or amenity purposes for SIL(E), while six trees of *Bauhinia x blakeana* were planted within the Pet Garden (location refers to **Figure 1**) currently managed by LCSD. As explained in the approved EPLP and the submitted quarterly reports for EPLP, LCSD has provided regular maintenance of this Garden since the 4th Quarter of 2016, including its hardscape and landscape according to their standards and practice. Ecological monitoring at this Pet Garden is not required as stated in the approved EPLP.

2.1.9 Native whip trees and shrub seedlings were mainly planted within the woodland mix areas designed on the engineered slopes of Zones A and B, and the planting areas between “D8” and “D12”. With the preservation of the existing trees and shrubs on these Zones and the wooded area close to the aforementioned columns, growth of the planted whip trees and shrub seedlings can further enhance the plant diversity and structure within these wooded areas. No quantitative monitoring of the survival rates of each planted seedlings is proposed in the approved EPLP, however the overall survival rate of these planted seedlings was found to be satisfactory from qualitative evaluation, particularly for whip trees *Aquilaria sinensis*, *Bischofia javanica*, *Celtis sinensis*, *Mallotus paniculatus*, *Ficus microcarpa*, *Polyspora axillaris*, *Schefflera heptaphylla* and *Sterculia lanceolata*, and most shrub species. Replacement planting of these seedlings (such as *Ligustrum sinensis* and *Rhododendron simsii*) was only carried out on a as needed basis in the 3-year post-planting care and maintenance period. The woodland mix areas were regularly weeded to remove weedy climbers and unwanted self-sown seedlings (*Ficus hispida*, *Leucaena leucocephala* and *Macaranga tanarius* var. *tomentosa*) to avoid overgrowth of the planted seedlings.

2.1.10 A total of 125 compensatory trees and palms, including 15 *Lagerstroemia speciosa* and *Podocarpus macrophyllus* not included in the approved EPLP, were planted in the habitat enhancement area. Design of each planting area use plant one tree or palm species only in order to achieve a uniform screening pattern. Replacement planting was carried out occasionally in these 3 years, and trees *Liquidambar formosana*, *Mallotus paniculatus* and *Sapium discolor* were replaced once due to site problems (e.g. drainage issues, insufficient irrigation during the dry season and transplantation shock). Rather than planting heavy standard trees (i.e. stem diameter exceeding 75mm but not exceeding 150mm), these three tree species were planted with undersized specimens to facilitate their adaptation in the planting areas with less than optimum growth environment (e.g. the area with a previous drainage problem for *Mallotus paniculatus*, and a windthrow area at the end of the Nullah for *Liquidambar formosana*). Smaller specimens of *Sapium discolor* were planted as this tree species usually exists as a large shrub/ small tree in nature. Furthermore, heavy standard-sized tree specimens of this species are seldom available in nurseries, hence this species was planted as ‘undersized’ specimens. The growth performance of the planted compensatory trees and palms in the habitat enhancement area was fair to good, with almost 100% survival rate by the end of December 2018.

2.1.11 Hydromulched slopes with erosion control mat and hydroseeded slopes were formed within or close to the wooded areas to the south of the Nullah. The green coverage on these hydromulched slopes and hydroseeded slopes varied along the nullah side. Grass germination was initially satisfactory on the newly hydroseeded/ hydromulched slopes but the growth performance declined in the following months. Slopes in Zone B and hydromulched slopes close to column 'D12' and the Pet Garden were re-hydroseeded in early wet season in 2016 and 2017 to improve the grass coverage. The green coverage fluctuated seasonally in response to various site constraints (e.g. under the shade of viaduct, soil washout, rock slope surface unfavorable for natural establishment of climbers and herbs). Throughout the three monitoring years, the green coverage significantly increased during the wet seasons and green coverage of individual slopes reached almost 70% during this period. Regular rainfall during this period not only nourished the hydroseeded grass, but also encouraged natural development of self-seeded grass, fern, herb and tree seedlings. However, grass germination was poor in certain hydromulched slopes underneath the shade of viaduct or on rock slopes with thin surface soil coverage. It is not feasible to maintain 100% green coverage on these hydromulched and hydroseeded slopes, but it is anticipated that the spread of climbers and naturally colonising grass, herbs and ferns on these slopes may help to improve the green coverage in the long term.

2.1.12 According to the Hong Kong Observatory, six tropical cyclones reaching warning signal no. 8 and two reaching signal no. 10 (Hato in August 2017 and Mangkhut in September 2018) were hoisted during this 3-year monitoring and maintenance period (see **Table 4**). Red and Black Rainstorms mostly occurred from May to October each year. During these three years, Super Typhoons Hato and Mangkhut mainly caused damage to the existing trees growing on the engineered slopes in Zones A and B next to Tai Wong Ye Temple, as well as blowing down small number of compensatory trees in the habitat enhancement areas. Uprooted and collapsed trees, broken scaffold branches, damaged canopy crowns and distorted tree trunks were found after these two typhoon strikes and photographic records were provided in the relevant Quarterly Reports (July – September 2017 and 2018). Tree risk assessment was carried out immediately by the landscape contractor to evaluate the tree stability and structural condition after the super typhoon strikes, and remedial works (such as pruning of broken or overhanging branches, and removal of unstable trees and broken tree parts) were carried out in the followed months. On the other hand, damage to the planted whip trees, shrub seedlings, compensatory trees and palms was comparatively limited.

Table 4 Summary of severe rainstorm warning signals and tropical cyclone warning signals hoisted during the 3-year post-planting care and maintenance period (2016-2018).

Rainstorm Color/ Tropical Cyclone Warning Signal	Issue Dates (Time)
Red Rainstorm	10 th May 2016 (07:35-09:35; 11:20-13:45)
Typhoon Warning Signal No. 8 (Nida)	1 st - 2 nd Aug 2016
Red Rainstorm	10 th Aug 2016 (06:55-08:35)
Red Rainstorm	28 th Aug 2016 (00:30-02:20)
Typhoon Warning Signal No. 8 (Haima)	21 st Oct 2016 (06:10-17:20)
Red Rainstorm	1 st Oct 2016 (05:55-07:00)
Red Rainstorm	19 th Oct 2016 (15:30-16:00)
Black Rainstorm	19 th Oct 2016 (16:00-17:15)

Rainstorm Color/ Tropical Cyclone Warning Signal	Issue Dates (Time)
Red Rainstorm	9 th Oct 2016 (17:15-18:15)
Red Rainstorm	24 th May 2017 (09:15-11:30)
Black Rainstorm	24 th May 2017 (11:30-12:30)
Typhoon Warning Signal No. 8 (Merbok)	12 th – 13 th June 2017
Red Rainstorm	13 th Jun 2017 (08:45-11:50)
Red Rainstorm	17 th Jun 2017 (02:25-04:05)
Red Rainstorm	17 th Jul 2017 (20:45-22:30)
Typhoon Warning Signal No. 8 (Roke)	23 rd Jul 2017
Red Rainstorm	3 rd Aug 2017 (05:30-07:05)
Typhoon Warning Signal No. 8, 9 and 10 (Hato)	23 rd Aug 2017
Typhoon Warning Signal No. 8 (Pakhar)	27 th Aug 2017
Typhoon Warning Signal No. 8 (Khanun)	15 th Oct 2017
Red Rainstorm	8 th Jun 2018 (11:30-12:30)
Red Rainstorm	26 th – 27 th Aug 2018 (23:06-00:45)
Red Rainstorm	29 th Aug 2018 (18:40-21:50)
Red Rainstorm	16 th Sept 2018 (10:55-18:50)
Typhoon Warning Signal No. 8, 9 and 10 (Mangkhut)	16 th – 17 th Sept 2018

2.1.13 During the three monitoring years, the following routine site and vegetation management works were carried out by the landscape contractor:

- Routine inspection and repairing of any damaged soil erosion control mats and anchor pins found on both slope batters in Zones A and B;
- Regular irrigation of all planted whip trees, shrub seedlings, compensatory trees and palms planted in the habitat enhancement area;
- Clearance of all the U-channels and removal of any plant debris (e.g. cut vegetation, broken twigs and branches) and rubbish left in the habitat enhancement area;
- Manual removal of the weedy climbers (such as *Mikania micrantha* and *Paederia scandens*), wrongly planted whip tree of *Eucalyptus* sp., and unwanted self-sown tree seedlings (mainly *Bauhinia variegata*, *Ficus hispida*, *Leucaena leucocephala* and *Macaranga tanarius* var. *tomentosa*) regenerated on selected slope batters and along U-channels of Zones A and B;
- Manual removal of the weedy climbers (such as *Ipomoea cairica*, *Mikania micrantha* and *Paederia scandens*), unwanted herbs (such as *Bidens alba* and *Sesbania cannabina*) and unwanted self-sown tree seedlings of *Leucaena leucocephala* in the woodland mix areas and planting areas of compensatory trees and palms in the remaining habitat enhancement area;
- There was a drainage problem in the planting area of the nine compensatory trees *Mallotus paniculatus* (i.e. next to columns "D12") since the commencement of the monitoring period. The Contractor rectified the waterlogging problem by constructing a new U-channel along the nearby slope toe in September 2017, and replanted new trees of *Mallotus paniculatus* which showed unsatisfactory growth performance.

Native shrub seedlings (*Ligustrum sinense* and *Psychotria asiatica*) were also planted at the reinstated area after the drainage improvement work;

- Checking, replanting or re-staking of any leaning, distorted or unstable compensatory trees and palms after the cancellation of each severe typhoon strike with typhoon warning signal no. 8 or above, as well as after the cancellation of Red or Black Rainstorm;
- Replacement planting of any dry or dead whip trees or shrub seedlings (such as *Ligustrum sinense* and *Rhododendron simsii*) on the slope batters of Zones A and B, and woodland mix areas between columns “D8” and “D12”;
- Replacement planting of any dead trees or trees of poor growth performance of the compensatory trees and palms found in the habitat enhancement area; and
- Removal of the whole trees or tree parts of the existing trees (including *Ficus hispida*, *Leucaena leucocephala* and *Macaranga tanarius* var. *tomentosa*) which were identified to be hazardous after the severe typhoon strikes.

Compensatory planting area for ardeid night roosting site (along the lower course of nullah)

2.1.14 Compensatory planting area for ardeid night roosting site is designed to create a wooded area, with hydroseeded ground, to provide a dense tree canopy for ardeids to roost along the nullah side. A total of 72 compensatory trees and three palms (*Chrysalidocarpus lutescens*) were planted at this area. In addition, three trees of *Sapium discolor* and two trees of *Schima superba* were planted by the landscape contractor in this area. Except one tree of *Cleistocalyx nervosum* and six trees of *Bauhinia variegata* planted within the Pet Garden, and nine trees of *Mallotus paniculatus* planted in the habitat enhancement area, all remaining compensatory trees in **Table 2**, as well as *Sapium discolor* in **Table 1**, were planted in this compensatory planting area. Almost all trees are native species and half of them can produce fleshy fruits for wildlife using this area.

2.1.15 By the end of December 2018, the overall survival rate of the remaining compensatory trees was almost 100%. The overall growth performance of these trees in this area was fair to good, particularly for *Celtis sinensis*, *Cleistocalyx nervosum*, *Ilex rotunda* and *Macaranga tanarius* var. *tomentosa*. However, a total of 16 trees of *Schima superba* planted at the two planting areas close to the footbridge connecting to the CityBus Depot had suffered from drainage problems during the monitoring period. Replacement planting of new *Schima* trees was arranged several times, and improvement of the growth performance was achieved by the completion of the drainage improvement work in 2018. In addition, replacement planting of a small number of trees *Bischofia javanica*, *Liquidambar formosana* and *Sapium discolor* was carried out on an as needed basis (e.g. poor structural condition or growth performance, uprooted after severe typhoon strike, etc.) during the three years.

2.1.16 Considerable numbers of whip trees (such as *Aquilaria sinensis*, *Bischofia javanica*, *Celtis sinensis* and *Sterculia lanceolata*) and shrub seedlings (such as *Ligustrum sinense*, *Psychotria asiatica* and *Rhaphiolepis indica*) were planted by the

landscape contractor under the tree canopy at the compensatory planting area. In addition, seedlings were planted in the compensatory area albeit this is not required in the approved EPLP. These were not removed so as to minimise the disturbance to this compensatory area as the seedling planting could increase the long-term naturalness of this wooded area and its value to wildlife. The growth performance of these planted seedlings was good, and with almost 100% survival rate. In particular, whip trees of *Bischofia javanica* developed very well, and some of them reached over 1.5m in height.

2.1.17 As explained in Section 2.1.11 and **Table 4**, a number of severe tropical cyclones and Rainstorms were hoisted during the 3-year monitoring and maintenance period. Severe typhoons (Hato and Mangkhut) did not cause significant impact on the planted vegetation in the compensatory planting area. Only a small number of trees such as *Liquidambar formosana* and *Schima superba* were found either leaning or uprooted by the strong winds. The landscape contractor arranged to re-erect and re-stake these affected trees as soon as possible after the cancellation of typhoon signals.

2.1.18 During the three monitoring years, the following routine site and vegetation management works were carried out by the landscape contractor:

- Regular irrigation of all planted whip trees, shrub seedlings, and compensatory trees planted in the compensatory planting area;
- Clearance of all the U-channels and removal of any plant debris (e.g. cut vegetation, broken twigs and branches) and rubbish left in the compensatory planting area;
- Manual removal of weedy climbers (such as *Mikania micrantha* and *Paederia scandens*), and unwanted self-sown tree seedlings (mainly *Leucaena leucocephala*) regenerated in the understorey of this wooded area;
- There was a drainage problem in the planting area of the 16 compensatory trees *Schima superba* (i.e. next to the footbridge connecting with the CityBus Depot) since the commencement of the monitoring period. The Contractor completed the drainage improvement works in late 2018 and continued to maintain the planted *Schima* trees;
- Checking, replanting or re-staking of any leaning, distorted or unstable compensatory trees after the cancellation of each severe typhoon strike with typhoon warning signal no. 8 or above, as well as after the cancellation of Red or Black Rainstorm signals; and
- Replacement planting of any dead trees or trees of poor growth performance of the compensatory trees found in the compensatory planting area.

2.1.19 Monitoring, site and vegetation maintenance works in the Pet Garden were managed by LCSD since the approval of the EPLP and are excluded from the Inspection Record. One tree of *Cleistocalyx nervosum*, six trees of *Bauhinia variegata* and three palms of *Chrysalidocarpus lutescens* were under LCSD's management.

2.2 Monitoring of ardeid species along compensatory planting area

2.2.1 The planting work in the proposed compensatory planting area for the ardeid night roost was completed by January 2016. Monitoring of the ardeid species

using this proposed compensatory planting area and along the nullah side (i.e. the habitat enhancement area) was carried out on a monthly basis from January 2016 to December 2018. Survey methodology followed the procedure described in the approved EPLP. The survey recorded the species, numbers and locations of the roost at the compensatory planting area. The survey commenced approximately one hour before sunset and continued for 20 minutes after sunset, or until nightfall, whichever came sooner. Meanwhile, the historical ardeid roosting site at the wooded area to the south of the Nullah was also checked during each monthly monitoring survey to review its utilisation by ardeids.

- 2.2.2 No ardeids were seen utilising the compensation planting area for roosting or for any other purpose during the monthly monitoring surveys conducted between January 2016 and December 2018; nor were any ardeids were seen entering the area of the historical night roost next to Wong Chuk Hang Nullah. During the surveys, only single ardeids such as Little Egret were occasionally seen loafing or foraging in the Wong Chuk Hang Nullah and leaving the area before sunset. With the absence of any roosting ardeids for over three years, it can be concluded that the historical night roost at Wong Chuk Hang has been abandoned, and the compensatory planting area has not yet attracted any night-roosting ardeids. Ardeid night roosts are known to be highly dynamic and often relocate to a new roost site for unknown reasons.

3 DISCUSSION

Effectiveness of planting measures in enhancing the ecological and amenity values of the areas

- 3.1.1 Prior to the establishment of the EPLP area, this area was paved and lined with 'shotcreted' slopes, rock slopes and degraded woodlands to the south of the nullah. A canopy of common trees (such as *Ficus hispida* and *Macaranga tanarius* var. *tomentosa*) and weedy tree *Leucaena leucocephala* hung over the channelised nullah and provided a sheltered area for night-roosting ardeids. These ardeids once roosted on a group of mature trees (mainly *Ficus variegata* and other shorter native trees) to the northwest of TWGHs Jockey Club Rehabilitation Complex. As observed during the construction period and throughout the 3-year monitoring period, the roost tree group (including the key individual trees of *Ficus variegata*) has been preserved and protected since the commencement of the railway project, except for a very small portion of the degraded woodland connecting the roost tree group and the nullah which was unavoidably lost due to the construction of the viaduct. This woodland loss has been compensated by creating more native wooded areas and enhancing the nullah and the adjacent slope area, with a total area of about 1 ha (refer to the approved EPLP).
- 3.1.2 The compensatory ecological and landscape planting areas were designed with woodland mix areas of whip trees and shrub seedlings on the slopes and flat ground near the nullah, as well as planting strips and areas of compensatory palms and trees. Though it takes a longer time for the planted seedlings to reach a mature size, seedling planting, especially of species such as shrub *Rhododendron simsii*, and whip trees *Machilus breviflora*, *Reevesia thyrsoides*, *Castanopsis fissa* which were absent in the degraded woodland, would increase the overall plant diversity and structure along the nullah side. Flowering shrubs *Rhododendron simsii*, *Ligustrum sinensis* and fruiting shrubs *Psychoria asiatica* and *Rhaphiolepis*

indica were observed during the monitoring period. These have enhanced the overall greenery, color and amenity value along the whole pedestrian link.

- 3.1.3 The original degraded woodland mainly comprised the weedy tree *Leucaena leucocephala* close to the slope toes and the Nullah. Removal of most of these weedy tree individuals has reduced its colonisation and minimised further deterioration of the woodland. Ecologically, most of the planted seedling species are typical woodland species which produce fleshy fruits providing food for wildlife and which can increase the naturalness of the woodland mix areas and engineered slopes at Zones A and B. Seedling planting will accelerate the woodland formation and enrich the existing degraded woodland to the south of the Nullah. For example, some whip trees *Bischofia javanica*, *Ficus microcarpa*, *Mallotus paniculatus* and *Sterculia lanceolata* have developed into young saplings of almost 1.5m – 2m tall. Continued development of the planted whip trees and shrub seedlings at the woodland mix areas on the slopes and flat area to the northwest of TWGHs Jockey Club Rehabilitation Complex is anticipated to form a woodland area with higher ecological and landscape values in the long term.
- 3.1.4 Compensatory palms (*Caryota ochlandra*, *Chrysalidocarpus lutescens* and *Roystonea regia*) were mainly planted around the viaduct columns and as planting strips along the pedestrian link. The planting of palms and trees have screened off the columns, increased greenery and amenity values (e.g. *Lagerstroemia speciosa* trees produce eye-catching purple flowers, while fruiting *Ilex rotunda* trees produce red-colored fruits) along the nullah. Fleshy fruits produced by these palms and trees (including *Celtis sinensis*, *Cleistocalyx nervosum*, *Ilex rotunda* and *Macaranga tanarius* var. *tomentosa*) are food sources for smaller birds (such as Chinese Bulbul and Red-whiskered Bulbul) using the nearby woodland.
- 3.1.5 The compensatory planting area aimed to re-provide a wooded area for ardeid night roosting, and planted tree species were selected based on the degraded woodland previously used by the roosting ardeids. As yet, however, the ardeid night roost has not become re-established. This may be because the trees need time to develop into a denser and continuous tree canopy to be suitable as a roost; whilst the pedestrian link bisecting the planting area, as well as the viaduct structure itself, have unavoidably caused a source of disturbance which may deter roosting ardeids. Once the understorey formed by the planted whip trees and shrub seedlings becomes taller and denser, this may help in reducing disturbance impact in the long term. Meanwhile, however, the compensatory planting area has at least increased the ecological and amenity values of the area by providing more native tree species, and providing increased feeding, resting and roosting opportunities for birds in general.

Effectiveness of the compensatory planting area in attracting ardeids

- 3.1.6 It is considered premature to evaluate the effectiveness and attractiveness of the compensatory planting area to the ardeid species at this stage since the compensatory trees and shrub species are still developing and the tree canopies are still too limited to provide roost habitat for a large group of ardeids. In addition, the pedestrian link along the Nullah bisects the compensatory planting area and the constant pedestrian flow may cause disturbance to any large roosting ardeids. Ardeids, such as Little Egrets, Chinese Pond Herons and Black-

crowned Night Herons, were sometimes observed loafing or foraging along the Nullah, where there is perhaps less disturbance from people.

3.1.7 However, it should be recognized that there are a number of factors which may cause birds to select or to cease to use a roost site and once a roost site has changed, the original site will not necessarily be re-occupied even if it again becomes suitable, for example if the new roost site is more secure, or is closer to foraging areas, it may be preferred to the original site.

3.1.8 Thus, in view of the absence of ardeids in the historical night roost next to WCH Nullah or in the compensatory planting area, it is considered likely that the ardeids may have switched to another preferred site or sites. Accordingly, additional ardeid night roost surveys were carried out from October to December 2018, at the same time period as detailed in **Section 2.2.1** above, to detect the presence of any new night roost(s) in the Aberdeen area.

3.1.9 A total of five survey points were selected for the roost survey (see below in **Table 5**) and their locations are shown in **Figure 3**:

Table 5 Survey points for the ardeid roost survey and their respective targets.

Point No.	Location	Target
1	Breakwater of the Aberdeen West Typhoon Shelter (i.e. Aberdeen West Typhoon Shelter)	Potential ardeid movement in and along the Aberdeen Harbour
2	Shek Pai Wan Landing No. 1 (Structure No. HP012) (i.e. Southern Horizon)	Potential ardeid night roost at the wooded slope north of Ap Lei Chau Estate
3	Wong Chuk Hang Nullah (near Heung Yip Road Sitting-out Area) (i.e. Uphill woodland habitats to the west of the original night roost area and the south facing slope to the south of the Holy Spirit Seminary)	Historical ardeid night roost(s) adjacent to Wong Chuk Hang Nullah, and uphill woodland to the west of the historical roost
4	Ap Lei Chau Praya Road (near Sham Wan Towers) (i.e. Aberdeen Channel)	Potential ardeid night roost(s) at the wooded slopes south of Holy Spirit Seminary and northeast of Sham Wan Towers
5	Ap Lei Chau Landing No. 5 (Structure No. HP023) (i.e. Tai Shue Wan at Ocean Park)	Historical ardeid night roost at Tai Shue Wan and potential ardeid movement associated with the roost

3.1.10 The findings of the additional ardeid surveys carried out from October to December 2018 are summarised in the following sections.

Point No. 1 – Breakwater of the Aberdeen West Typhoon Shelter

3.1.11 A net influx of ardeids (largely Little Egrets and Great Egrets) from over the sea to the west of the survey point into the Aberdeen West Typhoon Shelter was noted, though small numbers were travelling in the opposite direction (i.e. westbound), leaving the Typhoon Shelter.

3.1.12 The ardeids, travelling either singly or in groups (up to 50 birds), appeared from the southwest of the survey point over the sea, flying towards the east and finally landed on a wooded, north-facing slope to the north of Ap Lei Chau Estate.

Point No. 2 – Shek Pai Wan Landing No. 1

- 3.1.13 Ardeids were seen moving from both the east and the west along the harbour and gathered on the slope mentioned above. The ardeids utilising the roost were largely from the west of the survey point (nearly 90% as recorded in December 2018), with the remaining birds arriving the roost from the east.
- 3.1.14 The number of ardeids using the roost increased from 100-140 in October to approximately 250 in November, and to around 420 in the last survey in December. The increase is presumably caused by the arrival of wintering/migrating birds. The presence of water body and possible food source in its nearby areas, as well as the mature trees on the wooded slope at north Ap Lei Chau are considered as major factors making this site a suitable roosting site for ardeids.

Point No. 3 – Wong Chuk Hang Nullah

- 3.1.15 No ardeids were seen roosting in the compensatory planting area (for ardeid roosting site), the historical night roost in the previous demarcated Tree Protection Zone (TPZ) (i.e. next to the habitat enhancement area) to the south of the nullah, or the woodland uphill to the west of the historical roost.
- 3.1.16 Ardeid use of the WCH nullah appeared to be low. Only one Little Egret was observed foraging/loafing in the nullah during all three surveys; the bird eventually left before sunset, flying along the nullah towards the Aberdeen Typhoon Shelter.

Point No. 4 – Ap Lei Chau Prava Road (North)

- 3.1.17 No ardeids were observed roosting on the wooded slope south of Holy Spirit Seminary, or the slope northeast of Sham Wan Towers.
- 3.1.18 Some ardeids were observed lingering in the Aberdeen South Typhoon Shelter, circling in mid-air and occasionally making brief stops on boats in the Typhoon Shelter, either in singles or in small groups. Some of these ardeids were still lingering in the Shelter by the end of the survey, therefore it is not known whether these birds eventually moved to other area(s) to roost.
- 3.1.19 A number of ardeids (largely Great Egrets and Little Egrets) were observed flying from the south across the Ap Lei Chau Bridge and towards the Aberdeen Typhoon Shelter, though it is not known for sure whether the destination of these birds is the night roost on Ap Lei Chau or not.
- 3.1.20 Small numbers of ardeids were observed stopping on boats staying in the Typhoon Shelter by the end of each survey. Due to limited visibility near nightfall, it is not known whether they flew elsewhere after the surveys.

Point No. 5 – Ap Lei Chau Landing No. 5

- 3.1.21 Regarding Tai Shue Wan at Ocean Park, no ardeids were seen entering the historical roost area during the survey in October. No further surveys were carried out at this point in the following months.

3.1.22 To conclude, the absence of roosting ardeids from the WCH site for over 3 years indicates that this roost has been abandoned. The addition surveys carried out from October to December 2018 have revealed a newly recorded ardeid roosting site on the wooded slope at north Ap Lei Chau (see **Appendix 2**). As the newly recorded roost is only about 1.5km from the WCH Nullah night roost, it is believed that the ardeids had switched from the WCH Nullah night roost to the new night roost on the wooded slope at north Ap Lei Chau. This conforms with the literature about the nature of Ardeid night roosts that they can be dynamic and may periodically shift naturally. (Mott MacDonald Ltd. 2010).

4 CONCLUSION

- 4.1.1 This Final Monitoring Report summarises and evaluates the monitoring findings for the planted vegetation and ardeid species along the habitat enhancement area and compensatory planting area collected from January 2016 to December 2018.
- 4.1.2 A total of 200 compensatory trees and palms, together with 12 whip trees and seven shrub seedling species were planted in the whole EPLP area (i.e. habitat enhancement area and compensatory planting area along the Nullah). The landscape contractor conducted routine site and vegetation maintenance works (such as weeding, irrigation and replanting works) during the three years.
- 4.1.3 Though the planted seedlings, compensatory palms and trees are still not fully grown by the end of this monitoring period, the planting will enhance the ecological and amenity values along the nullah side by creating more ecologically diverse woodland in the long run.
- 4.1.4 No ardeids were seen utilising the compensatory planting area for roosting or for any other purpose in these three years. No ardeids were seen entering the area of the historical night roost next to the nullah either. During the surveys, only single ardeids such as Little Egret were occasionally seen loafing or foraging in the nullah, and leaving the area before sunset. With the absence of any roosting ardeids for over three years, it can be concluded that the historical night roost at Wong Chuk Hang has been abandoned, and the compensatory planting area has not yet attracted any night-roosting ardeids.
- 4.1.5 Additional ardeid night roosting surveys were carried out from October to December 2018 to determine if the ardeid night roosting site had shifted to elsewhere in the Aberdeen area. Monitoring was undertaken from five survey points around Aberdeen Channel at the same time period as the monthly ardeid monitoring. This survey revealed that the ardeids had switched from the WCH Nullah night roost to the new roost on the wooded slope at north Ap Lei Chau, where the number of ardeids using the roost increased from 100-140 in October to around 420 in the last survey in December. The increase was presumably caused by the arrival of wintering/ migrating birds.
- 4.1.6 In conclusion, the whole EPLP planted area has been monitored and maintained for 3 years. The growth performance of the planted compensatory trees, palms, whip trees and shrub seedlings was generally fair by the end of the monitoring period. The 3-year post-planting care and maintenance period has demonstrated the successful establishment of the planted vegetation. It is considered that this 3-

year monitoring and maintenance period has been sufficient to review the performance of the planted vegetation in its early establishment period.

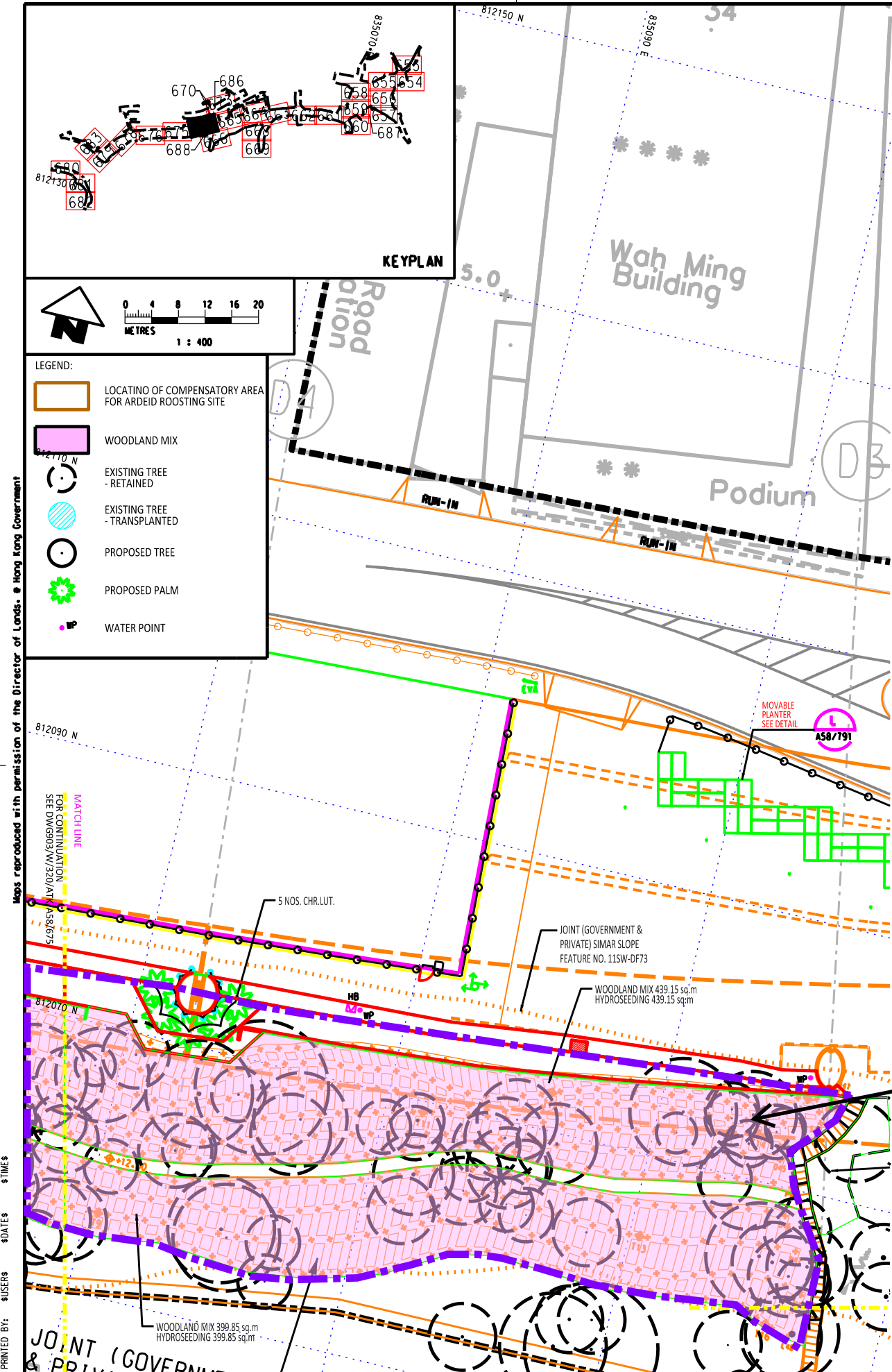
5 REFERENCES

MTR Corporation Limited (2016). South Island Line (East) – Ecological Planting & Landscape Plan (June 2016).

Mott MacDonald Ltd. (2010). Consultancy Agreement No. NEX/2301. South Island Line (East) Environmental Impact Assessment Report.

Figure 1

Planting areas and landscape treatment works along Wong Chuk Hang Nullah (Figures 1b-1e extracted from the approved EPLP)





"Zone B", including the woodland mix areas on both upper and lower slope batters, and the palm trees planted around the viaduct columns. However, the ornamental shrub planting next to the pedestrian path is not included in the EPLP

"Zone A", including the woodland mix areas on both upper and lower slope batters, and the palm trees planted around the viaduct columns. However, the ornamental shrub planting next to the pedestrian path is not included in the EPLP

The remaining woodland mix areas and areas for planting compensatory trees and palms (except the ornamental shrub planting areas) are "C to E Zones"

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 \$TIMES
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LEGEND:

	LOCATING OF COMPENSATORY AREA FOR ARDEID ROOSTING SITE
	WOODLAND MIX
	EXISTING TREE - RETAINED
	EXISTING TREE - TRANSPLANTED
	PROPOSED TREE
	PROPOSED PALM
	WATER POINT

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	JH
DESIGNED	IY
CHECKED	IY
APPROVED	IY
DATE	22/JUN/2016

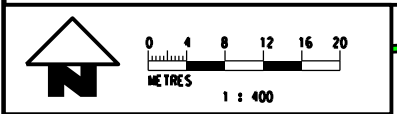
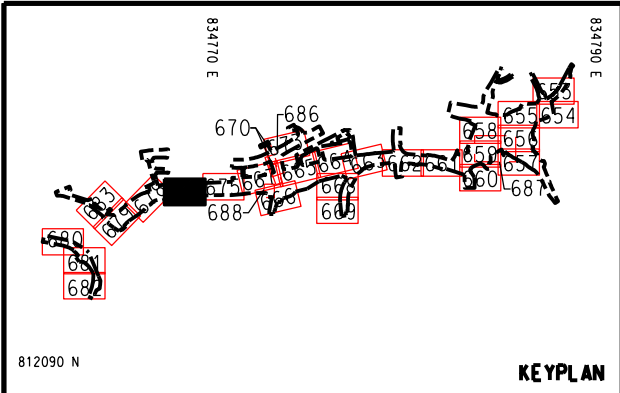
MTR

SOUTH ISLAND LINE (EAST)

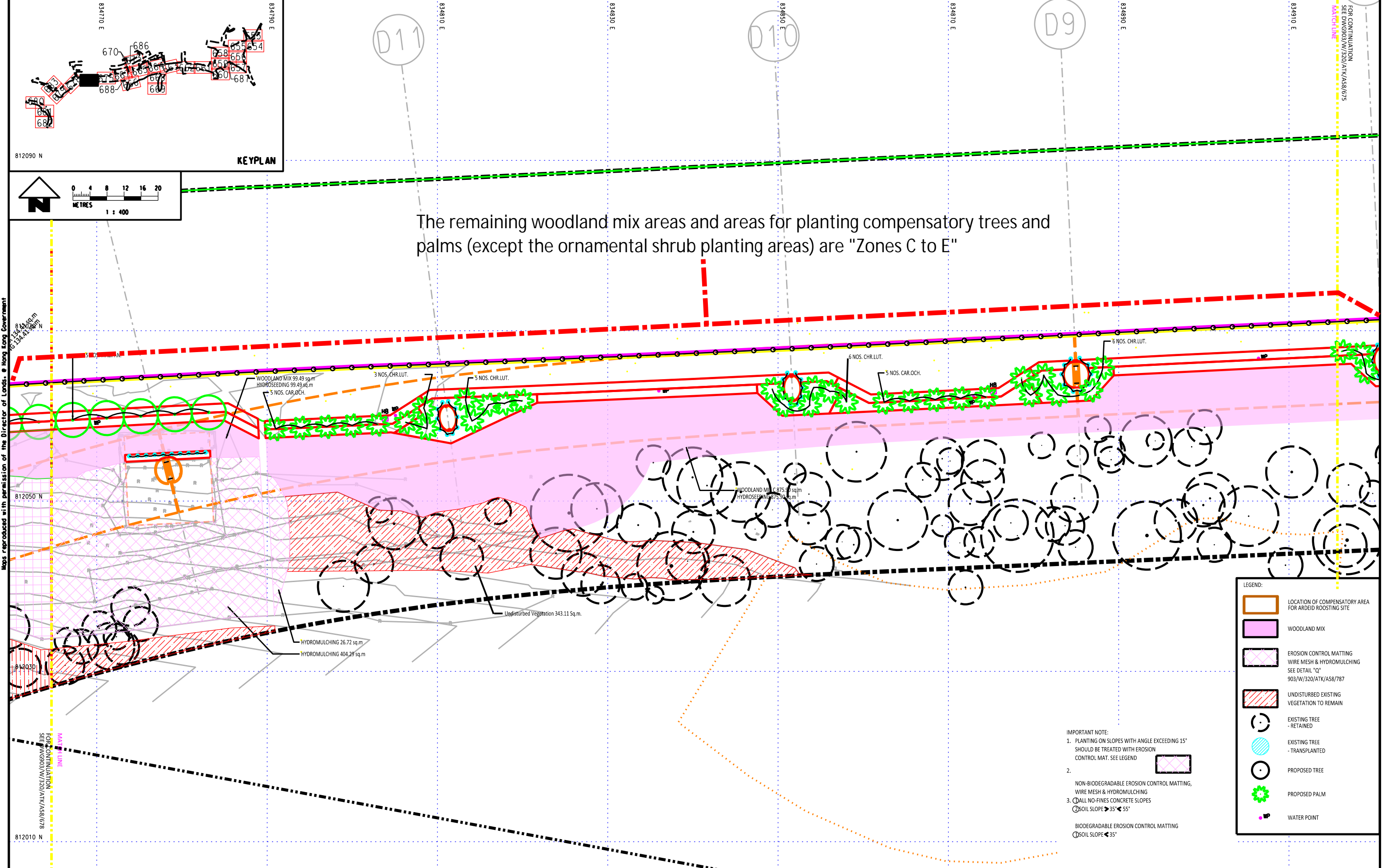
ecology arboriculture landscape **aec**

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TITLE		ECOLOGICAL PLANTING AND LANDSCAPE PLAN ALONG WONG CHUK HANG NULLAH
SCALE	DRAWING NO.	REV.
1:400 (A3)	Figure 1b	C



The remaining woodland mix areas and areas for planting compensatory trees and palms (except the ornamental shrub planting areas) are "Zones C to E"



LEGEND:

- LOCATION OF COMPENSATORY AREA FOR ARDEID ROOSTING SITE
- WOODLAND MIX
- EROSION CONTROL MATTING WIRE MESH & HYDROMULCHING SEE DETAIL "Q" 903/W/320/ATK/A58/787
- UNDISTURBED EXISTING VEGETATION TO REMAIN
- EXISTING TREE - RETAINED
- EXISTING TREE - TRANSPLANTED
- PROPOSED TREE
- PROPOSED PALM
- WATER POINT

IMPORTANT NOTE:

- PLANTING ON SLOPES WITH ANGLE EXCEEDING 15° SHOULD BE TREATED WITH EROSION CONTROL MAT. SEE LEGEND
- NON-BIODEGRADABLE EROSION CONTROL MATTING, WIRE MESH & HYDROMULCHING
- ⊙ SOIL SLOPE > 35° < 55°
 - ⊙ SOIL SLOPE < 35°

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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	JH
DESIGNED	IY
CHECKED	IY
APPROVED	IY
DATE	12/MAY/2014

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MTR

SOUTH ISLAND LINE (EAST)

ORIGINATOR

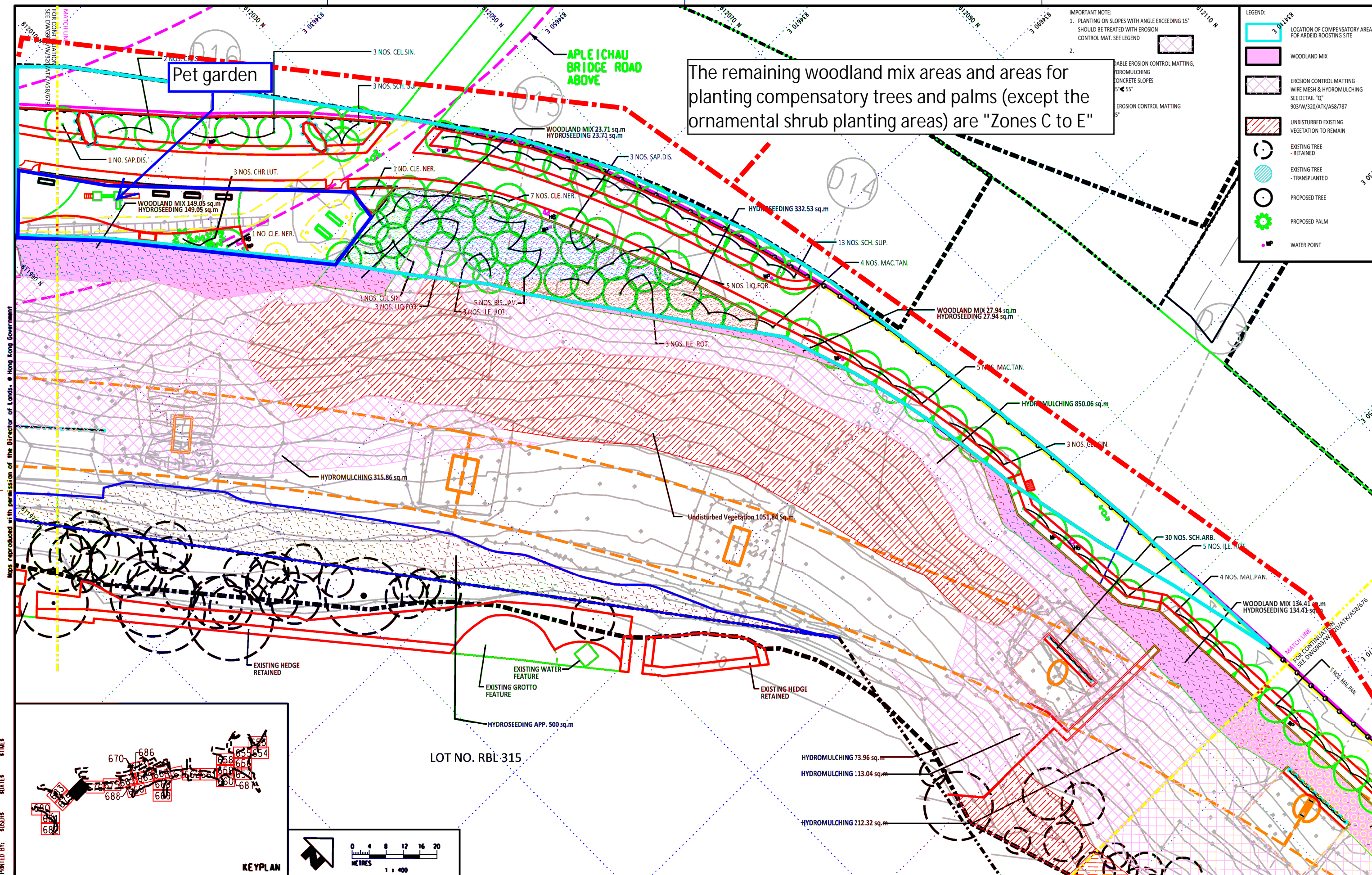
ecology arboriculture landscape **aec**

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TITLE

ECOLOGICAL PLANTING AND LANDSCAPE PLAN ALONG WONG CHUK HANG NULLAH

SCALE 1 : 400 (A3) DRAWING NO. Figure 1c REV. D1



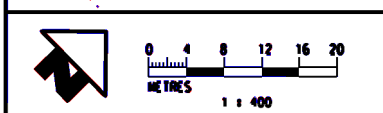
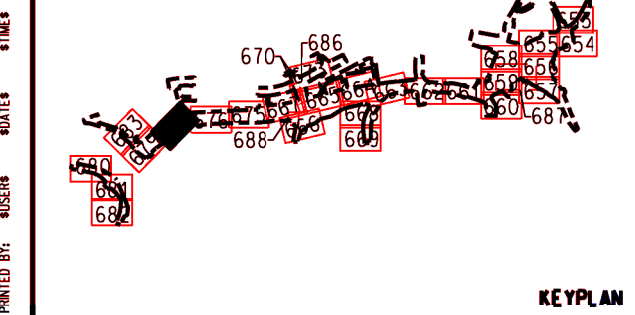
IMPORTANT NOTE:
 1. PLANTING ON SLOPES WITH ANGLE EXCEEDING 15° SHOULD BE TREATED WITH EROSION CONTROL MAT. SEE LEGEND
 2. [Symbol]

LEGEND:

- [Symbol] LOCATION OF COMPENSATORY AREA FOR ARDEID ROOSTING SITE
- [Symbol] WOODLAND MIX
- [Symbol] EROSION CONTROL MATTING WIRE MESH & HYDROMULCHING SEE DETAIL "Q" 903/W/320/ATK/AS8/787
- [Symbol] UNDISTURBED EXISTING VEGETATION TO REMAIN
- [Symbol] EXISTING TREE - RETAINED
- [Symbol] EXISTING TREE - TRANSPLANTED
- [Symbol] PROPOSED TREE
- [Symbol] PROPOSED PALM
- [Symbol] WATER POINT

The remaining woodland mix areas and areas for planting compensatory trees and palms (except the ornamental shrub planting areas) are "Zones C to E"

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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED
D3	CHANGES TO HSS PERMANENT WORKS (ACP)		19NOV13	LI	TO	19NOV13	LI		
D2	REVISED DOG PARK ENTRANCE DOOR (ACP)		01NOV13	LI	TO	01NOV13	LI		
D1	DOG TOILET ADDED (ACP)		18JUL13	LI	TO	18JUL13	LI		
C	REVISED PLANT SPECIES & CONFORMING DESIGN CHANGES		21FEB12	LI	TO	21FEB12	LI		
B	REVISED DOG PARK LAYOUT; ADDITIONAL WP; HYDROSEEDING ADDED; PLANTING ADDED		29APR11	LI	TO	29APR11	LI		
A	WORKING DRAWING		29APR11	LI	TO	29APR11	LI		

DRAWN	JH		SOUTH ISLAND LINE (EAST) 	TITLE	ECOLOGICAL PLANTING AND LANDSCAPE PLAN ALONG WONG CHUK HANG NULLAH
DESIGNED	IY			ORIGINATOR	ecology arboriculture landscape aec
CHECKED	IY			DATE	16/MAY/2014
APPROVED	IY			CADD REF.	\$FILES\$

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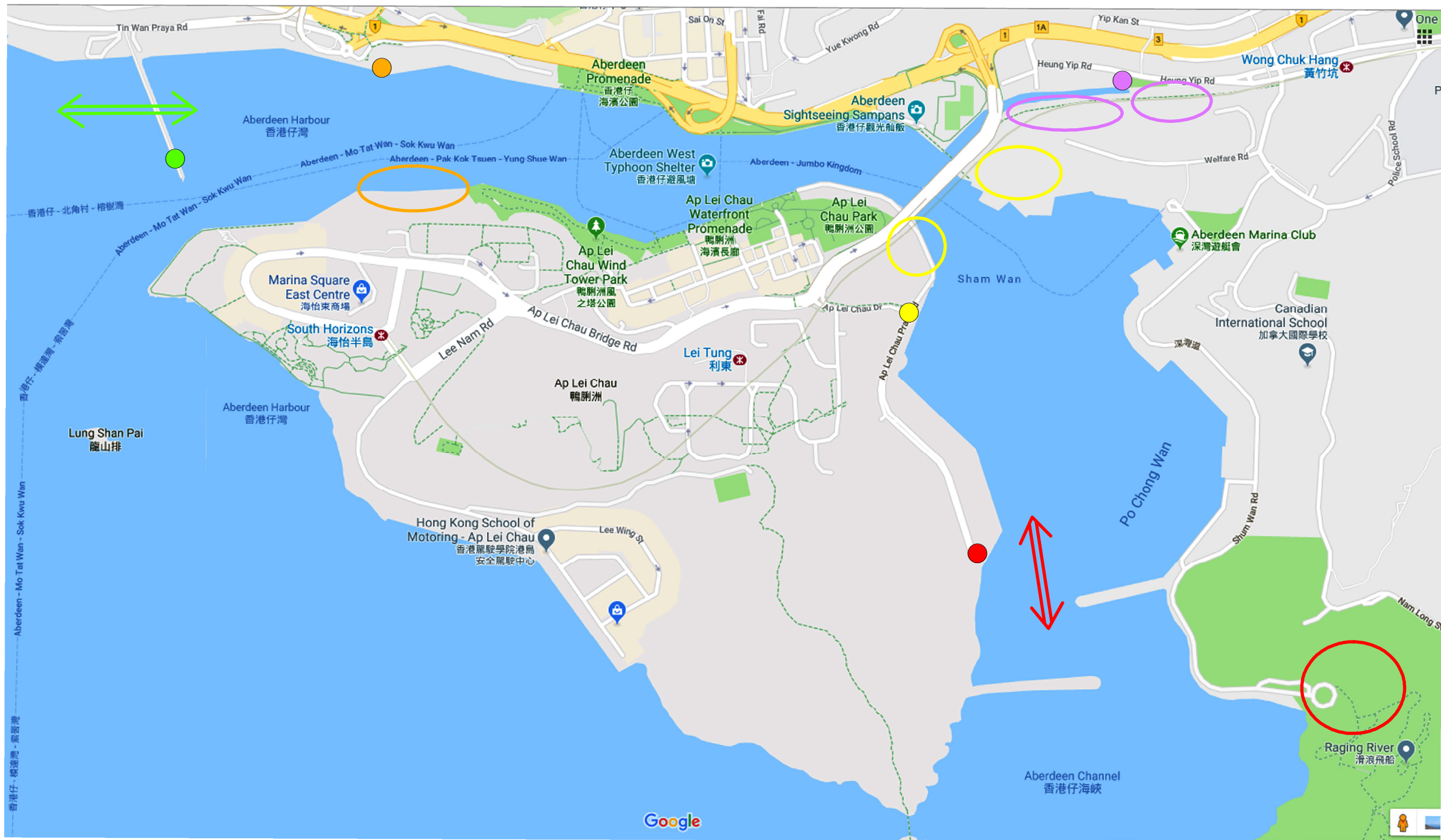
Figure 2

The Latest Management and Maintenance Matrix of the Ecological Planting and Landscape Area along Wong Chuk Hang Nullah

(This management and maintenance matrix will be updated on a need basis according to the latest arrangement.)

Figure 3

Locations of the additional ardeid night roosting survey points



Locations of Viewing Points for Each Potential/ Historical Ardeid Roost

- #1: Breakwater of the Aberdeen West Typhoon Shelter
- #2: Shek Pai Wan Landing No. 1 (Structure No. HP012)
- #3: Wong Chuk Hang Nullah (near Heung Yip Road Sitting-out Area)
- #4: Ap Lei Chau Praya Road (near Sham Wan Towers)
- #5: Ap Lei Chau Landing No. 5 (Structure No. HP023)

Locations of the Potential/ Historical Ardeid Roosts

- Potential ardeid night roost at the wooded slope of Ap Lei Chau Estate
- Historical ardeid night roost(s) adjacent to Wong Chuk Hang Nullah, and uphill woodland to the west of the historical roost
- Potential ardeid night roost(s) at the wooded slopes south of Holy Spirit Seminary and northeast of Sham Wan Towers
- Historical ardeid night roost at Tai Shue Wan

Potential ardeid movements along the Aberdeen Harbour/ Aberdeen Channel

- ↔ Potential ardeid movement in and along the Aberdeen Harbour
- ↔ Potential ardeid movement associated with the roost at Tai Shue Wan and along Aberdeen Channel



Project Title:
 Contract No. M1070-13C Ecological Monitoring and Adaptive Management Advice Services for Lok Ma Chau & West Rail Wetlands – Ecological Monitoring for EPLP areas along Wong Chuk Hang Nullah

Figure Title:
 Locations of the Additional Ardeid Night Roosting Survey Points

Drawn by:	MM	Scale:	1:9,100 on A3
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Appendix 1

Photographs of the overall growth performance of the planted vegetation and site condition along the EPLP area

Photos 1-11 show the latest growth performance of the selected shrub seedlings and whip trees planted in the woodland mix areas.

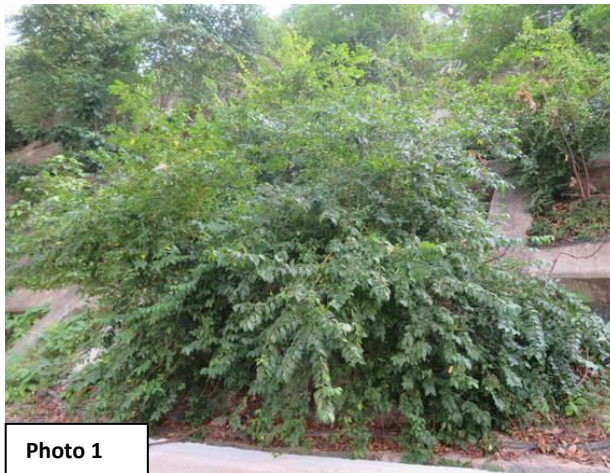


Photo 1

Ligustrum sinense



Photo 2

Psychotria asiatica



Photo 3

Rhaphiolepis indica



Photo 4

Rhododendron simsii



Photo 5

Rhodomyrtus tomentosa



Photo 6

Aquilaria sinensis

 <p>Photo 7</p>	 <p>Photo 8</p>
<p><i>Bischofia javanica</i></p>	<p><i>Machilus brevifolia</i></p>
 <p>Photo 9</p>	 <p>Photo 10</p>
<p><i>Reevesia thyrsoidea</i></p>	<p><i>Schefflera heptaphylla</i></p>
 <p>Photo 11</p>	
<p><i>Sterculia lanceolata</i></p>	

Photos 12-34 show the latest site condition and growth performance of planted vegetation as inspected on 21st December 2018. (**Photos 12-15** for slopes at Zone A; **Photos 16-21** for slopes at Zone B; **Photos 22-34** show the remaining EPLP areas along the nullah; **Photos 22-25** show planted trees at the compensatory planting area for the ardeid roosting site; **Photos 26-30** show the planted trees and palms in the remaining part of the EPLP area; **Photos 31-32** show the performance of the planted seedlings in the woodland mix areas; **Photos 33-34** show the general appearance of the hydromulched slopes).



Photo 12



Photo 13



Photo 14



Photo 15



Photo 16



Photo 17



Photo 18



Photo 19



Photo 20



Photo 21



Photo 22



Photo 23



Photo 24



Photo 25





Photo 34

Appendix 2

Site photos of the new ardeid night roosts in Aberdeen area

Photos 35-36 show the new ardeid night roosting site at the north of Ap Lei Chau. Waterbirds were also observed roosting on the roof of yacht repairing industry along the Aberdeen Channel during the additional ardeid survey.



Photo 35



Photo 36



Photo 37