



Drainage Services Department

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

**Protection and Transplantation Proposal
(Version 7.1)**

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.

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10 July 2019

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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**

**Protection and Transplantation Proposal
(Conditions 2.13(ii) and 2.14 of EP-533/2017)**

Reference is made to the captioned Protection and Transplantation Proposal (Version 7.1) 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

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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 Protection and Transplantation Proposal proposed in Sections 8.8.2.4, 8.8.3.3, 8.10.1.3 of the EIA Report are listed as follows:
- Potentially affected plant species of conservation importance identified should be labelled and fenced off on site prior to the commencement of works for better protection.
 - The potentially affected individuals shall be preserved, or in the case of unavoidable loss, transplanted.
 - The proposal should include subsequent monitoring visit for the affected individuals.
 - The proposal should be conducted by a suitably qualified local ecologist / horticulturist with at least 10 years relevant experience.

-
- The Proposal should be submitted for approval from EPD at least one month before works commencement.
- 1.6 Condition 2.13(ii) of the EP specifies that a Protection and Transplantation Proposal for the affected plants should be prepared before works commencement. Cinotech Consultants Limited was commissioned by the Drainage Services Department (DSD) to prepare a Protection and Transplantation Proposal. This proposal is prepared by a qualified ecologist with at least 10 years relevant experience (**Appendix D** refers). Details of the proposal specified in the EP include:
- the target species;
 - methodology for pre-construction survey, in situ preservation and/or transplantation for each species;
 - identification of suitable receptor sites;
 - an implementation programme of in situ preservation and/or transplantation; and
 - a post-transplantation monitoring and maintenance programme

2 SUMMARY OF FINDINGS OF DETAILED VEGETATION SURVEY**Findings and Recommendations in Detailed Vegetation Survey**

- 2.1 A detailed vegetation survey was conducted to verify the findings in EIA, and to identify whether or not other species of conservation importance are present in the Project Boundary (**Figures 1a-1e**). 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.
- 2.2 Detailed vegetation survey was conducted within four sites:

Table 2-1 Project Boundary

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

- 2.3 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.
- 2.4 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 in Sites 1 - 3. No species of conservation importance was observed in Site 4.

Table 2-2 Flora Species of Conservation Importance Found within Project Boundary in the Current Study

Chinese Name (Species Name)	Distributi on in Hong Kong#@	Observations in Appendix 8.03 of the EIA	Conservation Statuses	No. of Individuals observed within Project Boundary				No. of Individu als within Works Area
				Site 1	Site 2	Site 3	Total	
香港安蘭 Purple Bulb Orchid (<i>Ania hongkongensis</i>)	Common	<ul style="list-style-type: none"> Fung Shui Wood (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) 	5			5	1
土沉香 Incense Tree (<i>Aquilaria sinensis</i>)	Common	<ul style="list-style-type: none"> Woodland (Occasional) Fung Shui Wood (Occasional) 	<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 			1	1	1
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 		5	4	9	8
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 		21	158	179	78

Chinese Name (Species Name)	Distributi on in Hong Kong#@	Observations in Appendix 8.03 of the EIA	Conservation Statuses	No. of Individuals observed within Project Boundary				No. of Individu als within Works Area
				Site 1	Site 2	Site 3	Total	
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 	6,100	2,500	11,100	19,700	14,100
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 	2,000 m ²	2,800 m ²	2,650 m ²	7,450 m ²	6,100m 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. Agriculture, Fisheries and Conservation Department (AFCD).

2.5 The number and location of *Diospyros vaccinioides*, *Gnetum luofuense* and the other species of conservation importance are illustrated in **Figures 2a-2i**. A plant schedule showing survey summary, photographic record and number of affected *Diospyros vaccinioides* and coverage of *Gnetum luofuense* are shown in **Appendices A, B and C** respectively.

Recommendations

2.6 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

2.7 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 3.2**.

Minimization

- 2.8 Plants that fall within the works area are prone to damage during 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.
- 2.9 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.

- 2.10 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. While D0008 falls within development footprint in Site 2, it has poor health condition and is unlikely to survive after transplantation. Therefore, transplantation is not considered. 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.
- 2.11 *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 shrubland, woodland and plantation. 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.
- 2.12 According to the plant specialist, there is high risk of transplantation failure for this species *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 6a – 6d**. 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** 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 2-3 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** of Detailed Vegetation Survey Report).

2.13 *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. Therefore, transplantation is not recommended and compensation will be proposed in **Section 2.16**.

Compensation

2.14 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.

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

- 2.15 For *Diospyros vaccinioides*, compensatory planting by planting 13,600 nos. of seedling is proposed at the planting area on future completed 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.
- 2.16 Similarly, *Gnetum luofuense* will be compensated by seedling planting at the future planting area. 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 (**Figures 3b – 3c**).
- 2.17 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 $\leq 35^\circ$.
- 2.18 *Cibotium barometz* grows in damp environment (such as stream and seeping rock). However, nearby suitable habitat (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.

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-healthy.org/NP_tree_monitoring_2015_02.pdf. Last Accessed: 3 July 2019.

Summary of Recommendations

2.19 The overall recommendations is summarized in the following table:

Table 2-4 Summary of Recommendations (by Site)

Common Name	Species Name	Units	Recommendations				Compensator y Planting in Temporary Works Area
			Retain	Trans plant	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%)	7,450 (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 2-5 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 dicoccum</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

3 METHODOLOGY

Pre-construction Survey

- 3.1 All affected plant species of conservation importance (except *Diospyros vaccinioides* and *Gnetum luofuense*) were tagged during the detailed vegetation survey. Before commencement of site clearance, a pre-construction survey should be carried out within and adjacent to the works area to re-confirm the locations of the plant and update their condition. A new tag should be provided if the tag is damaged. An updated location plan, plant schedule and photographic record should be prepared. The survey should be carried out by a qualified local ecologist / botanist with at least 10 years relevant experience to be certified by the Environmental Team and verified by the Independent Environmental Checker. He/she shall form part of the Environmental Team (ET).

In-situ Preservation

- 3.2 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 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 near the edge of the works area. A typical design of the tree protection zone is shown in **Appendix E**. For plant species of conservation importance to be preserved (inclusive of trees, shrubs and herbs), the protection zone should be set 1m from 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.
- 3.3 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.

Transplantation

Preparation of Receptor site

- 3.4 The proposed receptor site for the transplanted individuals should first be cleared of rubbish, weeds and stones over 25mm diameter that may interrupt plant growth. The soil should be ploughed/scarified to loosen the soil, introduce air and improve drainage. Planting holes should be 1.5 times greater than the root ball of the transplanted individuals. The depth should not be too deep that the root level would be below the surrounding ground level after transplanting. The prepared ground should be protected from being compacted, eroded, silted up or damaged.

Preparation of root ball

- 3.5 Plants proposed to be transplanted are herb (*Ania hongkongensis*), fern (*Cibotium barometz*), young shrub (*Diospyros vaccinioides*) and young tree (*Aquilaria sinensis*). As they do not have extensive root system, no root pruning is proposed and preparation of root ball covering the entire root system is recommended. It should be prepared under the supervision of qualified ecologist or landscape contractor (who are on the List of Specialist Contractors for Public Works under Landscaping category, managed by Development Bureau). The plant should be well-watered before lifting. After digging up the plant, the root ball should be fully wrapped by damp Hessian and secured with a metal net or the like. As the plants are either not wooded or with weak stem, care should be taken to avoid damaging the plant during lifting and movement. They should be picked up by their root balls but not the stem or leaves. The leaves should be softly wrapped with tarpaulin to protect from damage during transportation. The transplants of *Diospyros vaccinioides* should be tagged (either on the plant or on the container) before transporting to the nursery and their original locations should be marked on a map to facilitate the subsequent checking and monitoring.

Transplantation

- 3.6 Lifted plant should be transplanted to the receptor site as soon as possible. Otherwise, they should be kept upright and watered at the nursery. At the nursery, light shading should be provided to protect the plant from heat and minimize evapotranspiration. It should also be protected from strong wind that may overturn the plant. A landscape contractor with knowledge on plant care will be engaged by the Contractor. The nursery location and requirements shall be proposed by the qualified ecologist or landscape contractor to AFCD for review.
- 3.7 At the receptor site, all wrappings should be removed before planting into the prepared pit. Soil excavated during pit preparation should be reused for backfilling. The soil should be slightly tamped to stabilize the plant. The plant should be well-watered once planted. Mulches can be added on soil surface to maintain moisture, as nutrients source and protection from sunlight and weed growth. For *Aquilaria sinensis*, supports (e.g. bamboo stakes) may be provided to keep it upright. As the receptor site is close to the construction area, robust and bright fencing should be erected to protect the plants.

Compensation

Seedling Planting

- 3.8 *Diospyros vaccinioides* and *Gnetum luofuense* shall be compensated by seedling planting in future planting areas available in Sites 1 and 3 as shown in **Figures 3a – 3c**. Seeds shall be collected from the individuals within or outside the project boundary.
- 3.9 The fruiting period of *Diospyros vaccinioides* is October – February. As around 13,600 nos. of *Diospyros vaccinioides* will be affected, 13,600 nos. of seedlings shall be propagated. Healthy seedlings will be selected and planted at the SIMAR slopes near the access road in Site 1 Magazine Site and behind the Main Portal in Site 3 A Kung Kok Site (orange hatched area in **Figures 3a – 3c**). Seedling planting can commence once the slopes are formed.
- 3.10 The fruiting period of *Gnetum luofuense* is August – October. Healthy seedlings will be selected and planted in the planting area in Sites 1 and 3. Upon completion of construction activities, the temporary works area will be released for reinstatement (orange and green hatched area in **Figures 3a – 3c**). Seedling planting is proposed on the edge of the planting areas. This promotes linkage to the undisturbed natural habitat and allows that climber to cling onto existing trees to obtain sunlight. To prevent the aggressive growth of *Gnetum luofuense* that may affect the health of the other vegetation in the planting area, one seedling shall be planted at 50m interval. The planting areas in Sites 1 and 3 can accommodate a total of 17 planting locations (blue dots in **Figures 3a – 3c**).

Broadcast Seeding

- 3.11 To further enhance the *Diospyros vaccinioides* population, broadcasting seeding is proposed in the temporary works area after cessation of construction activity (green hatched area in **Figures 3a – 3c**). Seeds shall be collected from the individuals within or outside the project boundary.

Whip Tree Planting

- 3.12 As the Site mainly consists of slope, planting of *Canthium dicoccum* in the form of whip tree is proposed to enhance survival rate. Planting area with gentle topography (35°) will be chosen and the potential planting location is shown in **Figures 3a – 3c** (green hatched area). Site preparation and planting method should follow the same principle in **Sections 3.4 – 3.6**.

4 IDENTIFICATION OF RECEPTOR SITETransplantation

- 4.1 Plants proposed to be transplanted are *Ania hongkongensis*, *Aquilaria sinensis* and *Cibotium barometz*. The former two grows under the tree canopy while the last one favours damp environment.
- 4.2 For *Ania hongkongensis* (H0002) in Site 1, it is proposed to be transplanted to the undisturbed woodland next to the other individuals (H0001) in Site 1 (see **Figure 3b**).
- 4.3 *Aquilaria sinensis*, *Cibotium barometz* are growing in Sites 2 and 3. As the existing streams in Site 2 where *Cibotium barometz* grows will be fully utilized for the project, no space is left for transplanting work. The area upslope to the works area in Site 3 is proposed as the receptor site (see **Figure 3c**). It is a woodland with a flowing stream where the retained E0007 *Cibotium barometz* grows, similar to existing habitats for the affected plants. Site 2 and 3 are connected via Miu Tsz Lam Road. This receptor site is chosen due to its proximity to the affected regions to minimize mobilization distance. Where possible, transplantation work is preferably done on the same day of lifting. Otherwise, the plants dug out shall be transported to a nursery before transplanting into their final receptor sites.
- 4.4 Transplantable *Diospyros vaccinioides* will be dug out prior to commencement of construction works and temporarily grown in nursery. As they will grow and adapt to the flat environment in the nursery, they are proposed to be transplanted to the planting area with gentle topography in Site 3 after cessation of work (green hatched area in **Figure 3c**).

Table 4-1 Proposed Transplantation

Plant / Colony No.	No. of individuals	Chinese Name	Common Name	Species Name	Existing Site	Receptor Site
H0002	1	香港安蘭	Purple Bulb Orchid	<i>Ania hongkongensis</i>	1	Woodland in Site 1 *
E0001a	16	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	2	Along a stream in Site 3 *
E0002	1	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	2	Along a stream in Site 3 *
E0003	2	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	2	Along a stream in Site 3 *
C0001	1	土沉香	Incense Tree	<i>Aquilaria sinensis</i>	3	Woodland in Site 3 *
E0004	7	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	3	Along a stream in Site 3 *
N/A	462	小果柿	Small Persimmon	<i>Diospyros vaccinioides</i>	1	Gentle ground in Site 3

* Outside works area

- 4.5 The locations and photos of the existing receptor sites that fall outside the works area are provided in **Figures 3b** and **3c**.

Compensation*Seedling Planting*

- 4.6 Seedlings of *Diospyros vacciniodes* will be planted on the newly formed SIMAR slopes in Site 1 and 3 (orange hatched areas in **Figures 3b – 3c**). Excluding the area occupied by soil nail heads, the remaining area will be used for planting seedlings of *Diospyros vaccinioides* at around 0.5m spacing. Therefore, the SIMAR slopes can accommodate about 14,821 nos. of *Diospyros vaccinioides*, sufficient for all seedlings.
- 4.7 Seedlings of *Gnetum luofuense* will be planted in all planting areas after cessation of works (orange and green hatched areas in **Figure 3b – 3c**). Seedlings will be planted at 17 locations at the edge of the planting area, which separate from each other by around 50m. The indicative locations are shown in **Figure 3b – 3c** (blue dots).

Broadcast Seeding

- 4.8 Seeds of *Diospyros vacciniodes* will be broadcasted in temporary works area outside the newly formed SIMAR slopes in Site 1 and 3 (green hatched areas in **Figures 3b – 3c**).

Whip Tree Planting

- 4.9 Whip trees of *Canthium diococcum* are proposed to be planted in temporary works after completion of construction works in Site 1. The planting locations are shown in **Figure 3c**. This area is selected due to its gentle topography which can enhance survival of this tree species.

5 IMPLEMENTATION PROGRAMME

In-situ Preservation

- 5.1 Prior to site clearance, the works area should be clearly demarcated to remind workers not to trespass to the area to be preserved. The protection zone is shown in **Figures 2a – 2i**. In addition, trees/plants which are to be retained should be clearly marked on site with a tag and surrounded by bright-coloured fencing of 1.5m in height. The construction works should be overseen by a resident site supervisor to ensure that the preservation measures are implemented and effective.

Transplantation

- 5.2 For *Ania hongkongensis*, *Cibotium barometz* and *Aquilaria sinensis*, the root ball preparation works should be completed before site clearance. The transplantation work is preferably carried out in early spring and autumn. If transplantation in summer cannot be avoided, the root ball preparation work should be carried out in early morning or late afternoon to avoid intense heat in noon, or on overcast or rainy days. Also, the plant should be well-watered before and after transplanting to avoid desiccation.
- 5.3 As the plants to be transplanted are small in size, preparation of root ball and transplantation for each individual are proposed to be done on the same day. If these cannot be done on the same day, the plant should be transported to a nursery.
- 5.4 If the prepared receptor site is left unattended for too long, it may be changed by natural forces (e.g. rain). Therefore, the receptor site for each individual should be prepared about two weeks beforehand. The transplantation is scheduled to be carried out in phases from around 2019 to 2021 subject to actual site progress.
- Prior to site clearance:
Collect individuals to be transplanted from the Site and transport to nursery or directly to the prepared receptor site
 - Two weeks prior to transplanting to receptor site:
Site preparation (e.g. removal of rubbish, weed and stone; ploughing; preparation of planting hole)
 - One-year establishment period after transplanting:
Regular monitoring of health condition (monthly in the first three months, quarterly afterwards), replacement planting if found dead (subject to agreement with AFCD)
 - Regular monitoring during construction period
Site inspection by Environmental Team (bi-weekly)
- 5.5 For *Diospyros vaccinioides*, the transplantable individuals should be dug out before site clearance. As the plants to be transplanted are small in size, preparation of root ball and transportation to the nursery are proposed to be done on the same day. When the construction activity in temporary works area along the access road to Magazine Site is completed, *Diospyros vaccinioides* in the nursery will be transplanted to these areas (green hatched area adjacent to the access road in **Figure 3b**) at a spacing of 0.5m. As in **Section 5.2**, the receptor site should be prepared about two weeks beforehand. The transplantation is scheduled to be carried out in phases from around 2019 to 2027 subject to actual site progress. Transplanting the individuals to the final receptor site in spring or autumn is recommended.

- Prior to site clearance:
Collect individuals to be transplanted from the Site and transport to nursery
- Two weeks prior to transplanting to receptor site (along access road in Magazine Site):
Site preparation (e.g. removal of rubbish, weed and stone; ploughing; preparation of planting hole)
- One-year establishment period after transplanting:
Regular monitoring of health condition (monthly in the first three months, quarterly afterwards), replacement planting if found dead (subject to agreement with AFCD)
- Regular monitoring during construction period
Site inspection by Environmental Team (bi-weekly)

Compensation

Whip Tree Planting

5.6 Whip trees of *Canthium dicoccum* would be planted in the green hatched area in **Figure 3b** to promote growth once the site is ready. Planting in spring or autumn is recommended. The implementation schedule is listed below:

- Two weeks prior to planting to receptor site:
Site preparation (e.g. removal of rubbish, weed and stone; ploughing; preparation of planting hole)
- One-year establishment period after planting:
Regular monitoring of health condition (monthly in the first three months, quarterly afterwards), replacement planting if found dead (subject to agreement with AFCD)
- Regular monitoring during construction period
Site inspection by Environmental Team (bi-weekly)

5.7 Based on the construction programme, the tentative planting schedule is from around 2022 to 2027, subject to completion of actual site works.

Seedling Planting

5.8 Seedlings of *Diospyros vaccinioides* would be planted on newly formed SIMAR slopes in Sites 1 and 3 (orange hatched area in **Figures 3b – 3c**). Based on the construction programme, the tentative planting schedule is from around 2022 to 2023, subject to completion of actual site works.

5.9 Seedlings of *Gnetum luofuense* would be planted in all available planting areas in Sites 1 and 3. The indicative planting locations are shown as blue dots in **Figures 3b – 3c**. Based on the construction programme, the tentative planting schedule is from around 2022 to 2027, subject to completion of actual site works.

- One year prior to availability of the receptor site:
Seed collection from nearby habitats
- Six months prior to availability of the receptor site:
Propagate the seeds
- Two weeks prior to planting to receptor site:
Site preparation (e.g. removal of rubbish, weed and stone; ploughing; preparation of planting hole)

-
- One-year establishment period after planting:
Regular monitoring of health condition (monthly in the first three months, quarterly afterwards), replacement planting if found dead (subject to agreement with AFCD)
 - Regular monitoring during construction period
Site inspection by Environmental Team (bi-weekly)
- 5.10 To promote growth of the seedlings in wet season, planting works should preferably be carried out in spring.

Broadcast Seeding

- 5.11 Outside the SIMAR slopes in Sites 1 and 3 are temporary works area for the project (green hatched area in **Figures 3a-3c**). Seeds of *Diospyros vaccinioides* would be broadcasted to promote the population of *Diospyros vaccinioides*. This shall be done in spring so that the seeds can germinate and establish in wet season. Before the receptor site is available, the collected seeds should be stored in sealed container, with moisture content below 7% and at temperatures of less than 15°C⁴. Based on the construction programme, the tentative planting schedule is from around 2022 to 2023 subject to completion of actual site works.
- One year prior to availability of the receptor site:
Seed collection from nearby habitats
 - Regular monitoring during construction period
Site inspection by Environmental Team (bi-weekly)

⁴ Hanson J. 1985. Practical Manual for Genebanks: No. 1. Procedures for Handling Seeds in Genebanks. VII. Seed Storage. [online] Available at: https://www.biodiversityinternational.org/fileadmin/biodiversity/publications/Web_version/188/ch09.htm. Last Accessed: 10 July 2019.

6 POST-TRANSPLANTATION MONITORING, POST-COMPENSATION MONITORING AND MAINTENANCE PROGRAMME

- 6.1 The transplantation works, whip tree planting works, seedling planting works and broadcast seeding work should be carried out by the contractor. The contractor should also monitor the health condition of the plants at the nursery and transplantation and compensatory planting receptor sites. Regular monitoring allows early detection of the growth status of species, sign of construction activity within and nearby the receptor site, and/or any environmental change of the receptor site. The findings shall be supplemented with photographic record.
- 6.2 The monitoring should be carried out by a qualified local ecologist / botanist with at least 10 years relevant experience to be certified by the Environmental Team and verified by the Independent Environmental Checker. He/she shall form part of the Environmental Team (ET).

Nursery Stage**Monitoring Frequency**

- 6.3 For plants stored in the nursery, monthly monitoring of the health is recommended prior to transplantation to the receptor site. Should the plant dies during the monitoring period, the contractor shall compensate the loss by seedling planting of the same species, subject to agreement with AFCD.

Post-transplantation & Post-compensation Stage**Monitoring Duration and Frequency**

- 6.4 According to Section 9.4.1.1 of the EM&A Manual, the Environmental Team should carry out site inspection at least once every two weeks during the construction period. Should the plant dies during the monitoring period, the contractor shall compensate the loss by seedling planting of the same species, subject to agreement with AFCD.

Maintenance Programme

- 6.5 To allow healthy growth of the transplanted species, the following maintenance works are recommended in the first year of establishment, to be carried out by the contractor:
- The frequency of watering shall be proposed by the ecologist who supervises the transplantation work based on the local environment of the receptor site. It should be adjusted depending on the wetness of the soil, in particular *Cibotium barometz* as it will be transplanted along a stream.
 - Remove weed by hand in the receptor site every month to avoid competition for water, nutrients, sunlight and growing space. The worker should be trained to be able to identify the transplanted plant species of conservation importance.
 - Apply fertilizer or pesticide for pest control if necessary.
 - Should the plant dies during the monitoring period, the contractor shall compensate the loss by seedling planting of the same species, subject to agreement with AFCD.

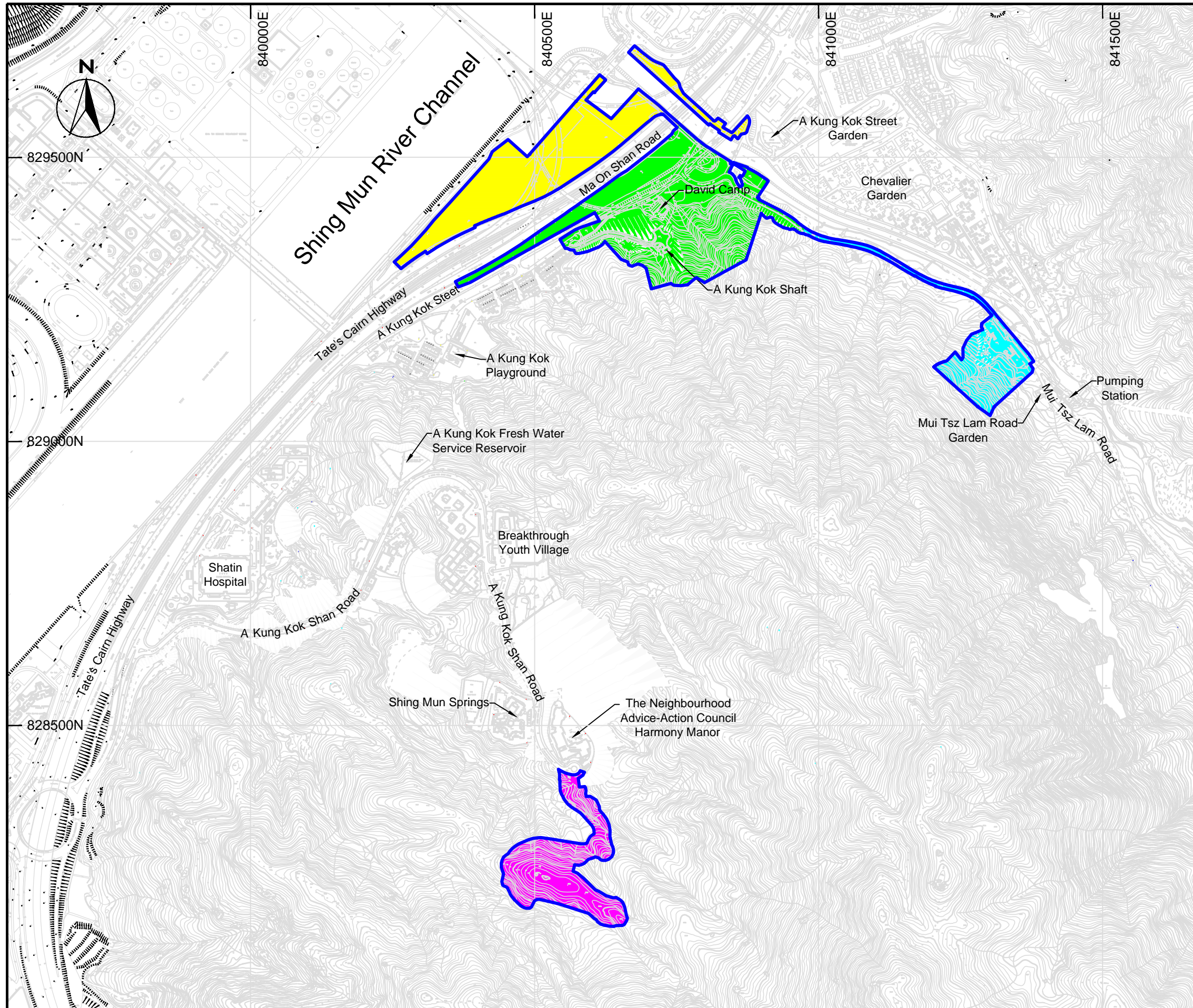
Maintenance Agent

- 6.6 The transplanted and planted individuals should be maintained by the contractor in the first year of establishment. After that, plants on SIMAR slopes formed in this Project will be maintained by DSD. In planting locations outside SIMAR slopes, the plants are expected to be self-sustaining.

7 CONCLUSION

- 7.1 Six plant species of conservation importance were recorded within and nearby the works area of the Project.
- 7.2 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 and E0007), four individuals of *Ania hongkongensis* (H0001), about 5,544 nos. of *Diospyros vaccinioides* and about 1,300m² of *Gnetum luofuense*.
- 7.3 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.)). They should be transplanted to receptor sites outside works area or to nursery temporarily prior to commencement of construction works. For 500 nos. of *Diospyros vaccinioides* to be transplanted, they will be collected prior to commencement of construction works and temporarily grown in the nursery. They will be transplanted to the SIMAR slope of this Project once formed. The exact numbers to be transplanted are subject to the actual site conditions.
- 7.4 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.
- 7.5 All transplanted and planted individuals should be regularly monitored and maintained through watering, weeding/grass cutting and fertilizing to ensure healthy growth.
- 7.1 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.

FIGURES



Legend

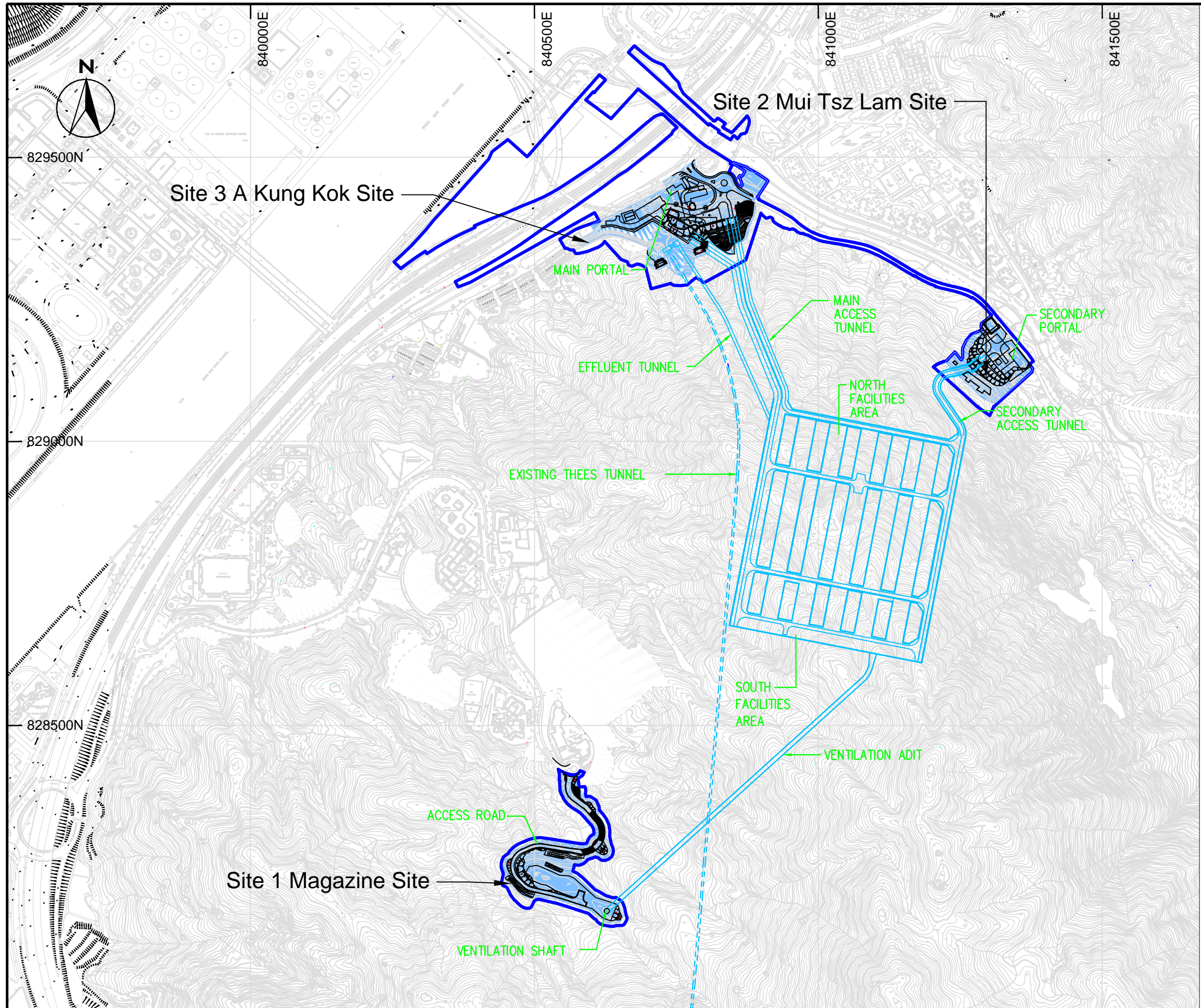
- Project Boundary
- Site 1 (Magazine Site)
- Site 2 (Mui Tsz Lam Site)
- Site 3 (A Kung Kok Site)
- Site 4 (Vehicle Detention Centre)



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

Site Plan and Project Boundary

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



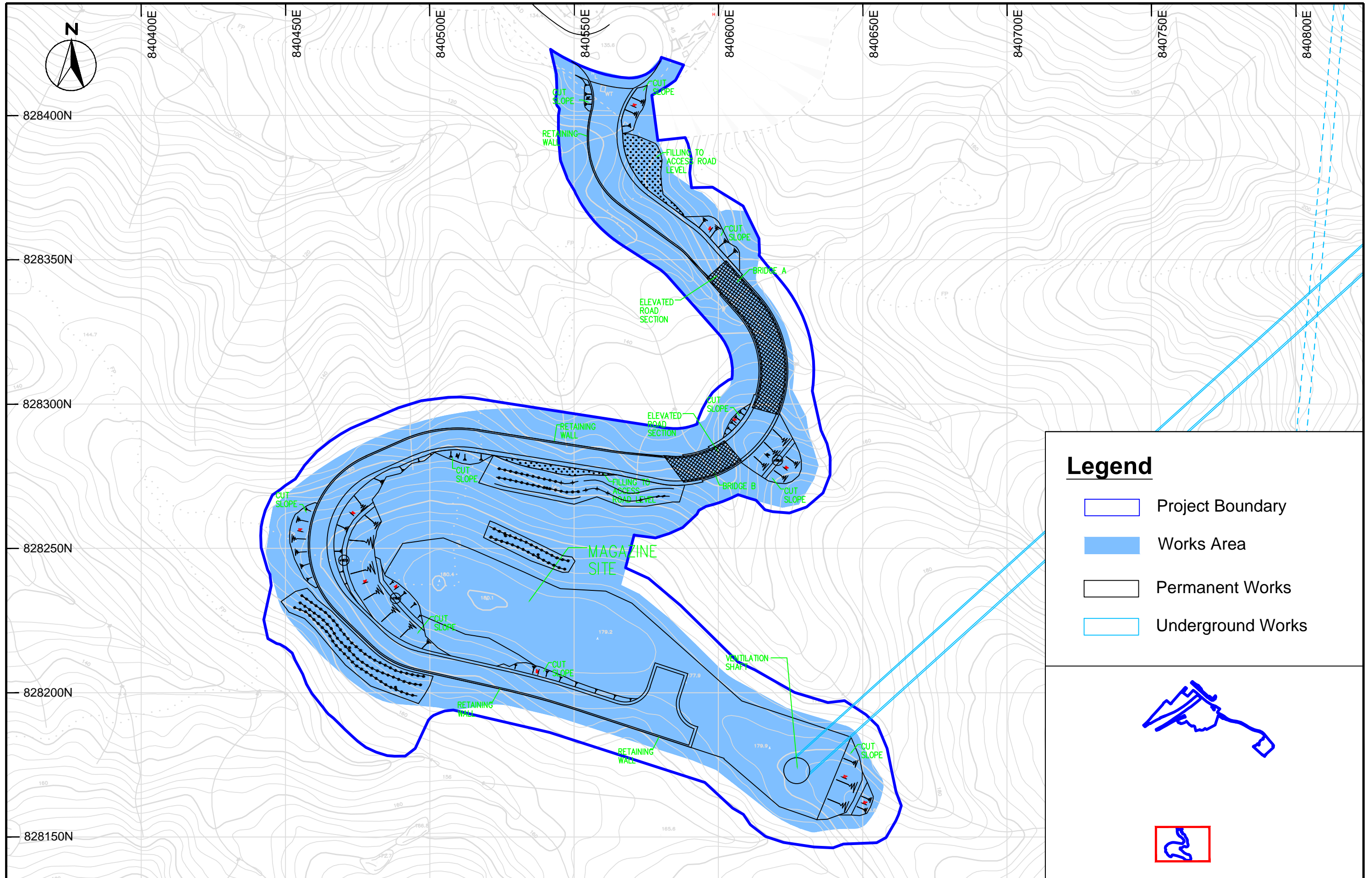
Legend

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



Contract No. SPW 09/2018
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works
Preliminary Development Plan (Overview)

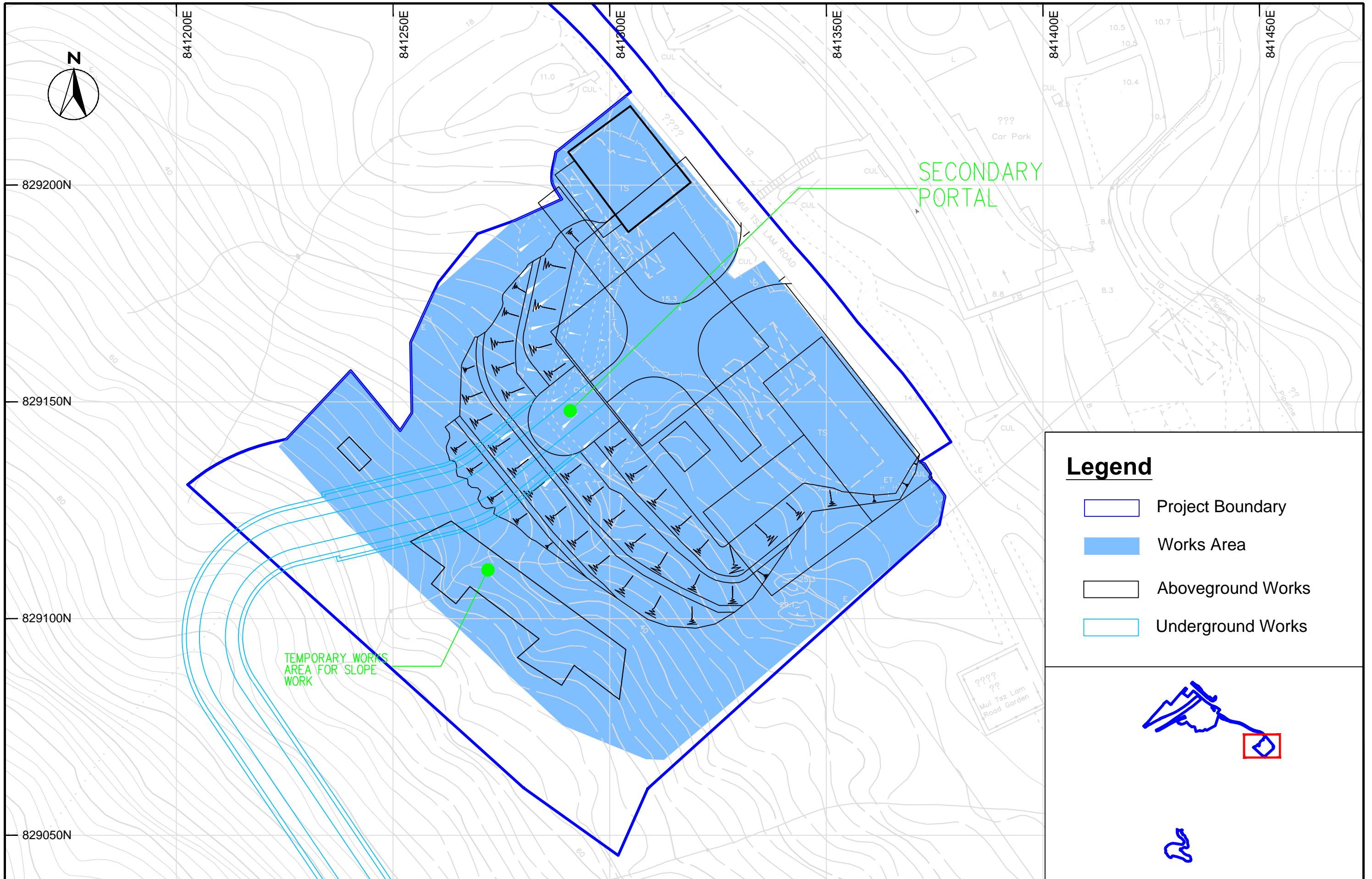
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JOB No.	IA18064	FIGURE No.	1b
		REV	1



Legend

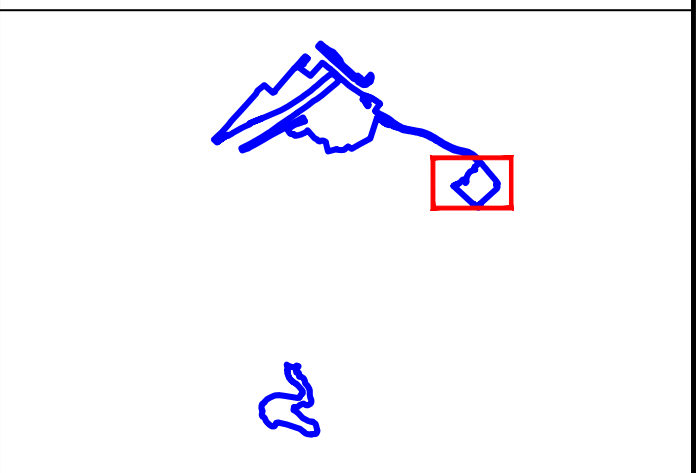
- Project Boundary
- Works Area
- Permanent Works
- Underground Works

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		REV	1

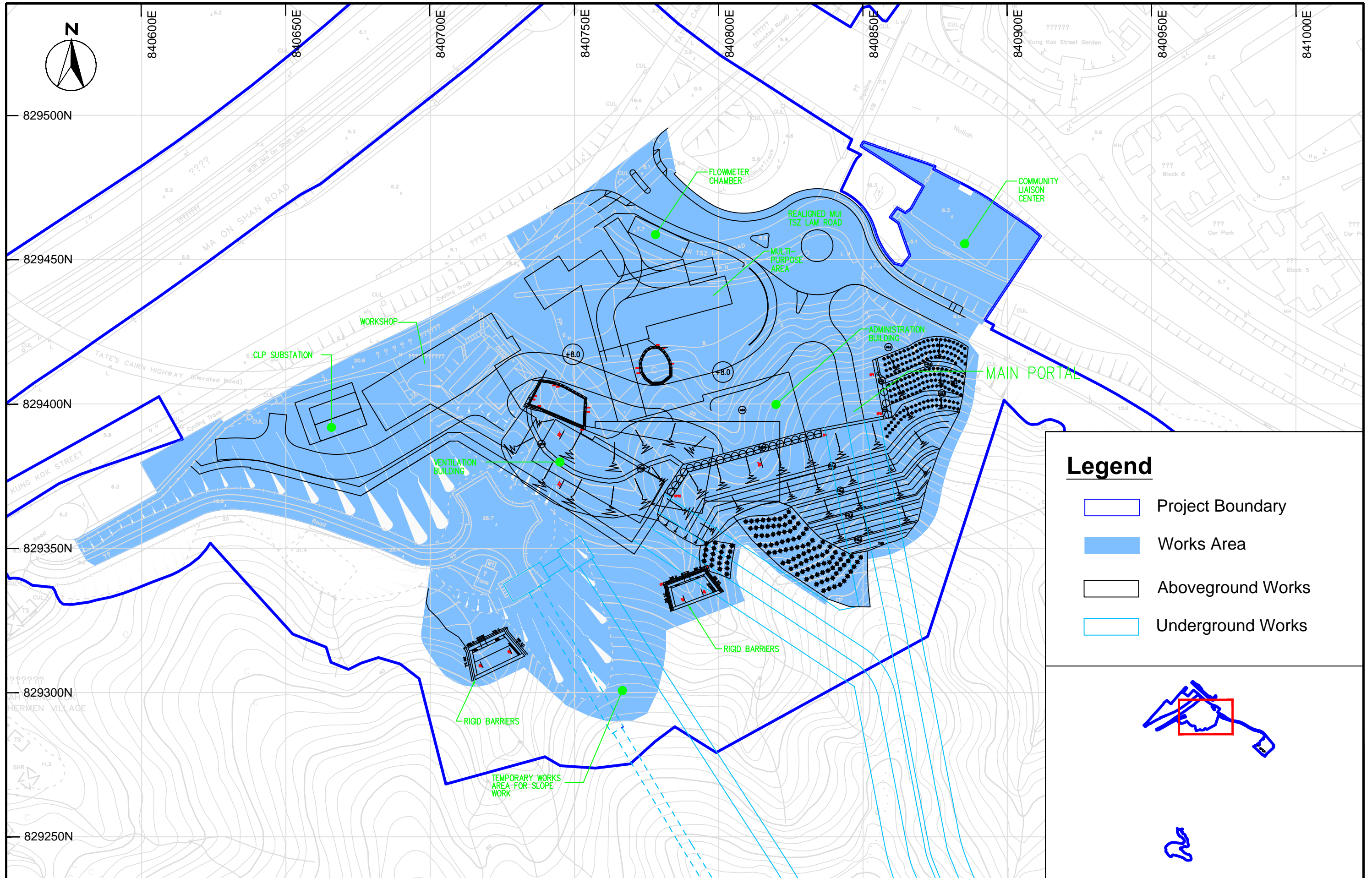


Legend

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

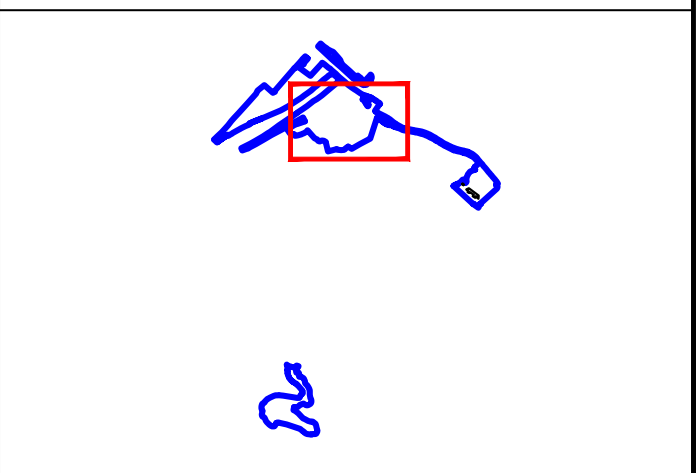


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JOB No.	IA18064	FIGURE No.	1d
		REV	1



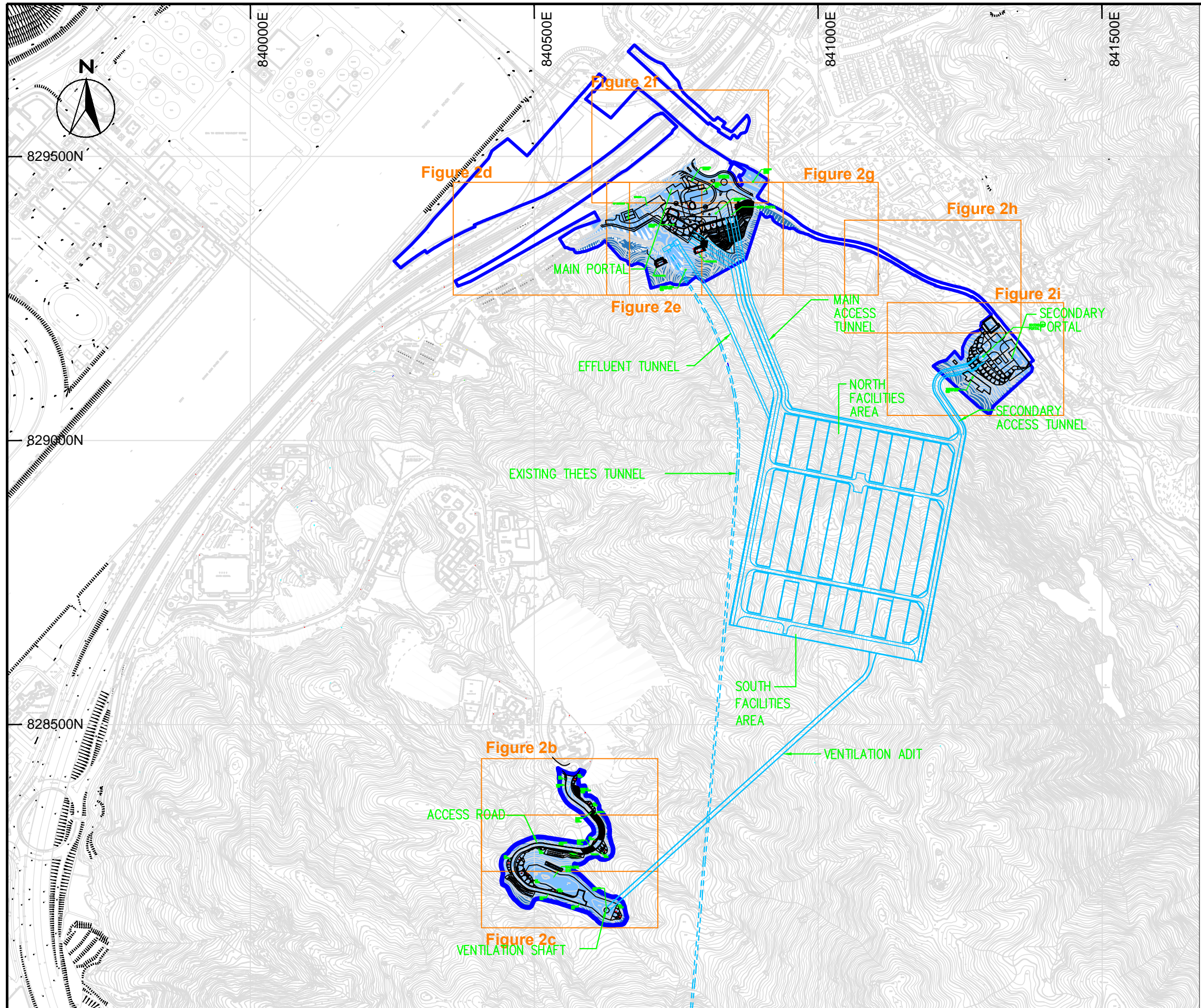
Legend

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



Contract No. SPW 09/2018
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works
Preliminary Development Plan (Site 3 A Kung Kok Site)

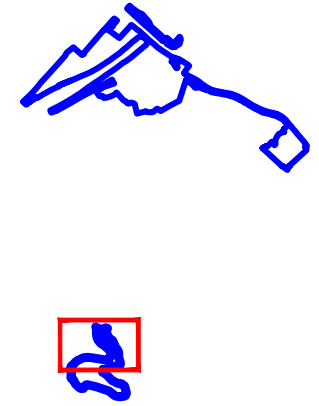
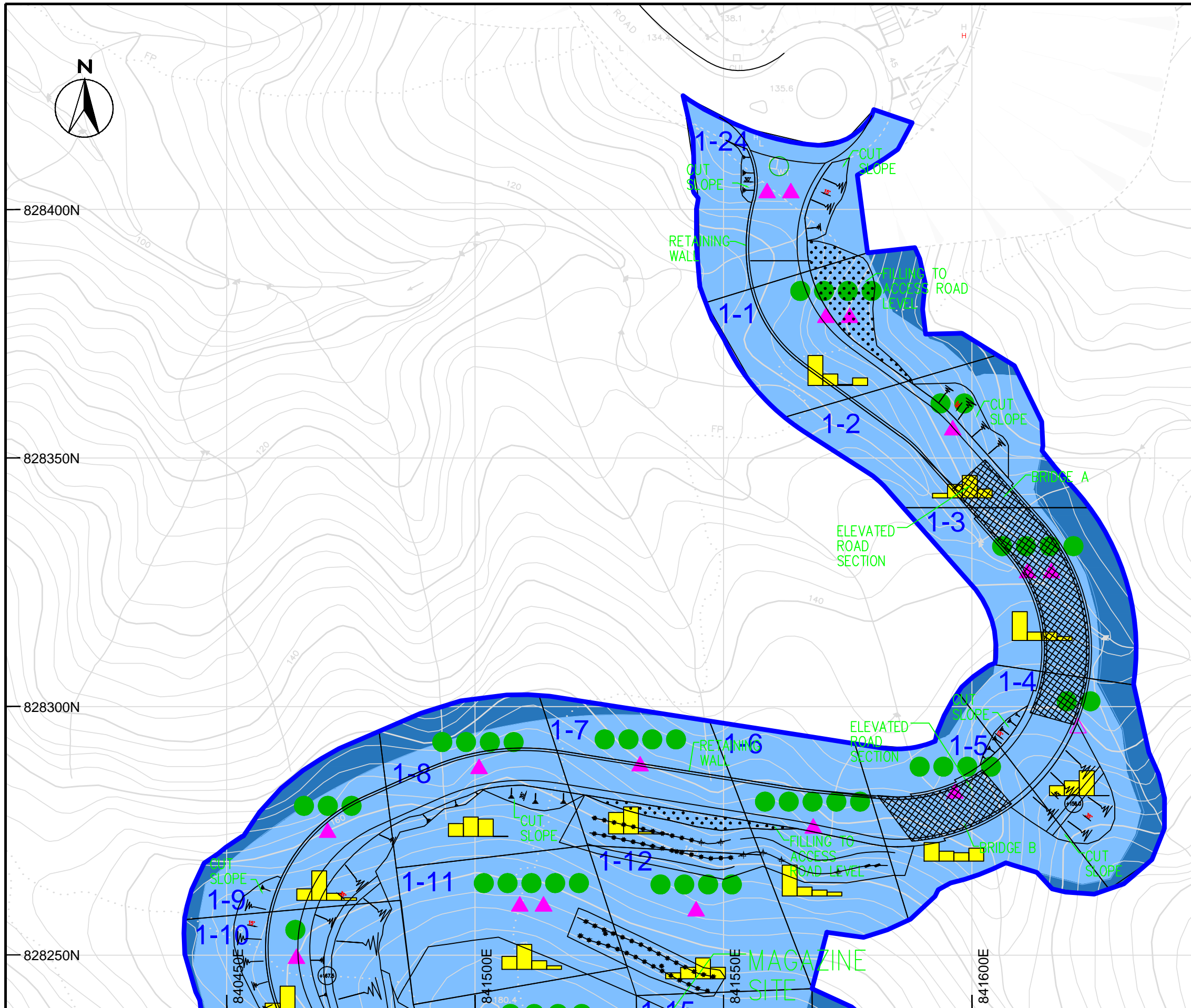
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CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	1e
		REV	1



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
- 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

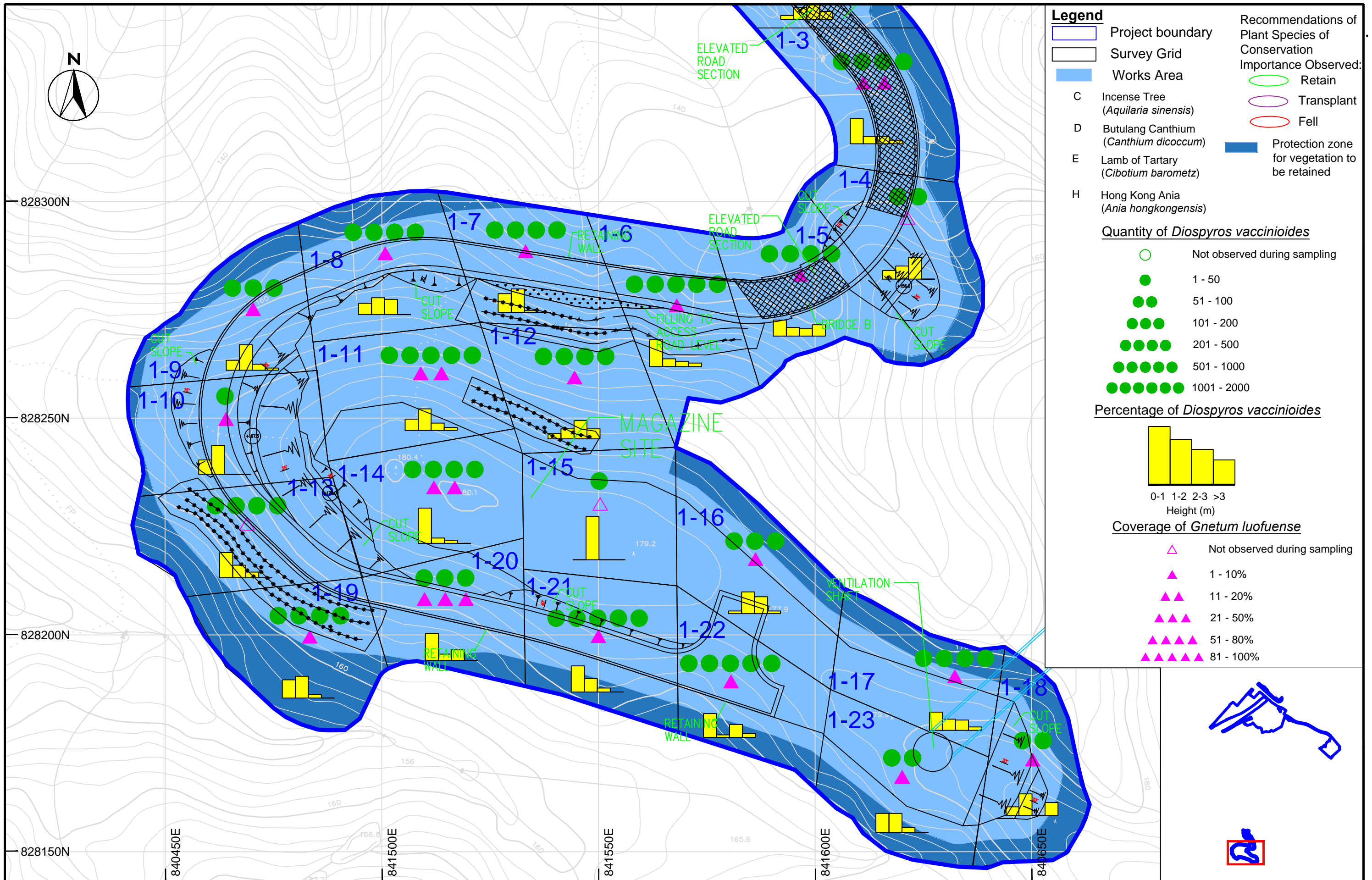
Percentage of *Diospyros vaccinioides*

- 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%



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 dicocum*)

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
- 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*

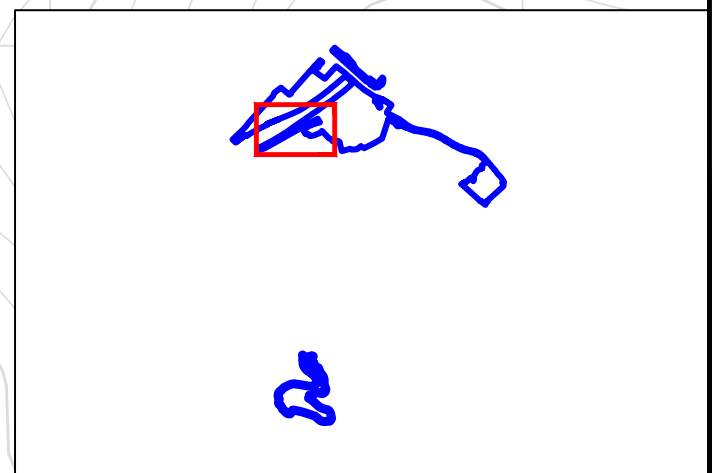
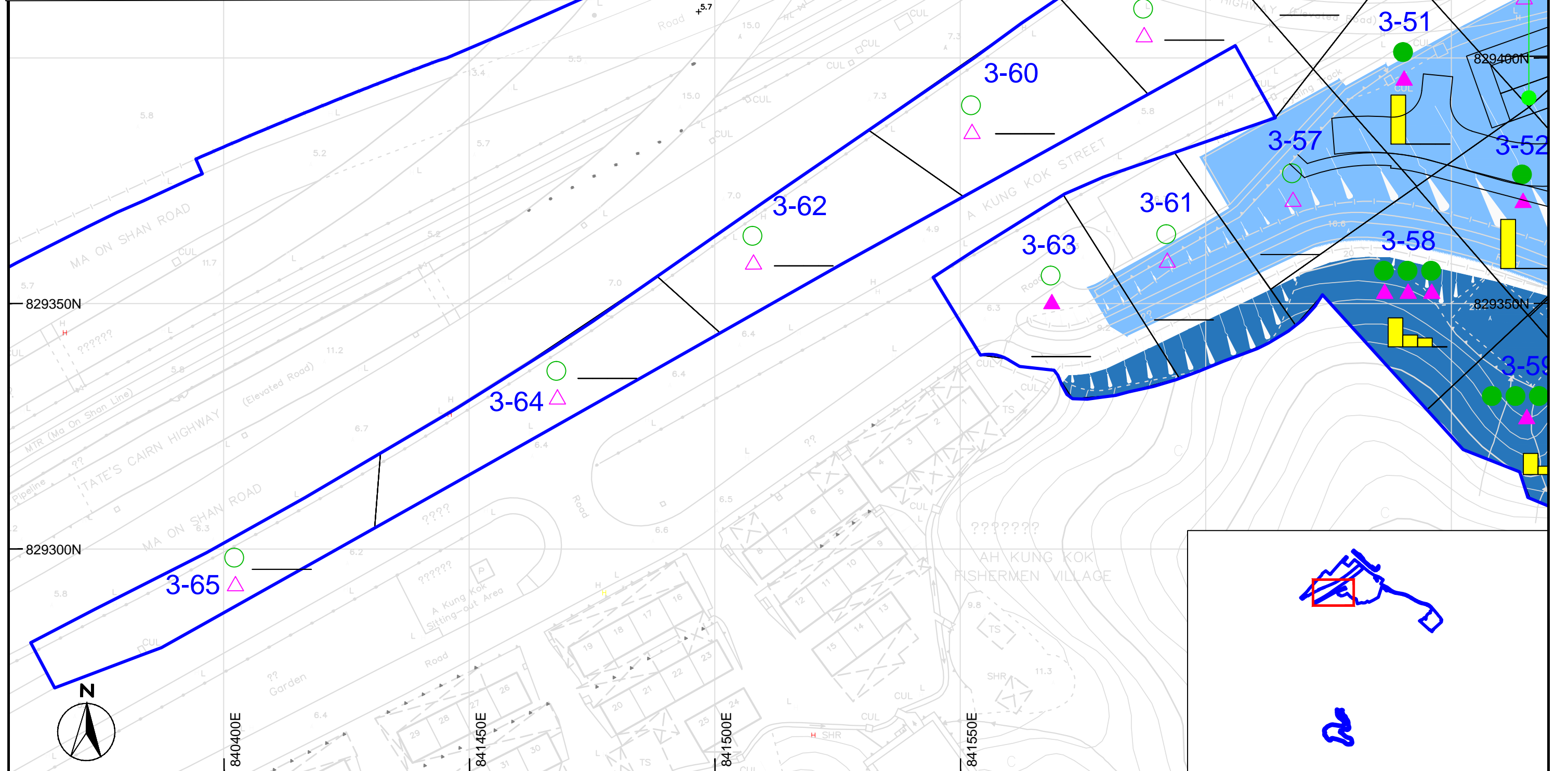
Not observed during sampling
1 - 10%
11 - 20%
21 - 50%
51 - 80%
81 - 100%

Percentage of *Diospyros vaccinioides*

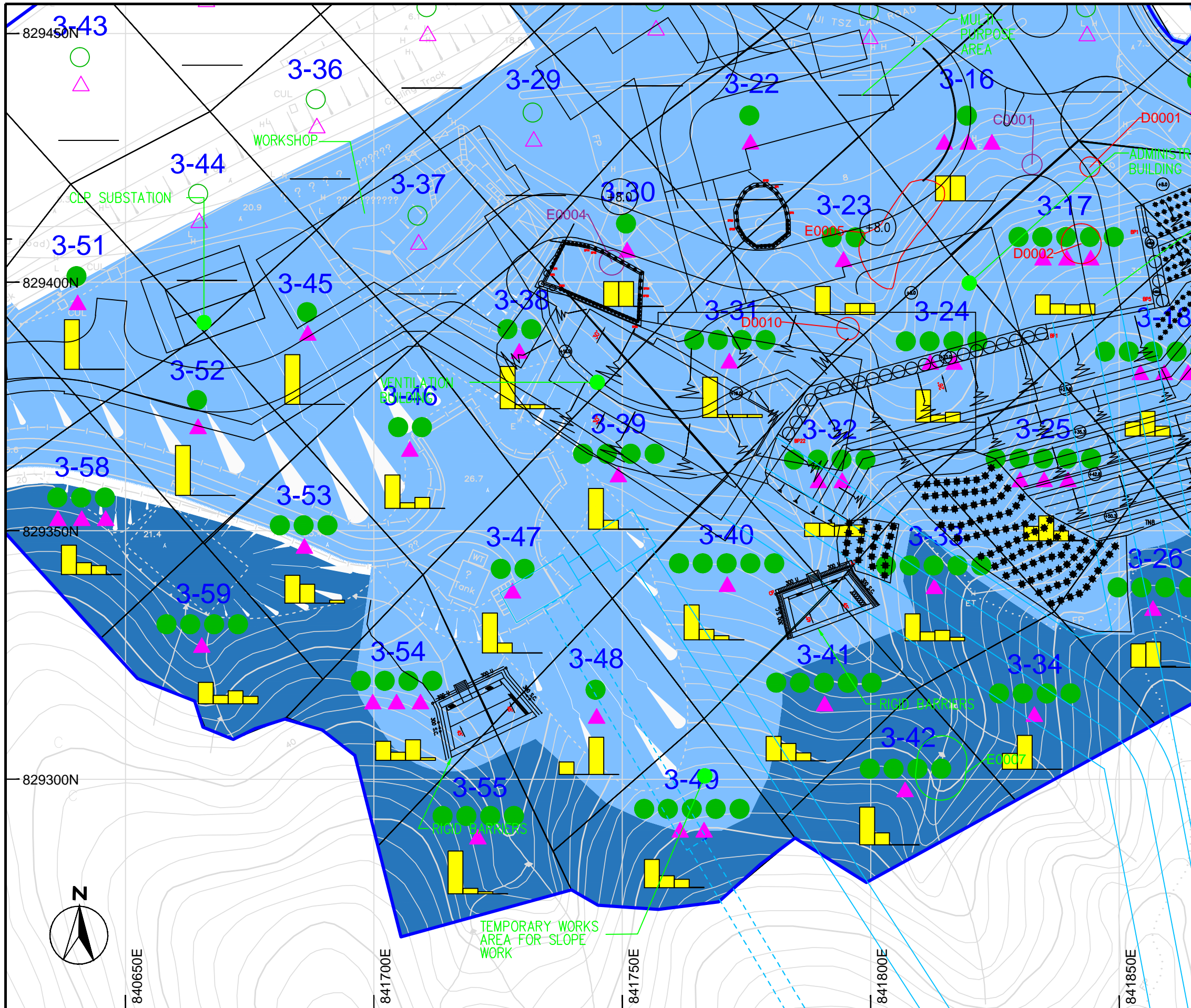
Height (m)	Percentage
0-1	0-10%
1-2	10-20%
2-3	20-30%
>3	30-40%

Species List:

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



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
- C Incense Tree (*Aquilaria sinensis*)
- D Butulang Canthium (*Canthium dicoccum*)
- E Lamb of Tartary (*Cibotium barometz*)
- H Hong Kong Ania (*Ania hongkongensis*)
- Retain
- Transplant
- Fell
- Protection Zone for Vegetation

Quantity of *Diospyros vaccinioides*

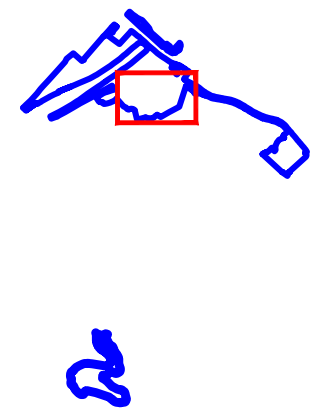
- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

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	MAY 2019	
CHECK	BC	DRAWN	TL	
JOB No.	IA18064	FIGURE No.	2e	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

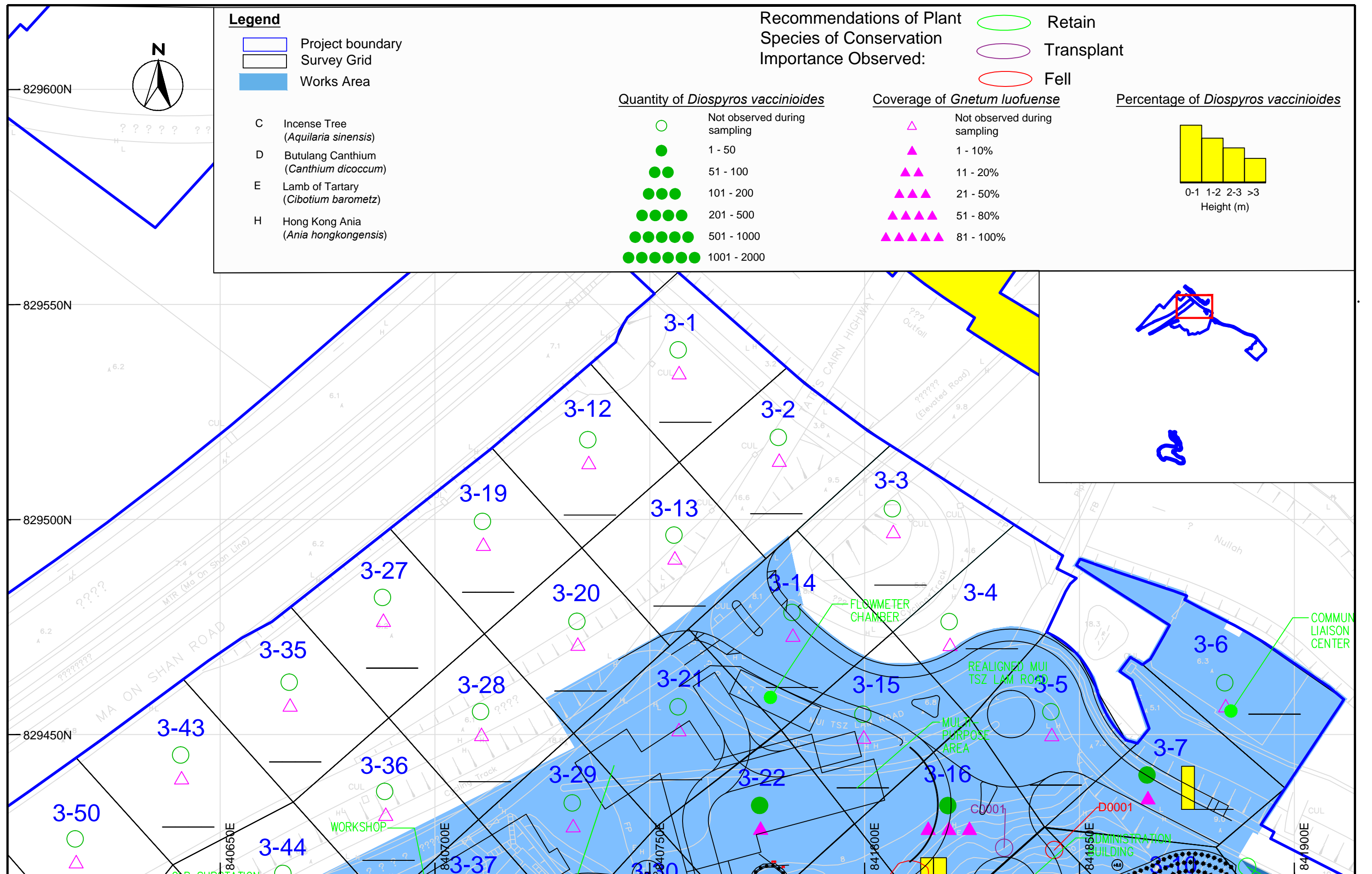
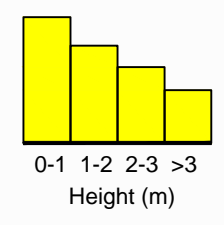
Quantity of *Diospyros vaccinioides*

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

Coverage of *Gnetum luofuense*

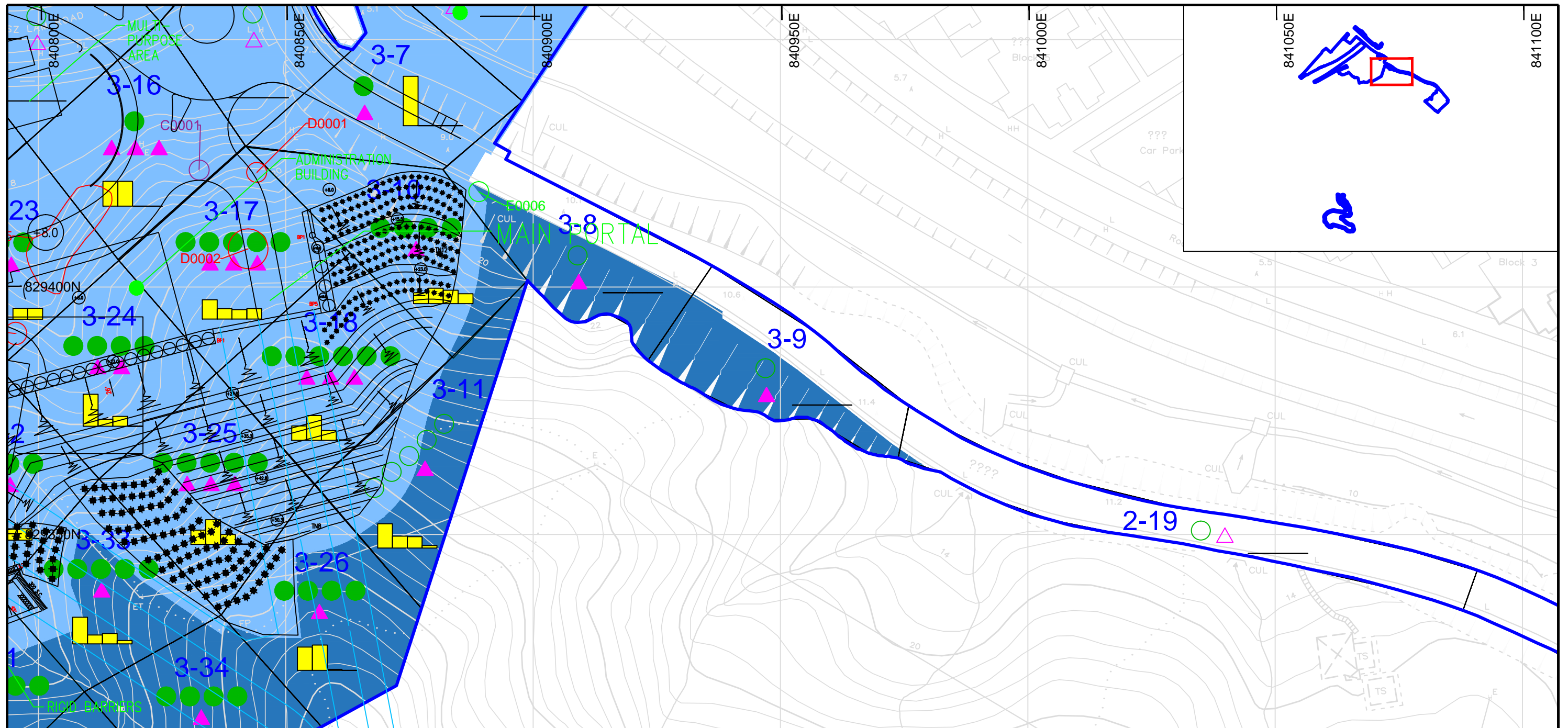
- Not observed during sampling
- 1 - 10%
- 11 - 20%
- 21 - 50%
- 51 - 80%
- 81 - 100%

Percentage of *Diospyros vaccinioides*



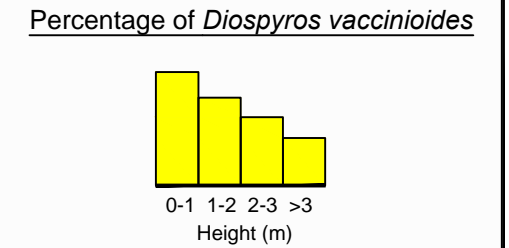
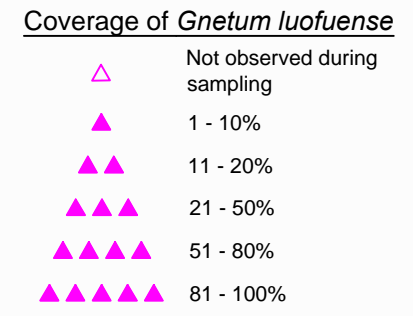
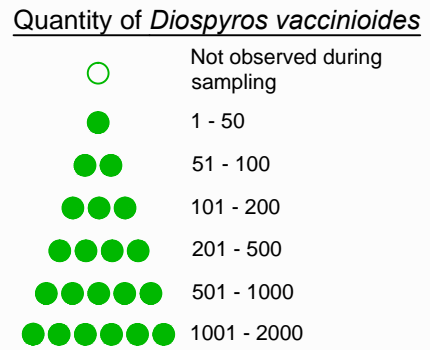
Contract No. SPW 09/2018
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works
Location of species of conservation importance (Site 3 A Kung Kok Site)

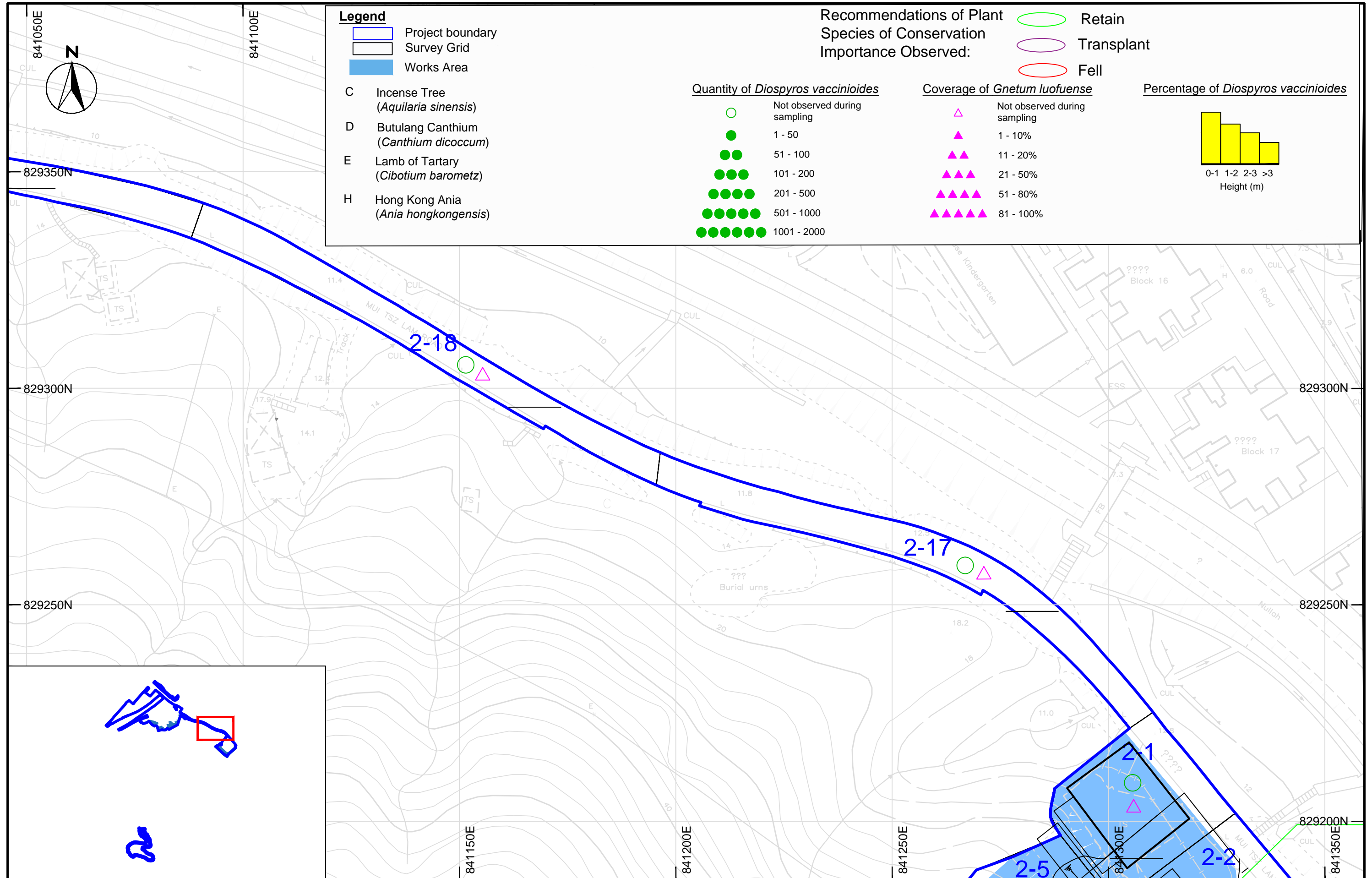
SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	2f
		REV	1

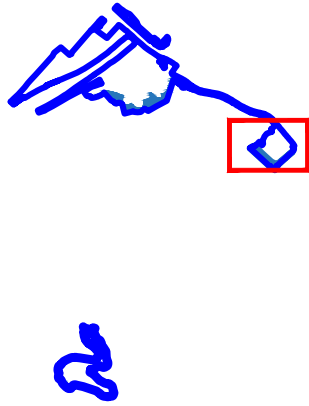


- Legend**
- Project boundary
 - Survey Grid
 - Works Area
 - Protection Zone for Vegetation
 - C Incense Tree (*Aquilaria sinensis*)
 - D Butulang Canthium (*Canthium dicoccum*)
 - E Lamb of Tartary (*Cibotium barometz*)
 - H Hong Kong Ania (*Ania hongkongensis*)

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

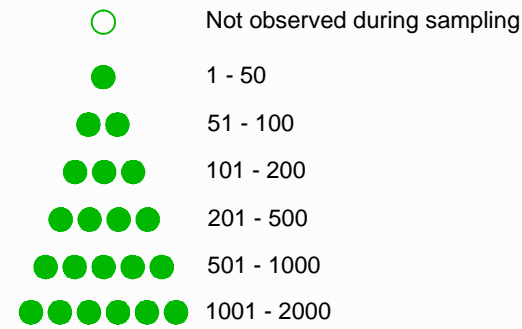




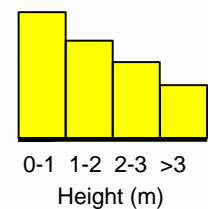


- Legend**
- Project boundary
 - Survey Grid
 - Works Area
- Recommendations of Plant Species of Conservation Importance Observed:
- Retain
 - Transplant
 - Fell
- Protection Zone for Vegetation
-
- C Incense Tree (*Aquilaria sinensis*)
 D Butulang Canthium (*Canthium dicoccum*)
 E Lamb of Tartary (*Cibotium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

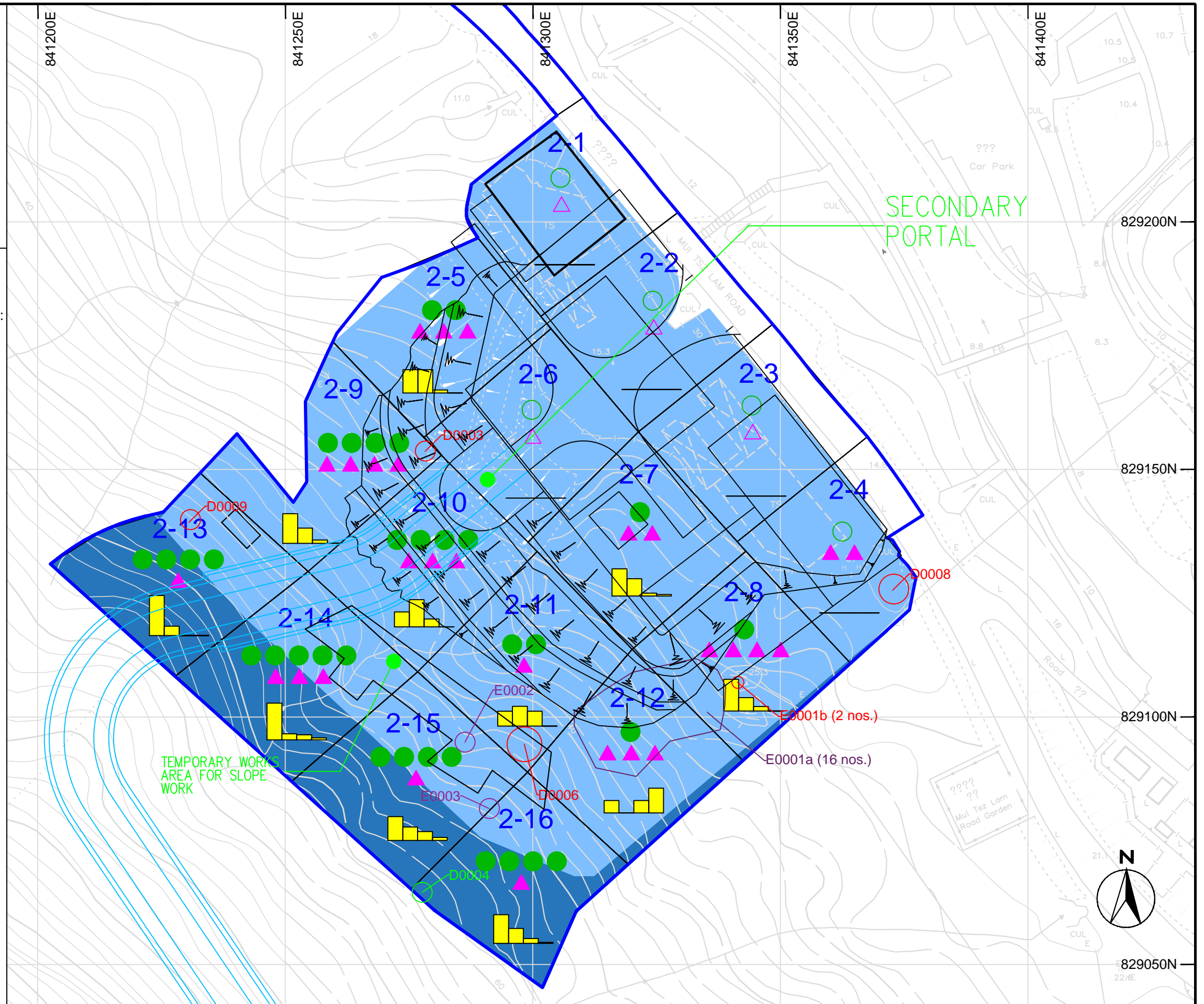
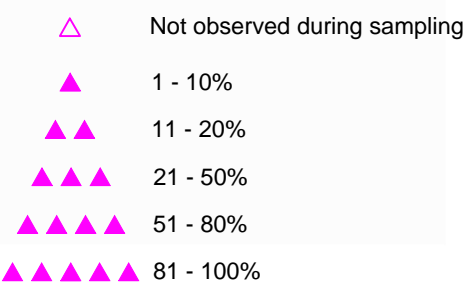
Quantity of *Diospyros vaccinioides*



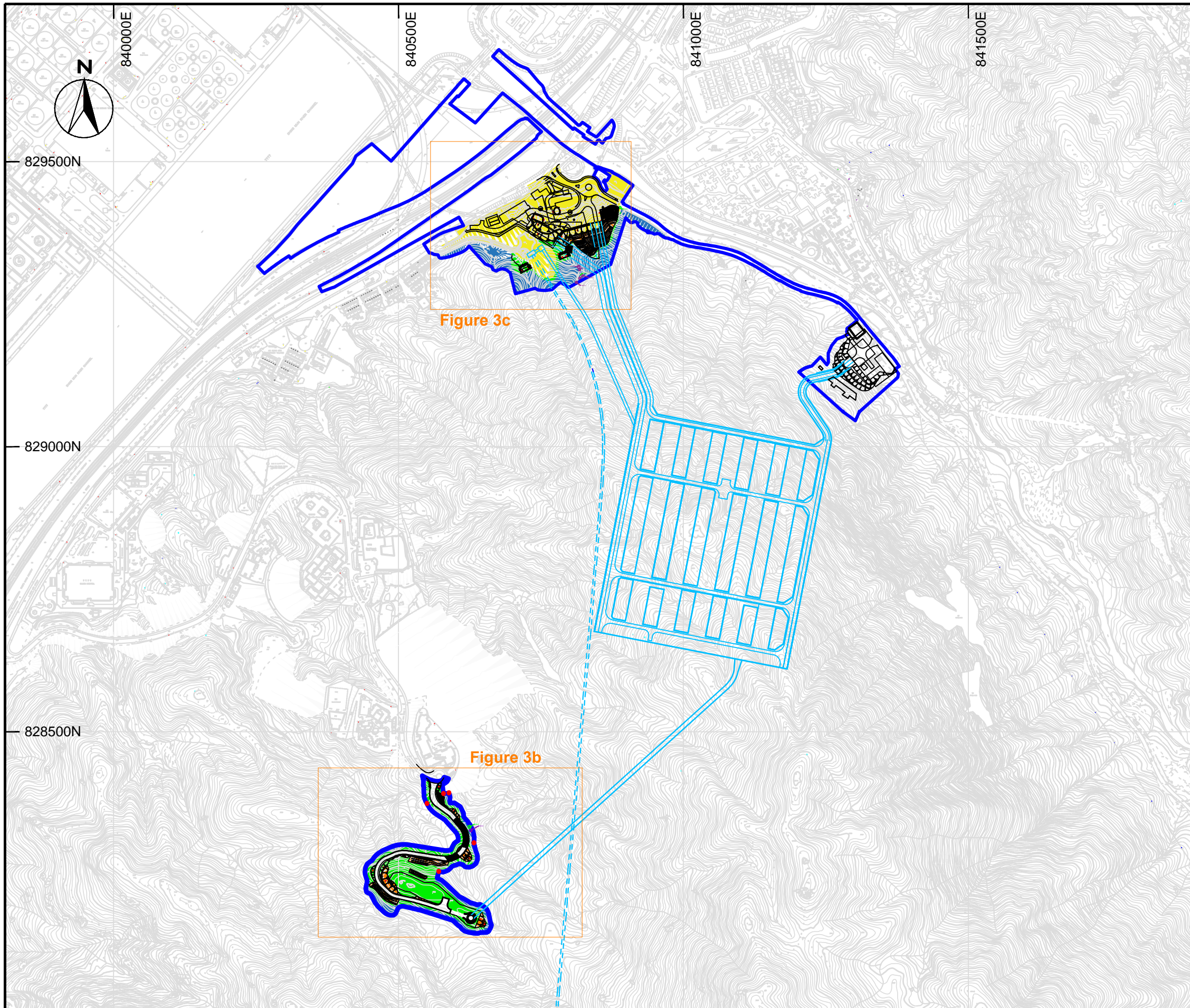
Percentage of *Diospyros vaccinioides*



Coverage of *Gnetum luofuense*

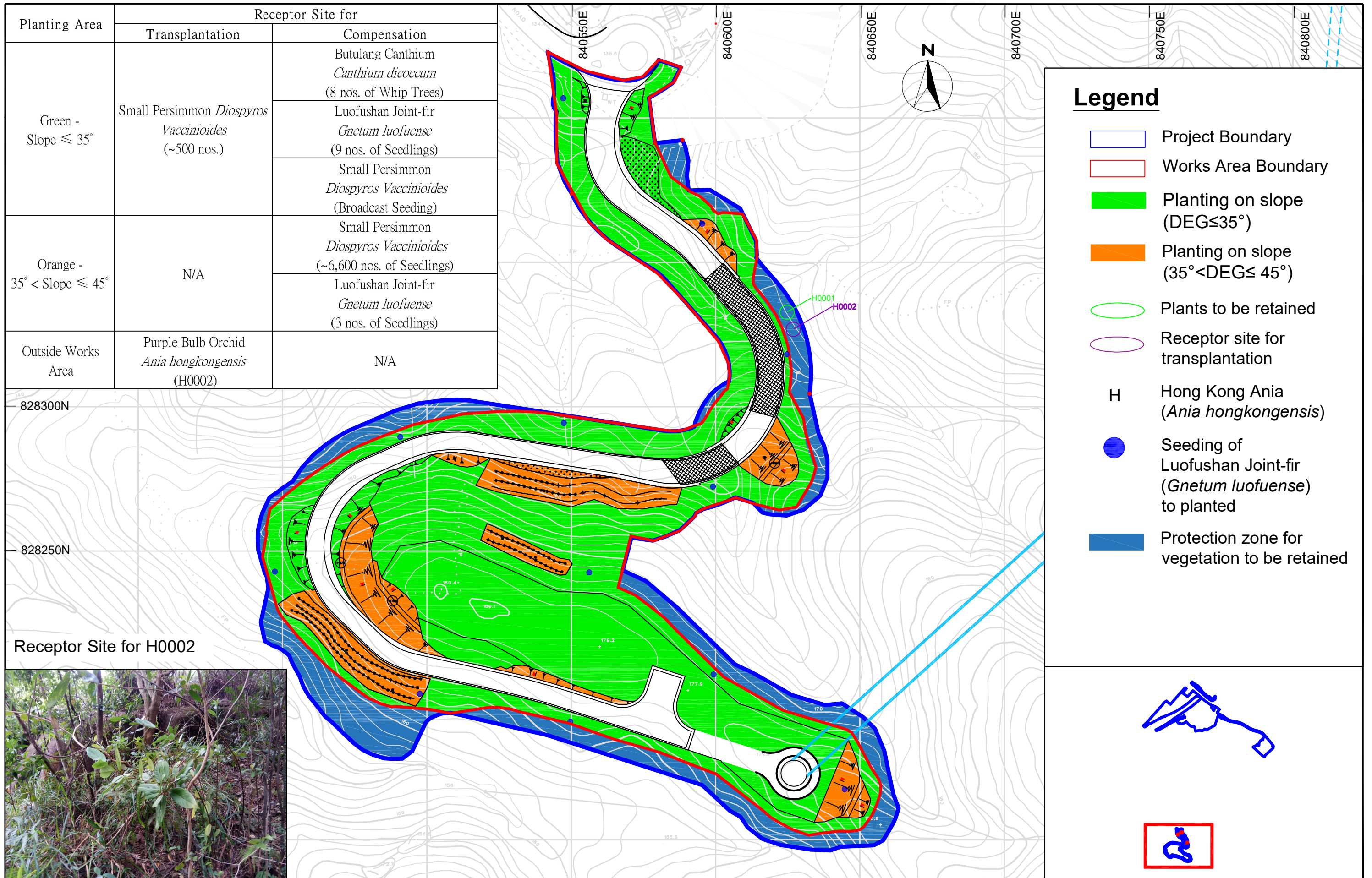


SCALE	1:800 @ A3	DATE	MAY 2019	
CHECK	BC	DRAWN	TL	
JOB No.	IA18064	FIGURE No.	2i	REV 1



- ### Legend
- Project Boundary
 - Works Area Boundary
 - Works Area
 - Planting on slope ($DEG \leq 35^\circ$)
 - Planting on slope ($35^\circ < DEG \leq 45^\circ$)
 - Plants to be retained
 - Receptor site for transplantation
 - Seeding of Luofushan Joint-fir (*Gnetum luofuense*) to be planted
 - Protection zone for vegetation to be retained

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



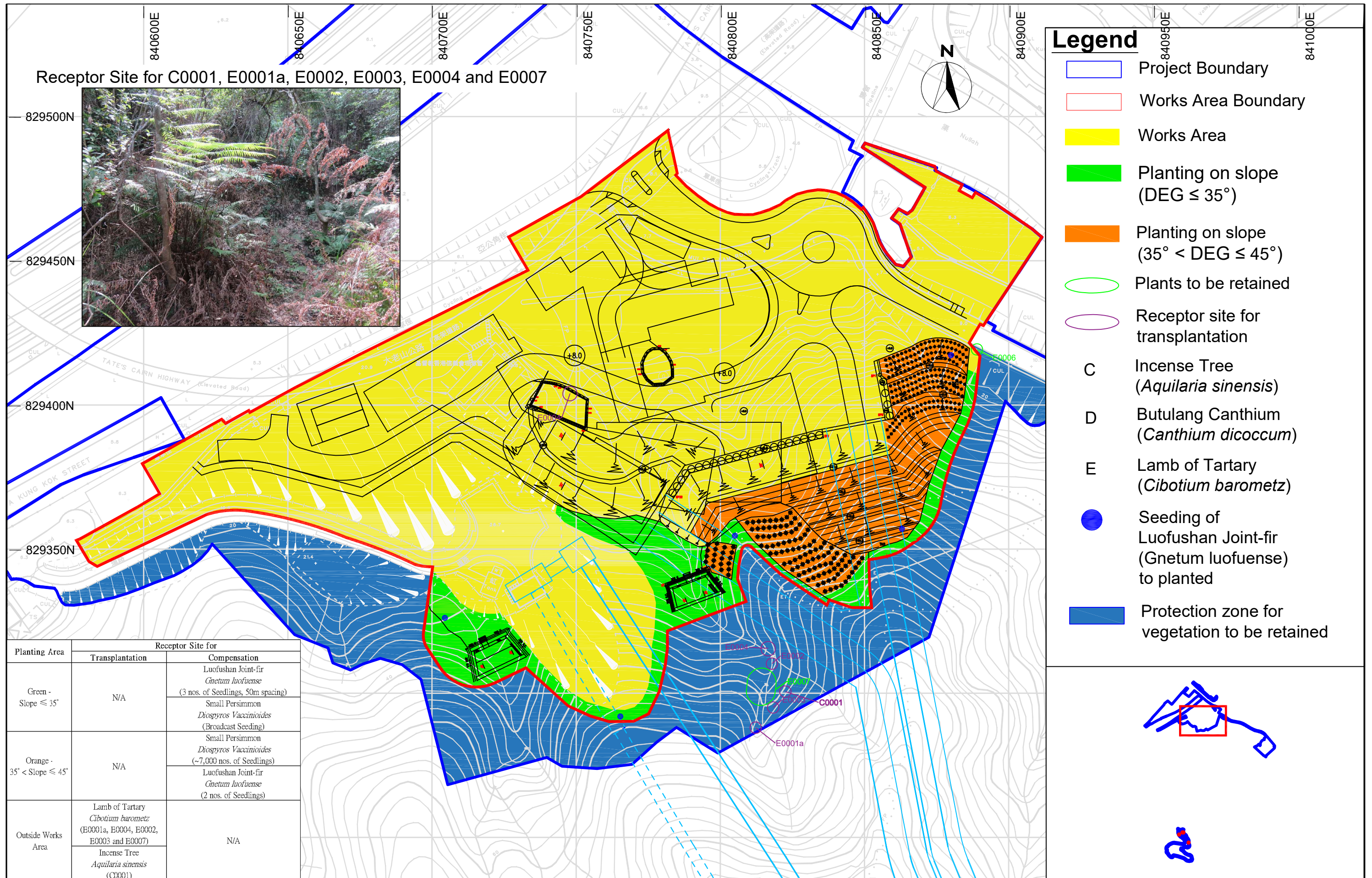
Planting Area	Receptor Site for	
	Transplantation	Compensation
Green - Slope $\leq 35^\circ$	Small Persimmon <i>Diospyros Vaccinioides</i> (~500 nos.)	Butulang Canthium <i>Canthium dicoccum</i> (8 nos. of Whip Trees)
		Luofushan Joint-fir <i>Gnetum luofuense</i> (9 nos. of Seedlings)
Orange - $35^\circ < \text{Slope} \leq 45^\circ$	N/A	Small Persimmon <i>Diospyros Vaccinioides</i> (Broadcast Seeding)
		Small Persimmon <i>Diospyros Vaccinioides</i> (~6,600 nos. of Seedlings)
Outside Works Area	Purple Bulb Orchid <i>Ania hongkongensis</i> (H0002)	Luofushan Joint-fir <i>Gnetum luofuense</i> (3 nos. of Seedlings)
		N/A

Legend

- Project Boundary
- Works Area Boundary
- Planting on slope ($\text{DEG} \leq 35^\circ$)
- Planting on slope ($35^\circ < \text{DEG} \leq 45^\circ$)
- Plants to be retained
- Receptor site for transplantation
- H Hong Kong Ania (*Ania hongkongensis*)
- Seeding of Luofushan Joint-fir (*Gnetum luofuense*) to planted
- Protection zone for vegetation to be retained



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

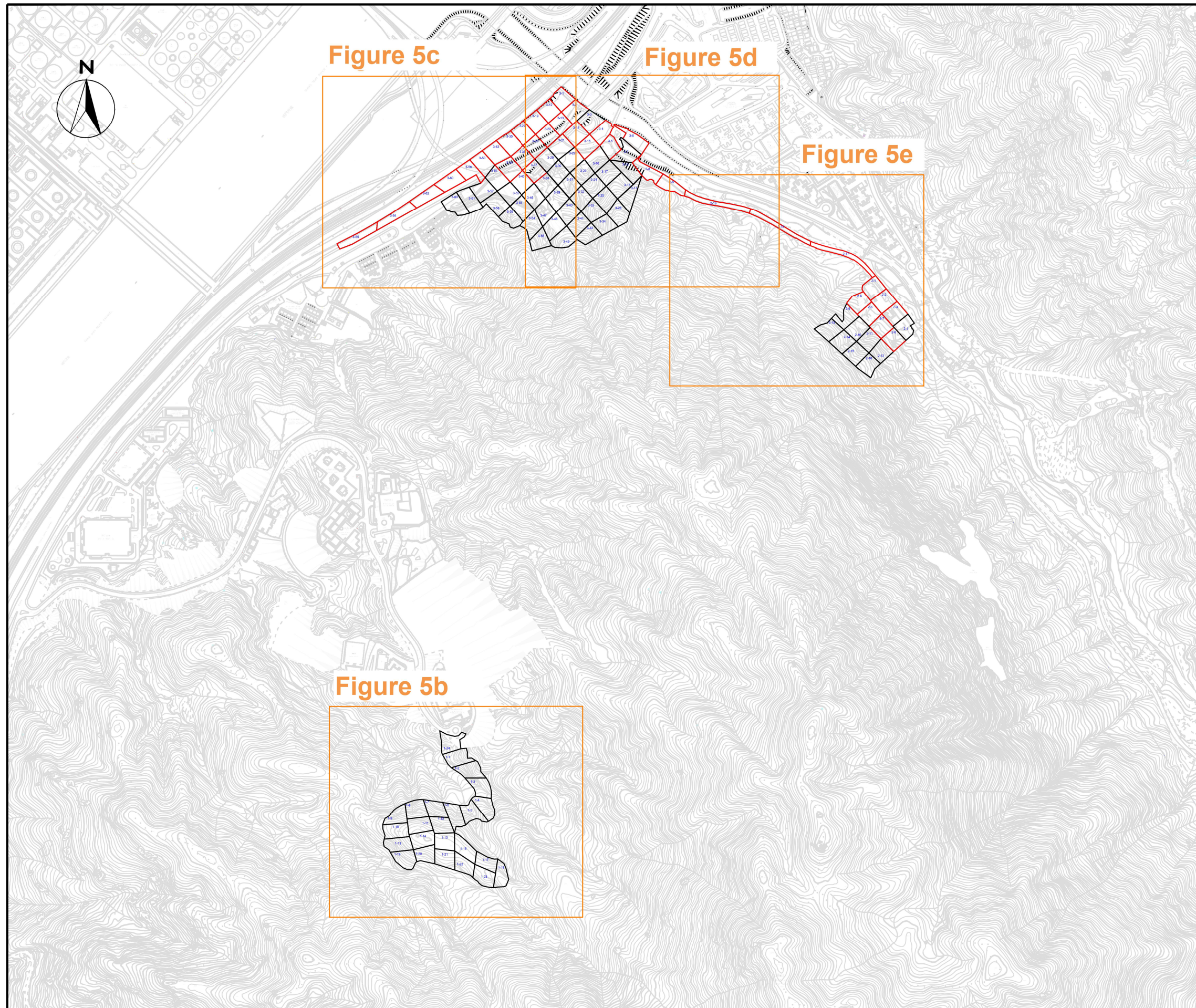


Planting Area	Receptor Site for	
	Transplantation	Compensation
Green - Slope ≤ 35°	N/A	Luofushan Joint-fir <i>Gnetum luofuense</i> (3 nos. of Seedlings, 50m spacing) Small Persimmon <i>Diospyros Vaccinioides</i> (Broadcast Seeding)
Orange - 35° < Slope ≤ 45°	N/A	Small Persimmon <i>Diospyros Vaccinioides</i> (~7,000 nos. of Seedlings) Luofushan Joint-fir <i>Gnetum luofuense</i> (2 nos. of Seedlings)
Outside Works Area	Lamb of Tartary <i>Cibotium barometz</i> (E0001a, E0004, E0002, E0003 and E0007) Incense Tree <i>Aquilaria sinensis</i> (C0001)	N/A



Contract No. SPW 09/2018
Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works
Proposed Receptor Sites for Transplantation and Compensatory Planting (Site 3 A Kung Kok Site)

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

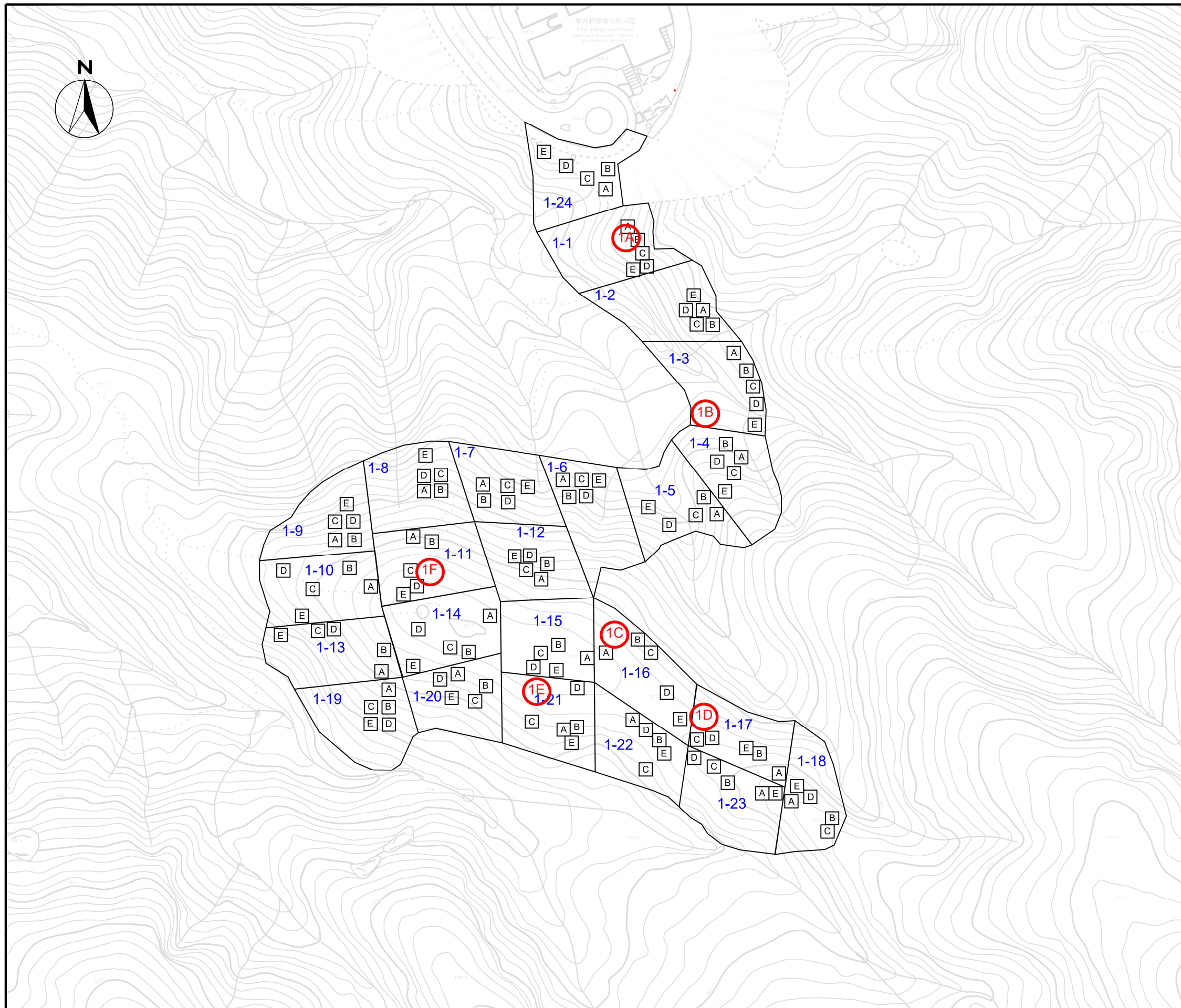


Legend

- 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.	5a
		REV	1

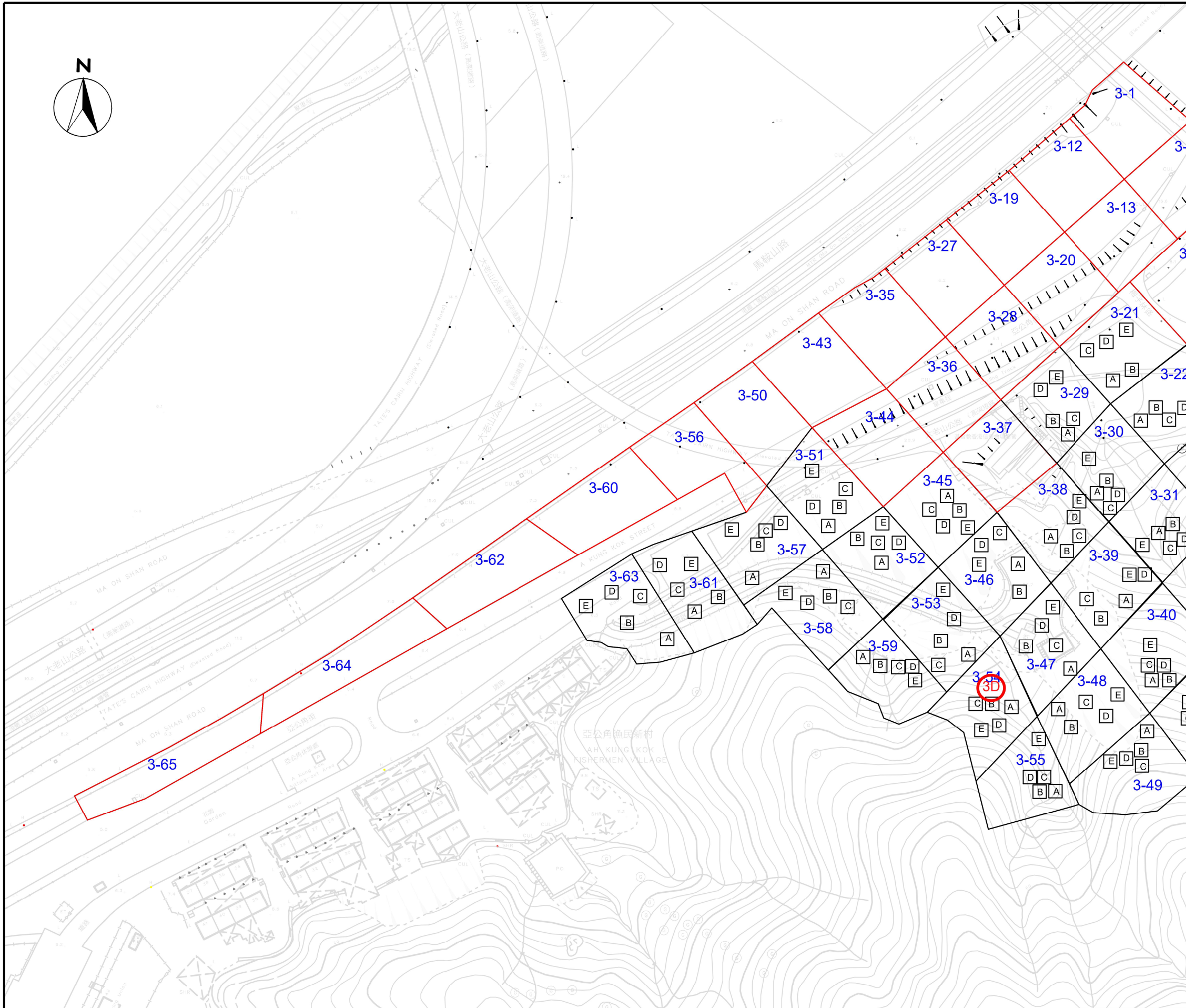


Legend

- 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.	5b
		REV	1

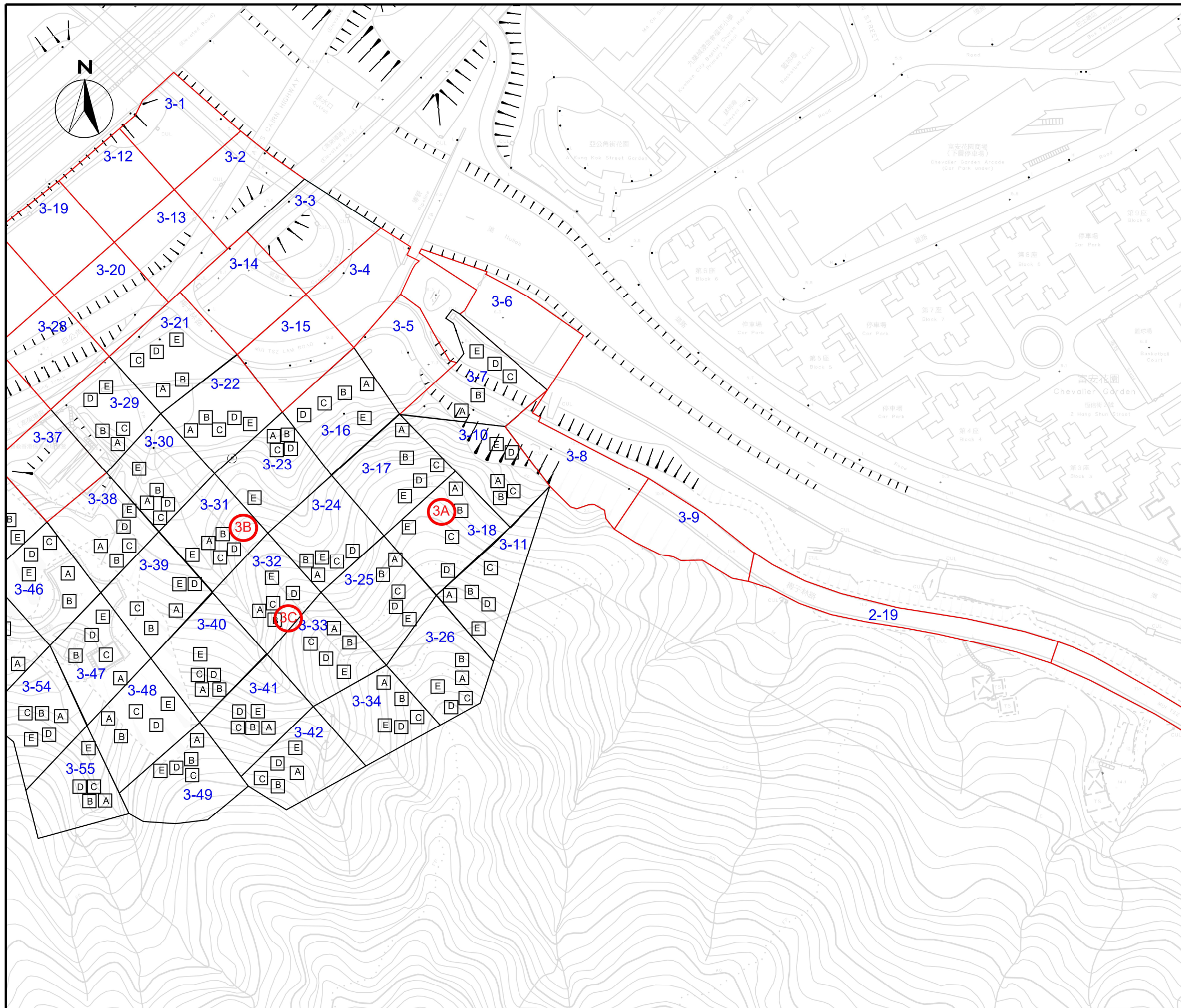


Legend

- 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.	5c
		REV	1

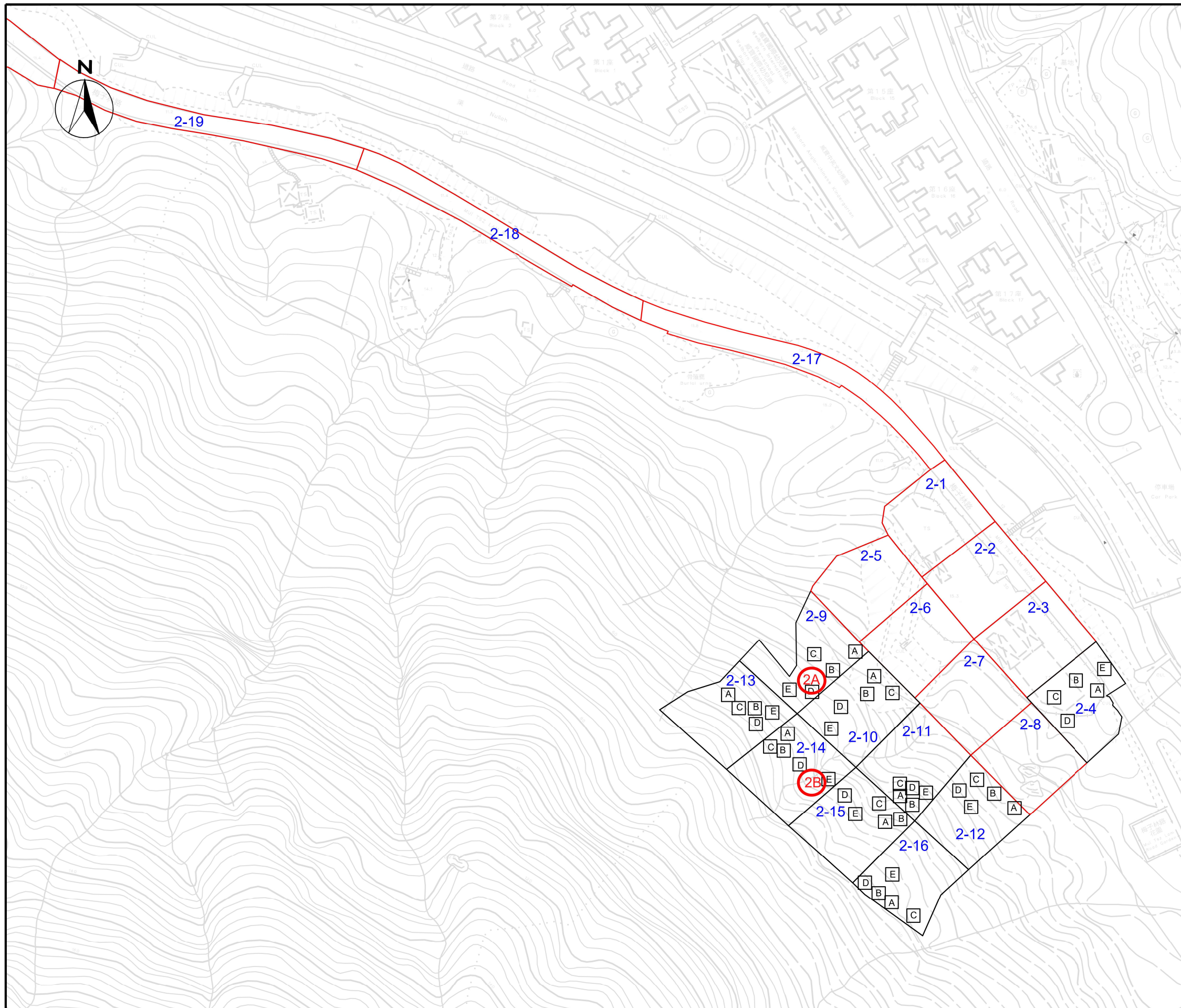


Legend

- 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.	5d
		REV	1

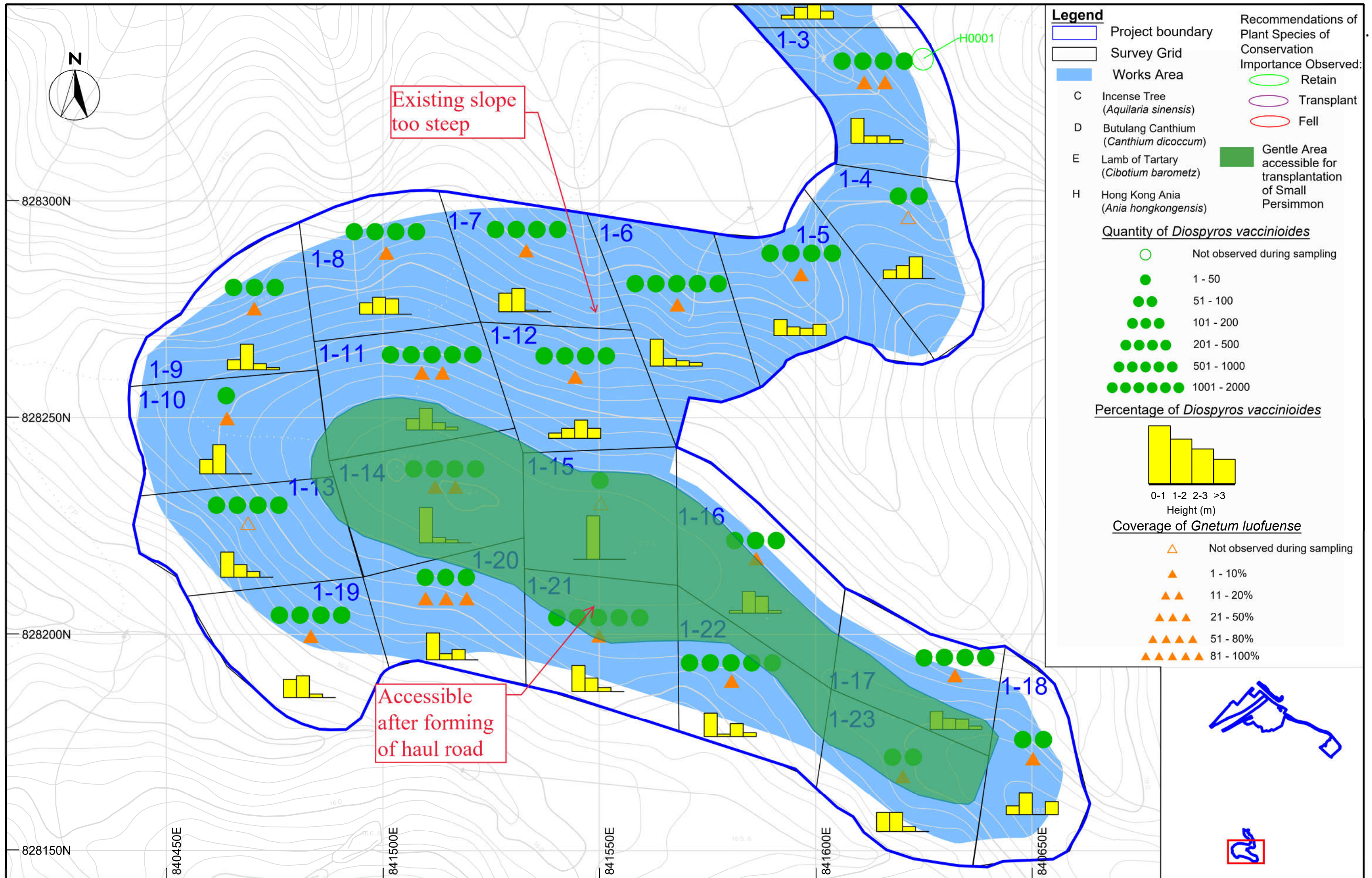


Legend

- 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.	5e
		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

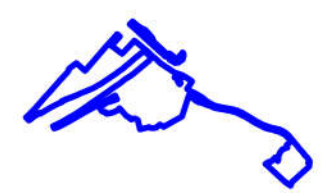
Percentage of *Diospyros vaccinioides*

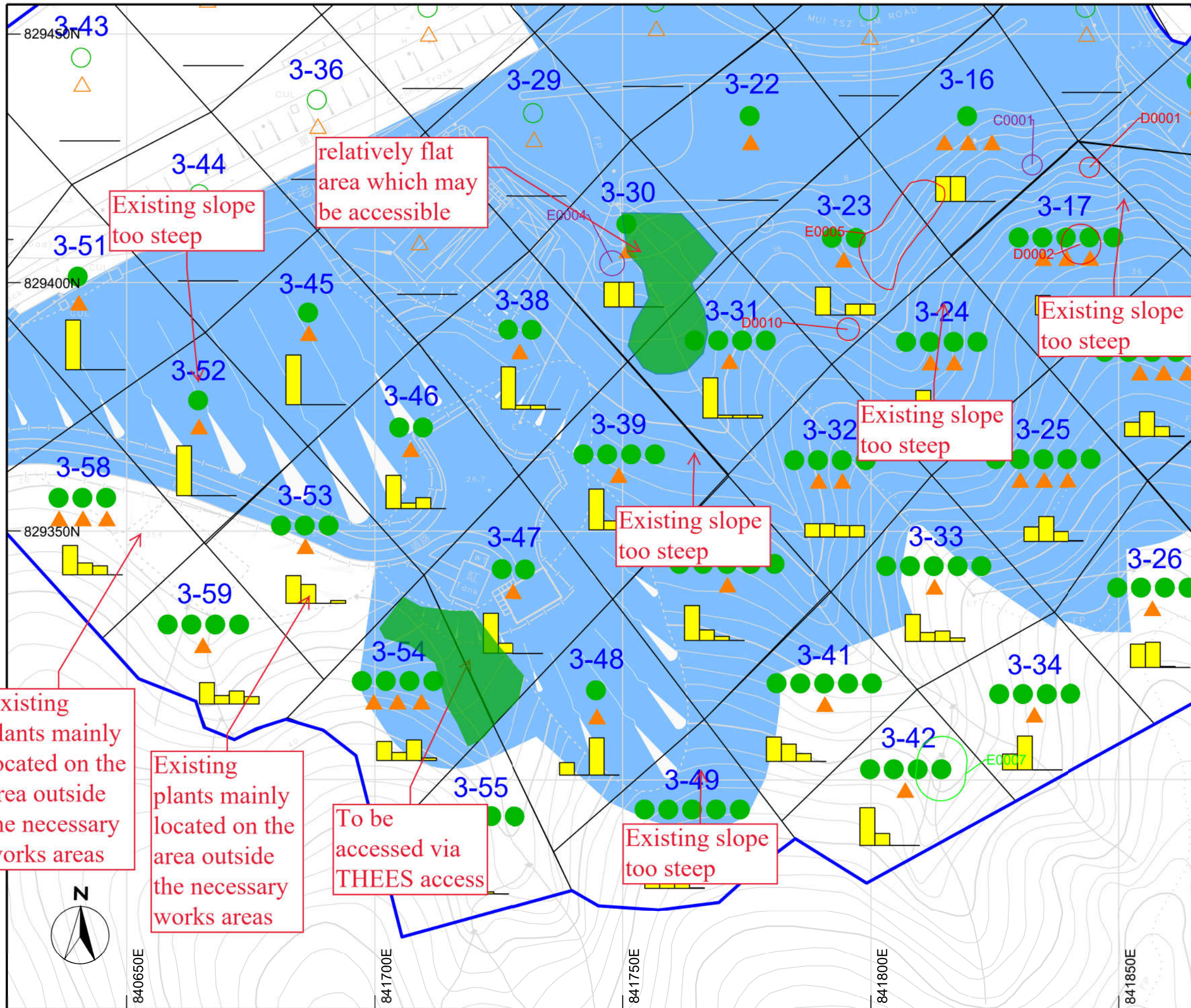
- 0-1
- 1-2
- 2-3
- >3

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

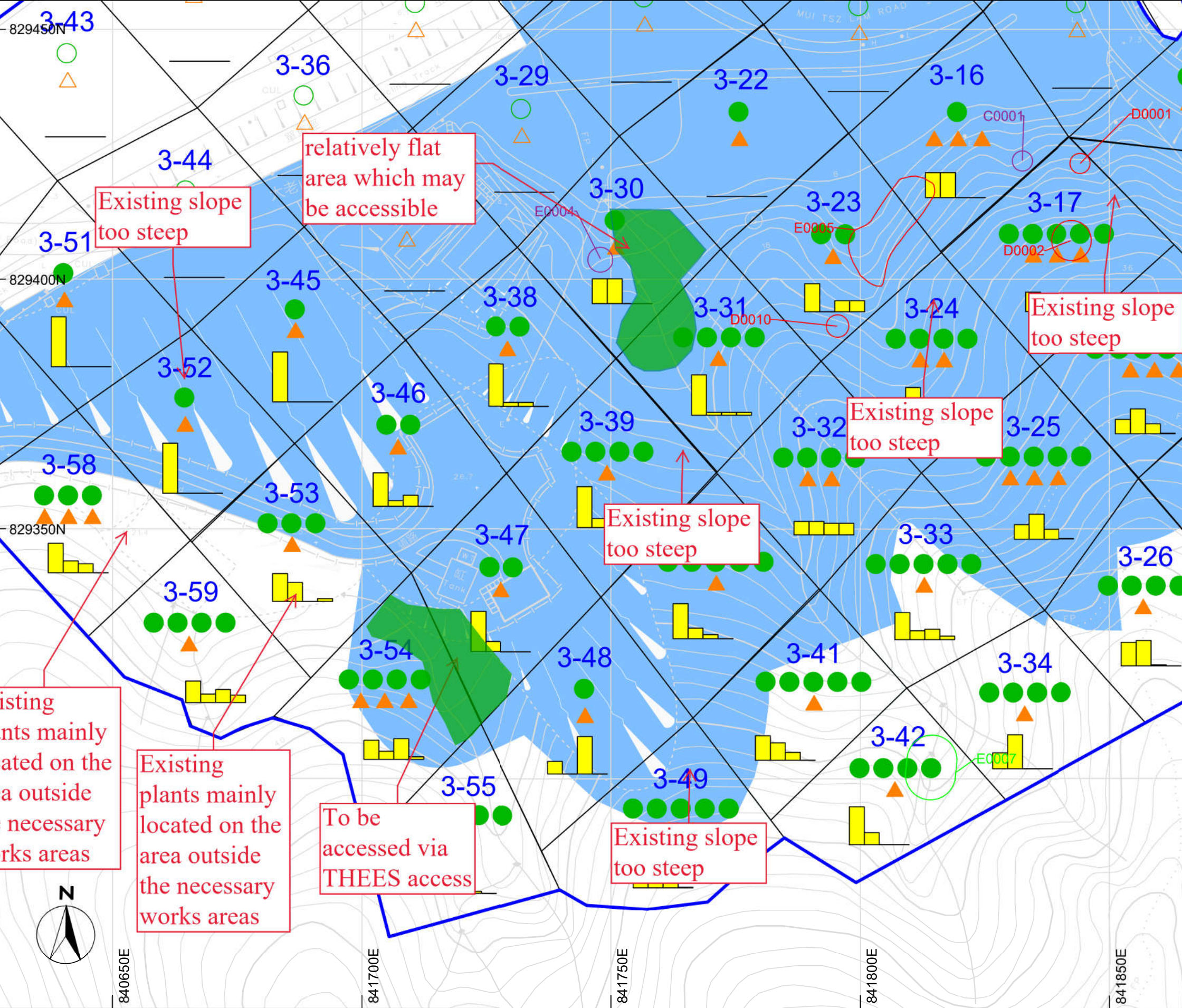
Existing slope too steep

Existing slope too steep

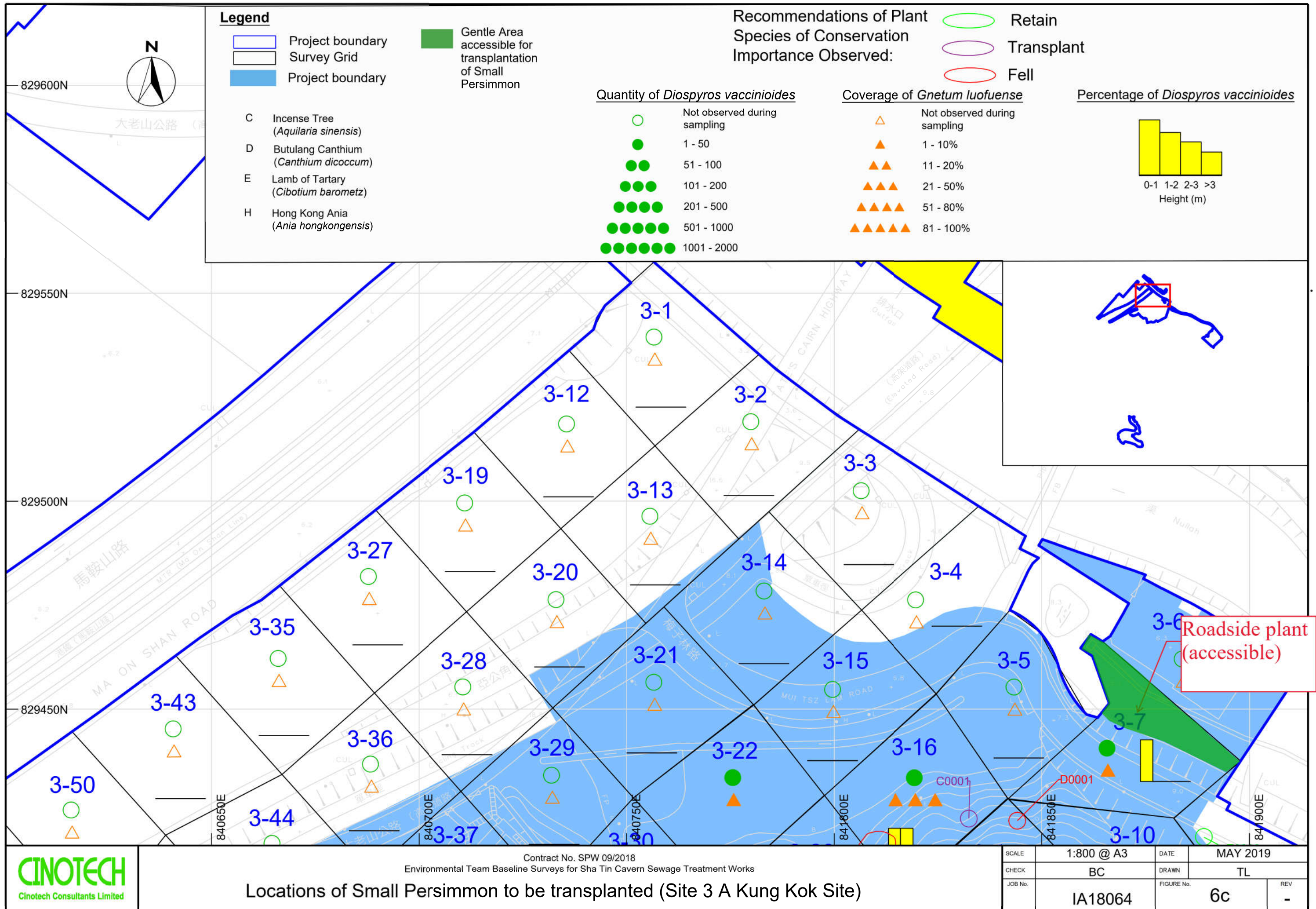
Existing slope too steep

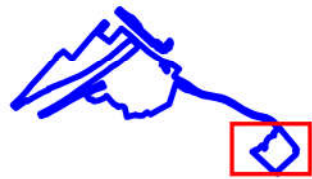
relatively flat area which may be accessible

Existing slope too steep



SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	6b
		REV	-





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:

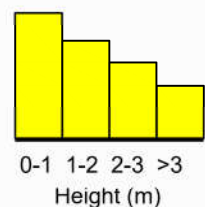
- Retain
- Transplant
- Fell

Gentle Area accessible for transplantation of Small Persimmon

Quantity of *Diospyros vaccinioides*

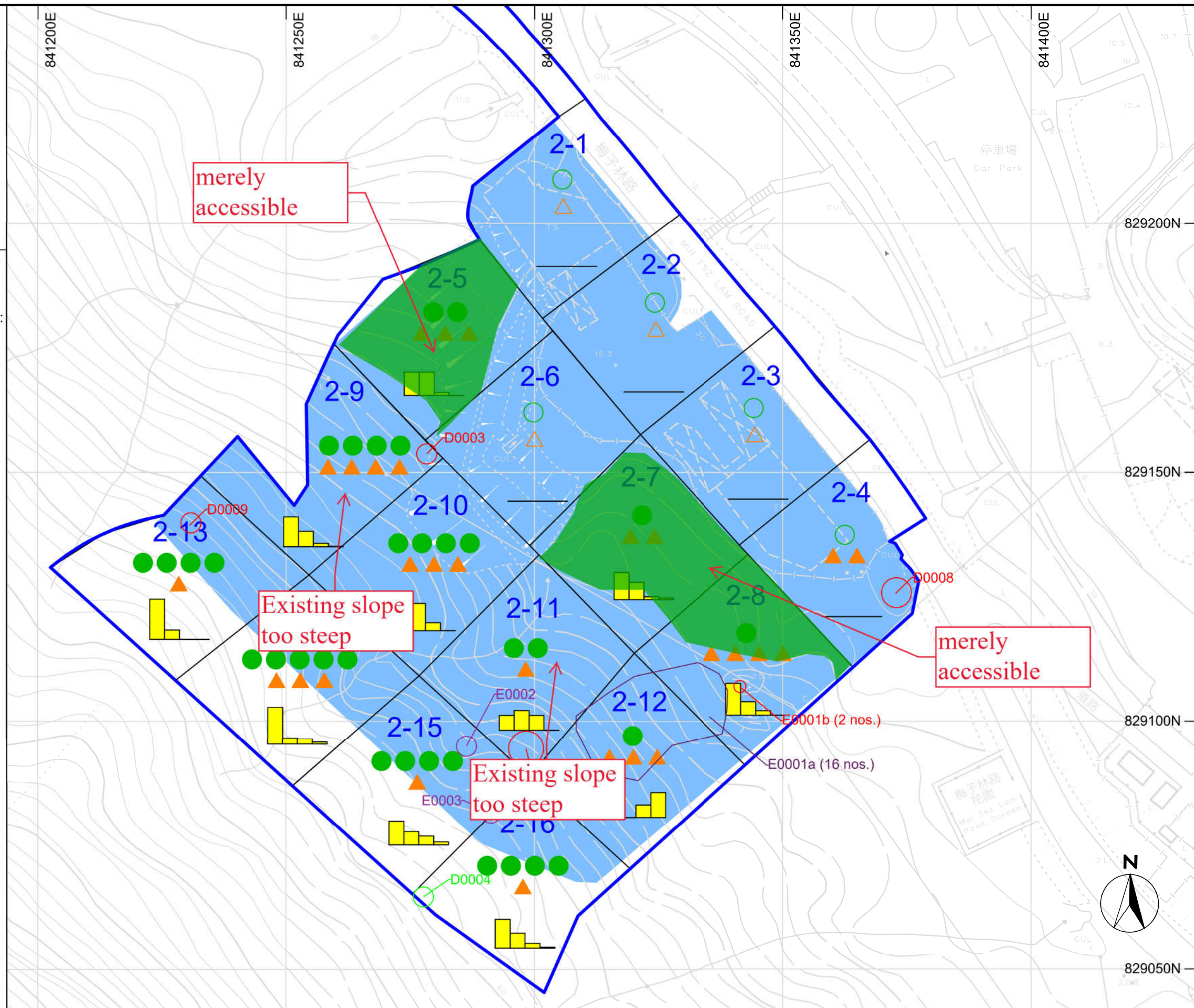
- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2000

Percentage of *Diospyros vaccinioides*



Coverage of *Gnetum luofuense*

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



SCALE	1:800 @ A3	DATE	MAY 2019
CHECK	BC	DRAWN	TL
JOB No.	IA18064	FIGURE No.	6d
		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	219
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						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*



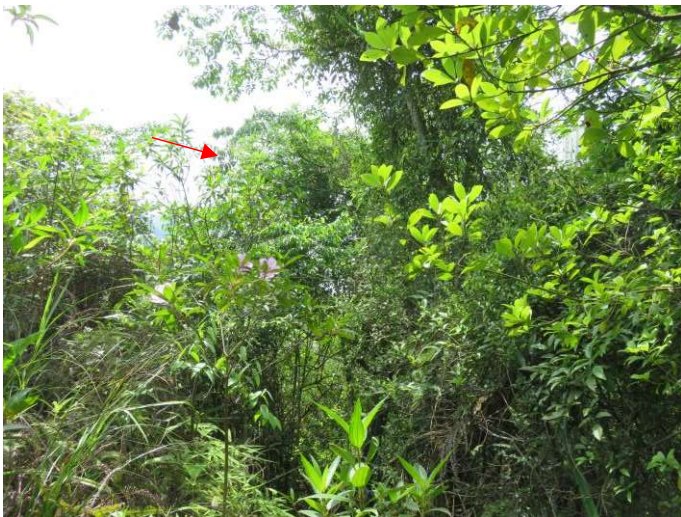
E0003 Lamb of Tartary *Cibotium barometz*



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
-

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
TYPICAL DESIGN OF TREE
PROTECTON ZONE**

Appendix E – Typical Design of Tree Protection Zone

