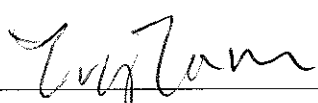
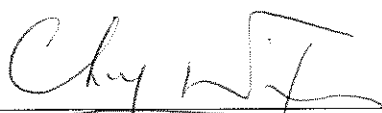


Drainage Services Department

**Contract No. SPW 09/2018
Environmental Team Baseline Surveys
for Sha Tin Cavern Sewage Treatment
Works**

**Detailed Vegetation Survey Report
(Version 8.1)**

Certified By	 _____ (Environmental Team Leader)
Prepared By	 _____ (Qualified Ecologist)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties

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10 July 2019

Drainage Services Department
Projects and Development Branch
Sewerage Projects Division
44th Floor, Revenue Tower
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Wan Chai
Hong Kong

By Post and E-mail

Attention: Ms. YIP Lai Yuk, Carol (Engr/Sewerage Projects 26)

Dear Ms. Yip,

**Re: Contract No. SPW 09/2018
Environmental Team Baseline Surveys
for Sha Tin Cavern Sewage Treatment Works**

**Detailed Vegetation Survey Report
(Conditions 2.13(i) and 2.14 of EP-533/2017)**

Reference is made to the captioned Detailed Vegetation Survey Report (Version 8.1) certified by the ET Leader and provided to us via e-mail on 10 July 2019.

Please be informed that we have no adverse comment on the captioned submission. We write to verify the captioned submission in accordance with condition 2.14 of EP-533/2017.

Thank you very much for your attention and please do not hesitate to contact our Mr. Simon Cheung (Tel: 3465 2861) or the undersigned should you have any queries.

Yours sincerely,



YH Hui
Independent Environmental Checker

c.c.	AECOM	Attn: Ms. Cherry Yau	by E-mail
	AECOM	Attn: Mr. Simon Leung	by E-mail
	WELLAB	Attn: Ms. Ivy Tam	by E-mail
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1 INTRODUCTION

- 1.1 To support social and economic development in Hong Kong, there is a pressing need to optimize the supply of land for various uses by sustainable and innovative approaches. One possible approach is rock cavern development. The Policy Agenda of the 2016 Policy Address has stated that works for the relocation of the Sha Tin Sewage Treatment Works (STSTW) is to commence as soon as possible to release the existing site, of a size about 28 hectares, for development purpose.
- 1.2 The Relocation of Sha Tin Sewage Treatment Works (STSTW) to Caverns (the Project) is implemented so as to release the existing site, of a size about 28 hectares, for other uses.
- 1.3 The Project is a Designated Project under the Environmental Impact Assessment Ordinance (EIAO). An Environmental Impact Assessment (EIA) Report for the Project was approved under EIAO in November 2016 in accordance with the EIA Study Brief (No.ESB-273/2014) and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The corresponding Environmental Permit was issued (EP no.: EP-533/2017) by the Director of Environmental Protection (DEP) in March 2017.
- 1.4 The approved EIA Report has identified species of conservation importance within 500m distance from the boundary of the Project, as well as other areas likely to be impacted by the Project. The ecological baseline resources within the assessment area and the results of the potential ecological impact resulting from the construction and operation of the Project, measures required to mitigate any identified adverse impacts have been presented and addressed in the EIA Report. For instance, flora species recorded during the ecological surveys were listed under Appendix 8.03 of the EIA Report and their conservation importance with reference to relevant legislation, standards, criteria, and distribution in Hong Kong were also discussed. The EIA Report also presented recommended measures to avoid, minimize, mitigate and compensate potential ecological impact arising from the Project. The EIA Report concluded that no adverse residual ecological impacts are expected from the Project with the proper implementation of mitigation measures. In order to formulate the approach for mitigation measures, the EIA Report and EM&A Manual recommended to conduct a Detailed Vegetation Survey within the proposed works areas to identify any potentially affected plant species of conservation importance. Based on the findings from the Detailed Vegetation Survey, a Protection and Transplantation Proposal recommending appropriate measures to mitigate impact can be prepared and implemented for the Project.
- 1.5 The requirements on the Detailed Vegetation Survey Report proposed in Sections 8.8.2.4, 8.8.3.3, 8.10.1.3 of the EIA Report are listed as follows:
- Identify any potentially affected plant species of conservation importance in the immediate vicinity of the proposed works areas.
 - The survey should be carried out prior to the commencement of site clearance works.

-
- These identified individuals should be labelled and fenced off on site prior to the commencement of works for better protection accordingly to the Protection and Transplantation Plan.
 - The potentially affected individuals shall be preserved, or in the case of unavoidable loss, transplanted according to the Protection and Transplantation Plan.
 - The survey shall be conducted by a suitably qualified botanist / ecologist.
- 1.6 To minimize the potential impact on flora species of conservation interest due to construction of the Project, including *Cibotium barometz*, *Canthium dicoccum*, *Peristylus tentaculatus* and any other flora species of conservation interest, Condition 2.13(i) of the EP specifies that a Detailed Vegetation Survey should be conducted within the proposed works areas. Cinotech Consultants Limited was commissioned by the Drainage Services Department (DSD) to prepare a Detailed Vegetation Survey Report. Details of the report specified in the EP include:
- methodology
 - survey results, including the updated conditions, number and locations of the individuals of flora species of conservation interest identified within the works boundary
 - confirmation on whether any individuals of these species would be directly affected by the proposed works
 - recommendation on protective measures for identified individuals of each species where in situ preservation is feasible
 - assessment on the suitability and / or practicality of the transplantation of those individuals to be directly affected.

Preliminary Development Plan

- 1.7 The EIA Report identified Nui Po Shan as the best site location for the cavern due to good geological conditions, proximity to existing STSTW and Tolo Harbour Effluent Export Scheme (THEES) effluent expert tunnel, minimal environmental nuisance to nearby residents and minimal traffic impact. The preliminary development plan is shown in **Figures 1b-1e**.
- 1.8 The EIA Report explored different location options for the STW facilities. The main portal was proposed near A Kung Kok Road (Site 3), which has the advantage of flexible integration of the sewage treatment works facilities with the THEES Tunnel Portal. The main portal will consist of access road to the cavern and outdoor facilities such as administration building, ventilation building and workshop. The slope modification work will be involved behind the THEES tunnel. While the design is under progress, the area that the modification work will affect is expected to cover both the existing SIMAR slope and its vicinity.
- 1.9 Secondary portal is proposed at an existing construction site office near Mui Tsz Lam Road (Site 2). It will consist of another ventilation building, secondary electrical substation and internal access road to the cavern.
- 1.10 A ventilation shaft will be built uphill of A Kung Kok Shan Road (Site 1). This site is far away from sensitive receivers so as to minimize odour impact from the shaft. The access road to the ventilation shaft will follow the topography of the existing natural terrain to minimize slope cutting and vegetation clearance. Also, part of the road will be

elevated for stream crossing to avoid habitat loss, habitat fragmentation and impact on a freshwater crab species *Cryptopotamon anacoluthon*. Near the shaft is a flat land, which will be used as explosive magazine site for cavern tunnelling works.

- 1.11 During the construction phase, a community liaison center will be set up near the junction of Mui Tsz Lam Road and A Kung Kok Road in Site 3.
- 1.12 Since the ancillary facilities and portals to the cavern are constructed on the hill, the construction extent will also include slope stabilization works after slope cutting. Localized stabilization work will be required at road alignment with steep topography. Temporary works area is required adjacent to the permanent works for construction access and material storage.

2 METHODOLOGY

Findings in EIA Report

2.1 The detailed vegetation project boundary required under the Project is shown in **Figure 1a**. With reference to Figure 8.05a and 8.05b of the EIA Report, seven flora species of conservation importance were found within or in the proximity to the project boundary (**Table 2-1**).

Table 2-1 Flora Species of Conservation Importance Found within or near Project Boundary in the EIA

Chinese Name (Species Name)	Distribution in Hong Kong#	Observations in Appendix 8.03 of the EIA	Conservation Statuses
竹葉蘭 Bamboo Orchid (<i>Arundina graminifolia</i>)	Very common	<ul style="list-style-type: none"> • Shrubland (Scarce) 	<ul style="list-style-type: none"> • Protected under the Forests and Countryside Ordinance (Cap. 96); & • Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)
魚骨木 Butulang Canthium (<i>Canthium dicoccum</i>)	Common	<ul style="list-style-type: none"> • Woodland (Occasional) • Plantation (Scarce) • Shrubland (Scarce) 	<ul style="list-style-type: none"> • Listed as “Vulnerable” by the IUCN Red List
金毛狗 Lamb of Tartary (<i>Cibotium barometz</i>)	Common	<ul style="list-style-type: none"> • Woodland (Frequent) • Fung Shui Wood (Frequent) • Plantation (Occasional) • Shrubland (Frequent) 	<ul style="list-style-type: none"> • Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586); • Listed as “Category II” in the Wild Plants under State Protection; & • Listed as “Vulnerable” in the Rare and Precious Plants of Hong Kong
小果柿 Small Persimmon (<i>Diospyros vaccinioides</i>)	Very Common	<ul style="list-style-type: none"> • Woodland (Occasional) • Plantation (Occasional) • Shrubland (Frequent) • Stream (Scarce) 	<ul style="list-style-type: none"> • Listed as “Critically Endangered” by the IUCN Red List

Chinese Name (Species Name)	Distribution in Hong Kong#	Observations in Appendix 8.03 of the EIA	Conservation Statuses
羅浮買麻藤 Luofushan Joint-fir (<i>Gnetum luofuense</i>)	Very Common	<ul style="list-style-type: none"> • Woodland (Frequent) • Shrubland (Frequent) 	<ul style="list-style-type: none"> • Listed as “Near Threatened” by the IUCN Red List
香港大沙葉 Hong Kong Pavetta (<i>Pavetta hongkongensis</i>)	Common	<ul style="list-style-type: none"> • Woodland (Scarce) • Plantation (Scarce) • Cultivated Land (Scarce) 	<ul style="list-style-type: none"> • Protected under the Forests and Countryside Ordinance (Cap. 96)
觸鬚闊蕊蘭 Club-spurred Tentacle Orchid (<i>Peristylus tentaculatus</i>)	Very Common	<ul style="list-style-type: none"> • Stream (Scarce) 	<ul style="list-style-type: none"> • Protected under the Forests and Countryside Ordinance (Cap. 96); & • Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)

Corlett, R., Xing, F., Ng, S. C., Chau, L., Wong, L. (2000). Hong Kong Vascular Plants: Distribution and Status. *Memoirs of the Hong Kong Natural History Society*. 23:1-3.

Survey Requirement

2.2 The detailed vegetation survey aims to verify the findings in EIA, and to identify whether or not other species of conservation importance are present in the project boundaries. Definition of “species of conservation importance” follows the Technical Memorandum of Environmental Impact Assessment Ordinance (EIAO-TM) Annex 16: Guidelines for Ecological Assessment, criteria related to plants include:

1. listed in IUCN Red Data Books or those of the South China region;
2. listed in international conventions for conservation of wildlife;
3. endemic to Hong Kong or South China;
4. listed under local legislation :
 - (1) Forestry Regulation (under Forests and Countryside Ordinance Cap. 96);
 - (2) Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586);
 - (3) Other relevant Ordinances or Regulations such as Marine Parks and Marine Reserves Regulation (under Marine Parks Ordinance Cap. 476);
(References shall also be made to species protected by legislation in China, especially the Guangdong Province.)
5. considered as rare in the territory or having special conservation importance by scientific studies other than those listed above.

Survey Method and Equipment

- 2.3 Detailed vegetation survey was conducted from June to September 2018 and January 2019 within four survey sites in the project boundary:

Table 2-2 Survey Sites

Site	Location
Site 1 – Magazine Site	A Kung Kok Shan Road Proposed Magazine Site
Site 2 – Mui Tsz Lam Site	DSD Mui Tsz Lam Site Office and section of Mui Tsz Lam Road
Site 3 – A Kung Kok Site	Vegetated slope around David Camp in A Kung Kok Road and landscape area located to the east of Ma On Shan Road
Site 4 – VDC Site	Ex-Custom and Excise Department Vehicle Detention Center (Ex-C&ED VDC) and landscape area near Hang Tai Road

- 2.4 Only plant species of conservation importance that naturally grows was counted. Species that are planted for landscape purpose or human consumption (e.g. fruit trees near village) were excluded.

Survey Method adopted in the EIA Study

- 2.5 During the EIA Study, vegetation surveys were conducted by direct observation to record diversity and dominance of plant species present in different habitat types. The location of any plant species of conservation importance was recorded. As shown in Figure 60334056/EIA/8.03 of the EIA Report, the survey was conducted along line transects that covered a large area within 500m boundary from the project boundary. The relative abundances of plant species observed were presented in terms of “Abundant”, “Frequent”, “Occasional” and “Scarce” in different habitats. The survey aimed to identify the general ecological characteristics of the Site and was therefore broad brush in nature. Therefore, the EIA Report, EM&A Manual and the EP proposed to conduct a detailed vegetation survey within the works boundary to identify and record the affected individuals prior to the commencement of any site clearance works.

Survey Method adopted in this Survey Report

- 2.6 In early stage of the survey, the detailed vegetation survey was designed to record the number and locations of all individuals of flora species of conservation importance identified within the works boundary as per Condition 2.13 of the EP.
- 2.7 Site visits were carried out at the three survey sites to understand the latest site condition. The sites were found to locate on steep slopes with no proper footpath. The understorey was covered by densely grown vegetation and fallen branches. In addition, *Diospyros vaccinioides* and *Gnetum luofuense* were found to be abundant in the three sites (site photos are shown in **Appendix B**). This opposed to “scarce”, “occasional” to “frequent” encounters in Appendix 8.03 of the EIA Report (**Table 2-1**) and limited observations within and near the project boundary as illustrated in Figures 60334056/EIA/8.05a and 8.05b of the same report. Given the high species abundance and poor site accessibility, recording every individual of these two species with high

accuracy is deemed impossible. Therefore, a reasonably practical survey method that is accepted both internationally and locally was explored.

- 2.8 In principle, the objective of a targeted threatened-plant survey in a vegetation survey methodologies is to establish, with a high level of confidence, the presence or absence of a threatened plant species at the survey site and, if the species is present, to collect data to determine the number of individuals or the habitat area. The survey aims to minimise ‘false-negatives’ (i.e. when a species is reported as absent from a site when it is actually present), with a high level of confidence in the reported results.
- 2.9 Due to large population size of *Diospyros vaccinioides* and *Gnetum luofuense* and habitats that can conceal them, the survey effort must generally be high to ensure confidence in the results. In order to ensure to have a high level of confidence in the reported results, we have chosen to record *Diospyros vaccinioides* and *Gnetum luofuense* through quadrat sampling. This method is commonly used worldwide, such as UK, USA, Australia and also in Hong Kong (e.g. intertidal surveys).
- 2.10 The following sections explain the proposed survey method for species with different degrees of occurrence observed during site visits.

A. Highly Abundant Species

- *Diospyros vaccinioides* and *Gnetum luofuense*

- “Sampling” was adopted to determine the abundance of highly abundant species in location with poor accessibility.
 - Plots of about 1,000m² were established for all the survey areas. In each plot, detailed survey of *Diospyros vaccinioides* were conducted in five random quadrats of 5m x 5m area in order to increase the sample size, hence reducing statistical error.
 - All individuals of *Diospyros vaccinioides* in a quadrat were counted and divided into four height categories: 0 – 1m, 1 – 2m, 2 – 3m, >3m. This helps understand the maturity of this shrub in the project boundary.
 - After counting all individuals in the 5 quadrats, the total number of *Diospyros vaccinioides* in five quadrats was summed and divided by 125m² (total area of the five quadrats) to determine the average density in the corresponding plot. The number of *Diospyros vaccinioides* in each plot was then obtained by multiplying the average density by the plot area. The total population in each survey site was calculated by adding the results in all plots.

- (a) Average Density of *Diospyros vaccinioides* in a Plot
 = Total no. of individuals in 5 quadrats / (5m x 5m)
- (b) No. of *Diospyros vaccinioides* in a Plot
 = (a) x Area of a Plot
- (c) Population of *Diospyros vaccinioides* in a Survey Site
 = Sum of individuals in All Plots

- As *Gnetum luofuense* is a climber that spreads across the canopy. It is difficult to identify whether the climber in an area contains one or more individuals. Therefore, its percentage coverage within a quadrat was estimated. The percentage coverage in a plot followed the similar method as *Diospyros vaccinioides*.

- (d) Average Percentage Coverage of *Gnetum luofuense* in a Plot
 = Sum of Percentage Coverage in all 5 quadrats / 5
- (e) Area of *Gnetum luofuense* in a Plot
 = (d) x Area of a Plot
- (f) Total Area of *Gnetum luofuense* in a Survey Site
 = Sum of Areas in All Plots

- “Walkthrough survey” was carried out in locations with low species abundance (e.g. area with sparse vegetation). The whole plot was walked through to count the number of *Diospyros vaccinioides* and to estimate the coverage of *Gnetum luofuense*. This method covered around one third of all plots.

B. Less Abundant Species

- *Ania hongkongensis*, *Canthium dicoccum*, *Cibotium barometz* and *Aquilaria sinensis*
- “Walkthrough survey” was carried out for other flora species of conservation importance that does not grow in significant number.
 - All individuals were actively searched. A pair of binoculars with at least 8x magnification (e.g. Leica 8 x 32 BA) was used to aid searching and identifying species on tree top or in inaccessible area where necessary.

Locating Species of Conservation Importance

- The location of each individual/colony was marked on a map of suitable scale (1:800). A hand held Global Positioning System (GPS) was used to aid positioning where necessary. All individuals were tagged with a unique identification code and their locations were marked on a map.

Recording Plant Conditions

- The conditions of each individual/colony, including approximate number of individuals in the colony, form, health condition, and suitability for transplanting were recorded and evaluated where applicable. The evaluation was carried out with reference to “Development Bureau Technical Circular (Works) (DEVB TCW) No. 7/2015 – Tree Preservation”. In addition, photographic record for each individual/colony was taken. The size of the plant (which can reflect its maturity) was recorded based on its growth form:
 - ❖ For trees (e.g. *Canthium dicoccum*), diameter at breast height (DBH), crown spread and height were recorded. DBH was measured in accordance to Agriculture, Fisheries and Conservation Department’s (AFCD’s) *Nature Conservation Practice Note No. 2 (Revised: June 2006) – Measurement of Diameter at Breast Height (DBH)*. A measurement tape was used for the measurement. Height and crown spread were measured by the tape / estimated where applicable.
 - ❖ For ferns (*Cibotium barometz*) and herbs (e.g. orchid), the number of individuals were recorded and coverage of the colony was presented in a figure.

Qualification of the Ecologist

- 2.11 As per Section 7.3.1.2 of the EM&A Manual, the survey was conducted by a qualified ecologist with over 10 years relevant experience as shown in the curriculum vitae attached in **Appendix D**.

3 SURVEY RESULT

- 3.1 Six plant species of conservation importance (*Ania hongkongensis*, *Aquilaria sinensis*, *Canthium dicoccum*, *Cibotium barometz*, *Diospyros vaccinioides* and *Gnetum luofuense*) were recorded within the project boundary. All species have been reported in the EIA Report.
- 3.2 The EIA Report mentioned that a Club-spurred Tentacle Orchid *Peristylus tentaculatus* grew near a stream in Site 1 Magazine Site. While active searching was conducted around the area marked in Figure 60334056/EIA/8.05b of the EIA Report, this individual could not be found in the current study. Also, Bamboo Orchid *Arundina graminifolia* and Hong Kong Pavetta *Pavetta hongkongensis*, which were reported near the project boundary in the EIA Study, were not observed within the project boundary in the current study.
- 3.3 The number and location of *Diospyros vaccinioides* and *Gnetum luofuense* and the other species of conservation importance are illustrated in **Figures 2a-2i**. A plant schedule showing survey summary and photographic record are shown in **Appendices A** and **B** respectively. The survey method for each plot is illustrated in **Figures 3a-3e**. The survey findings for each site are described in the following sections:

Site 1 – Magazine Site

- 3.4 The magazine site is located at the hill upslope of A Kung Kok Shan Road. It is mainly covered by secondary woodland. Plantation woodland is found near A Kung Kok Shan Road and on the ridge in the southern portion of the proposed magazine site. Shrubland is sandwiched between secondary and plantation woodlands and also on the ridge. A few natural streams flowed across the magazine site.
- 3.5 Three species of conservation importance were recorded, with *Diospyros vaccinioides* and *Gnetum luofuense* being the most abundant species.
- 3.6 *Diospyros vaccinioides* was observed in all plots in Site 1 except Grid 1-24 near A Kung Kok Shan Road. Individuals of height from 0 – 1m was the major portion (45%). *Diospyros vaccinioides* with over 3m in height were mostly found under the shade of secondary woodland and in highly exposed shrubland.
- 3.7 Due to the climbing nature of *Gnetum luofuense*, this species mostly clung on trees in shrubland/woodland. It is estimated to cover 8% of Site 1 area (~1,900m²).
- 3.8 Five individuals of *Ania hongkongensis* (in two clusters H0001 (4 nos.) and H0002 (1 no.)) grew on loose soil in secondary woodland.

Site 2 – Mui Tsz Lam Site

- 3.9 Site 2 is comprised of section of Mui Tsz Lam Road, DSD site office and the vegetated hill. The former two areas are manmade environment with concrete paving. Near the foot of the hill is predominantly woodland on flat ground. The upslope is a mix of woodland and shrubland.

-
- 3.10 Four species of conservation importance were recorded, with *Diospyros vaccinioides* and *Gnetum luofuense* being the most abundant species.
- 3.11 *Diospyros vaccinioides* dominated in shrubland/woodland in the uphill. Individuals of height from 0 – 1m was the major portion (60%)
- 3.12 Due to the climbing nature of *Gnetum luofuense*, this species mostly clung on trees in shrubland/woodland. It is estimated to cover 15% of Site 2 area (~2,800m²).
- 3.13 Four patches of *Cibotium barometz* (E0001a (16 nos.), E0001b (2 nos.), E0002 (1 no.) and E0003 (2 nos.)) were found along two seasonal streams. Five individuals of *Canthium dicoccum* (D0003, D0004, D0006, D0008 and D0009) scattered in the shrubland/woodland.

Site 3 – A Kung Kok Site

- 3.14 Near A King Kok Street is a landscape area, cycle track, David Camp and a series of SIMAR slopes. The foot of Nui Po Shan is covered by woodland while near the top of the survey site is covered by plantation. In between these two habitats is a large stretch of shrubland.
- 3.15 Five species of conservation importance were recorded in Site 3, with *Diospyros vaccinioides* being the most abundant species.
- 3.16 *Diospyros vaccinioides* dominated in exposed shrubland in the uphill. Individuals of height from 0 – 1m was the major portion (49%). Compared with Site 2 which is located on the same hill (Nui Po Shan), upper slope in Site 3 has fewer trees and is more exposed. Being more competitive in this harsh environment, the percentage of individuals of *Diospyros vaccinioides* over 3m in height in Site 3 (5%) is higher than that in Site 2 (2%).
- 3.17 Due to the climbing nature of *Gnetum luofuense*, this species mostly clung on trees in shrubland/woodland. It is estimated to cover 4% of Site 3 area (~2,600m²).
- 3.18 Four patches of *Cibotium barometz* (E0004 (7 nos.), E0005 (50 nos.), E0006 (1 no.) and E0007 (100 nos.)) were found along three flowing streams and its damp vicinity. One major patch of about 100 individuals (E0007) is located in the upstream section of the stream behind A Kung Kok Shaft. Another major patch of about 50 individuals (E0005) is located in the downstream section of the stream near Mui Tsz Lam Road. Both streams are characterised by steep topography and well-shaded environment.
- 3.19 Four individuals of *Canthium dicoccum* (D0001 (2 nos.), D0002 and D0010) scattered in the woodland. A sapling of *Aquilaria sinensis* (C0001) grew under the canopy.

Site 4 – VDC Site

3.20 The northeastern end of ex-VDC was rented out as car park under short term tenancy. Another carpark also partly encroached near the center of the site. The remaining area was left vacant. Opposite to the ex-VDC is a landscape area that is overgrown with weeds, self-grown trees and invasive White Popinac *Leucaena leucocephala*. No species of conservation importance was observed.

Summary

3.21 The following table summarized the current findings:

Table 3-1 Flora Species of Conservation Importance Found within Project Boundary in the Current Study

Chinese Name (Species Name)	Distribution in Hong Kong #@	Conservation Statuses	Observation in EIA	No. of Individuals observed within Project Boundary in Current Study			Total
				Site 1	Site 2	Site 3	
香港安蘭 Purple Bulb Orchid (<i>Ania hongkongensis</i>)	Common	<ul style="list-style-type: none"> Protected under the Forests and Countryside Ordinance (Cap. 96); & Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) 	Found in Fung Shui Wood; Not observed inside or near project boundary	5			5
土沉香 Incense Tree (<i>Aquilaria sinensis</i>)	Common	<ul style="list-style-type: none"> Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) Listed as “Vulnerable” in the China Plant Red Data Book Listed as “Vulnerable” by the IUCN Red List 	Found in Woodland and Fung Shui Wood; Not observed inside or near project boundary			1	1

Chinese Name (Species Name)	Distribution in Hong Kong #@	Conservation Statuses	Observation in EIA	No. of Individuals observed within Project Boundary in Current Study			Total
				Site 1	Site 2	Site 3	
魚骨木 Butulang Canthium (<i>Canthium dicoccum</i>)	Common	<ul style="list-style-type: none"> Listed as “Vulnerable” by the IUCN Red List 	Found in Woodland, Shrubland and Plantation; Observed near Site 2		5	4	9
金毛狗 Lamb of Tartary (<i>Cibotium barometz</i>)	Common	<ul style="list-style-type: none"> Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586); Listed as “Category II” in the Wild Plants under State Protection; & Listed as “Vulnerable” in the Rare and Precious Plants of Hong Kong 	Found in Woodland, Fung Shui Wood, Plantation, Shrubland and Stream; Observed in a stream in Site 3		21	158	179
小果柿 Small Persimmon (<i>Diospyros vaccinioides</i>)	Very Common	<ul style="list-style-type: none"> Listed as “Critically Endangered” by the IUCN Red List 	Found in Woodland, Plantation, Shrubland, Stream; Observed in Site 1	6,100	2,500	11,100	19,700
羅浮買麻藤 Luofushan Joint-fir (<i>Gnetum luofuense</i>)	Very Common	<ul style="list-style-type: none"> Listed as “Near Threatened” by the IUCN Red List 	Found in Woodland and Shrubland; Observed near Site 1	2,000m ²	2,800m ²	2,650m ²	7,450m ²

Corlett, R., Xing, F., Ng, S. C., Chau, L., Wong, L. (2000). Hong Kong Vascular Plants: Distribution and Status. *Memoirs of the Hong Kong Natural History Society*. 23:1-3.

@ Pang K.S., Yip J.K.L., Lai P.C.C.. (2011) A Review of the Status of the IUCN Red List of Threatened Plants in Hong Kong. *Hong Kong Biodiversity Issue No. 20*. AFGD.

3.22 The IUCN Redlist is commonly used for understanding the threat to an assessed species at global level (AFCD, 2011). Nevertheless, the species may be locally common and widely distributed. For example, the distribution of *Diospyros vaccinioides* is restricted to Guangxi, Guangdong, Hainan and Taiwan. Although it is heavily exploited in Taiwan and is considered critically endangered by the IUCN (2018), it does not have commercial value in mainland China and Hong Kong and is very common in these regions. In the case of *Aquilaria sinensis*, it is locally common in Hong Kong but is heavily harvested in mainland China. The Hong Kong population is being targeted and is under threat as well.

4 IMPACT ASSESSMENT & RECOMMENDATIONS

Impact Assessment

- 4.1 The latest works area required under the Project (**Figures 2a – 2i**) covers areas with both temporary and permanent works. As vegetation clearance will be carried out within the works area, the following plants would be affected by the project without mitigation. The calculations are shown in **Appendix C**.

Table 4-1 Flora Species of Conservation Importance affected by the Project

Chinese Name (Species Name)	No. of Individuals <u>outside</u> Works Area to be Retained				No. of Individuals <u>within</u> Works Area affected by the Project			
	Site 1	Site 2	Site 3	Total	Site 1	Site 2	Site 3	Total
香港安蘭 Purple Bulb Orchid (<i>Ania hongkongensis</i>)	4	0	0	4	1	0	0	1
土沉香 Incense Tree (<i>Aquilaria sinensis</i>)	0	0	0	0	0	0	1	1
魚骨木 Butulang Canthium (<i>Canthium dicoccum</i>)	0	1	0	1	0	4	4	8
金毛狗 Lamb of Tartary (<i>Cibotium barometz</i>)	0	0	101	101	0	21	57	78
小果柿 Small Persimmon (<i>Diospyros vaccinioides</i>)	950	950	3,700	5,600	5,150	1,550	7,400	14,100
羅浮買麻藤 Luofushan Joint-fir (<i>Gnetum luofuense</i>)	300m ²	300m ²	750m ²	1,350m ²	1,700m ²	2,500m ²	1,900m ²	6,100m ²

Recommendations

- 4.2 According to Section 8.8.1.1 of the EIA Report, ecological impacts on important habitats should be mitigated by, in order of priority, avoidance, minimization, and compensation approaches to the maximum practical extent.

Avoidance

- 4.3 While the design of the ancillary facilities has yet been finalized, the vegetation survey was assigned to cover all potentially affected areas within project boundary. The works area has been refined in accordance with the latest design and survey works to minimize vegetation clearance coverage and to avoid species of conservation importance as far as possible. The coverage of the protection zone for retained vegetation is shown in **Figure 2a-2i**. Therefore, one individual of *Canthium dicoccum* (D0004), about 101 nos. of *Cibotium barometz* (E0006 and E0007), four individuals of *Ania hongkongensis* (H0001), about 5,600 nos. of *Diospyros vaccinioides* and about 1,350m² of *Gnetum*

luofuense will be preserved. They will be protected by clear site demarcation or with robust fencing to be explained in **Section 4.17**.

Minimization

4.4 Plants that fall within the works area are prone to damage during to site clearance. If impact on the plant species of conservation importance cannot be avoided, the suitability and /or practicality of transplantation will be assessed according to Condition 2.13(i) of the EP. Considerations include health condition, site condition, transplantation feasibility, conservation value and availability of receptor site. With reference to the *Guidelines on Tree Transplanting* issued by the Development Bureau, the suitability of transplantation of affected individuals was reviewed based on the following considerations:

- **Health, form and structural condition** – Healthy individual has higher chance to survive the transplant shock and recover after transplantation. Plants with poor form or structure (e.g. inclining, multiple trunk) have imbalanced shape that is difficult to grow well in new environment. Therefore, only healthy individuals with good to fair form and structural conditions will be considered for transplantation.
- **Formation of root ball** – A balanced root ball of suitable size is essential to support the transplanted plant and to re-grow for water and nutrient absorption. In general, the ratio between root ball diameter:trunk diameter is 8:1 to 10:1. Also, plants growing on steep slope develop roots that adapt to the existing gradient. If there is hindrance in the root growing direction (e.g. rocks and concrete structure), the root ball will be in unbalanced form and hard to support the plant in new environment. Mature plant needs larger root ball, implying that higher chance of imbalanced root ball formation on the sloped environment. Therefore, transplantation of herbs and young trees is recommended.
- **Site remoteness, accessibility, technical feasibility and cost effectiveness** – Unless the plant is located near road network, mobilization of powered mechanical equipment on the slope for large tree transplant is technical impractical and not cost-effective. In addition, there is safety concern for working in location with steep topography.
- **Conservation value** – While all plants considered in this proposal have certain conservation statuses, the commonness of the species in Hong Kong should be considered in evaluating the impact of removing the affected plant in a wider perspective (population survival).
- **Availability of Suitable Receptor Site** – Areas within the project boundary but outside the works area will be the receptor site of the affected plants. Habitat similar to the existing growing environment will be chosen to enhance the survival rate after transplant.

- 4.5 Based on the above, transplantation of healthy herbs and young trees with good to medium form and structural conditions is recommended. These include one *Aquilaria sinensis* (C0001), one *Ania hongkongensis* (H0002) and 26 nos. of *Cibotium barometz* (E0001a (16 nos.), E0002 (1 no.), E0003 (2 nos.) and E0004 (7 nos.)). Although most of them are located on steep slope and is difficult to access, transplantation is recommended in view of the small number of individuals involved to minimize the impact as far as possible.
- 4.6 Most *Canthium dicoccum* recorded are semi-mature trees over 7m tall. Young individuals are growing near rocks or concrete structure. These make formation of a good root ball difficult. For two individuals located within the works area in Site 2 (D0008 and D0009), the former has poor health condition while the latter has been uprooted. Although they would be affected by the construction works, they are unlikely to survive after transplantation and thus this option is not recommended.
- 4.7 *Diospyros vaccinioides* is highly adaptive in the project boundary. It can be found in majority of plots and occurs in both exposed and shady environment. This species was also observed outside the project boundary. Appendix 8.03 of the EIA Report indicated that this species was found in woodland, plantation and shrubland. With reference to the habitat map of the approved EIA Report, Nui Po Shan consists of extensive stretch of woodland, plantation and shrubland. This species was reported in different locations in the 430ha Nui Po Shan study area in the EIA Report, indicating that its distribution is widespread throughout Nui Po Shan. Only a small portion of Nui Po Shan (8ha) would be affected by the Project.
- 4.8 According to the plant specialist, there is high risk of transplantation failure for *Diospyros vaccinioides*. To increase the chance of survival, transplantation of very young individuals is proposed to minimize the impact as far as possible. About 500 numbers of *Diospyros vaccinioides* are proposed to be transplanted based the criteria in the following table. The exact numbers to be transplanted are subject to the actual site conditions. The location of *Diospyros vaccinioides* to be transplanted is shown in **Figures 4a – 4d**. In addition to selection of individuals of high survival rate, care should be undertaken during root ball preparation and transplantation work as proposed in Sections 3.4 – 3.7 of the Protection and Transplantation Proposal to reduce the risk of transplantation failure, so that the total number of individuals survived after transplantation would meet the target of 500 (exact numbers to be transplanted are subject to actual site conditions).

Table 4-2 Screening of *Diospyros vaccinioides* to be Transplanted

Screening of <i>Diospyros vaccinioides</i> not suitable for transplantation		Justifications	No. of Individuals Remain
Total number of affected <i>Diospyros vaccinioides</i> in Sites 1, 2 and 3:			14,100
Step 1	Individuals >0.5m in height	The Sites are located on steep ground and the soil was dry. The roots of the vegetation are likely to grow wide and deep to reach groundwater. As older plant (Individuals >0.5m in height) is well adapted to existing environment, it will more likely to experience transplantation stress and may not be able to survive ^{1,2} . Also, a balanced root ball for transplantation cannot be prepared on steep slope and near obstacles.	4,700 *
	Grown near woody plants and other obstacles (e.g. rocks, man-made structures)		
	Locally grown on Steep Slopes (>40 degree)		
Step 2	Grown in remote location away from road network (>50m) and grown on steep slopes with no proper access	No road access and proper man access for transportation. Also, ecologist/landscape specialist/workers cannot carry out root ball preparation and transplantation works under safe condition.	500
Total number of <i>Diospyros vaccinioides</i> to be transplanted:			500

* Twelve 5m x 5m quadrats that scattered around the three Sites were surveyed to count the number of *Diospyros vaccinioides* in different height ranges (**Figure 5a-5e**). About 30% of individuals among height range of 0-1m were screened in Step 1 (**Appendix E**).

4.9 *Gnetum luofuense* is a woody climber that spans across the shrubland and woodland in Nui Po Shan as reported in the EIA Report and this vegetation survey. This species was also observed outside the project boundary. Appendix 8.03 of the EIA Report indicated that this species was frequently found in woodland and shrubland. It twines on shrubs and trees to reach the canopy. It is impractical to segregate it from other plants for transplantation. Also, transplanting it may induce stress to the existing vegetation in the receptor site. As transplantation is not suitable, compensatory planting for this species is proposed in **Section 4.12**.

¹ LandOwner Resource Centre. 2017. Successful Transplanting of Woodland Vegetation for Plant Salvage or Habitat Restoration Projects. [online] Available: <https://www.grca.on.ca/wp-content/uploads/2017/07/trnsplntng.pdf>. Last Accessed: 3 July 2019.

² Nemati N. 1977. Shrub Transplanting for Range Improvement in Iran. Journal of Range Management Vol. 30, No. 2

Compensation

- 4.10 The potential of compensatory planting for 13,600 nos. of *Diospyros vaccinioides*, 6,100m² *Gnetum luofuense*, 8 nos. of *Canthium dicoccum*, about 52 nos. of *Cibotium barometz* that cannot be transplanted is reviewed and explained in the following sections. The planting location will be indicated in a separate Protection and Transplantation Proposal.
- 4.11 For *Diospyros vaccinioides*, compensatory planting of 13,600 nos. of seedling is proposed at the planting area on future completed SIMAR slopes behind Main Portal (Site 3) and next to the access road to Magazine Site (Site 1). This species produces numerous fruits. Seeds will be collected from individuals near the Project Site. After germination, only healthy seedlings will be selected to ensure the quantity and quality after planting. With reference to a community-involved tree planting event near the top of Nei Lak Shan in Lantau Island, seedlings of *Diospyros vaccinioides* planted had 94% survival rate one month after planting³. Re-sampling after one year recorded an average height increment from 26.6cm to 38.1cm. Therefore, seedling planting is considered an effective compensatory measure. In addition, broadcast seeding in temporary works area after cessation of work is proposed to enhance the population. Furthermore, considering the commonness of this species in Nui Po Shan, the wild population growing in the vicinity of the project boundary is expected to naturally propagate into the disturbed area after cessation of construction works.
- 4.12 Similarly, *Gnetum luofuense* will be compensated by seedling planting at the future planting. Since this species will grow in large mass and twine on nearby plants to compete for sunlight, it will be planted in low density (50m interval) to reduce its aggressiveness. Seedling will be planted on the edge of works area to connect to the undisturbed area. The planting area in Sites 1 and 3 can accommodate a total of 17 planting locations.
- 4.13 For *Canthium dicoccum*, at least 8 nos. of whip trees will be planted in the temporary works area so that there will be no net loss of this species. As this is a tree species, it will be planted in locations with slope $\leq 35^\circ$.
- 4.14 *Cibotium barometz* grows in damp environment (such as stream and seeping rock). However, nearby suitable habitat within the project boundary (stream in the upper slope in Site 3) has been adopted as transplantation receptor site and thus compensation for the lost individuals would not be recommended.
- 4.15 The preservation, transplantation and compensatory planting methods are proposed in the separate Protection and Transplantation Plan.

³ The Conservancy Association (CA). 2016. Islands District Healthy City Tree Planting Festival Green Lantau 2015. Nei Lak Shan, Lantau Island. 2nd Tree Monitoring Report. [online] Available at: http://www.islands-healthycity.org/NP_tree_monitoring_2015_02.pdf. Last Accessed: 3 July 2019.

Summary of Recommendations

4.16 The overall recommendations is summarized in the following table:

Table 4-3 Summary of Recommendations (by Site)

Common Name	Species Name	Units	Recommendations				Compensatory Planting in Temporary Works Area
			Retain	Transplant	Fell	Total (in Project Boundary)	
Site 1							
小果柿 Small Persimmon	<i>Diospyros vaccinioides</i>	No.	950 (15%)	350 (6%)	4,800 (79%)	6,100	Seedlings + Broadcast Seeding
羅浮買麻藤 Luofushan Joint-fir	<i>Gnetum luofuense</i>	m ²	300 (15%)	0 (0%)	1,700 (85%)	2,000	Seedlings
香港安蘭 Purple Bulb Orchid	<i>Ania hongkongensis</i>	No.	4 (80%)	1 (20%)	0 (0%)	5	N/A
Site 2							
小果柿 Small Persimmon	<i>Diospyros vaccinioides</i>	No.	950 (38%)	50 (2%)	1,500 (60%)	2,500	Seedlings + Broadcast Seeding
羅浮買麻藤 Luofushan Joint-fir	<i>Gnetum luofuense</i>	m ²	300 (11%)	0 (0%)	2,500 (89%)	2,800	Seedlings
魚骨木 Butulang Canthium	<i>Canthium dicoccum</i>	No.	1 (20%)	0 (0%)	4 (80%)	5	4 Whip Trees
金毛狗 Lamb of Tartary	<i>Cibotium barometz</i>	No.	0 (0%)	19 (90%)	2 (10%)	21	No suitable habitat for compensatory planting
Site 3							
小果柿 Small Persimmon	<i>Diospyros vaccinioides</i>	No.	3,700 (33%)	100 (1%)	7,300 (66%)	11,100	Seedlings + Broadcast Seeding
羅浮買麻藤 Luofushan Joint-fir	<i>Gnetum luofuense</i>	m ²	750 (28%)	0 (0%)	1,900 (72%)	2,650	Seedlings
魚骨木 Butulang Canthium	<i>Canthium dicoccum</i>	No.	0 (0%)	0 (0%)	4 (100%)	4	4 Whip Trees
金毛狗 Lamb of Tartary	<i>Cibotium barometz</i>	No.	101 (64%)	7 (4%)	50 (32%)	158	No suitable habitat for compensatory planting
土沉香 Incense Tree	<i>Aquilaria sinensis</i>	No.	0 (0%)	1 (100%)	0 (0%)	1	N/A

Table 4-4 Summary of Recommendations (by Project)

Common Name	Species Name	Units	Recommendations				Compensatory Planting in Temporary Works Area
			Retain	Transplant	Fell	Total	
小果柿 Small Persimmon	<i>Diospyros vaccinioides</i>	No.	5,600 (28%)	500 (3%)	13,600 (69%)	19,700	Seedlings (13,600 nos.)
羅浮買麻藤 Luofushan Joint-fir	<i>Gnetum luofuense</i>	m ²	1,350 (18%)	0 (0%)	6,100 (82%)	7,450	Seedlings (17 locations at 50m interval)
香港安蘭 Purple Bulb Orchid	<i>Ania hongkongensis</i>	No.	4 (80%)	1 (20%)	0 (0%)	5	N/A
魚骨木 Butulang Canthium	<i>Canthium dicocum</i>	No.	1 (11%)	0 (0%)	8 (89%)	9	8 Whip Trees
金毛狗 Lamb of Tartary	<i>Cibotium barometz</i>	No.	101 (56%)	26 (15%)	52 (29%)	179	No suitable habitat for compensatory planting
土沉香 Incense Tree	<i>Aquilaria sinensis</i>	No.	0 (0%)	1 (100%)	0 (0%)	1	N/A

Protective Measures

4.17 During construction of the Project, the following guidelines should be followed to protect retained trees and plant species of conservation importance within and in the vicinity of the work area:

- All works should be confined within the site boundary.
- Access of site staff should be controlled to avoid damage to the vegetation in surrounding areas. A protection zone for retained vegetation is shown in **Figures 2a – 2i**.
- Equipment or stockpile should be placed in the existing disturbed / urbanized land within the site boundary of the Project to minimize disturbance to vegetated areas.
- Before the commencement of construction works, the Contractor must be aware of which trees/plants are to be retained and which are to be transplanted.
- Trees/plants which have been proposed to be transplanted should be clearly marked on the layout plan.
- Trees/plants which are to be retained should be clearly marked on site prior to the commencement of site construction works, preferably by printed numbers consistent with the Tree Survey Report and Detailed Vegetation Survey Report for the Project. Trees/plants to be retained will also be marked with surveyor's flagging or ribbon.
- As a general rule the majority of a tree's roots lies within an area just greater than the spread of its crown and are at a depth of approximately 600mm. This may be less on heavy soils and greater on drier soils. Therefore, the following precautions

should be undertaken in order to prevent damage to the trunks, roots and crowns of trees during constructions.

- A tree protection zone should be set below the drip line of the tree crown for trees near the edge of the works area. A typical design of the tree protection zone for individual trees/tree groups is shown in **Appendix F**. For plant species of conservation importance to be preserved (inclusive of trees, shrubs and herbs), the protection zone should be set 1m from the dripline of the plant. Robust, bright-coloured fencing of 1.5m in height should be erected to remind workers not to trespass before site clearance.
- Heavy equipment, supplies, ditches and underground utility lines should be placed outside the protection zone.
- Care should be taken to prevent trees/plants being damaged by mechanical equipment both during site clearance works and construction works.
- No fixings should be driven into trees/plants.
- No workshop, canteens, or similar should be installed beneath trees/plants, nor will equipment maintenance etc. be carried out under trees/plants.
- No excavation, including that for services or changes in ground level will take place within the spread of the crown of the trees/plants.
- No change of ground level around preserved trees/plants is permitted.
- No soil, debris or construction materials should be deposited around and against the trunk of a tree/plant as this causes bark damage and compaction of the soil.
- No fire should be lit below the branches and no petrol, oil or caustic substances stored near the trees/plants.
- No trees/plants should be used for anchoring or winching purposes or for the display of signs.
- Regular inspection should be conducted to ensure the integrity of the protection zone and the plant condition.

4.18 If trees are wounded or stressed during construction, they are more susceptible to insect and disease attack. Any wounds to the bark should be cleaned to sound wood by removing loose bark and wood, leaving a smooth edge around the wound. No application of a wound dressing is necessary.

Review of Residual Ecological Impacts

4.19 Although plant species of conservation importance will be affected by the project, mitigation measures have been proposed to minimize the impact based on the hierarchy in EIAO-TM Annex 16:

- Avoidance, by reducing works area to minimum
(The survey area was designed to cover all potential works area. The extent of works area was reviewed and reduced to blue-hatched area shown in **Figures 1b-1e** based on the actual site condition with an aim to avoid the impact on the flora species as far as possible. For *Diospyros vaccinoides* and *Gnetum luofuense*, the affected population is reduced from 19,700nos. to 14,100nos. and 7,450m² to 6,100m² respectively. Also, one individual of *Canthium dicoccum*, about 101 nos. of *Cibotium barometz*, four individuals of *Ania hongkongensis* will be preserved.)
- Minimization, by transplanting individuals of high survival rate
(one *Aquilaria sinensis*, one of *Ania hongkongensis*, 26 nos. of *Cibotium barometz* and 500 nos. of *Diospyros vaccinioides*)

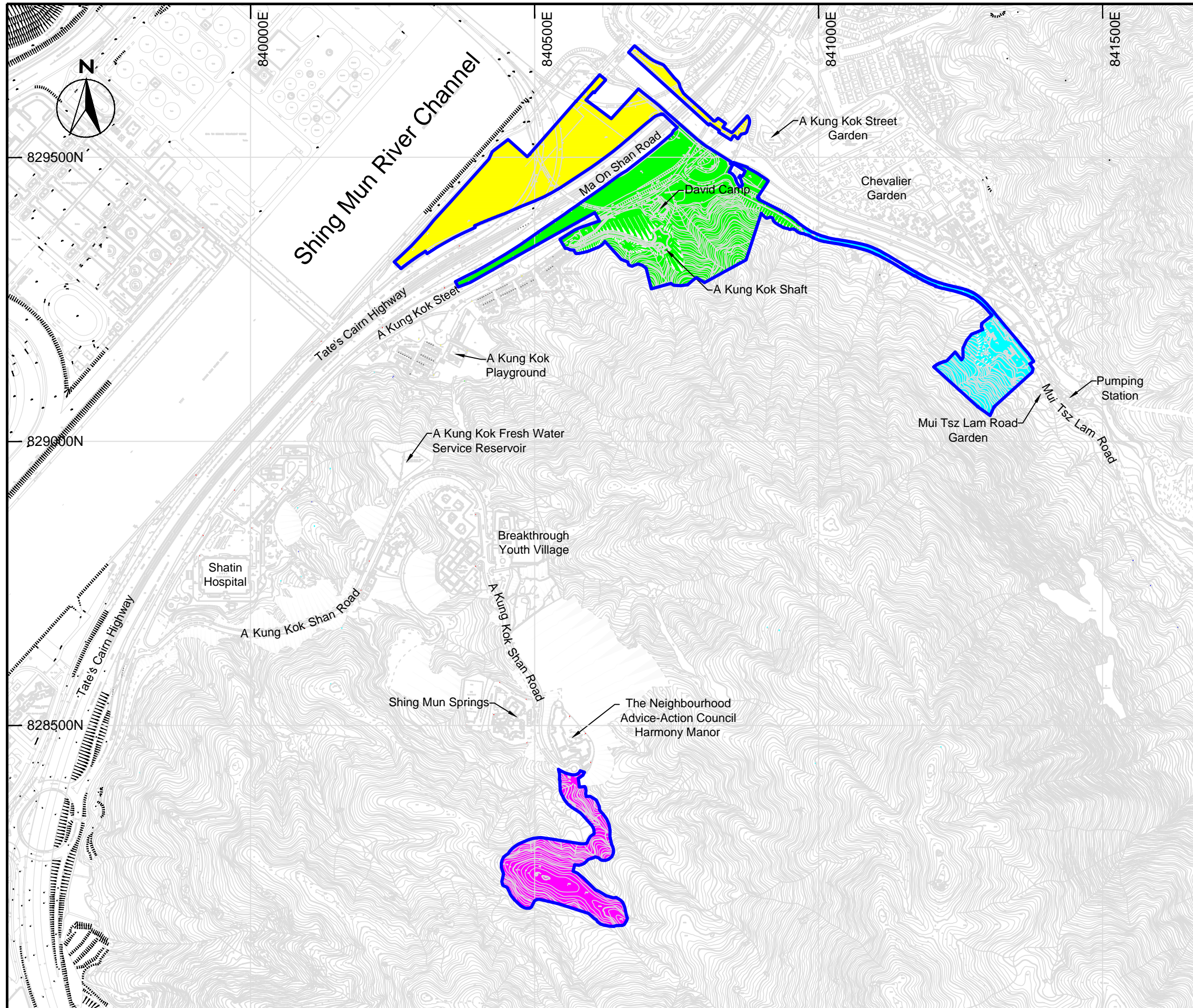
- Compensation, by planting of 8 whip trees for *Canthium diocum*, 13,600 seedlings of *Diospyros vaccinoides* and 17 seedlings of *Gnetum luofuense*

4.20 These measures will minimize the loss of plant species of conservation importance. Together with the fact that all species identified are common in Hong Kong, no adverse residual ecological impacts are expected from the Project with the proper implementation of mitigation measures.

5 CONCLUSION

- 5.1 Six plant species of conservation importance were recorded within the project boundary. According to Section 8.8.2.4 of the EIA Report, direct impact on species of conservation importance should be avoided. Identified individuals should be labelled and fenced off on site for preservation. In case of unavoidable loss, mitigation measures such as transplantation should be implemented to minimise impact.
- 5.2 The works area has been refined to minimize vegetation clearance coverage and to avoid species of conservation importance as far as possible. Plants outside the works area shall be preserved and protected on-site, which include one individual of *Canthium dicoccum* (D0004), about 101 nos. of *Cibotium barometz* (E0006 (1 no.) and E0007 (100 nos.)), four individuals of *Ania hongkongensis* (H0001), about 5,600 nos. of *Diospyros vaccinioides* and about 1,350m² of *Gnetum luofuense*.
- 5.3 Plants that are prone to removal due to vegetation clearance will be transplanted as far as possible, which include one *Aquilaria sinensis* (C0001), one of *Ania hongkongensis* (H0002), 26 nos. of *Cibotium barometz* (E0001a (16 nos.), E0002 (1 no.), E0003 (2 nos.) and E0004 (7 nos.)) and 500 nos. of *Diospyros vaccinioides*. The exact numbers to be transplanted are subject to the actual site conditions.
- 5.4 Compensatory planting is proposed to minimize the loss of *Diospyros vaccinioides* (seedling planting and broadcast seeding), *Gnetum luofuense* (seedling planting) and *Canthium dicoccum* (whip tree planting). As there is no suitable habitat for *Cibotium barometz* within project boundary, compensatory planting for this common species is not considered.
- 5.5 The above measures will minimize the loss of plant species of conservation importance. Together with the fact that all species identified are common in Hong Kong, no adverse residual ecological impacts are expected from the Project with the proper implementation of mitigation measures which concurs with the findings and recommendations from the approved EIA for the Project.

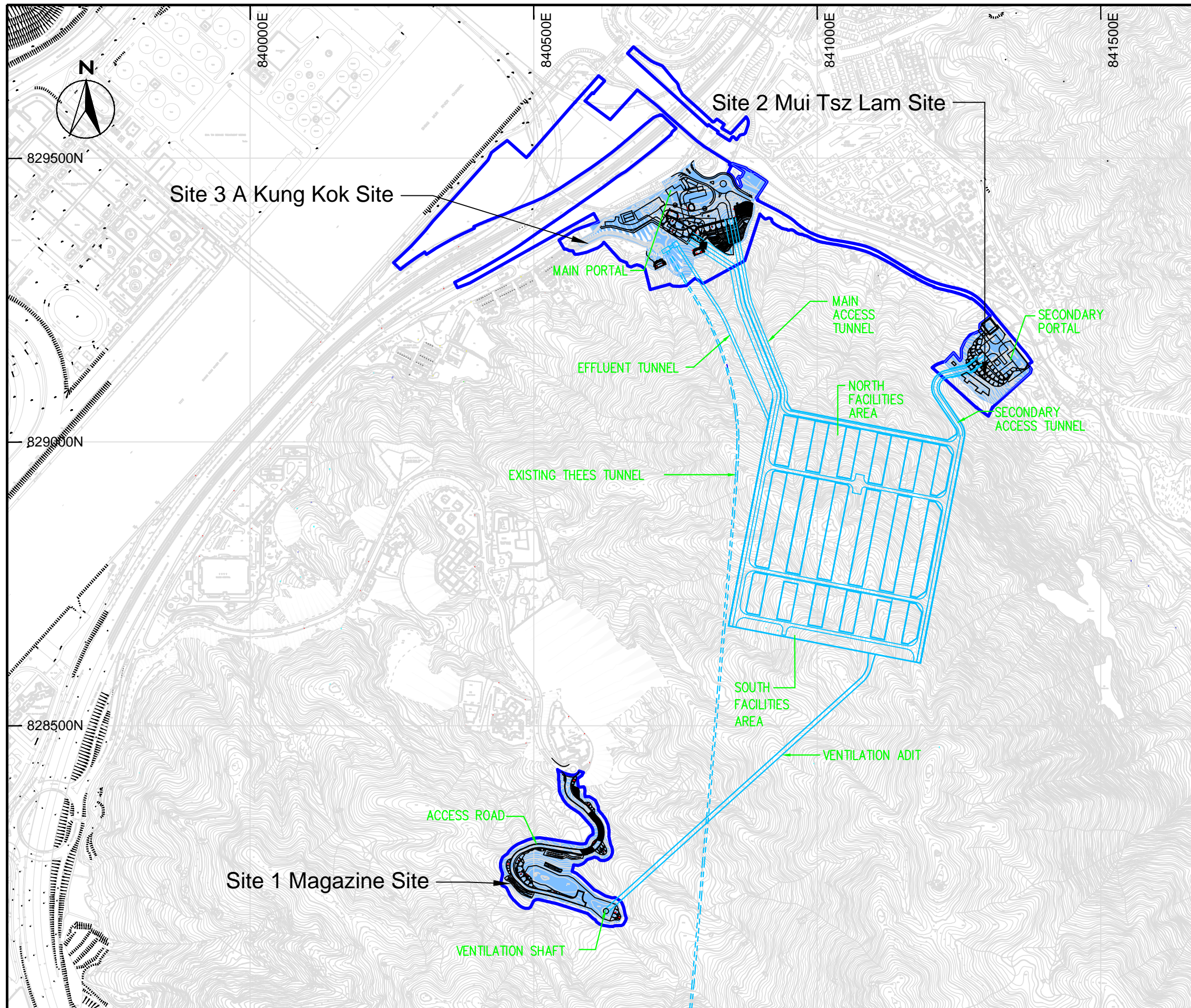
FIGURES



Legend

- Project Boundary
- Site 1 (Magazine Site)
- Site 2 (Mui Tsz Lam Site)
- Site 3 (A Kung Kok Site)
- Site 4 (Vehicle Detention Centre)

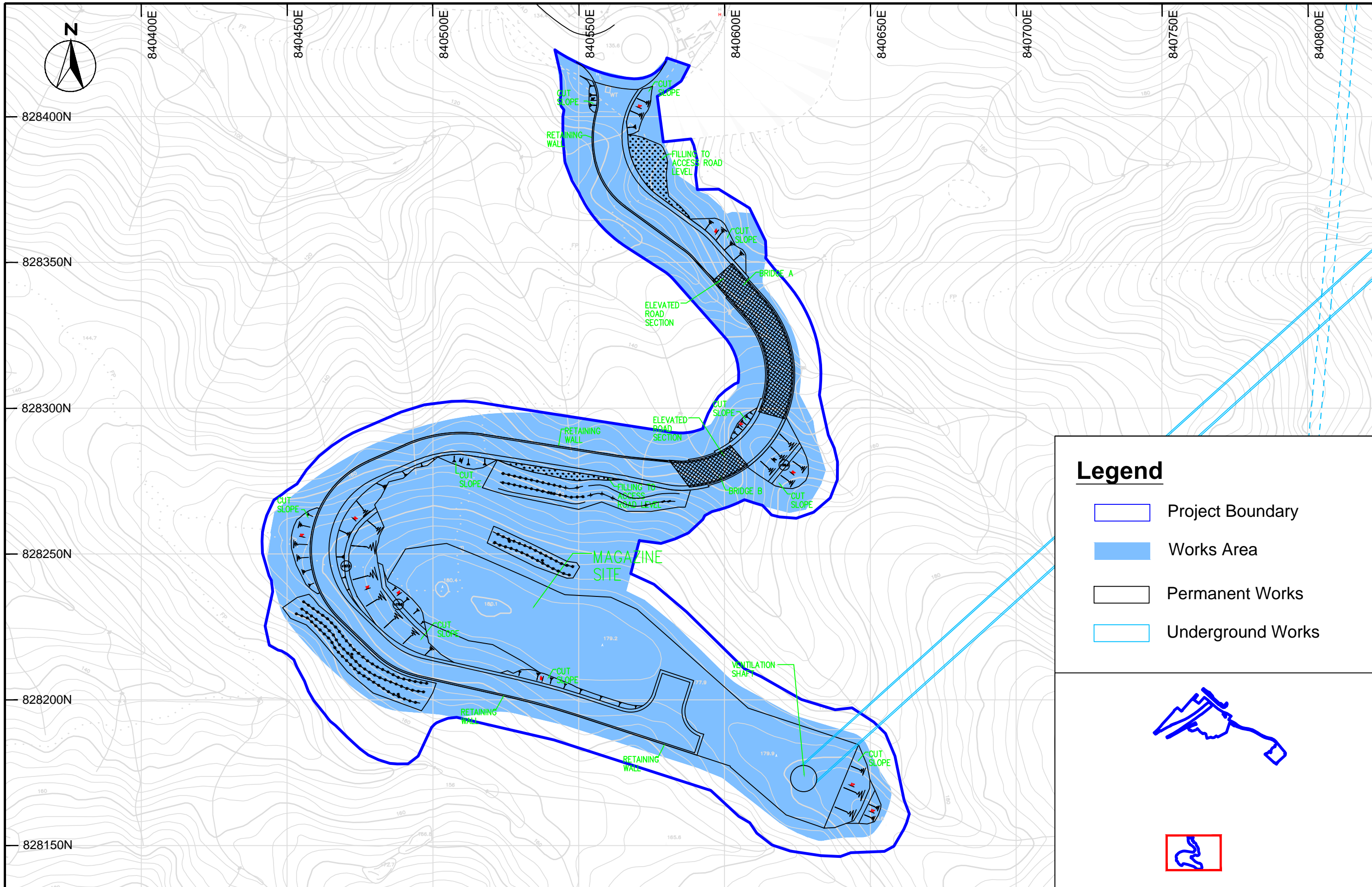
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CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	1a
		REV	1



Legend

- Project Boundary
- Works Area
- Aboveground Works
- Underground Works

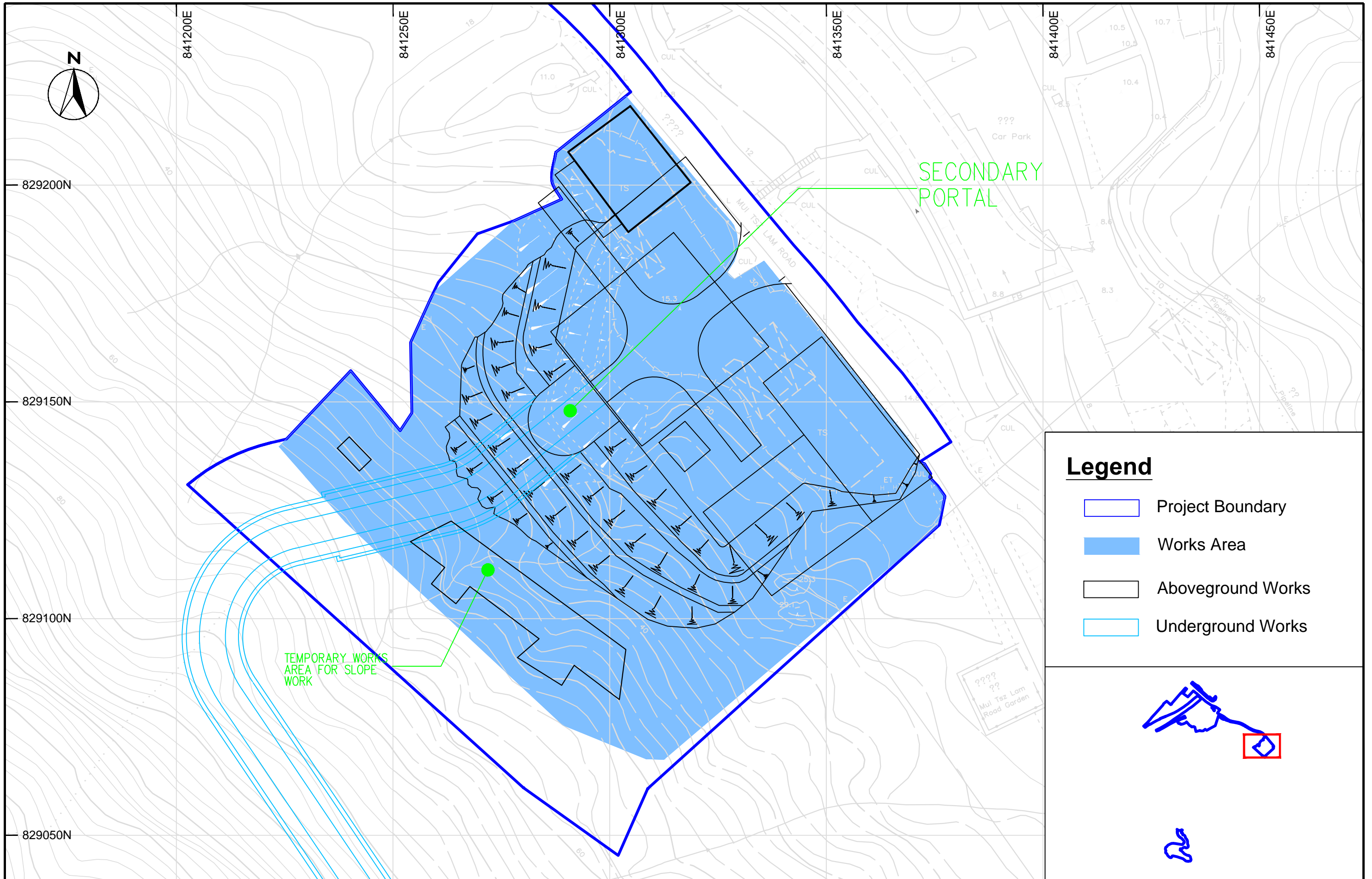
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JOB No.	IA18064	FIGURE No.	1b
		REV	1



Legend

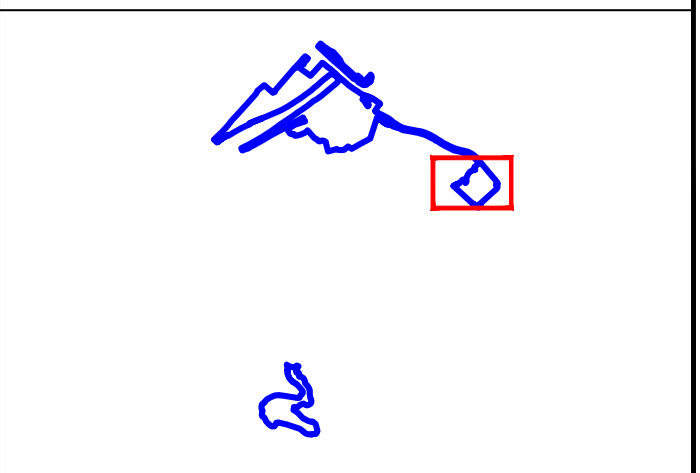
- Project Boundary
- Works Area
- Permanent Works
- Underground Works

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JOB No.	IA18064	FIGURE No.	1c
		REV	1

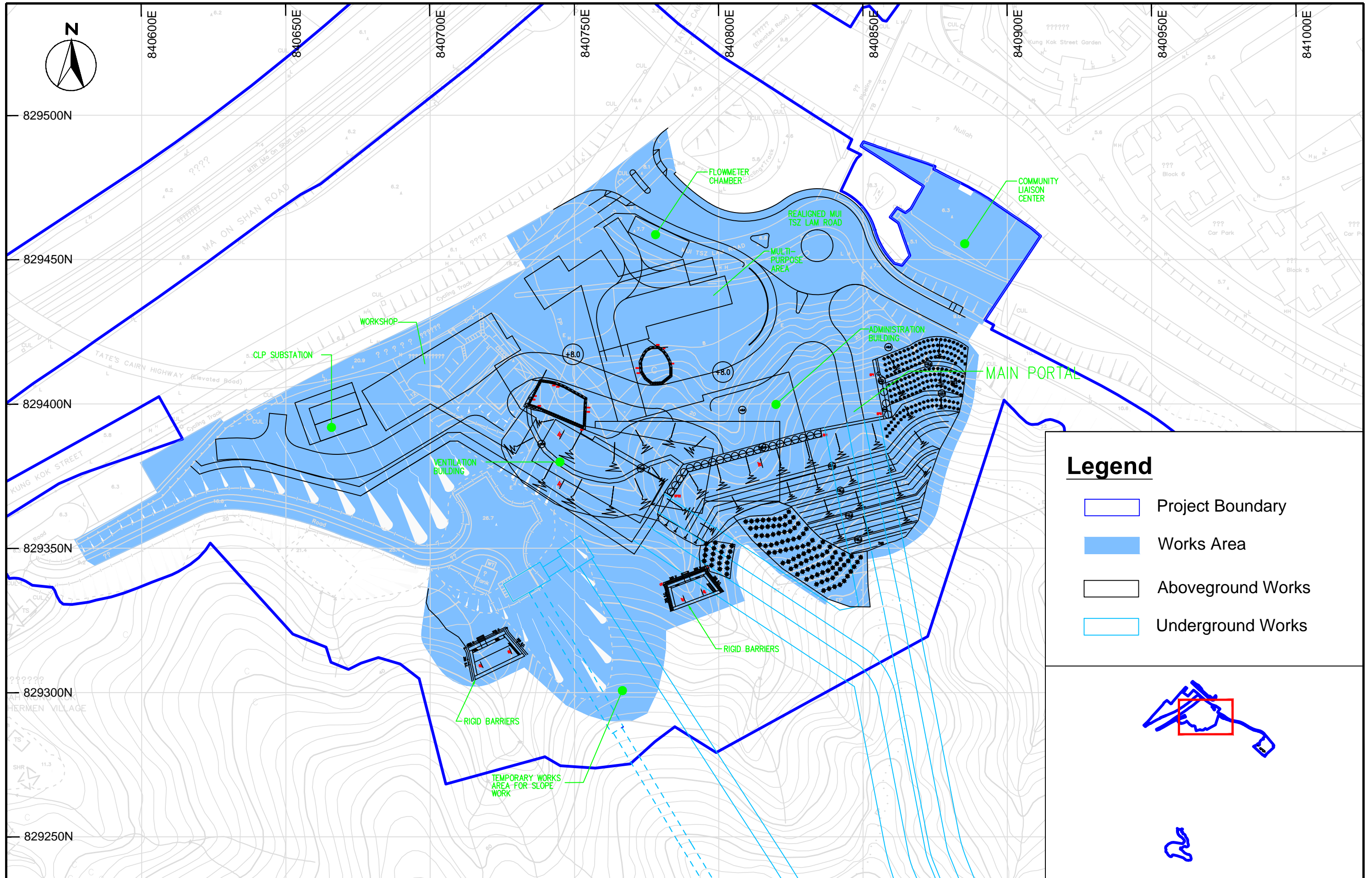


Legend

- Project Boundary
- Works Area
- Aboveground Works
- Underground Works

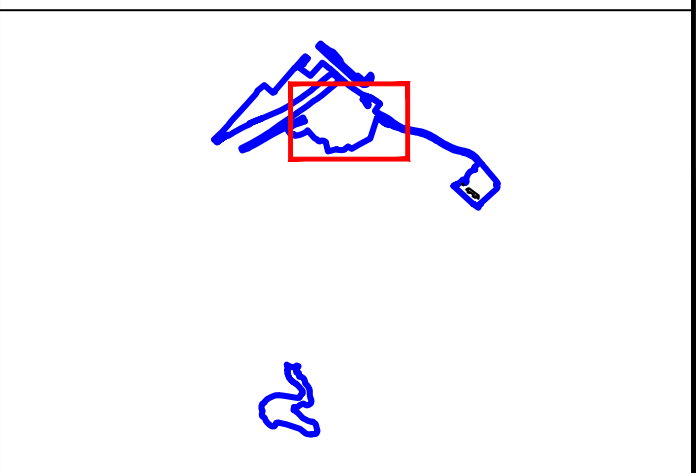


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		REV	1

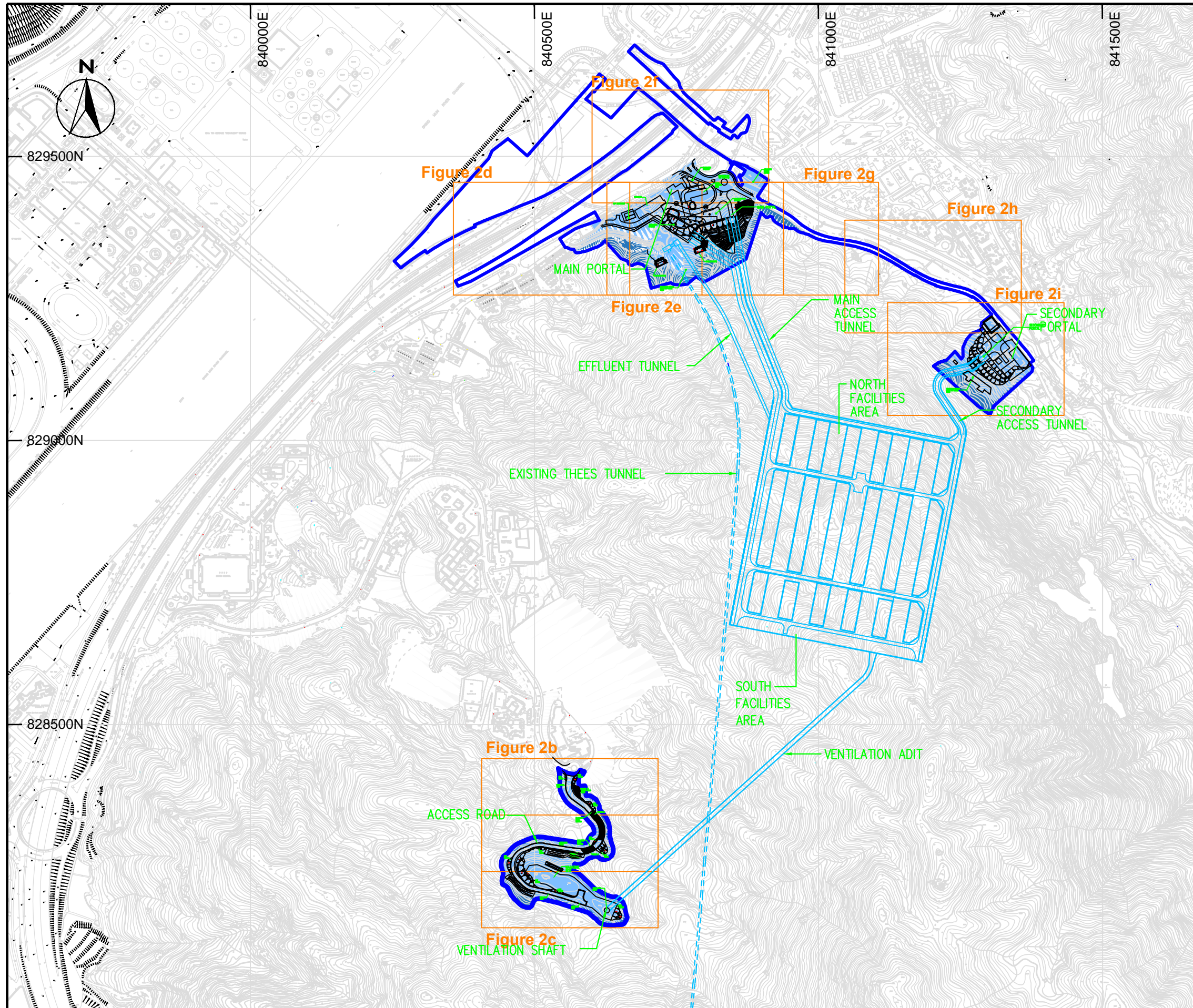


Legend

- Project Boundary
- Works Area
- Aboveground Works
- Underground Works



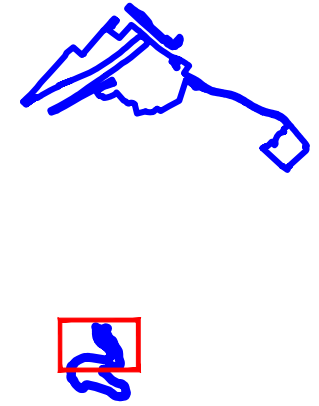
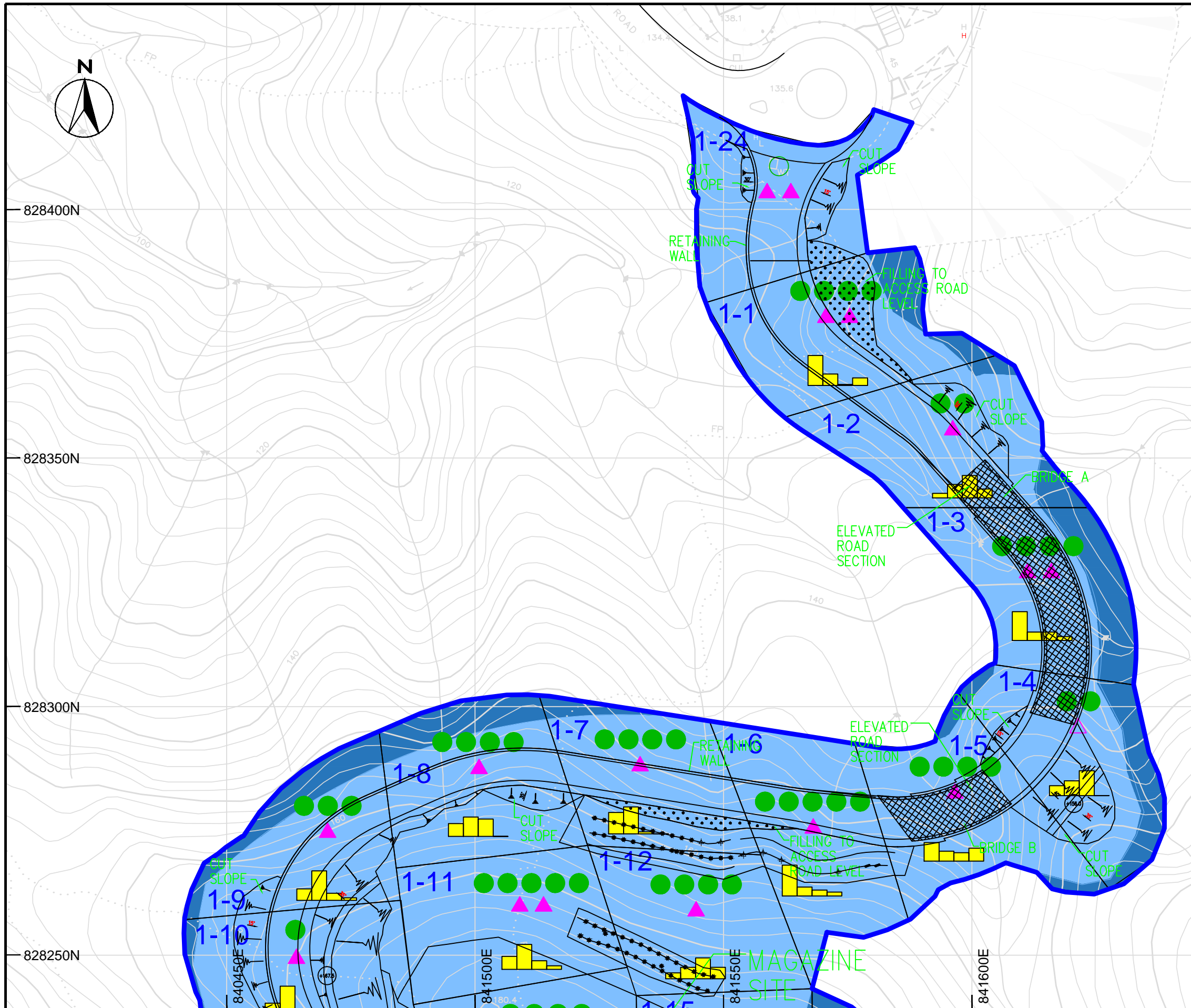
SCALE	1:1200 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	1e
		REV	1



Legend

- Project Boundary
- Works Area
- Protection zone for vegetation to be retained

SCALE	1:7000 @ A3	DATE	JUL 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	2a
		REV	-



Legend

	Project boundary		Recommendations of Plant Species of Conservation Importance Observed:
	Survey Grid		Retain
	Works Area		Transplant
C	Incense Tree (<i>Aquilaria sinensis</i>)		Fell
D	Butulang Canthium (<i>Canthium dicoccum</i>)		Protection zone for vegetation to be retained
E	Lamb of Tartary (<i>Cibotium barometz</i>)		
H	Hong Kong Ania (<i>Ania hongkongensis</i>)		

Quantity of *Diospyros vaccinioides*

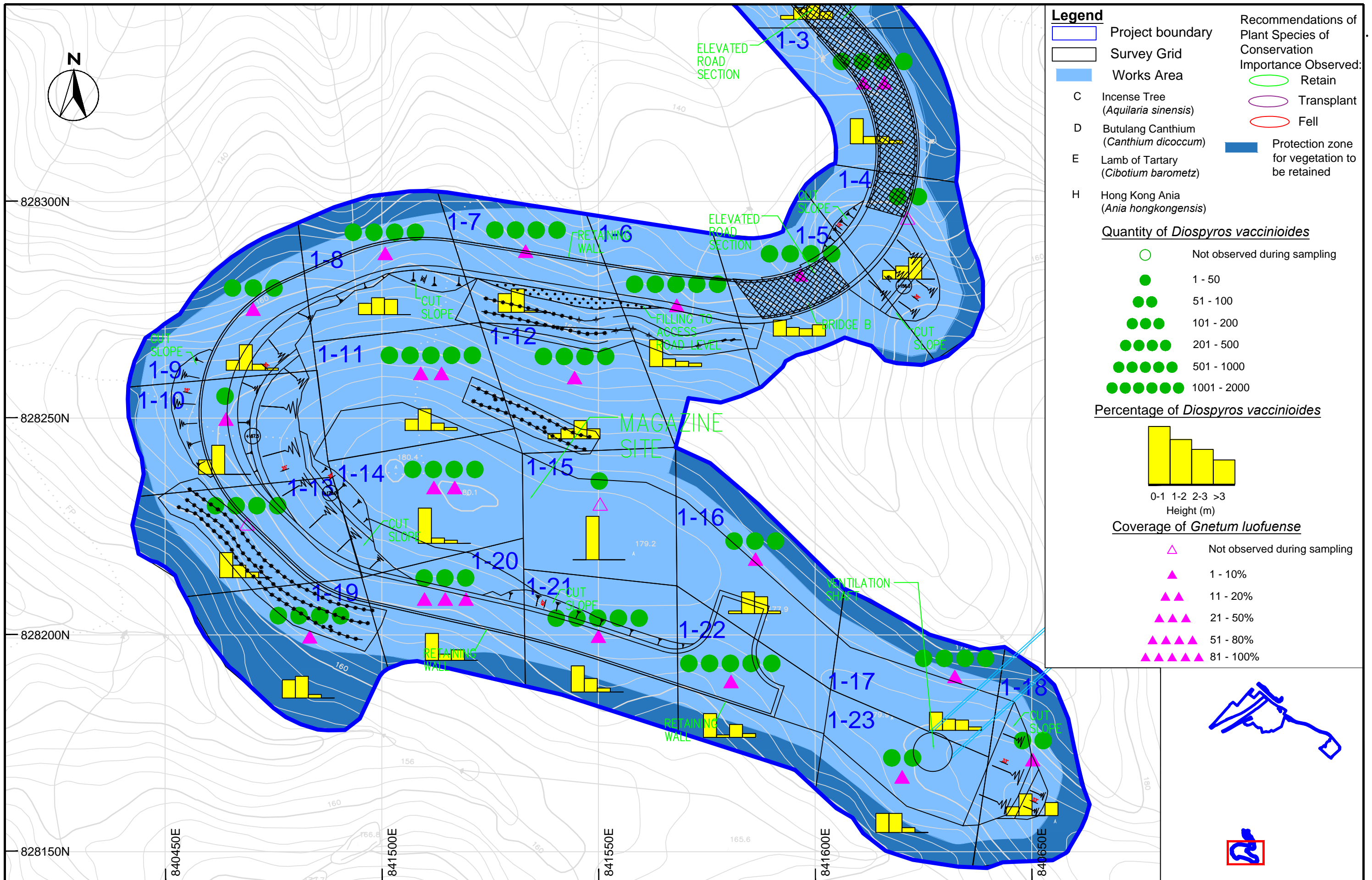
	Not observed during sampling
	1 - 50
	51 - 100
	101 - 200
	201 - 500
	501 - 1000
	1001 - 2000

Percentage of *Diospyros vaccinioides*

	0-1 1-2 2-3 >3
	Height (m)

Coverage of *Gnetum luofuense*

	Not observed during sampling
	1 - 10%
	11 - 20%
	21 - 50%
	51 - 80%
	81 - 100%



Legend

- Project boundary
- Survey Grid
- Works Area

Recommendations of Plant Species of Conservation Importance Observed:

- Retain
- Transplant
- Fell
- Protection zone for vegetation to be retained

C Incense Tree (*Aquilaria sinensis*)
D Butulang Canthium (*Canthium dicoccum*)
E Lamb of Tartary (*Cibotium barometz*)
H Hong Kong Ania (*Ania hongkongensis*)

Quantity of *Diospyros vaccinioides*

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

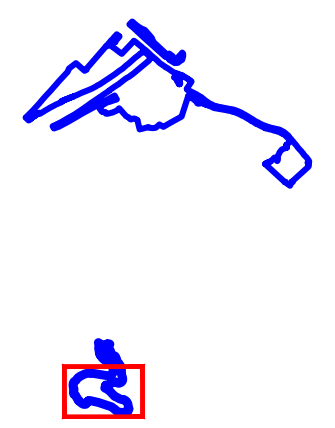
Percentage of *Diospyros vaccinioides*

- 0-1
- 1-2
- 2-3
- >3

Height (m)

Coverage of *Gnetum luofuense*

- Not observed during sampling
- 1 - 10%
- 11 - 20%
- 21 - 50%
- 51 - 80%
- 81 - 100%



SCALE	1:800 @ A3	DATE	JUL 2019	
CHECK	BC	DRAWN	EC	
JOB No.	IA18064	FIGURE No.	2c	REV 1

Legend

- Project boundary
- Survey Grid
- Works Area
- Protection Zone for Vegetation

Recommendations of Plant Species of Conservation Importance Observed:

- Retain
- Transplant
- Fell

Quantity of *Diospyros vaccinioides*

○	Not observed during sampling
●	1 - 50
●●	51 - 100
●●●	101 - 200
●●●●	201 - 500
●●●●●	501 - 1000
●●●●●●	1001 - 2000

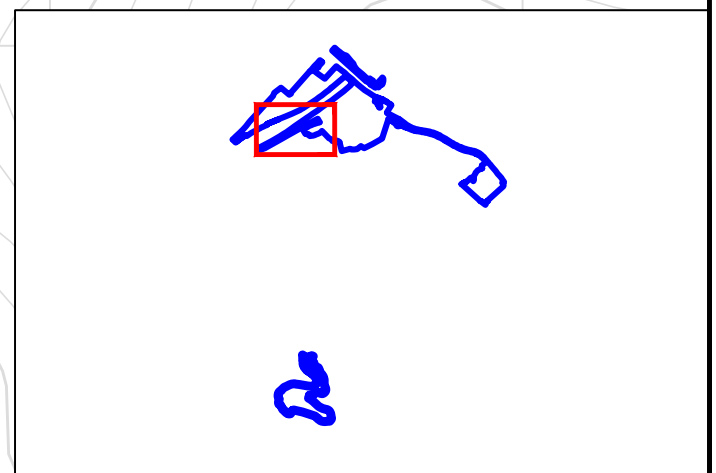
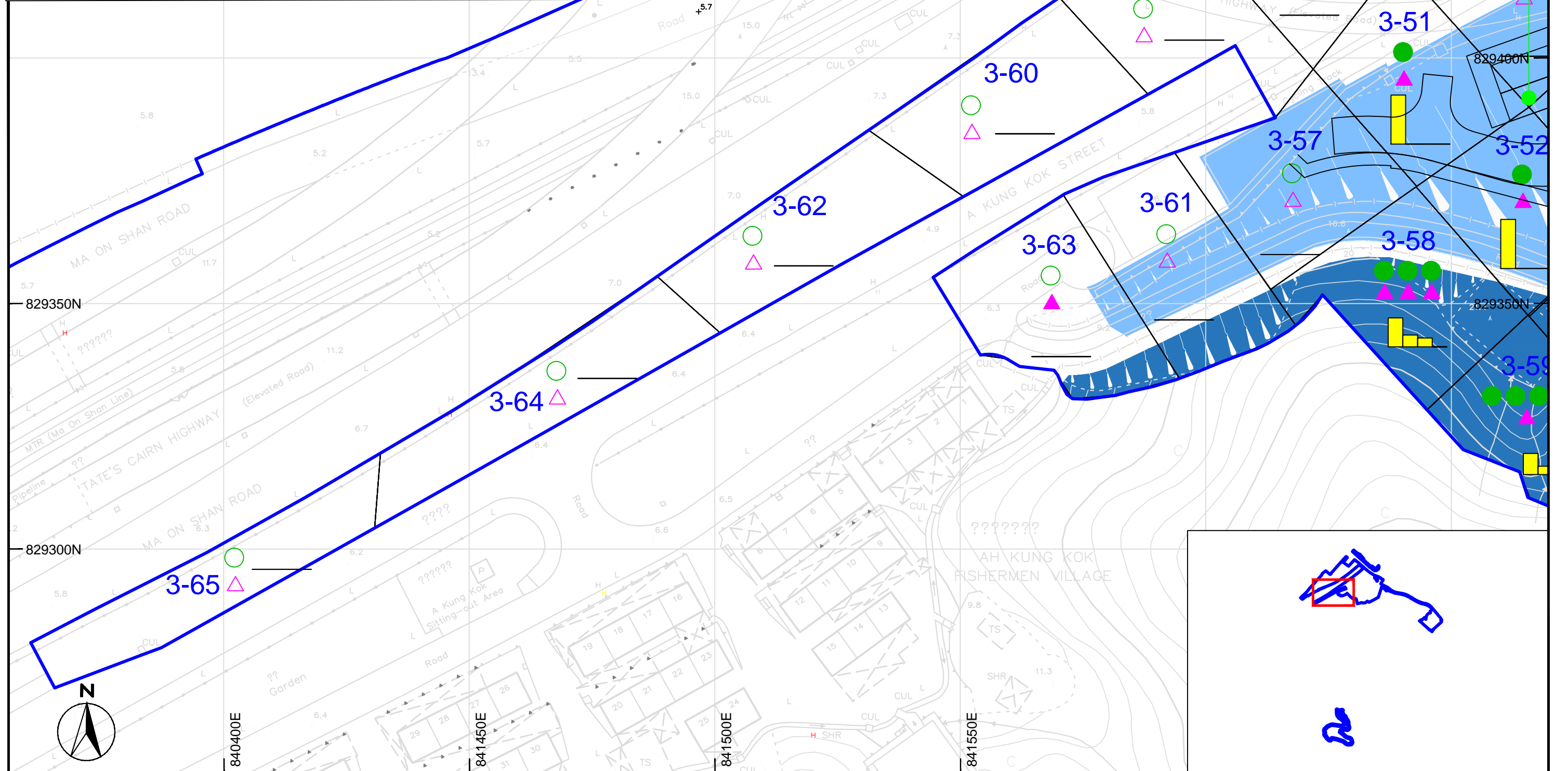
Coverage of *Gnetum luofuense*

△	Not observed during sampling
▲	1 - 10%
▲▲	11 - 20%
▲▲▲	21 - 50%
▲▲▲▲	51 - 80%
▲▲▲▲▲	81 - 100%

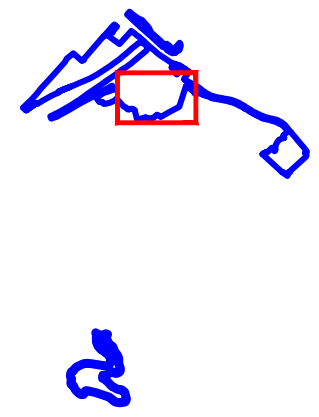
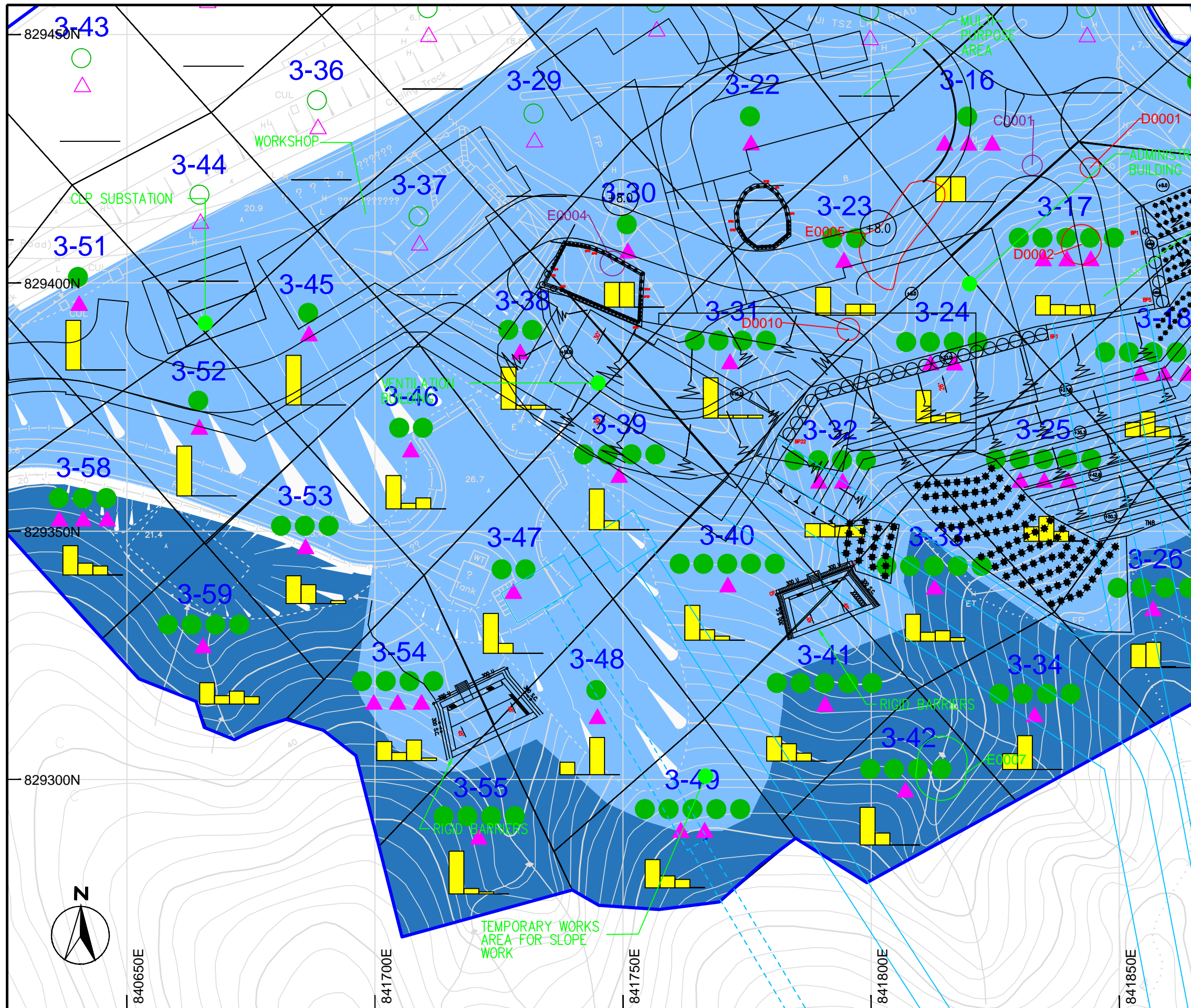
Percentage of *Diospyros vaccinioides*

Bar 1	0-1
Bar 2	1-2
Bar 3	2-3
Bar 4	>3

Height (m)



SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	2d
		REV	1



Legend

- Project boundary
 - Survey Grid
 - Works Area
 - Recommendations of Plant Species of Conservation Importance Observed:**
 - Retain
 - Transplant
 - Fell
 - Protection Zone for Vegetation
- Species:**
- C Incense Tree (*Aquilaria sinensis*)
 - D Butulang Canthium (*Canthium dicoccum*)
 - E Lamb of Tartary (*Cibotium barometz*)
 - H Hong Kong Ania (*Ania hongkongensis*)

Quantity of *Diospyros vaccinioides*

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

Percentage of *Diospyros vaccinioides*

- 0-1 1-2 2-3 >3
- Height (m)

Coverage of *Gnetum luofuense*

- Not observed during sampling
- 1 - 10%
- 11 - 20%
- 21 - 50%
- 51 - 80%
- 81 - 100%



Legend

- Project boundary
- Survey Grid
- Works Area

- C Incense Tree (*Aquilaria sinensis*)
- D Butulang Canthium (*Canthium dicoccum*)
- E Lamb of Tartary (*Cibotium barometz*)
- H Hong Kong Ania (*Ania hongkongensis*)

Recommendations of Plant Species of Conservation Importance Observed:

- Retain
- Transplant
- Fell

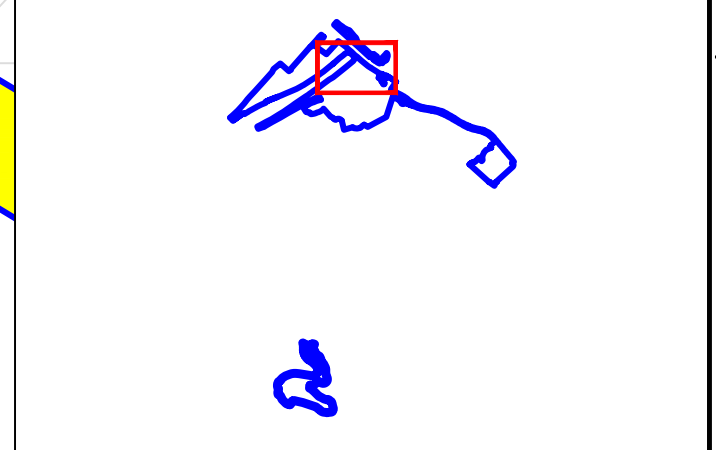
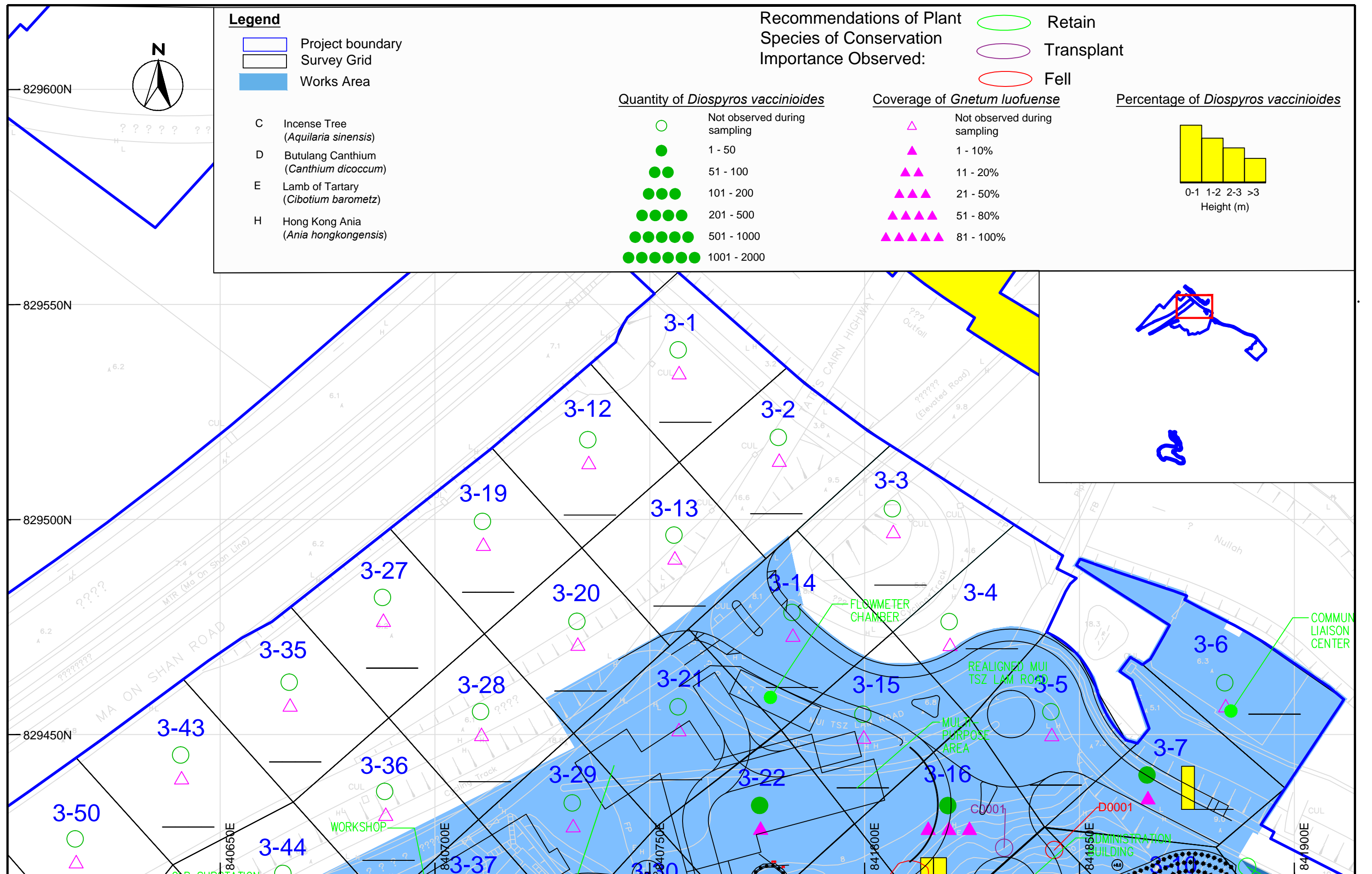
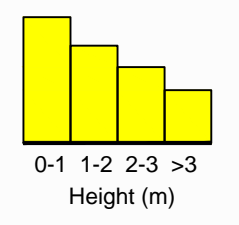
Quantity of *Diospyros vaccinioides*

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

Coverage of *Gnetum luofuense*

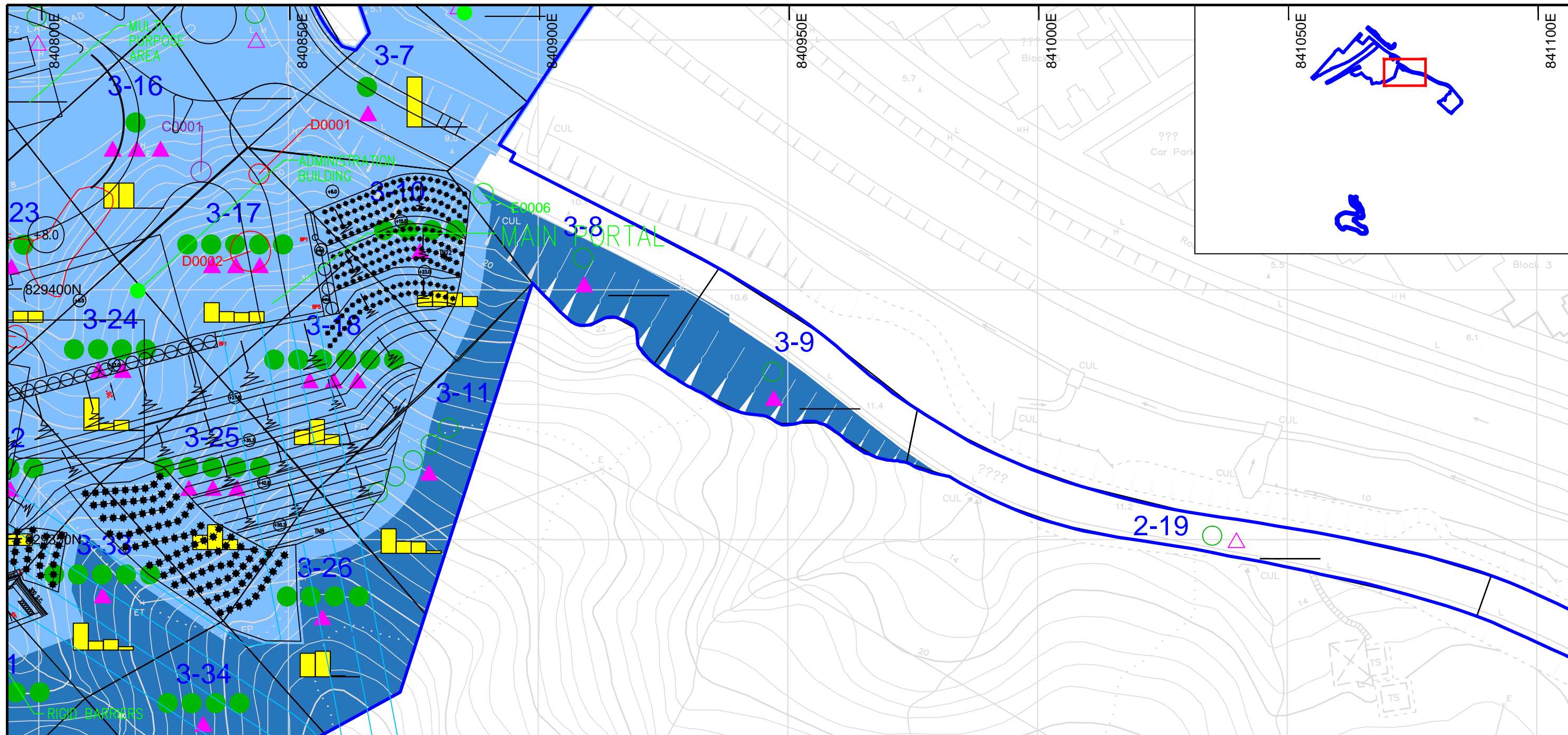
- Not observed during sampling
- 1 - 10%
- 11 - 20%
- 21 - 50%
- 51 - 80%
- 81 - 100%

Percentage of *Diospyros vaccinioides*



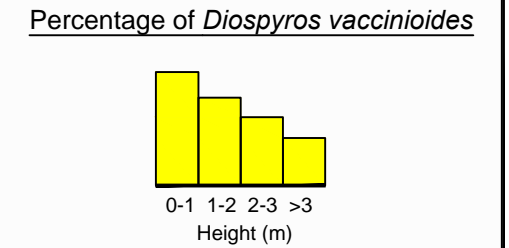
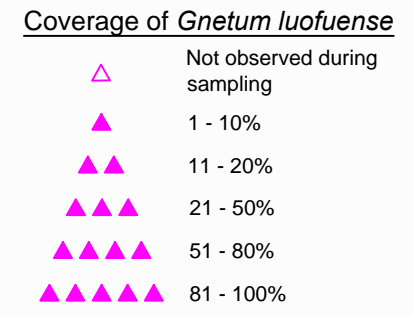
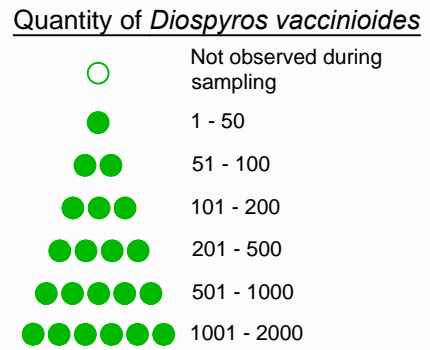
Contract No. SPW 09/2018
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works
Location of species of conservation importance (Site 3 A Kung Kok Site)

SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	2f
		REV	1

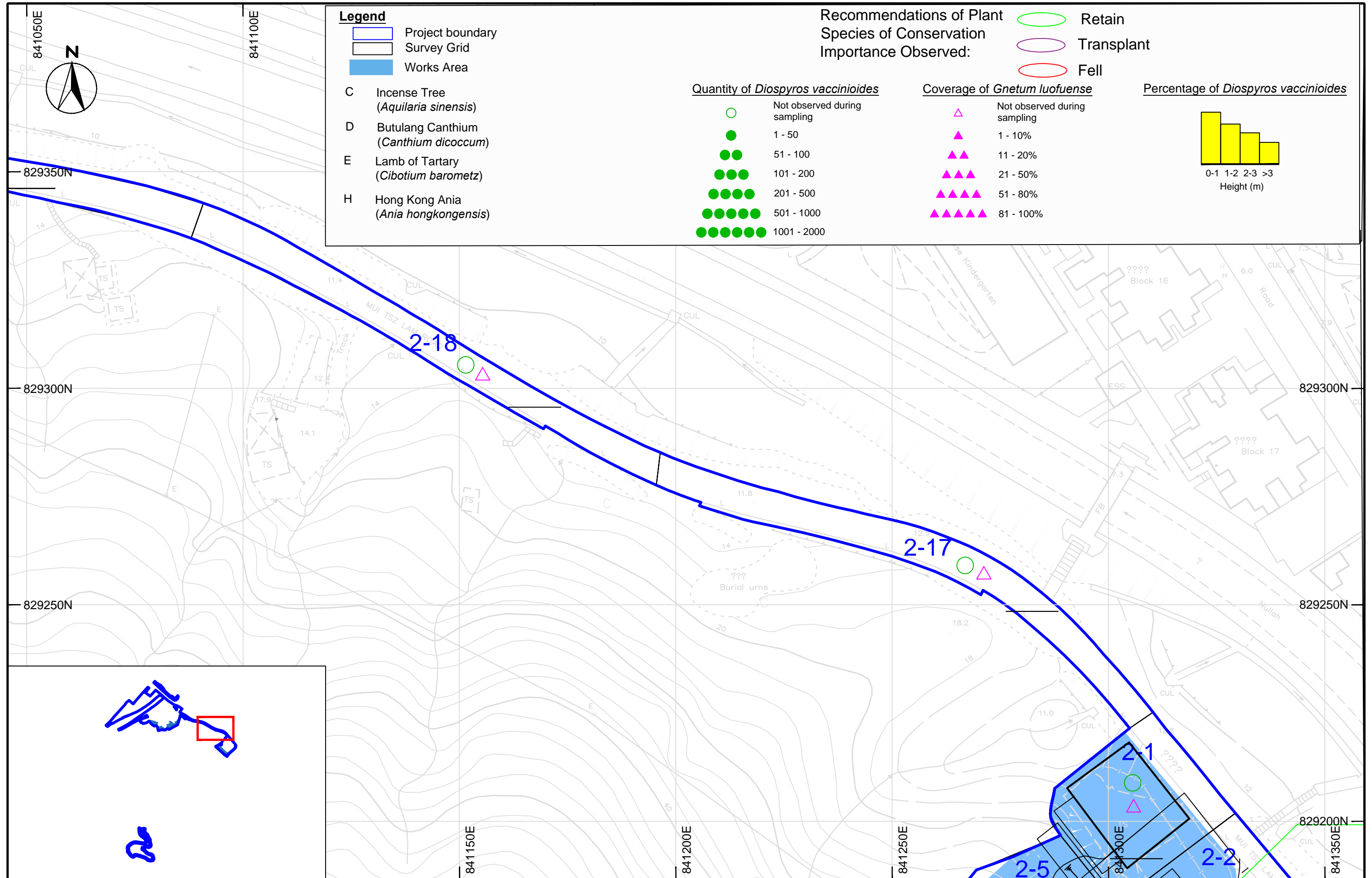


- Legend**
- Project boundary
 - Survey Grid
 - Works Area
 - Protection Zone for Vegetation
 - C** Incense Tree (*Aquilaria sinensis*)
 - D** Butulang Canthium (*Canthium dicoccum*)
 - E** Lamb of Tartary (*Cibotium barometz*)
 - H** Hong Kong Ania (*Ania hongkongensis*)

- Recommendations of Plant Species of Conservation Importance Observed:**
- Retain
 - Transplant
 - Fell



SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	2g
		REV	1



Legend

- Project boundary
- Survey Grid
- Works Area

- C Incense Tree (*Aquilaria sinensis*)
- D Butulang Canthium (*Canthium dicoccum*)
- E Lamb of Tartary (*Cibotium barometz*)
- H Hong Kong Ania (*Ania hongkongensis*)

Recommendations of Plant Species of Conservation Importance Observed:

- Retain
- Transplant
- Fell

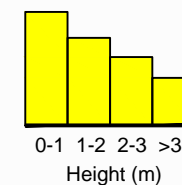
Quantity of *Diospyros vaccinioides*

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

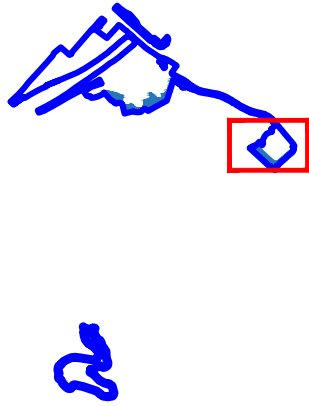
Coverage of *Gnetum luofuense*

- Not observed during sampling
- 1 - 10%
- 11 - 20%
- 21 - 50%
- 51 - 80%
- 81 - 100%

Percentage of *Diospyros vaccinioides*

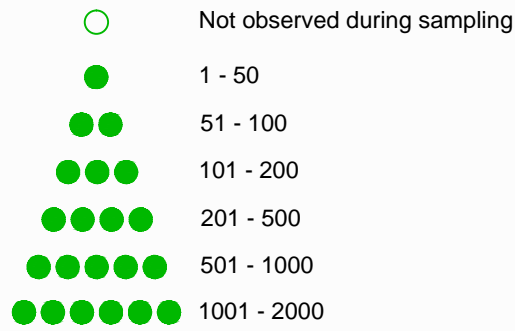


SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	2h
		REV	1

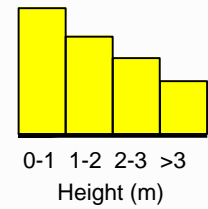


- Legend**
- Project boundary
 - Survey Grid
 - Works Area
- Recommendations of Plant Species of Conservation Importance Observed:
- Retain
 - Transplant
 - Fell
- Protection Zone for Vegetation
- C Incense Tree (*Aquilaria sinensis*)
 - D Butulang Canthium (*Canthium dicoccum*)
 - E Lamb of Tartary (*Cibotium barometz*)
 - H Hong Kong Ania (*Ania hongkongensis*)

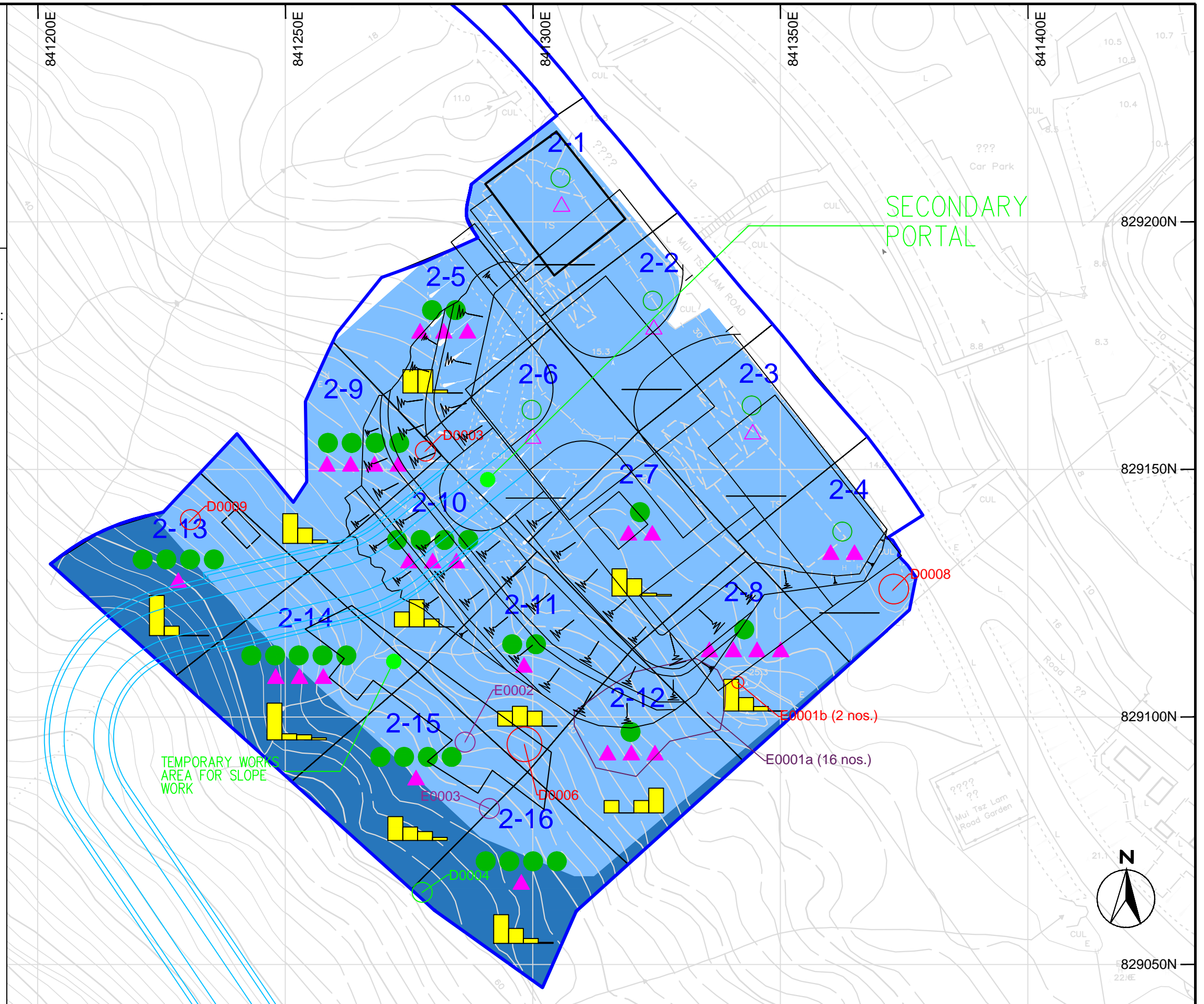
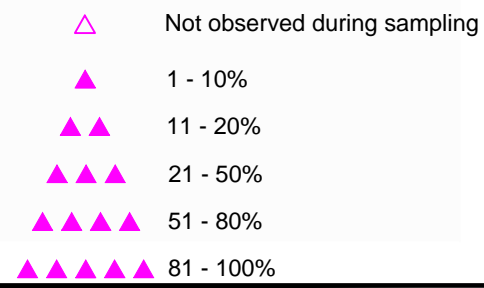
Quantity of *Diospyros vaccinioides*



Percentage of *Diospyros vaccinioides*

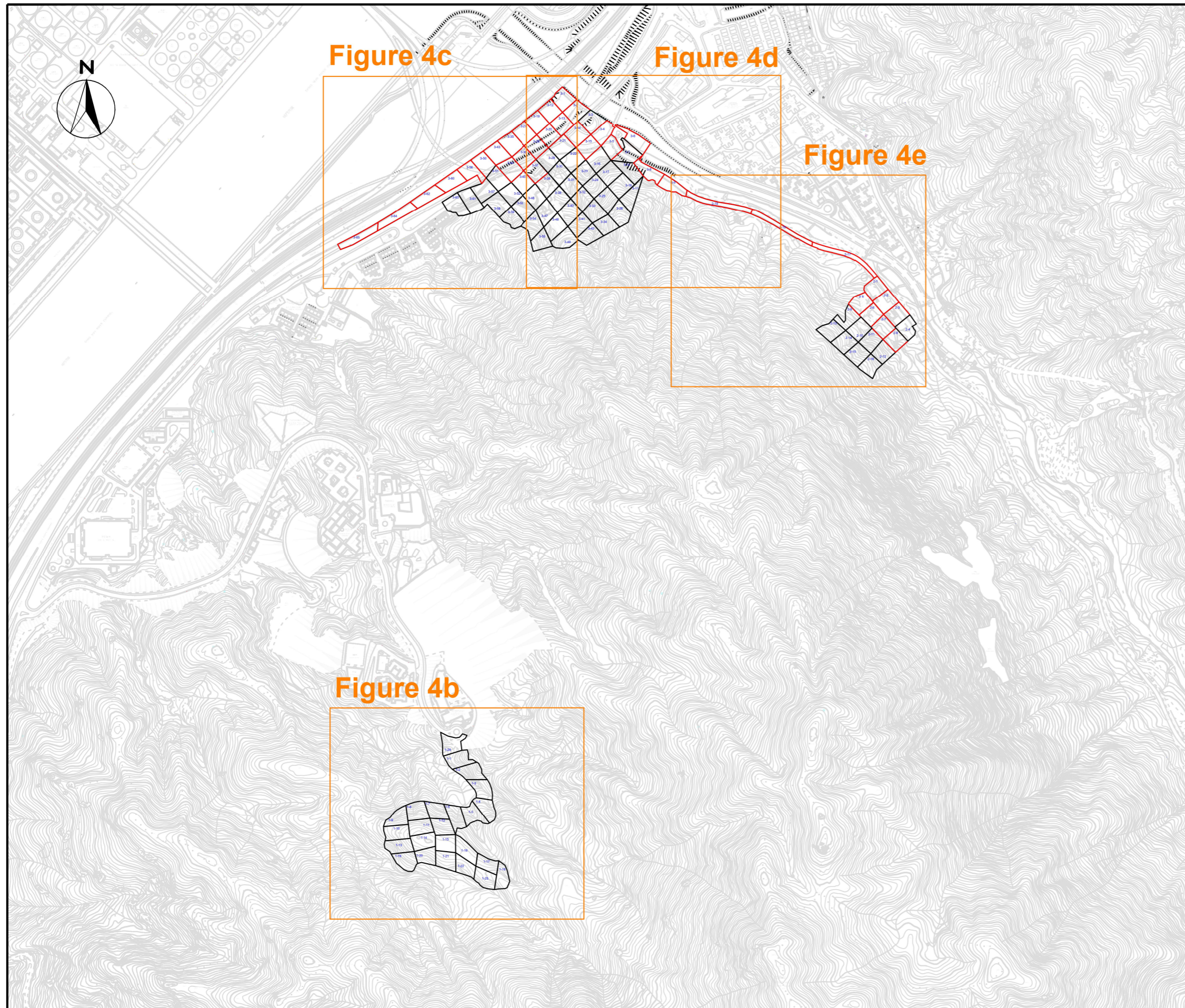


Coverage of *Gnetum luofuense*



Contract No. SPW 09/2018
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works
Location of Species of Conservation Importance (Site 2 Mui Tsz Lam Site)

SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	2i
		REV	1

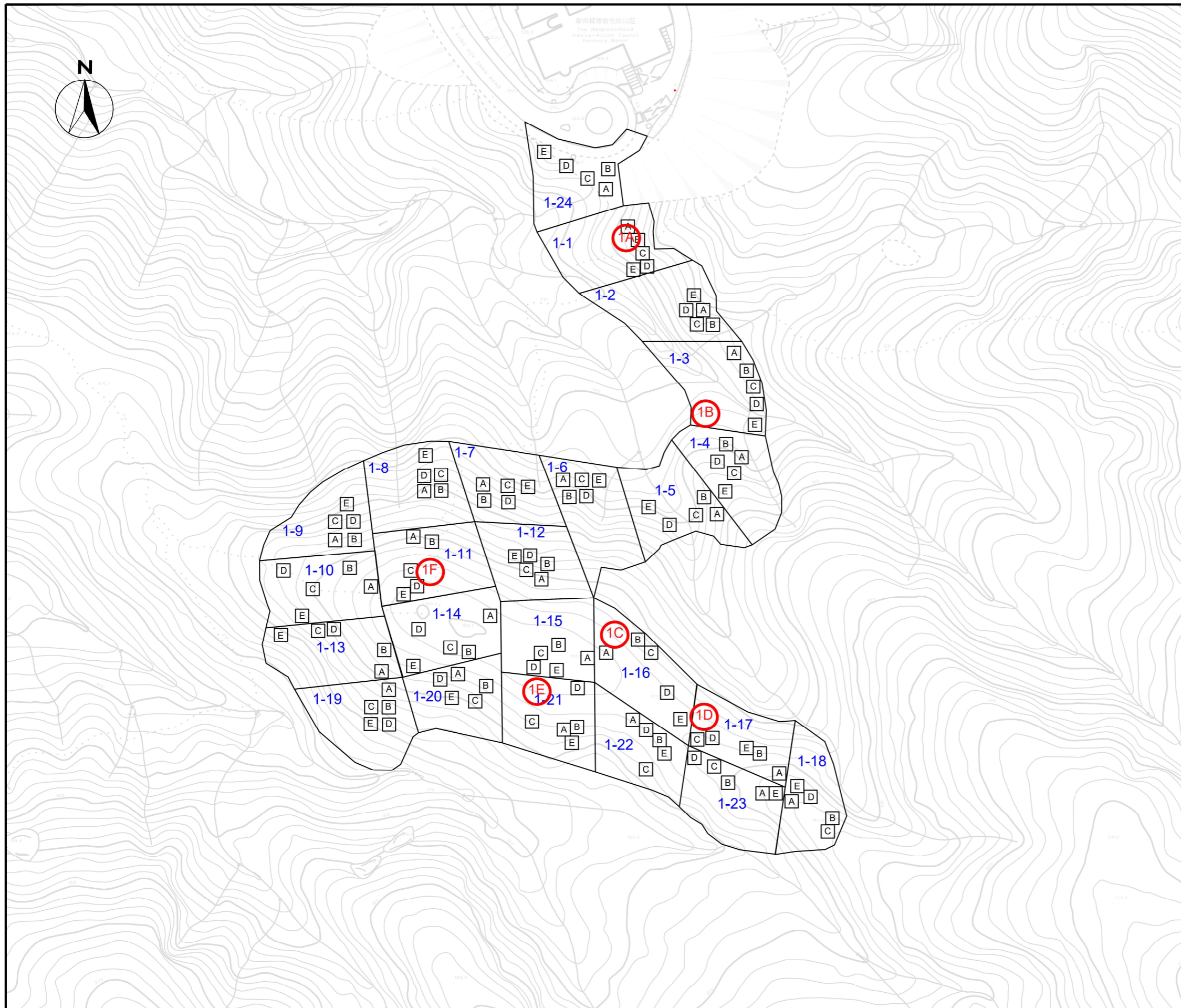


Legend

- Walkthrough Survey
- Sampling Survey

* Active searching was adopted in all sites for species other than Small Persimmon and Luofoshan Joint-fir

SCALE	1:7000 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	3a
		REV	1

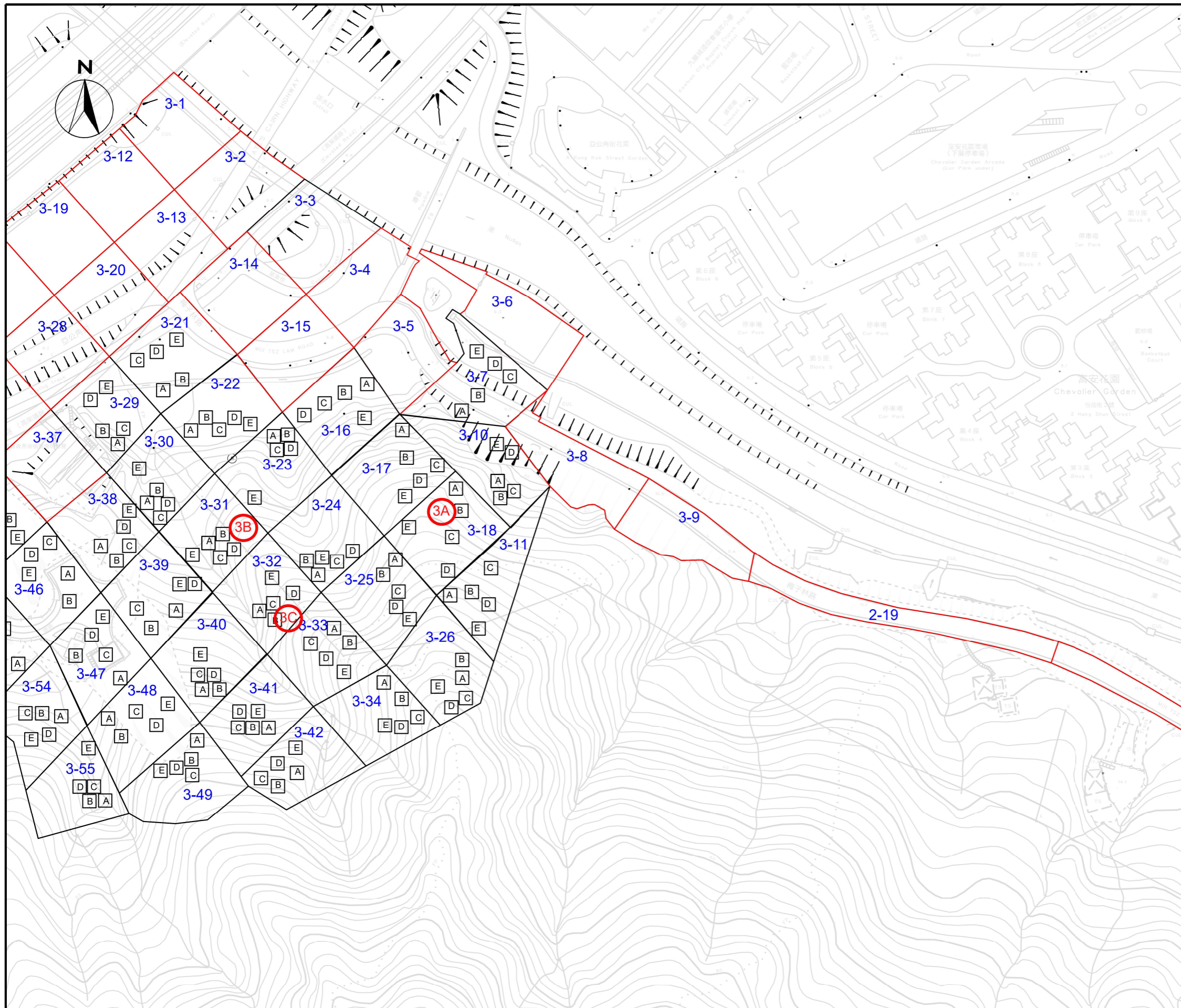


Legend

- Walkthrough Survey
- Sampling Survey
- A 5m x 5m Small Grid
(For estimation of average density in the corresponding 1000m² grid)
- 1A 5m x 5m Grid
(For estimation of no. of transplanted Small Persimmon *Diospyros vaccinoides*)

* Active searching was adopted in all sites for species other than Small Persimmon and Luofoshan Joint-fir

SCALE	1:1500 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	3b
		REV	1

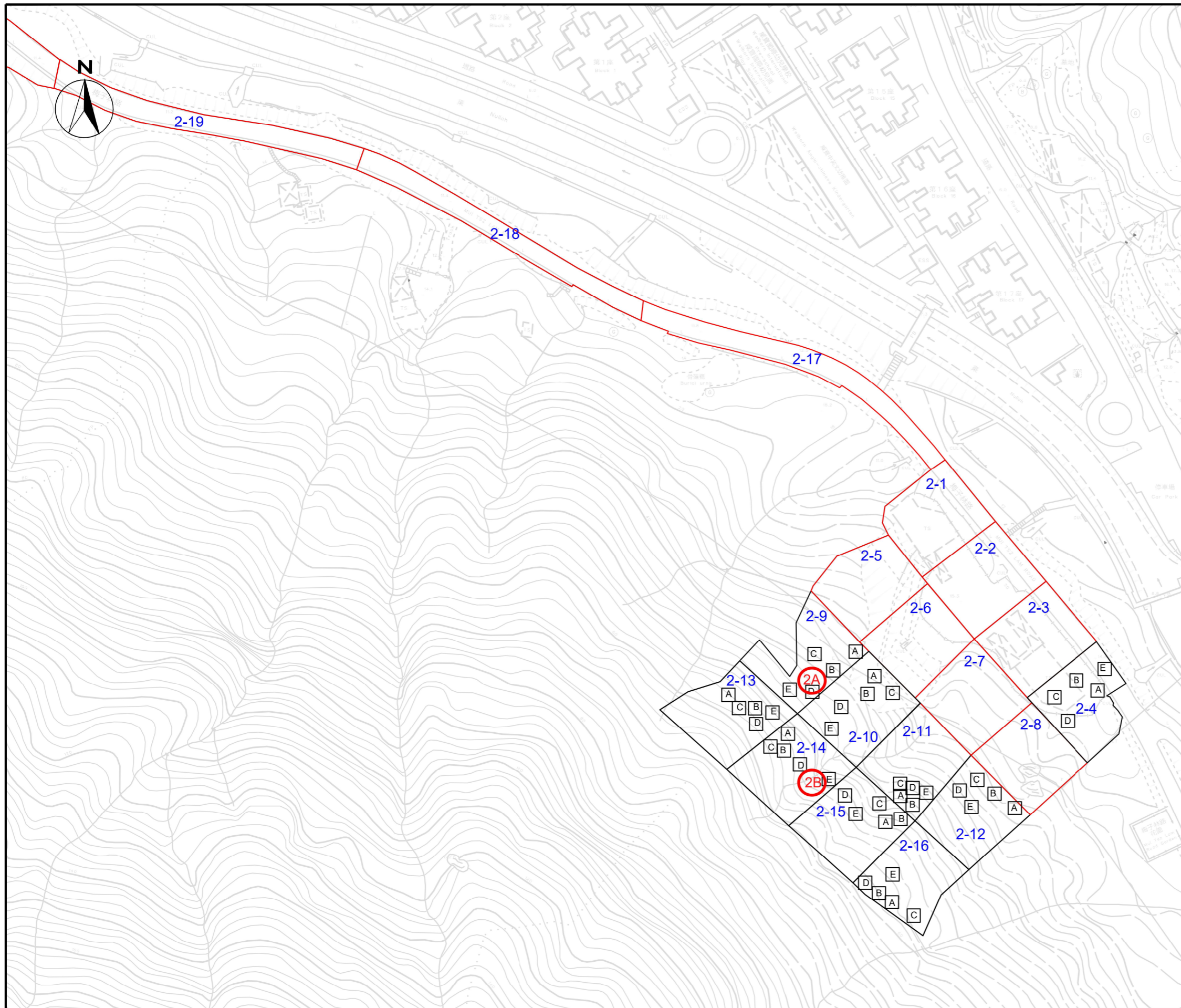


Legend

- Walkthrough Survey
- Sampling Survey
- A 5m x 5m Small Grid
(For estimation of average density in the corresponding 1000m² grid)
- 1A 5m x 5m Grid
(For estimation of no. of transplantable Small Persimmon *Diospyros vaccinoides*)

* Active searching was adopted in all sites for species other than Small Persimmon and Luofoshan Joint-fir

SCALE	1:1500 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	3d
		REV	1

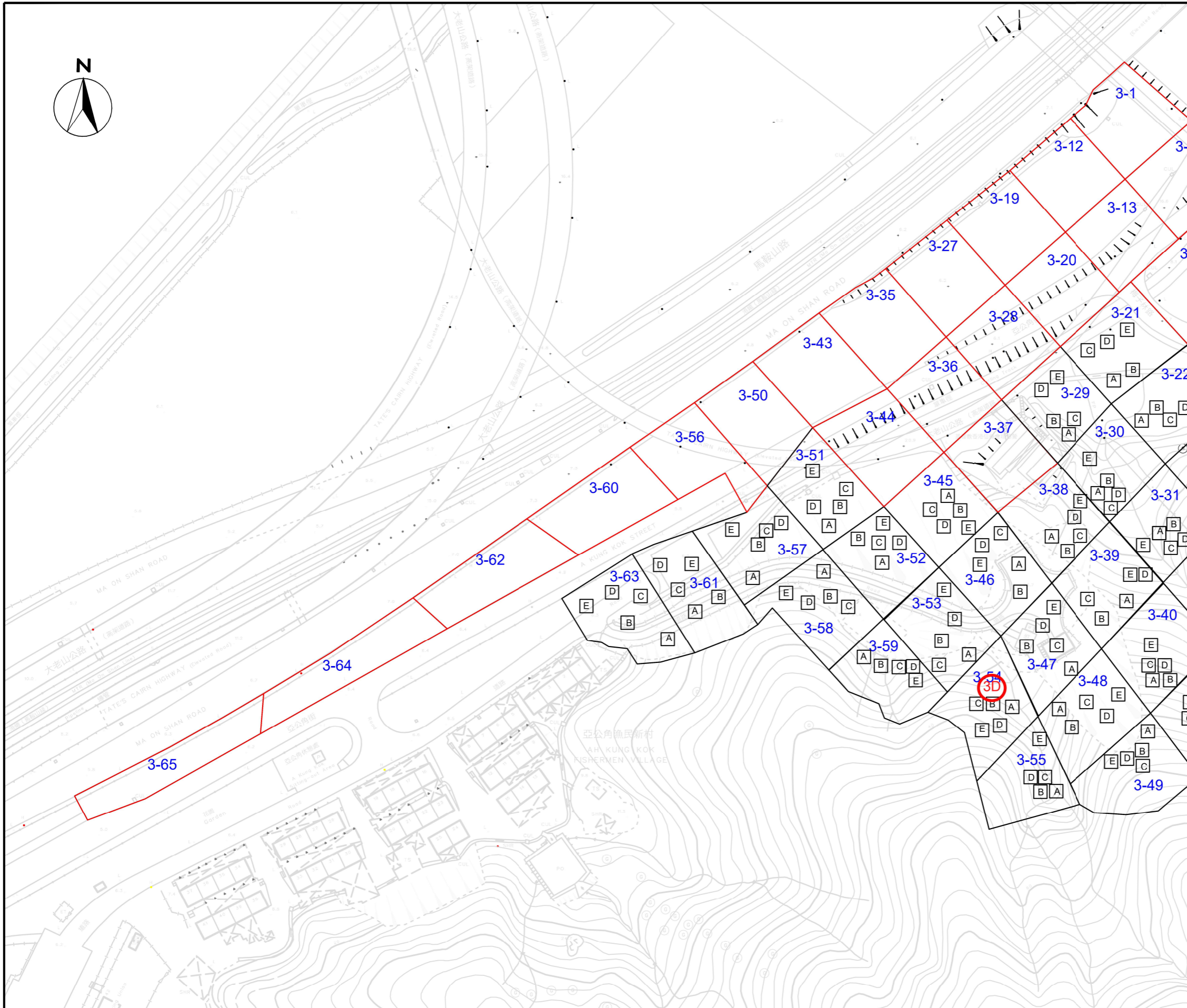


Legend

- Walkthrough Survey
- Sampling Survey
- A 5m x 5m Small Grid
(For estimation of average density in the corresponding 1000m² grid)
- 1A 5m x 5m Grid
(For estimation of no. of transplantable Small Persimmon *Diospyros vaccinoides*)

* Active searching was adopted in all sites for species other than Small Persimmon and Luofoshan Joint-fir

SCALE	1:1500 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	3e
		REV	1

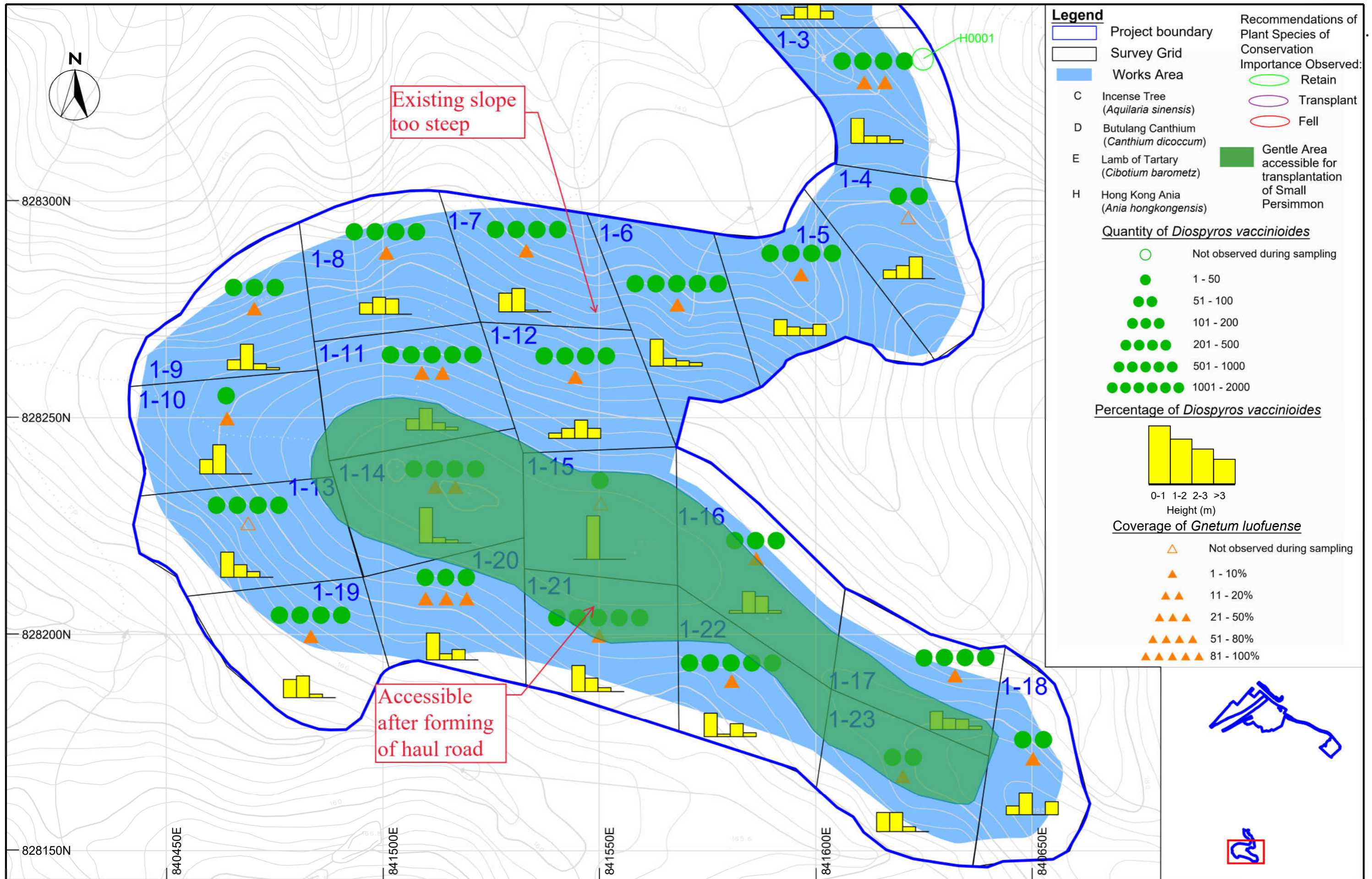


Legend

- Walkthrough Survey
- Sampling Survey
- A 5m x 5m Small Grid
(For estimation of average density in the corresponding 1000m² grid)
- 1A 5m x 5m Grid
(For estimation of no. of transplantable Small Persimmon *Diospyros vaccinoides*)

* Active searching was adopted in all sites for species other than Small Persimmon and Luofoshan Joint-fir

SCALE	1:1500 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	3c
		REV	1



Legend

- Project boundary
- Survey Grid
- Works Area

Recommendations of Plant Species of Conservation Importance Observed:

- Retain
- Transplant
- Fell

C Incense Tree (*Aquilaria sinensis*)

D Butulang Canthium (*Canthium dicoccum*)

E Lamb of Tartary (*Cibotium barometz*)

H Hong Kong Ania (*Ania hongkongensis*)

Gentle Area accessible for transplantation of Small Persimmon

Quantity of *Diospyros vaccinioides*

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

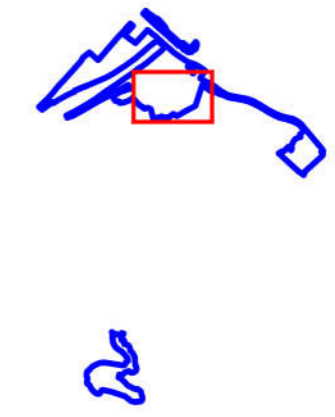
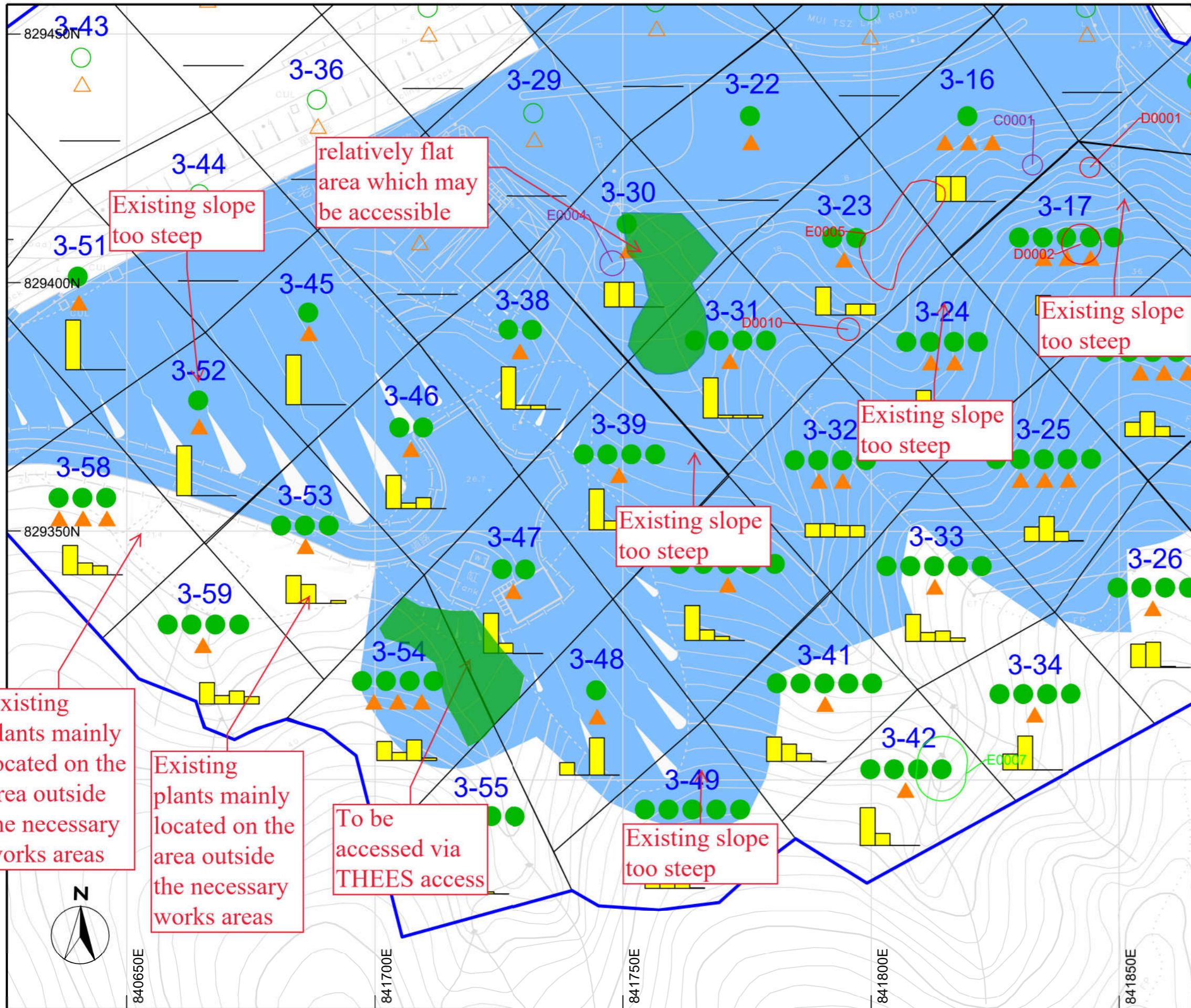
Percentage of *Diospyros vaccinioides*

- 0-1
- 1-2
- 2-3
- >3

Height (m)

Coverage of *Gnetum luofuense*

- Not observed during sampling
- 1 - 10%
- 11 - 20%
- 21 - 50%
- 51 - 80%
- 81 - 100%



Legend

- Project boundary
- Survey Grid
- Works Area
- Incense Tree (*Aquilaria sinensis*)
- Butulang Canthium (*Canthium dicoccum*)
- Lamb of Tartary (*Cibotium barometz*)
- Hong Kong Ania (*Ania hongkongensis*)

Recommendations of Plant Species of Conservation Importance Observed:

- Retain
- Transplant
- Fell
- Gentle Area accessible for transplantation of Small Persimmon

Quantity of *Diospyros vaccinioides*

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

Percentage of *Diospyros vaccinioides*

- 0-1
- 1-2
- 2-3
- >3

Height (m)

Coverage of *Gnetum luofuense*

- Not observed during sampling
- 1 - 10%
- 11 - 20%
- 21 - 50%
- 51 - 80%
- 81 - 100%

Existing plants mainly located on the area outside the necessary works areas

Existing plants mainly located on the area outside the necessary works areas

To be accessed via THEES access

Existing slope too steep

Existing slope too steep

Existing slope too steep

Existing slope too steep

relatively flat area which may be accessible

Existing slope too steep

3-43

3-36

3-29

3-22

3-16

3-44

3-30

3-23

3-17

3-51

3-45

3-38

3-31

3-24

3-52

3-46

3-39

3-32

3-25

3-58

3-53

3-47

3-33

3-26

3-59

3-54

3-48

3-41

3-34

3-55

3-55

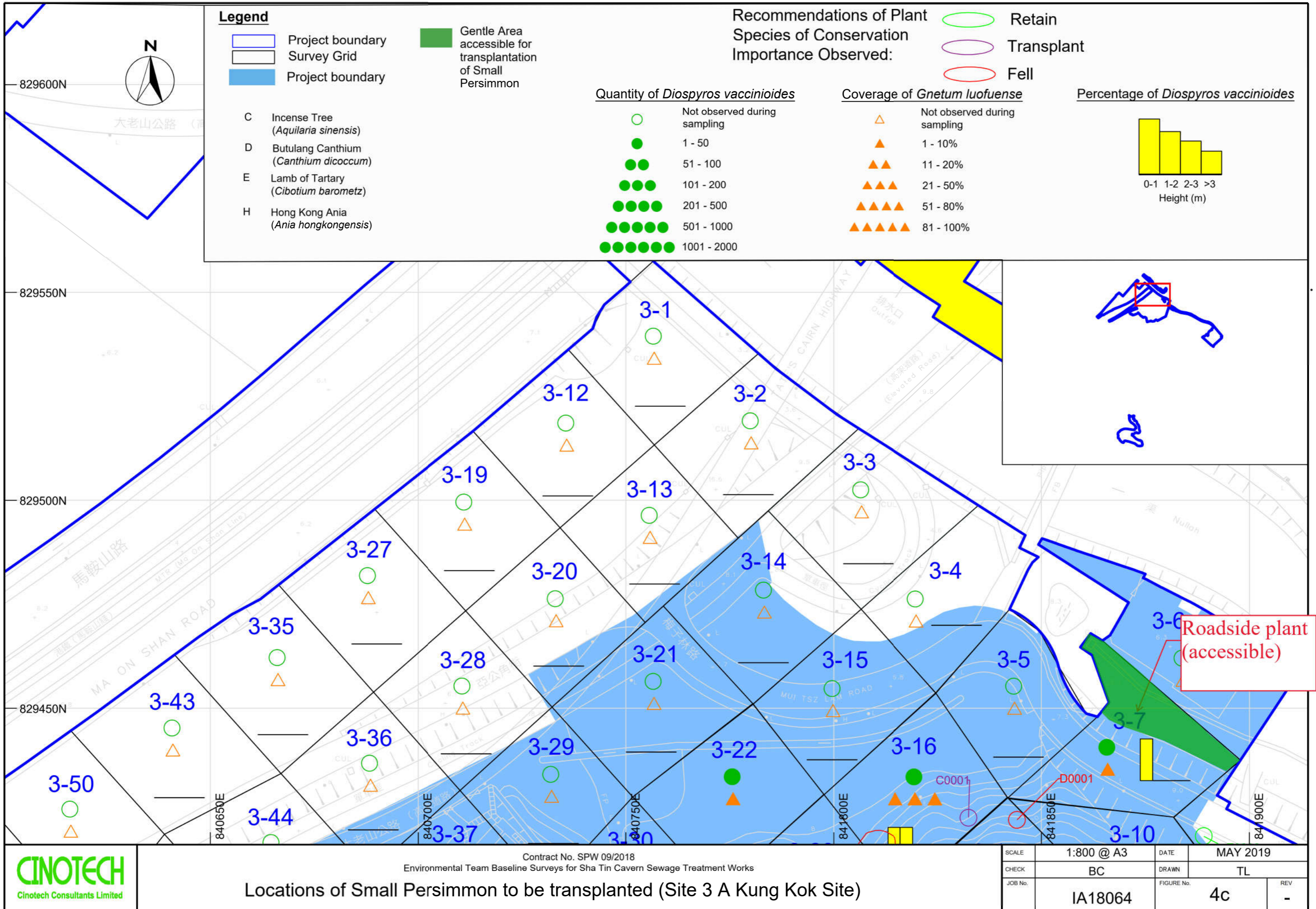
3-49

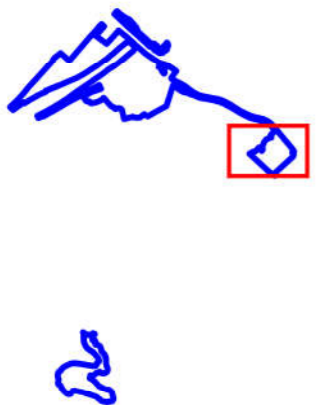
3-42



Contract No. SPW 09/2018
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works
Locations of Small Persimmon to be transplanted (Site 3 A Kung Kok Site)

SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	4b
		REV	-





Legend

- Project boundary
- Survey Grid
- Works Area

Recommendations of Plant Species of Conservation Importance Observed:

- Retain
- Transplant
- Fell

Quantity of *Diospyros vaccinioides*

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

Percentage of *Diospyros vaccinioides*

Coverage of *Gnetum luofuense*

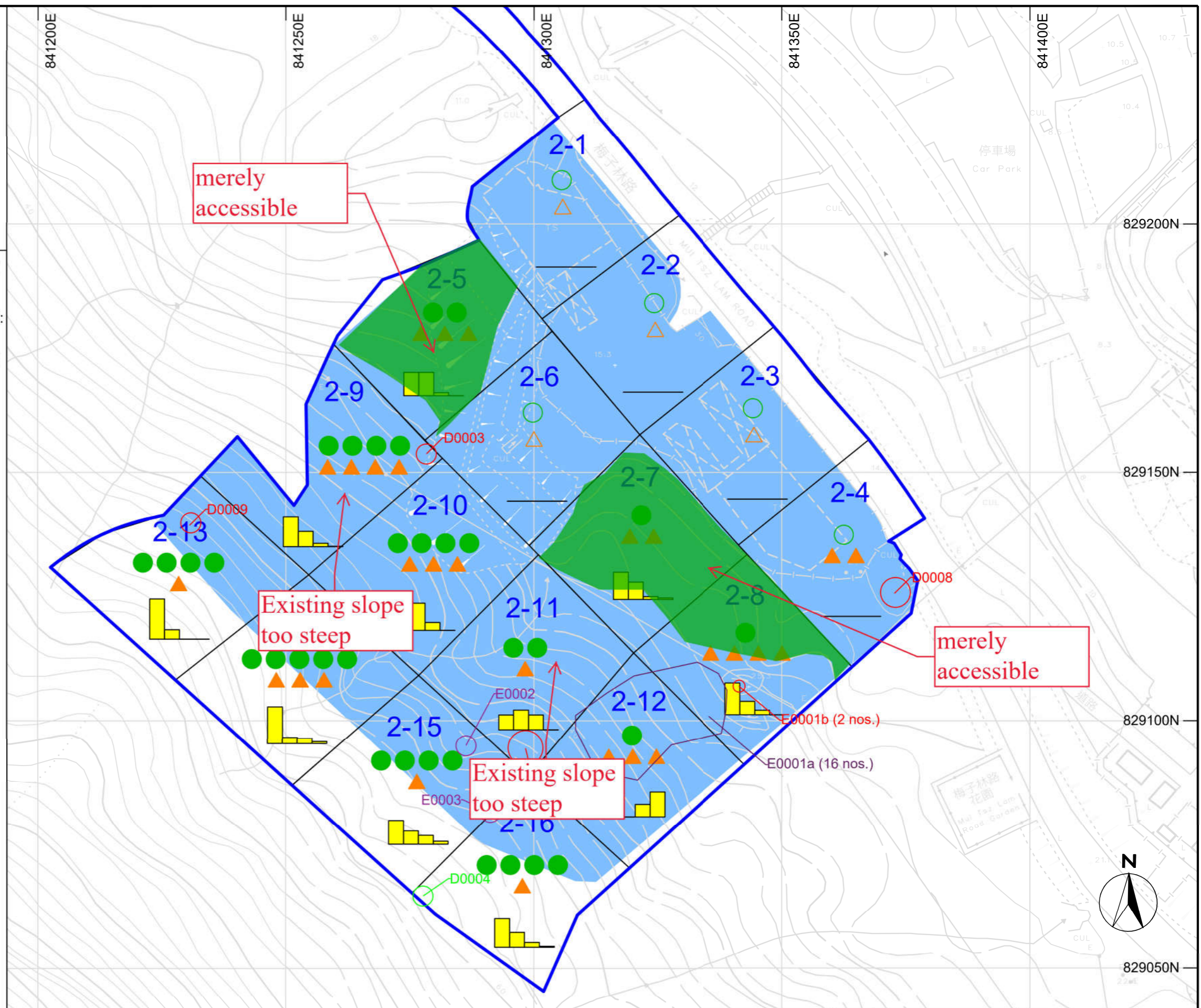
- Not observed during sampling
- 1 - 10%
- 11 - 20%
- 21 - 50%
- 51 - 80%
- 81 - 100%

Recommendations of Plant Species of Conservation Importance Observed:

- Gentle Area accessible for transplantation of Small Persimmon

Plant Species of Conservation Importance:

- C Incense Tree (*Aquilaria sinensis*)
- D Butulang Canthium (*Canthium dicoccum*)
- E Lamb of Tartary (*Cibotium barometz*)
- H Hong Kong Ania (*Ania hongkongensis*)



Contract No. SPW 09/2018
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works
Locations of Small Persimmon to be transplanted (Site 2 Mui Tsz Lam Site)

SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	4d
		REV	-

APPENDIX A
VEGETATION SURVEY RESULTS

Appendix A - Vegetation Survey Results (Small Persimmon and Luofushan Joint-fir)

Project Title: Contract No. SPW 09 / 2018 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works

Site 1 Magazine Site

Grid No.	Grid Area (m ²)	Small Persimmon <i>Diospyros vaccinioides</i>					
		Density (no./m ²)	Estimated Total Individuals	Percentage of Individuals in Different Height Ranges (m)			
				0-1	1-2	2-3	3+
1 - 1	1,096	0.424	465	60%	23%	2%	15%
1 - 2	1,095	0.088	96	9%	27%	45%	18%
1 - 3	1,067	0.192	205	58%	17%	17%	8%
1 - 4	1,050	0.080	84	20%	30%	50%	0%
1 - 5	1,068	0.280	299	37%	20%	17%	26%
1 - 6	1,086	0.584	634	62%	18%	12%	8%
1 - 7	952	0.224	213	43%	54%	4%	0%
1 - 8	1,103	0.184	203	26%	39%	35%	0%
1 - 9	954	0.176	168	23%	59%	14%	5%
1 - 10	1,096	0.024	26	33%	67%	0%	0%
1 - 11	1,093	0.464	507	26%	50%	17%	7%
1 - 12	1,000	0.456	456	12%	23%	42%	23%
1 - 13	1,097	0.192	211	58%	29%	13%	0%
1 - 14	1,100	0.336	370	81%	12%	7%	0%
1 - 15	1,037	0.024	25	0%	100%	0%	0%
1 - 16	1,139	0.144	164	6%	50%	39%	6%
1 - 17	864	0.304	263	42%	26%	24%	8%
1 - 18	889	0.080	71	20%	50%	0%	30%
1 - 19	1,080	0.304	328	42%	50%	8%	0%
1 - 20	915	0.168	154	62%	14%	24%	0%
1 - 21	1,064	0.520	553	60%	31%	9%	0%
1 - 22	942	0.552	520	55%	6%	30%	9%
1 - 23	1,064	0.072	77	44%	44%	11%	0%
1 - 24	1,086	0.000	0	0%	0%	0%	0%
Total Estimated Individual			6,092 (~6,100)	45%	29%	18%	8%

Grid No.	Average Coverage of Luofushan Joint-fir <i>Gnetum luofuense</i>	
	%	m ²
	1 - 1	20
1 - 2	4	44
1 - 3	12	128
1 - 4	0	0
1 - 5	4	43
1 - 6	8	87
1 - 7	1	10
1 - 8	3	33
1 - 9	7	67
1 - 10	1	11
1 - 11	17	186
1 - 12	1	10
1 - 13	0	0
1 - 14	14	154
1 - 15	0	0
1 - 16	6	68
1 - 17	8	69
1 - 18	5	44
1 - 19	4	43
1 - 20	41	375
1 - 21	9	96
1 - 22	4	38
1 - 23	7	74
1 - 24	12	130
Average Coverage		8%
Estimated Coverage (m²)		1,929 (~1,900)

Appendix A - Vegetation Survey Results (Small Persimmon and Luofushan Joint-fir)

Project Title: Contract No. SPW 09 / 2018 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works

Site 2 Mui Tzs Lam Site

Grid No.	Grid Area (m ²)	Small Persimmon <i>Diospyros vaccinioides</i>					
		Density (no./m ²)	Estimated Total Individuals	Percentage of Individuals in Different Height Ranges (m)			
				0-1	1-2	2-3	3+
2 - 1	1,022	0.000	0	0%	0%	0%	0%
2 - 2	1,044	0.000	0	0%	0%	0%	0%
2 - 3	1,018	0.000	0	0%	0%	0%	0%
2 - 4	906	0.000	0	0%	0%	0%	0%
2 - 5	963	0.055	53	47%	47%	6%	0%
2 - 6	931	0.000	0	0%	0%	0%	0%
2 - 7	967	0.032	31	55%	35%	6%	3%
2 - 8	932	0.012	11	64%	27%	9%	0%
2 - 9	907	0.500	454	60%	31%	7%	1%
2 - 10	1,008	0.236	238	30%	55%	16%	0%
2 - 11	960	0.080	77	30%	40%	30%	0%
2 - 12	943	0.011	11	25%	0%	25%	50%
2 - 13	1,039	0.288	299	81%	19%	0%	0%
2 - 14	1,034	0.584	604	74%	12%	10%	4%
2 - 15	1,042	0.264	275	48%	27%	18%	6%
2 - 16	921	0.480	442	58%	30%	10%	2%
2 - 17	977	0.000	0	0%	0%	0%	0%
2 - 18	920	0.000	0	0%	0%	0%	0%
2 - 19	981	0.000	0	0%	0%	0%	0%
Estimated Total Individual			2,495 (~2,500)	60%	27%	10%	2%

Grid No.	Average Coverage of Luofushan Joint-fir <i>Gnetum luofuense</i>	
	%	m ²
2 - 1	0	0
2 - 2	0	0
2 - 3	0	0
2 - 4	20	181
2 - 5	24	231
2 - 6	0	0
2 - 7	20	193
2 - 8	58	541
2 - 9	59	535
2 - 10	30	302
2 - 11	6	58
2 - 12	34	321
2 - 13	10	104
2 - 14	23	238
2 - 15	5	52
2 - 16	5	46
2 - 17	0	0
2 - 18	0	0
2 - 19	0	0
Average Coverage		15%
Estimated Coverage (m²)		2,802 (~2,800)

Appendix A - Vegetation Survey Results (Small Persimmon and Luofushan Joint-fir)

Project Title: Contract No. SPW 09 / 2018 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works

Site 3 A Kung Kok Site

Grid No.	Grid Area (m ²)	Small Persimmon <i>Diospyros vaccinioides</i>					
		Density (no./m ²)	Estimated Total Individuals	Percentage of Individuals in Different Height Ranges (m)			
				0-1	1-2	2-3	3+
3 - 1	1,021	0.000	0	0%	0%	0%	0%
3 - 2	1,075	0.000	0	0%	0%	0%	0%
3 - 3	1,100	0.000	0	0%	0%	0%	0%
3 - 4	948	0.000	0	0%	0%	0%	0%
3 - 5	895	0.000	0	0%	0%	0%	0%
3 - 6	1,078	0.000	0	0%	0%	0%	0%
3 - 7	1,092	0.016	17	100%	0%	0%	0%
3 - 8	1,000	0.000	0	0%	0%	0%	0%
3 - 9	937	0.000	0	0%	0%	0%	0%
3 - 10	1,057	0.392	414	22%	31%	27%	20%
3 - 11	958	0.767	735	49%	24%	23%	5%
3 - 12	937	0.000	0	0%	0%	0%	0%
3 - 13	916	0.000	0	0%	0%	0%	0%
3 - 14	1,097	0.000	0	0%	0%	0%	0%
3 - 15	969	0.000	0	0%	0%	0%	0%
3 - 16	1,063	0.010	10	50%	50%	0%	0%
3 - 17	1,068	0.702	749	39%	21%	19%	21%
3 - 18	1,104	1.067	1,178	29%	50%	20%	1%
3 - 19	969	0.000	0	0%	0%	0%	0%
3 - 20	932	0.000	0	0%	0%	0%	0%
3 - 21	1,107	0.000	0	0%	0%	0%	0%
3 - 22	1,032	0.000	0	0%	0%	0%	0%
3 - 23	1,010	0.072	73	56%	0%	22%	22%
3 - 24	971	0.392	381	65%	14%	20%	0%
3 - 25	1,066	0.889	948	29%	50%	20%	1%
3 - 26	1,091	0.344	375	47%	51%	2%	0%
3 - 27	993	0.000	0	0%	0%	0%	0%
3 - 28	931	0.000	0	0%	0%	0%	0%
3 - 29	912	0.000	0	0%	0%	0%	0%
3 - 30	909	0.016	15	50%	50%	0%	0%
3 - 31	921	0.384	354	81%	6%	6%	6%
3 - 32	942	0.480	452	27%	27%	23%	23%
3 - 33	975	0.896	874	54%	18%	21%	7%
3 - 34	938	0.272	255	32%	68%	0%	0%
3 - 35	1,084	0.000	0	0%	0%	0%	0%
3 - 36	938	0.000	0	0%	0%	0%	0%
3 - 37	911	0.000	0	0%	0%	0%	0%
3 - 38	960	0.104	100	85%	8%	8%	0%
3 - 39	1,009	0.224	226	82%	18%	0%	0%
3 - 40	1,070	0.672	719	70%	21%	8%	0%
3 - 41	962	0.552	531	49%	35%	16%	0%
3 - 42	911	0.408	372	76%	24%	0%	0%
3 - 43	1,105	0.000	0	0%	0%	0%	0%
3 - 44	1,101	0.000	0	0%	0%	0%	0%
3 - 45	934	0.032	30	100%	0%	0%	0%
3 - 46	990	0.072	71	67%	11%	22%	0%
3 - 47	967	0.080	77	80%	20%	0%	0%
3 - 48	1,075	0.032	34	25%	0%	75%	0%
3 - 49	1,065	0.688	733	57%	24%	17%	1%
3 - 50	1,021	0.000	0	0%	0%	0%	0%
3 - 51	992	0.040	40	100%	0%	0%	0%
3 - 52	931	0.032	30	100%	0%	0%	0%
3 - 53	1,028	0.128	132	56%	38%	0%	6%
3 - 54	1,022	0.488	499	38%	16%	41%	5%
3 - 55	910	0.224	204	86%	11%	4%	0%
3 - 56	965	0.000	0	0%	0%	0%	0%
3 - 57	1,061	0.000	0	0%	0%	0%	0%

Grid No.	Average Coverage of Luofushan Joint-fir <i>Gnetum luofuense</i>	
	%	m ²
3 - 1	0	0
3 - 2	0	0
3 - 3	0	0
3 - 4	0	0
3 - 5	0	0
3 - 6	0	0
3 - 7	0	0
3 - 8	5	50
3 - 9	5	47
3 - 10	0	0
3 - 11	6	57
3 - 12	0	0
3 - 13	0	0
3 - 14	0	0
3 - 15	0	0
3 - 16	23	244
3 - 17	21	224
3 - 18	22	243
3 - 19	0	0
3 - 20	0	0
3 - 21	0	0
3 - 22	0	0
3 - 23	4	40
3 - 24	19	184
3 - 25	21	224
3 - 26	0	0
3 - 27	0	0
3 - 28	0	0
3 - 29	0	0
3 - 30	0	0
3 - 31	1	9
3 - 32	18	170
3 - 33	0	0
3 - 34	0	0
3 - 35	0	0
3 - 36	0	0
3 - 37	0	0
3 - 38	0	0
3 - 39	2	20
3 - 40	4	43
3 - 41	1	10
3 - 42	0	0
3 - 43	0	0
3 - 44	0	0
3 - 45	2	19
3 - 46	1	10
3 - 47	6	58
3 - 48	10	108
3 - 49	11	117
3 - 50	0	0
3 - 51	0	0
3 - 52	0	0
3 - 53	1	10
3 - 54	26	266
3 - 55	7	64
3 - 56	0	0
3 - 57	0	0

Appendix A - Vegetation Survey Results (Small Persimmon and Luofushan Joint-fir)

Project Title: Contract No. SPW 09 / 2018 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works

Site 3 A Kung Kok Site

Grid No.	Grid Area (m ²)	Small Persimmon <i>Diospyros vaccinioides</i>					
		Density (no./m ²)	Estimated Total Individuals	Percentage of Individuals in Different Height Ranges (m)			
				0-1	1-2	2-3	3+
3 - 58	1,108	0.136	151	59%	24%	18%	0%
3 - 59	905	0.376	340	43%	17%	26%	15%
3 - 60	1,087	0.000	0	0%	0%	0%	0%
3 - 61	1,093	0.000	0	0%	0%	0%	0%
3 - 62	1,050	0.000	0	0%	0%	0%	0%
3 - 63	1,101	0.000	0	0%	0%	0%	0%
3 - 64	1,043	0.000	0	0%	0%	0%	0%
3 - 65	943	0.000	0	0%	0%	0%	0%
Estimated Total Individual			11,119 (~11,100)	49%	29%	17%	5%

Grid No.	Average Coverage of Luofushan Joint-fir <i>Gnetum luofuense</i>	
	%	m ²
3 - 58	30	332
3 - 59	4	36
3 - 60	0	0
3 - 61	0	0
3 - 62	0	0
3 - 63	4	44
3 - 64	0	0
3 - 65	0	0
Average Coverage		4%
Estimated Coverage (m²)		2,630 (~2,600)

Appendix A - Vegetation Survey Results (Species other than Small Persimmon Luofoshan Joint-fir)

Project Title: Contract No. SPW 09 / 2018 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works

Site	Plant / Colony No.	No. of individuals	Chinese Name	Common Name	Species Name	Height (m)	DBH (m)	Crown Spread (m)	Form	Health	Amenity Value	Structural Condition	Suitability for Transplanting	Recommendations	Justifications						Remarks
															A	H	R	T	C	S	
1	H0001	4	香港安蘭	Purple Bulb Orchid	<i>Ania hongkongensis</i>	-	-	-	Good	Fair	-	-	Medium	Retain							-
1	H0002	1	香港安蘭	Purple Bulb Orchid	<i>Ania hongkongensis</i>	-	-	-	Fair	Fair	-	-	Medium	Transplant	1						On slope, grow next to tree
2	D0003	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	3	0.05	2	Fair	Fair	Medium	Good	Low	Fell	1		1	1	1		On slope, near u-channel
2	D0004	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	1.7	0.01	1.5	Fair	Good	Medium	Good	Low	Retain							On rocky slope
2	D0006	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	9	-	7	Fair	Fair	Medium	Fair	Low	Fell	1		1	1	1		On slope, inaccessible
2	D0008	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	4	0.17	6	Poor	Poor	Low	Poor	Low	Fell	1	1	1	1	1		On rock, 80% dieback
2	D0009	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	6	0.25	4	Poor	Poor	Low	Poor	Low	Fell	1	1	1	1	1		On slope, uprooted, dying leaves
2	E0001a	16	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Fair	Fair	-	-	Medium	Transplant	1						-
2	E0001b	2	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Fair	Poor	-	-	Low	Fell	1	1	1			1	Grow on bare rocks along the stream
2	E0002	1	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Fair	Fair	-	-	Medium	Transplant	1						Grow on rocks along the stream
2	E0003	2	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Good	-	-	Medium	Transplant	1						Grow near stream
3	C0001	1	土沉香	Incense Tree	<i>Aquilaria sinensis</i>	0.6	<0.01	0.25	Good	Good	Low	Good	Medium	Transplant	1						On slope
3	D0001	2	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	8	0.15	4	Poor	Fair	Medium	Fair	Low	Fell	1		1	1	1		On slope, leaning
3	D0002	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	8	0.15	8	Good	Fair	Medium	Fair	Low	Fell	1		1	1	1		On slope
3	D0010	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	8	0.23	4.5	Good	Fair	Medium	Fair	Low	Fell	1		1	1	1		On slope, slight leaning, watersprout
3	E0004	7	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Fair	Fair	-	-	Low	Transplant	1						Grow on slope near stream
3	E0005*	50	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Fair - Good	-	-	Low	Fell	1		1		1		Grow on steep slope near stream
3	E0006	1	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Fair	Fair	-	-	Low	Retain							Grow on steep, seeping rock
3	E0007*	100	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Fair	Poor - Good	-	-	Low	Retain							Some grow on steep slope near stream

* No. of individual was estimated on-site based on the density in a small area.

Justifications

A - Affected by project (located within works area)
 H - Poor health, form and/or structural condition
 R - Imbalanced root ball

T - Technically impractical and not cost-effective for transplantation
 C - Common in Hong Kong that removal would not affect survival of the population of the species
 S - Suitable receptor site not available

APPENDIX B
PHOTOGRAPHIC RECORD



H0001 Purple Bulb Orchid *Ania hongkongensis*



H0002 Purple Bulb Orchid *Ania hongkongensis*

Appendix B Photographic Record (Site 1)



D0003 Butulang Canthium *Canthium dicoccum*



D0004 Butulang Canthium *Canthium dicoccum*



D0006 Butulang Canthium *Canthium dicoccum*

Appendix B Photographic Record (Site 2)



D0008 Butulang Canthium *Canthium dicoccum*



D0009 Butulang Canthium *Canthium dicoccum*

Appendix B Photographic Record (Site 2)



E0001a Lamb of Tartary *Cibotium barometz*



E0001b Lamb of Tartary *Cibotium barometz*

Appendix B Photographic Record (Site 2)



E0002 Lamb of Tartary *Cibotium barometz*



E0003 Lamb of Tartary *Cibotium barometz*



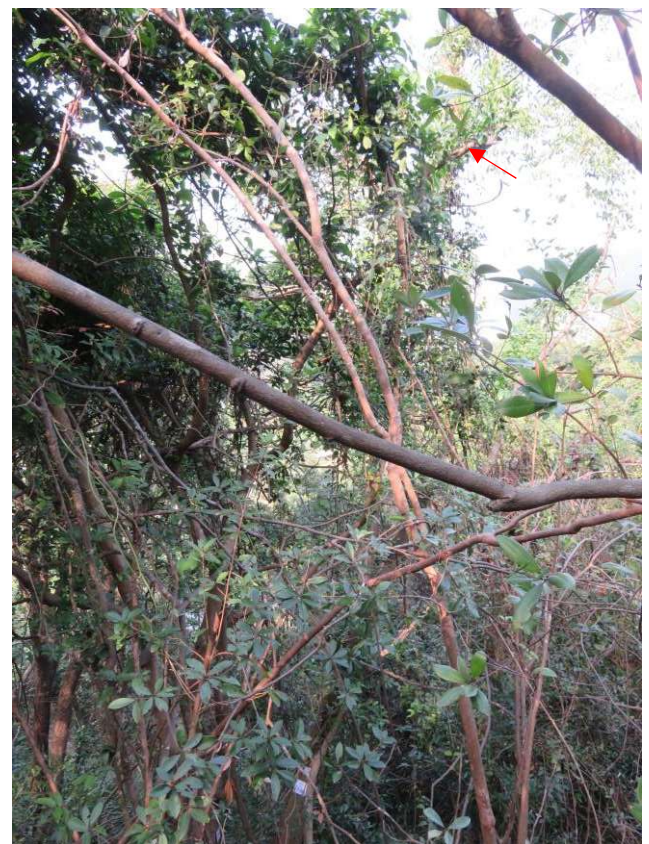
C0001 Incense Tree *Aquilaria sinensis*



D0001 Butulang Canthium *Canthium dicoccum*



D0002 Butulang Canthium *Canthium dicoccum*



D0010 Butulang Canthium *Canthium dicoccum*



E0004 Lamb of Tartary *Cibotium barometz*



E0005 Lamb of Tartary *Cibotium barometz* (On slope behind the two trees)



E0005 Lamb of Tartary *Cibotium barometz*



E0006 Lamb of Tartary *Cibotium barometz*

Appendix B Photographic Record (Site 3)



E0007 Lamb of Tartary *Cibotium barometz*

Appendix B Photographic Record (Site 3)



Grid 3-16



Grid 1-12



Grid 3-25



Grid 2-5



Grid 3-55



Grid 3-41



Grid 1-9

Appendix B Photographic Record (Example of Small Persimmon *Diospyros Vaccinioides*)



Grid 3-10



Grid 2-5



Grid 3-11



Grid 3-25

Appendix B Photographic Record (Example of Luofushan Joint-fir *Gnetum lufuense*)

**APPENDIX C
ESTIMATION OF QUANTITY OF
AFFECTED SMALL PERSIMMON AND
LUOFUSHAN JOINT-FIR**

Appendix C - Quantity of Affected Small Persimmon and Luofushan Joint-fir

Site 1 Magazine Site

Grid No.	Works Area (m ²)	Small Persimmon <i>Diospyros vaccinioides</i>		Luofushan Joint-fir <i>Gnetum luofuense</i>	
		Density (no./m ²)	Affected Individuals	% Coverage	Affected Area (m ²)
1 - 1	936	0.424	397	20	187
1 - 2	1,003	0.088	88	4	40
1 - 3	806	0.192	155	12	97
1 - 4	828	0.080	66	0	0
1 - 5	1,016	0.280	285	4	41
1 - 6	1,086	0.584	634	8	87
1 - 7	894	0.224	200	1	9
1 - 8	888	0.184	163	3	27
1 - 9	720	0.176	127	7	50
1 - 10	1,054	0.024	25	1	11
1 - 11	1,093	0.464	507	17	186
1 - 12	1,000	0.456	456	1	10
1 - 13	870	0.192	167	0	0
1 - 14	1,100	0.336	370	14	154
1 - 15	1,031	0.024	25	0	0
1 - 16	841	0.144	121	6	50
1 - 17	621	0.304	189	8	50
1 - 18	457	0.080	37	5	23
1 - 19	378	0.304	115	4	15
1 - 20	807	0.168	136	41	331
1 - 21	843	0.520	439	9	76
1 - 22	734	0.552	405	4	29
1 - 23	785	0.072	57	7	55
1 - 24	1,086	0.000	0	12	130
Total Area	20,877	Total Individual	5,164	Total Area	1,658

Appendix C - Quantity of Affected Small Persimmon and Luofushan Joint-fir

Site 2

Mui Tzs Lam Site

Grid No.	Works Area (m ²)	Small Persimmon <i>Diospyros vaccinioides</i>		Luofushan Joint-fir <i>Gnetum luofuense</i>	
		Density (no./m ²)	Affected Individuals	% Coverage	Affected Area (m ²)
2 - 1	1,022	0.000	0	0	0
2 - 2	1,044	0.000	0	0	0
2 - 3	1,018	0.000	0	0	0
2 - 4	906	0.000	0	20	181
2 - 5	915	0.055	50	24	220
2 - 6	931	0.000	0	0	0
2 - 7	967	0.032	31	20	193
2 - 8	906	0.012	11	58	525
2 - 9	907	0.500	454	59	535
2 - 10	1,008	0.236	238	30	302
2 - 11	960	0.080	77	6	58
2 - 12	887	0.011	10	34	301
2 - 13	418	0.288	120	10	42
2 - 14	490	0.584	286	23	113
2 - 15	500	0.264	132	5	25
2 - 16	314	0.480	151	5	16
2 - 17	977	0.000	0	0	0
2 - 18	920	0.000	0	0	0
2 - 19	981	0.000	0	0	0
Total Area	16,071	Total Individual	1,560	Total Individual	2,511

Appendix C - Quantity of Affected Small Persimmon and Luofushan Joint-fir

Site 3 A Kung Kok Site

Grid No.	Works Area (m ²)	Small Persimmon <i>Diospyros vaccinioides</i>		Luofushan Joint-fir <i>Gnetum luofuense</i>	
		Density (no./m ²)	Affected Individuals	% Coverage	Affected Area (m ²)
3 - 1	0	0.000	0	0	0
3 - 2	1	0.000	0	0	0
3 - 3	0	0.000	0	0	0
3 - 4	280	0.000	0	0	0
3 - 5	885	0.000	0	0	0
3 - 6	1,074	0.000	0	0	0
3 - 7	1,091	0.016	17	0	0
3 - 8	913	0.000	0	5	46
3 - 9	0	0.000	0	5	0
3 - 10	905	0.392	355	0	0
3 - 11	316	0.767	242	6	19
3 - 12	0	0.000	0	0	0
3 - 13	54	0.000	0	0	0
3 - 14	1,097	0.000	0	0	0
3 - 15	969	0.000	0	0	0
3 - 16	1,063	0.010	10	23	244
3 - 17	1,068	0.702	749	21	224
3 - 18	1,101	1.067	1,175	22	242
3 - 19	969	0.000	0	0	0
3 - 20	932	0.000	0	0.000	0
3 - 21	1,107	0.000	0	0	0
3 - 22	1,032	0.000	0	0	0
3 - 23	1,010	0.072	73	4	40
3 - 24	971	0.392	381	19	184
3 - 25	1,066	0.889	948	21	224
3 - 26	305	0.344	105	0	0
3 - 27	993	0.000	0	0	0
3 - 28	931	0.000	0	0	0
3 - 29	912	0.000	0	0	0
3 - 30	909	0.016	15	0	0
3 - 31	921	0.384	354	1	9
3 - 32	942	0.480	452	18	170
3 - 33	465	0.896	417	0	0
3 - 34	6	0.272	1	0	0
3 - 35	1,084	0.000	0	0	0
3 - 36	938	0.000	0	0	0
3 - 37	911	0.000	0	0	0
3 - 38	960	0.104	100	0	0
3 - 39	1,009	0.224	226	2	20
3 - 40	1,070	0.672	719	4	43
3 - 41	370	0.552	204	1	4
3 - 42	0	0.408	0	0	0
3 - 43	1,105	0.000	0	0	0
3 - 44	1,101	0.000	0	0	0
3 - 45	934	0.032	30	2	19
3 - 46	990	0.072	71	1	10
3 - 47	892	0.080	71	6	54
3 - 48	846	0.032	27	10	85
3 - 49	370	0.688	255	11	41
3 - 50	1,021	0.000	0	0	0
3 - 51	640	0.040	26	0	0

Appendix C - Quantity of Affected Small Persimmon and Luofushan Joint-fir

Site 3

A Kung Kok Site

Grid No.	Works Area (m ²)	Small Persimmon <i>Diospyros vaccinioides</i>		Luofushan Joint-fir <i>Gnetum luofuense</i>	
		Density (no./m ²)	Affected Individuals	% Coverage	Affected Area (m ²)
3 - 52	863	0.032	28	0	0
3 - 53	446	0.128	57	1	4
3 - 54	616	0.488	301	26	160
3 - 55	38	0.224	8	7	3
3 - 56	965	0.000	0	0	0
3 - 57	894	0.000	0	0	0
3 - 58	158	0.136	21	30	47
3 - 59	0	0.376	0	4	0
3 - 60	1,087	0.000	0	0	0
3 - 61	308	0.000	0	0	0
3 - 62	0	0.000	0	0	0
3 - 63	61	0.000	0	4	0 *
3 - 64	0	0.000	0	0	0
3 - 65	0	0.000	0	0	0
Total Area	43,964	Total Individual	7,438	Total Area	1,892

* No Luofushan Joint-fir was observed in the works area

**APPENDIX D
CURRICULUM VITAE OF QUALIFIED
ECOLOGIST**

COMPANY	CINOTECH CONSULTANTS LIMITED
POSITION	DIRECTOR
PROFESSION	ENVIRONMENTAL SCIENTIST
NATIONALITY	CHINESE

PROFESSIONAL QUALIFICATIONS & AFFILIATIONS

- Ph.D., Microbiology, University of Hong Kong, Hong Kong. 1992.
 - B.Sc., Biology, National Taiwan Normal University, Taipei, Taiwan, Republic of China. 1983

 - Hong Kong Institute of Qualified Environmental Professionals Limited (HKIQEP), 2017
 - Member, Hong Kong Institution of Engineers, 2015
 - Fellow, Hong Kong Institute of Environmental Impact Assessment, 2015
 - Accredited Monitoring Professional, Hong Kong Institute of Environmental Impact Assessment, 2010
 - Member, Hong Kong Waste Management Association, 1998

 - Member, the Innovation and Technology Fund Research Projects Assessment Panel (Environmental Technology) (2017-2019)
 - Member, Enterprise Support Scheme Assessment Panel, Innovation and Technology Commission (2015-2019)
 - Member, the Advisory Committee on Agriculture and Fisheries (2013-2019)
 - Member, Hong Kong Council for Testing and Certification (2011-2017)

 - ISA Certified Arborist (CertificationID:HK-0361A) (2009 - present)
 - ISA Tree Risk Assessment Qualification (2012-2015)
 - PNW-ISA Certified Tree Risk Assessor
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KEY EXPERIENCE

Dr. Priscilla Choy has over 25 year experience in ecological surveys and assessment, tree survey, tree risk assessment, environmental monitoring & audit, environmental management studies, environmental testing, water quality analysis and scientific research. In the past 15 years, she has managed numerous environmental monitoring & audit for infrastructure projects, ecological surveys and assessment studies, tree survey projects, and ecological surveys and assessment studies. She is familiar with the requirements and expectation of EPD, AFCD and other stake holders in the construction of infrastructure projects. Furthermore, she communicates well with green groups and understands well their concerns on ecological values and conservation of wetlands, marine parks, marine reserves, country parks, Ramsar site, coral communities, intertidal mudflats and sites of special scientific interest in Hong Kong.

Dr. Choy is an Ecologist (PNW-ISA Certified Tree Risk Assessor and ISA Certified Arborist) specialized in the evaluation of vegetation, wildlife and habitat values of brackish and freshwater. She has supervised and undertaken many ecological projects involving ecological survey, monitoring and assessment, involving wetland recreation, coral translocation, rare/protected plant species transplantation and fish translocation works. She has also conducted extensive surveys on different habitats and the associated vegetation and wildlife for development projects, including Improvement to Tung Chung Road Between Lung Tseng Tau and Cheung Sha, Drainage Improvement, Stage 1, Phase 2A – Kam Tin and Ngau Tam Mei; and many others.

PROFESSIONAL HISTORY

2002 – Present	Director, Cinotech Consultants Limited
2005 – Present	Laboratory Director, Wellab Limited
1998 – 2002	Director, Maunsell Environmental Management Consultants Ltd.

1997 - 1998	Director, ENPAC Ltd. (An Environmental Consultancy Company)
1996 – 1997	Project Manager, ENPAC Ltd. (An Environmental Consultancy Company)
1995 - 1996	Manager, Chemical, Food and Environmental Department, the Hong Kong Standards and Testing Centre Ltd
1994 - 1995	Product Specialist, Pharmacia Biotech Asia Pacific Ltd
1993 - 1994	Research Associate, Department of Research and Development, Alexon Biomedical Inc., USA.
1990 – 1992	Scientific Officer, Lee Hysan Clinical Research Laboratory, Faculty of Medicine, Chinese University of Hong Kong
1982 - 1990	Technician, Department of Microbiology, University of Hong Kong

PROFESSIONAL EXPERIENCE AND RECORDS

Tree Survey, Risk Assessment, Protection and Monitoring (Partial List)

Project	Scope	Period
Proposed Residential Development At 21, 23 & 25 Borrett Road	- Tree compensation proposal - Tree health monitoring	2015
Provision of Lifts/Ramps to Four Footbridges across Aberdeen Praya Road and Yue Shi Cheung Road, across Tsuen Wan MTR Depot near Mega Trade Centre, across Castle Peak Road near Fou Wah Centre and across Choi Yuen Road and San Wan Road at Pak Wo Road, and Two Subways across Ching Hong Road near Mayfair Gardens and across Tai Po Road near Fo Tan Road	Tree survey in Sheung Shui area	2015
CEDD Maintenance Contract for Seawalls and Navigation Channels (2013 – 2016)	Tree group inspection and detailed tree risk assessment of trees at Cha Kwo Ling Depot	2014
Main Contract for Footbridge at Tuen Mun River	Tree survey at Portions A and B	2014
Tree Survey and Compensation Report for Hong Kong Vipassana Meditation Centre	Tree survey at the proposed centre and along the access road	2011
Agreement No. CE 64/2009 (HY) Improvement to Fan Kam Road Feasibility Study	Tree survey within and about 5 m outside the work site boundary	2010 – 2011
Tenancy Agreement No. SHX-1241 Tin Wan Concrete Batching Plant	Tree survey	2010
Contract No: ST/2008/02 Ma On Shan Development - Roads, Drainage and Sewerage Works at Whitehead and Lok Wo Sha Phase 1	Tree transplanting site assessment	2010
Contract No. DC/2007/19 Drainage Improvement in Northern Hong Kong Island - Western Lower Catchment Works	Tree survey at the following locations: - Cotton Path - Shouson Hill Road West - Sheung Wan Site Office - Nullah next to Queen’s College - Drainage D4 Tree risk assessment at the following location: - Nullah next to Queen’s College	2009 2009, 2013 2009 2009, 2012 2010 2013
Cycle Tracks Connecting North West New Territories with North East New Territories – (Extension), Minor Sections Investigation, Design and Construction	Tree survey	2008 – 2013

Project	Scope	Period
Contract No. DC/2007/10 Design and Construction of Hong Kong West Drainage Tunnel	Tree survey report for at the Eastern and Western Portals of the Project	2008
Slope Upgrading Works for Feature No. 11SW-B/FR211 & 11SW-B/F247 at Kowloon Park	Regular tree inspection for retained and historical trees	2007 - 2008
Tree Survey in Pokfulam & Wah Fu Areas	Tree survey in Pokfulam & Wah Fu Areas	2007
Contract No. 15/WSD/06 Mainlaying along Castle Peak Road between Siu Lam and Lok On Pai	Tree survey within and about 5 m outside the work site boundary	2007
Contract No. DC/2003/02 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai Drainage Improvement, Stage 1, Phase 2A – Kam Tin and Ngau Tam Mei	Tree survey affected by the construction of the Ngau Tam Mei Channel (NTM1) and Kam Tin Secondary Channel (KT7)	2004
Trunk Road T4, Shatin	Tree survey within and about 5 m outside the work site boundary	2003 - 2005
Agreement No. CE 57/2002 (HY) Provision of Access Facilities for the Elderly & Disabled at Existing Footbridge in NT – Phase I	Tree surveys at five existing footbridge sites	2003
EIA for High Pressure Gas Pipeline Inside Ma On Shan Country Park	Tree survey within and about 5 m outside the work site boundary	2002
Agreement No. CE 61/90 Tolo Harbour Catchment Stage I Phase ID Sewerage Contract 1D – Yung Shue O	Tree survey within the work site and 20 m outside the work boundary	2002

Ecological Impact Assessment / Monitoring (Partial list)

Project	Scope	Period
Deep Cement Mixing Works for Three Runway System	Dolphin monitoring	2016 – ongoing
Contract P553 Deep Cement Mixing Trial Works (By Multiple Rigs)	Dolphin monitoring	2015
Consultancy for Environmental Assessment for Laser and Light Shows at Galaxy Cotai Macau Phase 1 & 2 Development	Review of impact on avifauna due to laser show	2014
Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill	Dolphin monitoring	2013 – ongoing
Contract No. CV/2012/01 Sediment Removal at Yim Tin Tsai (East) Fish Culture Zone	Monitoring for ardeids, white-bellied sea eagles and coral	2013 - 2014
Port Shelter Sewerage, Stage 3 – Sewerage Works at Po Toi O Environmental Impact Assessment Studies – Investigation	Ecological impact assessment (terrestrial, coastal and benthic)	2013 - 2014
Discovery Bay Maintenance Dredging 2012	Ecological appraisal (terrestrial, coastal, benthic)	2013
Maintenance Contract for Seawalls and Navigation Channels (2010-2013) Kam Tin River – Waterbird Monitoring	Waterbird monitoring	2012

Project	Scope	Period
Harbour Area Treatment Scheme Stage 2A – Construction of Advance Disinfection Facilities at Stonecutters Island Sewage Treatment Works	Benthic survey	2012
Baseline Environmental Monitoring for Hong Kong - Zhuhai - Macao Bridge Hong Kong Projects – Investigation	Dolphin monitoring	2011
Deep Cement Mixing Trial Works	Dolphin monitoring	2011
Consultancy Service for Ecological Impact Assessment at Yan Tun Kong Study Hall, Hang Tau Tsuen, Ping Shan, Hong Kong	Ecological impact assessment (bat)	2010 – 2011
Agreement No. CE 64/2009 (HY) Improvement to Fan Kam Road Feasibility Study	Ecological impact assessment (terrestrial and stream)	2010 – 2011
Improvement Work for Mui Wo Facelift – Design and Construction	Ecological impact assessment for opening of Silvermine Cave (terrestrial and stream)	2010 - 2011
Consultancy for Environmental Monitoring on the Major Restoration of the Residence of Ip Ting-Sz, Lin Ma Hang Tsuen, Sha Tau Kok	Ecological impact assessment (terrestrial and stream)	2010
Contract No: ST/2008/02 Ma On Shan Development - Roads, Drainage and Sewerage Works at Whitehead and Lok Wo Sha Phase 1	- Shrub survey for Hong Kong Pavetta (<i>Pavetta hongkongensis</i>) and Small Persimmon (<i>Diospyros vaccinioides</i>) - Transplantation monitoring	2010
Contract No. DC/2008/09 Harbour Area Treatment Scheme Stage 2A Construction of Sewage Conveyance System From Ap Lei Chau to Aberdeen	Dive survey	2009
CE39/2006 (DS) Rehabilitation of Yuen Long Town Nullahs	Ecological impact assessment (terrestrial and stream)	2008 – 2009
Environmental Audit and Review on the Effectiveness of Mitigation Measures for Projects in Sai Kung and on Lantau Island	Review of effectiveness of ecological mitigation measures (vegetation, stream and coral transplant)	2007
Agreement No. CE18/2006(DS) Reconstruction & Improvement of Staunton Creek Nullah in Wong Chuk Hang and Fuk Man Road Nullah in Sai Kung, Investigation, Design and Construction	Ecological impact assessment (terrestrial and stream)	2007
Agreement No. CE 27/2005 (CE) Ping Ha Road Improvement and Hung Shui Kiu Development, Stage 2 – Remaining Works	Ecological impact assessment (terrestrial and stream)	2005 – 2006
Trunk Road T4, Shatin	Ecological impact assessment (terrestrial)	2003 - 2005
Tonggu Channel of Shenzhen Port	Ecological impact assessment (intertidal, benthic)	2003 - 2005

APPENDIX E
ESTIMATION OF TRANSPLANTABLE
SMALL PERSIMMON

Appendix E - Estimation of Transplantable Small Persimmon

Grid No.	No. of Individuals in Diff Height (m)				Total	No. of transplantable individuals *	% of transplantable Individuals among 0-1m in Height
	0-1	1-2	2-3	3+			
1A	7	3	4	0	14	5	71%
1B	6	2	0	0	8	6	100%
1C	1	3	2	0	6	0	0%
1D	0	6	1	0	7	0	0%
1E	5	2	3	0	10	3	60%
1F	6	9	1	0	16	4	67%
2A	7	4	0	0	11	4	57%
2B	3	2	0	0	5	3	100%
3A	16	17	0	0	33	9	56%
3B	11	0	0	0	11	5	45%
3C	9	1	2	1	13	7	78%
3D	5	1	1	0	7	4	80%
Total	76	50	14	1	141	50	

Average % of transplantable Individuals among 0-1m in Height

$$= 50 / 76 * 100\%$$

$$= 66\% \text{ (Approx. 70\%)}$$

- * • Young individual with vigorous growth (<0.5m in height)
- Grown away from other woody plants
- Grown away from obstacles (e.g. rocks, man-made structures)
- Not grown on steep slope (>40 degree)

**APPENDIX F
TYPICAL DESIGN OF TREE
PROTECTON ZONE**

Appendix F – Typical Design of Tree Protection Zone

