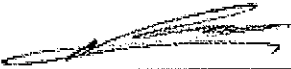



# Drainage Services Department

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

**Protection and Transplantation Proposal  
(Version 8.2)**

Approved By	 _____ (Project Director: Mr. KS Lee)
Prepared By	 _____ (Qualified Ecologist: Ms. Betty Choi)

REMARKS:

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

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

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## 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 and EP Condition 2.6 are listed as follows:
- Potentially affected plant species of conservation importance identified individuals 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 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.
  - The Permit Holder shall appoint qualified ecologist(s) to form part of the ET to carry out work relating to ecological aspects including but not limited to advising on, monitoring and ensuring proper implementation of measures for habitat loss due to project as required under EP Conditions 2.13 & 2.14 no later than 3 months before the commencement of the project. The qualification and experience of the qualified ecologist(s) shall be certified by the ET Leader and verified by the IEC.
- 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
- 1.7 Condition 2.14 of the EP also specifies that the Protection and Transplantation Proposal shall be prepared by the qualified ecologist under Condition 2.6 and shall certified by the ET Leader and certified by the IEC as conforming to the information and recommendations contained in the EIA Report (Register No. AEIAR-202/2016). All recommended measures as set out in the approved Detailed Vegetation Survey Report and the Protection and Transplantation Proposal shall be fully and properly implemented. The implementation of the recommended measures shall be certified by the ET Leader, verified by the IEC and reported in the EM&A programme required in the EM&A Manual in the following month of the measure(s) implemented.

### **Updating the Protection and Transplantation Proposal**

- 1.8 Protection and Transplantation Proposal (Ver 7.1) was approved by the Environmental Protection Department in 2019. According to the engineer, the design of the secondary portal in Site 2 had been updated in early 2020. The expansion of Site 2 has encroached to surroundings which were previously protective zones for plants species. In addition, the works area had been expanded towards uphill at Sites 2 and 3 by adding landslip preventive mitigation measures such as soil nails, rigid barrier and flexible barrier. Therefore, Protection and Transplantation Proposal has to be updated for proposing measures to minimize the impact on plant species with conservation importance in the new works area.
- 1.9 Upon the review of works area, the scope of works for the project is still “site formation at secondary portal located on Mui Tsz Lam Road” (Environmental Permit Part B(6)) and “Associated slope stabilization, natural terrain hazard mitigation and

geotechnical works” (EP Part B(9)) and fall within the limit of works area under Figure 1 of EP-533/2017. There the scope under EP-533/2017 remained valid. Any additional affected floral species would be mitigated as described within this report and Protection and Transplantation Proposal. It is therefore considered that no amendment to EP is required.

- 1.10 As EP conditions 2.13 & 2.14 do not prescribe any requirement on variation of submissions, this report shall be submitted under EP Condition 1.9 as variation of the submission.

#### **Change in the Size of Affected Area**

- 1.11 As mentioned in **Section 1.7**, the affected area will be expanded due to the latest design of the secondary portal and landslip prevention measures. The affected area had changed as the following and details can be found at **Figure 1f – 1g**:

**Table 1-1 Change in the Size of Affected Area**

Location	Area (ha)		Increase in Number of Surveying Grids
	Before	After	
Site1	2.1ha	2.1ha	0
Site2	1.2ha	2.0ha	15
Site3	3.3ha	3.4ha	1
<b>Total</b>	<b>6.6ha</b>	<b>7.5ha</b>	<b>16</b>

**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 (**Figure 1**). 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 Eight plant species of conservation importance (*Ania hongkongensis*, *Aquilaria sinensis*, *Artabotrys hongkongensis*, *Canthium dicoccum*, *Cibotium barometz*, *Diospyros vaccinioides*, *Gnetum luofuense* and *Spathoglottis pubescens*) 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)	Distribution in Hong Kong#@	Observations in Appendix 8.03 of the EIA	Conservation Statuses	No. of Individuals observed within Project Boundary				No. of Individuals 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"> <li>Fung Shui Wood (Scarce)</li> </ul>	<ul style="list-style-type: none"> <li>Protected under the Forests and Countryside Ordinance (Cap. 96); &amp;</li> <li>Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)</li> </ul>	5			5	1
土沉香 Incense Tree ( <i>Aquilaria sinensis</i> )	Common	<ul style="list-style-type: none"> <li>Woodland (Occasional)</li> <li>Fung Shui Wood (Occasional)</li> </ul>	<ul style="list-style-type: none"> <li>Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)</li> <li>Listed as "Vulnerable" in the China Plant Red Data Book</li> <li>Listed as "Vulnerable" by the IUCN Red List</li> </ul>			1	1	1
香港鷹爪花 Hong Kong Eagle's Claw ( <i>Artabotrys hongkongensis</i> )	Common	<ul style="list-style-type: none"> <li>Not reported</li> </ul>	<ul style="list-style-type: none"> <li>Listed in "Rare and Precious Plants of Hong Kong"</li> </ul>		1		1	1
魚骨木 Butulang Canthium ( <i>Canthium dicoccum</i> )	Common	<ul style="list-style-type: none"> <li>Woodland (Occasional)</li> <li>Plantation (Scarce)</li> <li>Shrubland (Scarce)</li> </ul>	<ul style="list-style-type: none"> <li>Listed as "Vulnerable" by the IUCN Red List</li> </ul>		14	4	18	12
金毛狗 Lamb of Tartary ( <i>Cibotium barometz</i> )	Common	<ul style="list-style-type: none"> <li>Woodland (Frequent)</li> <li>Fung Shui Wood (Frequent)</li> <li>Plantation (Occasional)</li> <li>Shrubland (Frequent)</li> </ul>	<ul style="list-style-type: none"> <li>Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586);</li> <li>Listed as "Category II" in the Wild Plants under State Protection; &amp;</li> <li>Listed as "Vulnerable" in the Rare and Precious Plants of Hong Kong</li> </ul>		951	158	1,109	148
小果柿 Small Persimmon ( <i>Diospyros vaccinioides</i> )	Very Common	<ul style="list-style-type: none"> <li>Woodland (Occasional)</li> <li>Plantation (Occasional)</li> <li>Shrubland (Frequent)</li> <li>Stream (Scarce)</li> </ul>	<ul style="list-style-type: none"> <li>Listed as "Critically Endangered" by the IUCN Red List</li> </ul>	6,090	7,540	12,860	26,490	17,810
羅浮買麻藤 Luofushan Joint-fir ( <i>Gnetum luofuense</i> )	Very Common	<ul style="list-style-type: none"> <li>Woodland (Frequent)</li> <li>Shrubland (Frequent)</li> </ul>	<ul style="list-style-type: none"> <li>Listed as "Near Threatened" by the IUCN Red List</li> </ul>	1,930 m <sup>2</sup>	3,980 m <sup>2</sup>	2,980 m <sup>2</sup>	8,890 m <sup>2</sup>	6,880 m <sup>2</sup>
苞舌蘭 Buttercup Orchid ( <i>Spathoglottis pubescens</i> )	Common	<ul style="list-style-type: none"> <li>Not reported</li> </ul>	<ul style="list-style-type: none"> <li>Protected under the Forests and Countryside Ordinance (Cap. 96); &amp;</li> <li>Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)</li> </ul>		17		17	17

# 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, 6 individual of *Canthium dicoccum* (D0004, D0011, D0012, D0013, D0014, D0015), about 961 nos. of *Cibotium barometz* (E0006, E0007, E0011, E0012, E0013, E0014, E0015 and E0016A), 4 individuals of *Ania hongkongensis* (H0001), about 8,680 nos. of *Diospyros vaccinioides* and about 2,010m<sup>2</sup> of *Gnetum luofuense* will be preserved in-situ. 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 to site clearance. If impact on the plant species of conservation importance cannot be avoided, the suitability and /or practicality of transplantation will be assessed according to Condition 2.13(i) of the EP. Considerations include health condition, site condition, transplantation feasibility, conservation value and availability of receptor site. With reference to the *Guidelines on Tree Transplanting* issued by the Development Bureau, the suitability of transplantation of affected individuals was reviewed based on the following considerations:

- **Health, form and structural condition** – Healthy individual has higher chance to survive the transplant shock and recover after transplantation. Plants with poor form or structure (e.g. inclining, multiple trunk) have imbalanced shape that is difficult to grow well in new environment. Therefore, only healthy individuals with good to fair form and structural conditions will be considered for transplantation.
- **Formation of root ball** – A balanced root ball of suitable size is essential to support the transplanted plant and to re-grow for water and nutrient absorption. In general, the ratio between root ball diameter:trunk diameter is 8:1 to 10:1. Also, plants growing on steep slope develop roots that adapt to the existing gradient. If there is hindrance in the root growing direction (e.g. rocks and

concrete structure), the root ball will be in unbalanced form and hard to support the plant in new environment. Mature plant needs larger root ball, implying that higher chance of imbalanced root ball formation on the sloped environment. Therefore, transplantation of herbs and young trees is recommended.

- **Site remoteness, accessibility, technical feasibility and cost effectiveness** – Unless the plant is located near road network, mobilization of powered mechanical equipment on the slope for large tree transplant is technical impractical and not cost-effective. In addition, there is safety concern for working in location with steep topography.
- **Conservation value** – While all plants considered in this proposal have certain conservation statuses, the commonness of the species in Hong Kong should be considered in evaluating the impact of removing the affected plant in a wider perspective (population survival).
- **Availability of Suitable Receptor Site** – Areas within the Project Boundary but outside the works area will be the receptor site of the affected plants. Habitat similar to the existing growing environment will be chosen to enhance the survival rate after transplant.

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 1 *Aquilaria sinensis* (C0001), 1 *Ania hongkongensis* (H0002), 3 *Canthium dicoccum* (D0016B, D0017 and D0018) and 68 nos. of *Cibotium barometz* (E0001a (16 nos.), E0002 (1 no.), E0003 (2 nos.), E0004 (7 nos.) and E0016B (42 nos., see below)). Although most of them are located on steep slope and is difficult to access, transplantation to nearby receptor site is recommended in view of the small number of individuals involved to minimize the impact as far as possible.

2.10 Since many individuals of *Cibotium barometz* (E0016B) grows between boulders, it is would be difficult to transplant the individuals that grows on rock without dealing fatal damage to them. It was therefore recommended to fell the individuals that grow between boulders and transplant the remained individuals that grow on soil (which is estimated to be around 60% of the affected individuals (42 nos.)). In addition, the design of rigid barrier at Site 2 upper slope had been best-fitted to block the potential channelized debris flow along the valley from slope safety purpose in accordance to the findings in the Natural Terrain Hazard Mitigation Strategy Report (Secondary Portal). The affected area and related impact had been minimized.

2.11 The Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) found (I0001) was located within the works area and found growing between rocks. Due to the climbing nature of the species, it would be difficult to transplant this individual without dealing heavy damage to it and the tangled vegetation. It would be unlikely to survive after transplantation and thus this option was not recommended.

2.12 Most *Canthium dicoccum* recorded are young trees less than 7m tall. Some individuals are growing near rocks or concrete structure. These make formation of a good root ball difficult. This included D0001, D0002, D0003, D0006 and D0010. For D0008, D0016A and D0009, the former two has poor health condition while the latter one 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.

- 2.13 3 young individuals of *Canthium dicoccum* (D0016B, D0017 and D0018) were found on flat ground at Grid 2-31. These individuals have good tree form and health conditions. They can be easily accessed as they are located near the Mui Tsz Lam Road Garden and thus transplantation of those individuals are recommended.
- 2.14 *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 (8.6ha) would be affected by the Project. Nevertheless, transplantation of young individuals of high survival rates is proposed to minimize the impact as far as possible. About 500 numbers of *Diospyros vaccinioides* are proposed to be transplanted based the criteria in the following table. The exact numbers to be transplanted are subject to the actual site conditions. The location of *Diospyros vaccinioides* to be transplanted is shown in **Figures 4a – 4c**.

**Table 2-3 Screening of *Diospyros vaccinioides* to be Transplanted in Grids 1-1 to 1-24, 2-1 to 2-16 and 3-1 to 3-65**

Screening of <i>Diospyros vaccinioides</i> suitable for transplantation		Justifications	No. of Individuals Remain
<b>Total number of affected <i>Diospyros vaccinioides</i> in the Approved Report v.8.1:</b>			<b>14,100</b>
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 is well adapted to existing environment, it will more like to experience transplantation stress and may not be able to survive <sup>1,2</sup> . 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 <sup>^</sup>
<b>Total number of <i>Diospyros vaccinioides</i> to be transplanted:</b>			<b>~500</b>

<sup>1</sup> 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.

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

\* 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 3a-3e**). About 30% of individuals among height range of 0-1m were screened in Step 1 (**Appendix E**).

^ Accessible grids include 1-10 to 1-18, 1-20 to 1-23, 2-5, 2-7, 2-8, 2-17, 2-18, 2-30, 2-31, 3-7, 3-30, 3-31, 3-47 and 3-54. Details of the exact extend shall be referred to **Figure 4a – 4c**.

2.15 At the time of preparation of this report, transplantation of affected individuals in Site 1 and 3 were completed. Based on the previous experience from Site 1 and 3 the actual transplantation statistics in the accessible area (about 22%) was in fact much lower than the theoretical prediction, which the detailed calculation shall be referred to **Appendix G**. Therefore, for newly affected grids in this report, the transplantation of *Diospyros vaccinioides* will be calculated based on the following table:

**Table 2-4 Screening of *Diospyros vaccinioides* to be Transplanted due to the Change of Design**

Screening of <i>Diospyros vaccinioides</i> not suitable for transplantation		Justifications	No. of Individuals Remain
<b>Total number of newly affected <i>Diospyros vaccinioides</i> due to the change of design (Grid no. 2-17 – 2-31 &amp; 3-66 and increase due to expansion of works area in Grid no. 2-12 – 2-16, 3-33, 3-34, 3-41, 3-42, 3-49):</b>			<b>3,710</b>
Step 1	Grown at remote location away from road network 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.	912 <sup>^</sup>
Step 2	Proportion of individuals that fulfill criteria of <b>Table 4-2</b>	Previous experience in Site 1 and 3 for finding suitable individuals for transplantation is 22% on average*.	201
<b>Total number of <i>Diospyros vaccinioides</i> to be transplanted:</b>			<b>~200</b>

<sup>^</sup> Accessible grids include 1-10 to 1-18, 1-20 to 1-23, 2-5, 2-7, 2-8, 2-17, 2-18, 2-30, 2-31, 3-7, 3-30, 3-31, 3-47 and 3-54. Details of the exact extend shall be referred to **Figure 4a – 4c**

\* No. of Transplanted Individuals / No. of Small Persimmon in Accessible Area in Sites 1 & 3  
= 268 / 1,244 \* 100% = 22%

2.16 *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 2.19**.

### Compensation

2.17 The potential of compensatory planting for 17,110 nos. of *Diospyros vaccinioides*, 6,880m<sup>2</sup> *Gnetum luofuense*, 9 nos. of *Canthium dicocum*, about 80 nos. of *Cibotium barometz* and 1 *Artabotrys hongkongensis* that cannot be transplanted is reviewed and explained in the following sections.

2.18 For *Diospyros vaccinioides*, compensatory planting by planting 17,110 nos. of seedling is proposed at the future 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 planting<sup>3</sup>. 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.

- 2.19 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 areas in Sites 1, 2 & 3 can accommodate a total of 22 planting locations (**Figures 5b – 5c**).
- 2.20 For *Canthium dicoccum*, at least 9 nos. of tree whip 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  $\leq 35^\circ$ .
- 2.21 *Cibotium barometz* grows in damp environment (such as stream and seeping rock). However, nearby suitable habitats (stream in the upper slope in Site 3 and the valley in Site 2) has been adopted as transplantation receptor site and thus compensation for the lost individuals would not be recommended.
- 2.22 For *Artabotrys hongkongensis*, 1 seedling will be planted in the temporary works area in the Secondary Portal (Site 2) after completion of works to compensate the loss of the existing individual.

### **Summary of Recommendations**

- 2.23 The overall recommendations is summarized in the following table:

**Table 2-5 Summary of Recommendations (by Site)**

Common Name	Species Name	Units	Recommendations				
			Retain	Trans plant	Fell	Total (in Project Boundary)	Compensatory Planting in Temporary Works Area
<b>Site 1</b>							
小果柿 Small Persimmon	<i>Diospyros vaccinioides</i>	No.	930 (15%)	350 (6%)	4,810 (79%)	<b>6,090</b>	Seedlings + Broadcast Seeding

<sup>3</sup> The Conservancy Association (CA). 2016. Islands District Healthy City Tree Planting Festival Green Lantau 2015. Nei Lak Shan, Lantau Island. 2nd Tree Monitoring Report. [online] Available at: [http://www.islands-healthycity.org/NP\\_tree\\_monitoring\\_2015\\_02.pdf](http://www.islands-healthycity.org/NP_tree_monitoring_2015_02.pdf). Last Accessed: 3 July 2019.

Common Name	Species Name	Units	Recommendations					Compensatory Planting in Temporary Works Area
			Retain	Trans plant	Fell	Total (in Project Boundary)		
羅浮買麻藤 Luofushan Joint-fir	<i>Gnetum luofuense</i>	m <sup>2</sup>	270 (14%)	0 (0%)	1,660 (86%)	<b>1,930</b>	Seedlings	
香港安蘭 Purple Bulb Orchid	<i>Ania hongkongensis</i>	No.	4 (80%)	1 (20%)	0 (0%)	<b>5</b>	N/A	
<b>Site 2</b>								
小果柿 Small Persimmon	<i>Diospyros vaccinioides</i>	No.	3,240 (43%)	250 (3%)	4,050 (54%)	<b>7,540</b>	Seedlings + Broadcast Seeding	
羅浮買麻藤 Luofushan Joint-fir	<i>Gnetum luofuense</i>	m <sup>2</sup>	750 (19%)	0 (0%)	3,230 (81%)	<b>3,980</b>	Seedlings	
香港鷹爪花 Hong Kong Eagle's Claw	<i>Artabotrys hongkongensis</i>	No.	0 (0%)	0 (0%)	1 (100%)	<b>1</b>	1 Seedling	
魚骨木 Butulang Canthium	<i>Canthium dicoccum</i>	No.	6 (43%)	3 (21%)	5 (36%)	<b>14</b>	5 Whip Trees	
金毛狗 Lamb of Tartary	<i>Cibotium barometz</i>	No.	860 (91%)	61 (6%)	30 (3%)	<b>951</b>	No suitable habitat for compensatory planting	
苞舌蘭 Buttercup Orchid	<i>Spathoglottis pubescens</i>	No.	0 (0%)	16 (94%)	1 (6%)	<b>17</b>	Difficult to propagate from seed & not available in market	
<b>Site 3</b>								
小果柿 Small Persimmon	<i>Diospyros vaccinioides</i>	No.	4,510 (35%)	100 (1%)	8,250 (64%)	<b>12,860</b>	Seedlings + Broadcast Seeding	
羅浮買麻藤 Luofushan Joint-fir	<i>Gnetum luofuense</i>	m <sup>2</sup>	990 (33%)	0 (0%)	1,990 (67%)	<b>2,980</b>	Seedlings	
魚骨木 Butulang Canthium	<i>Canthium dicoccum</i>	No.	0 (0%)	0 (0%)	4 (100%)	<b>4</b>	4 Whip Trees	
金毛狗 Lamb of Tartary	<i>Cibotium barometz</i>	No.	101 (64%)	7 (4%)	50 (32%)	<b>158</b>	No suitable habitat for compensatory planting	
土沉香 Incense Tree	<i>Aquilaria sinensis</i>	No.	0 (0%)	1 (100%)	0 (0%)	<b>1</b>	N/A	

**Table 2-6 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.	8,680 (32%)	700 (3%)	17,110 (65%)	<b>26,490</b>	Seedlings (17,150 nos.)
羅浮買麻藤 Luofushan Joint-fir	<i>Gnetum luofuense</i>	m <sup>2</sup>	2,010 (23%)	0 (0%)	6,880 (77%)	<b>8,890</b>	Seedlings (22 locations at 50m interval)
香港安蘭 Purple Bulb Orchid	<i>Ania hongkongensis</i>	No.	4 (80%)	1 (20%)	0 (0%)	<b>5</b>	N/A
香港鷹爪花 Hong Kong Eagle's Claw	<i>Artabotrys hongkongensis</i>	No.	0 (0%)	0 (0%)	1 (100%)	<b>1</b>	1 Seedling
魚骨木 Butulang Canthium	<i>Canthium dicoccum</i>	No.	6 (33%)	3 (17%)	9 (50%)	<b>18</b>	9 Whip Trees
金毛狗 Lamb of Tartary	<i>Cibotium barometz</i>	No.	961 (87%)	68 (6%)	80 (7%)	<b>1,109</b>	No suitable habitat for compensatory planting
土沉香 Incense Tree	<i>Aquilaria sinensis</i>	No.	0 (0%)	1 (100%)	0 (0%)	<b>1</b>	N/A
苞舌蘭 Buttercup Orchid	<i>Spathoglottis pubescens</i>	No.	0 (0%)	16 (94%)	1 (6%)	<b>17</b>	Difficult to propagate from seed & not available in market

### 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**.
  - 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. 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. A typical design of the tree protection zone is shown in **Appendix E**.
  - 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.



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- 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 1.5 times greater than the root ball of the transplanted individuals. The depth should not be too deep that the root level should 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* and *Spathoglottis pubescens*), 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. 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.

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### 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* and *Canthium dicoccum*, 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 seeding planting in future planting areas available in Sites 1 and 3 as shown in **Figures 5a – 5c**. 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 17,110 nos. of *Diospyros vaccinioides* will be felled, 17,110 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 and green hatched areas in **Figures 5a – 5c**). Seedling planting can commence once the slopes are formed or temporary works area can be reinstated.
- 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 5a – 5c**). 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, 2 and 3 can accommodate a total of 22 planting locations (blue dots in **Figures 5a – 5c**).

#### *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 5a – 5c**). 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 5a – 5c** (green hatched area). Site preparation and planting method should follow the same principle in **Sections 3.4 – 3.6**.

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#### **4 IDENTIFICATION OF RECEPTOR SITE**

##### Transplantation

- 4.1 Plants proposed to be transplanted are *Ania hongkongensis*, *Aquilaria sinensis*, *Canthium dicoccum*, *Cibotium barometz*, and *Spathoglottis pubescens*. The first three species grows under the tree canopy while *Cibotium barometz* favours damp environment. *Spathoglottis pubescens* grows in open grassy slopes.
- 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 5b**).
- 4.3 *Aquilaria sinensis* (C0001) in Site 3 is proposed to be transplanted to a woodland upslope (see **Figure 5d**).
- 4.4 Patches of *Cibotium barometz* are growing in Sites 2 and 3. As the existing stream in lower portion of 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 5d**) for *Cibotium barometz* that grows in Site 3 (E0004) and at the lower portion of Site 2 (E0001A, E0002 and E0003). 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.
- 4.5 As for the *Cibotium barometz* (E0016B) that grows at the upper portion of Site 2, area next to E0014 at Site 2 is proposed as the receptor site (see **Figure 5c**). It is a woodland in a valley. This receptor site is chosen due to its proximity to the affected regions to minimize mobilization distance. The aforementioned transplantation schedule in **Section 4.4** also applies.
- 4.6 3 young individuals of *Canthium dicoccum* (D0016B, D0017 and D0018) are growing in proximity of Mui Tsz Lam Road Garden which fall under the ambit of Site 2. They are proposed to be transplanted upslope to a flat area next to D0013 (See **Figure 5c**).
- 4.7 16 nos. of *Spathoglottis pubescens* (F0001A) are growing at the edge of a bedrock with loose soil. They are proposed to be transplanted to a similar environment nearby, next to D0014 and D0015 (See **Figure 5c**). It should be planted also at the edge of the bedrock to minimize sunlight blockage by nearby vegetation.
- 4.8 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 1 after cessation of work (green hatched area in **Figure 5b**).

**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 *
D0016B	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	2	Woodland in Site 2 next to D0013 *
D0017	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	2	
D0018	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	2	
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 *
E0016B	42 <sup>^</sup>	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	2	Shaded woodland in Site 2 *
F0001A	16	苞舌蘭	Buttercup Orchid	<i>Spathoglottis pubescens</i>	2	Exposed shrubland in Site 2 #
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	~700	小果柿	Small Persimmon	<i>Diospyros vaccinioides</i>	1, 2 & 3	Gentle ground in Site 1

\* Outside works area

# Outside project boundary

<sup>^</sup> E0016B originally contains around 70 individuals, only ~60% of them are practically transplantable.

Therefore 70 x 60% = 42.

4.9 The locations and photos of the existing receptor sites that fall outside the works area are provided in **Figures 5b – 5d**.

### Compensation

#### *Seedling Planting*

4.10 Seedlings of *Diospyros vaccinioides* will be planted on the newly formed SIMAR slopes in Site 1 and 3 (orange hatched areas in **Figures 5b & 5d**). 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*. 13,600 nos. of seedlings will be planted on these SIMAR slopes. The remaining 3,550 nos. of seedlings are proposed to be planted on the gentle slope in Site 1 after cessation of work (green hatched area in **Figure 5b**).

4.11 Seedlings of *Gnetum luofuense* will be planted in all planting areas after cessation of works (orange and green hatched areas in **Figure 5b – 5d**). Seedlings will be planted at 22 locations at the edge of the planting area, which separate from each other by around 50m. The indicative locations are shown in **Figure 5b – 5d** (blue dots).

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- 4.12 For *Artabotrys hongkongensis*, 1 seedling will be planted in the upper woodland in Site 2 near E0014 to compensate the loss of the existing individual (shown as the magenta dot in **Figure 5c**).

*Broadcast Seeding*

- 4.13 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 5b & 5d**).

*Whip Tree Planting*

- 4.14 Nine 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 5c**. 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*, *Aquilaria sinensis*, *Canthium dicoccum*, *Cibotium barometz* and *Spathoglottis pubescens*, 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 5b**) at a spacing of 0.5m. As in **Section 5.4**, 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 5b** 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 13,600 seedlings of *Diospyros vaccinioides* would be planted on newly formed SIMAR slopes in Sites 1 and 3 (orange hatched area in **Figures 5b and 5d**). Based on the construction programme, the tentative planting schedule is from around 2022 to 2023, subject to completion of actual site works.

5.9 3,550 seedlings of *Diospyros vaccinioides* would be planted on temporary works area in Site 1 (green hatched area in **Figure 5b**). Based on the construction programme, the tentative planting schedule is from around 2020 to 2027, subject to completion of actual site works.



- 5.10 One seedling of *Artabotrys hongkongensis* would be planted outside the works area at Site 2 (magenta circle in **Figure 5c**). As no construction work will be involved, the seedling should be planted after purchase from the nursery or propagated from seed, tentatively in 2021 – 2022.
- 5.11 22 seedlings of *Gnetum luofuense* would be planted in all available planting areas in Sites 1, 2 and 3. The indicative planting locations are shown as blue dots in **Figures 5b – 5d**. 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)
- 5.12 To promote growth of the seedlings in wet season, planting works should preferably be carried out in spring.

#### *Broadcast Seeding*

- 5.13 Outside the SIMAR slopes in Sites 1 and 3 are temporary works area for the project (green hatched area in **Figures 5b & 5d**). 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°C<sup>4</sup>. 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)

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<sup>4</sup> 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](https://www.biodiversityinternational.org/fileadmin/biodiversity/publications/Web_version/188/ch09.htm). Last Accessed: 10 July 2019.

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

- 6.1 The transplantation works, tree whip 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/valley.
  - 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.

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**7 CONCLUSION**

- 7.1 Eight 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 4 individuals of *Ania hongkongensis* (H0001), 6 individuals of *Canthium dicoccum* (D0004, D0011, D0012, D0013, D0014 and D0015), about 961 nos. of *Cibotium barometz* (E0006, E0007, E0011, E0012, E0013, E0014, E0015 and E0016A), about 8,650 nos. of *Diospyros vaccinioides* and about 1,950m<sup>2</sup> 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), 3 nos. of *Canthium dicoccum* (D0016B, D0017 and D0018), 68 nos. of *Cibotium barometz* (E0001A (16 nos.), E0002 (1 no.), E0003 (2 nos.), E0004 (7 nos.) and E0016B (42 nos.)) and 16 nos. of *Spathoglottis pubescens* (F0001A). They should be transplanted to receptor sites outside works area or to nursery temporarily prior to commencement of construction works. For 700 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 or temporary work area after cessation of work. 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), *Canthium dicoccum* (whip tree planting) and *Artabotrys hongkongensis* (seedling planting). As there is no suitable habitat for *Cibotium barometz* within project boundary and *Spathoglottis pubescens* is difficult to propagate and not available in market, compensatory planting for these species are 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.
- 7.6 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.

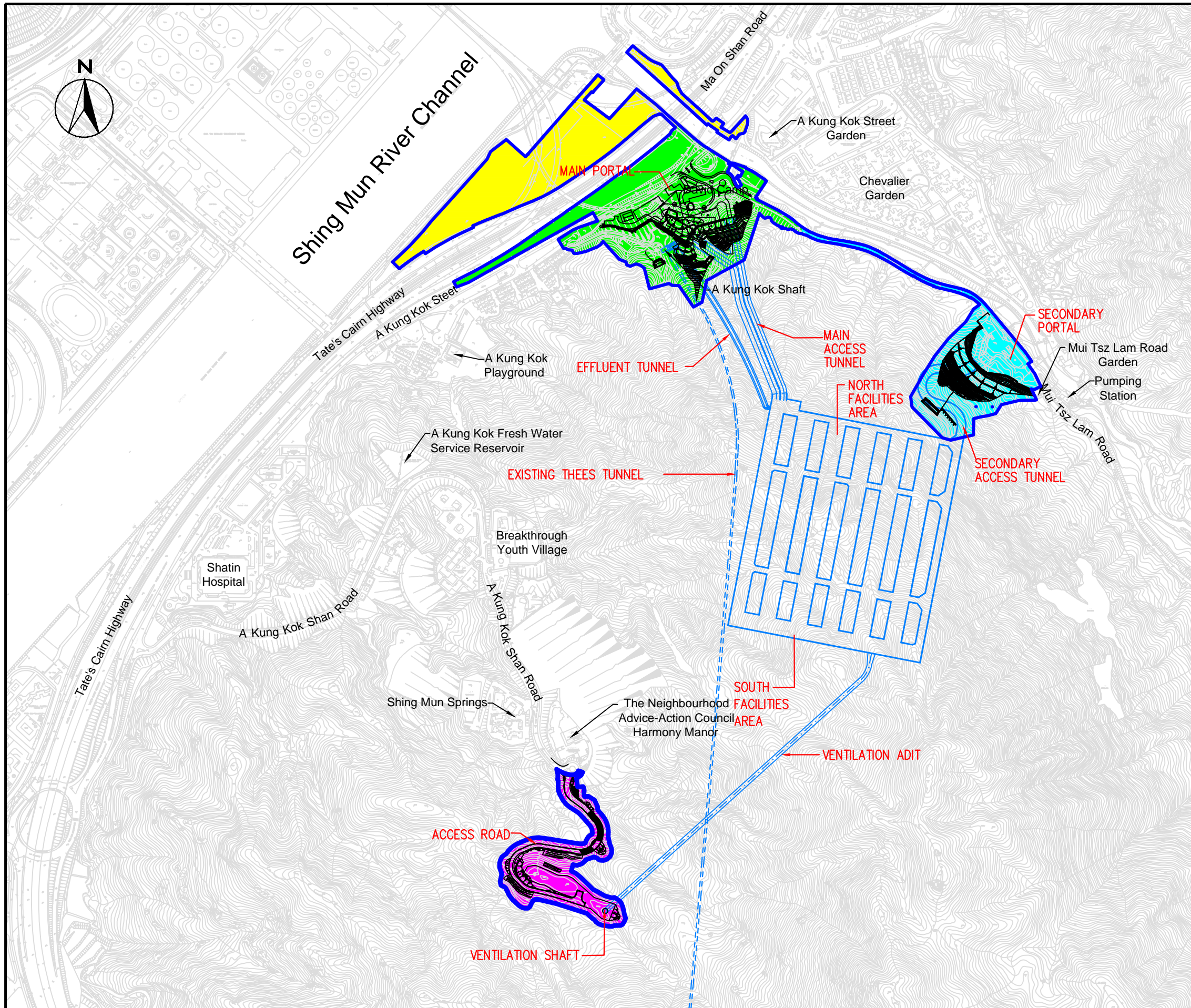
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## FIGURES

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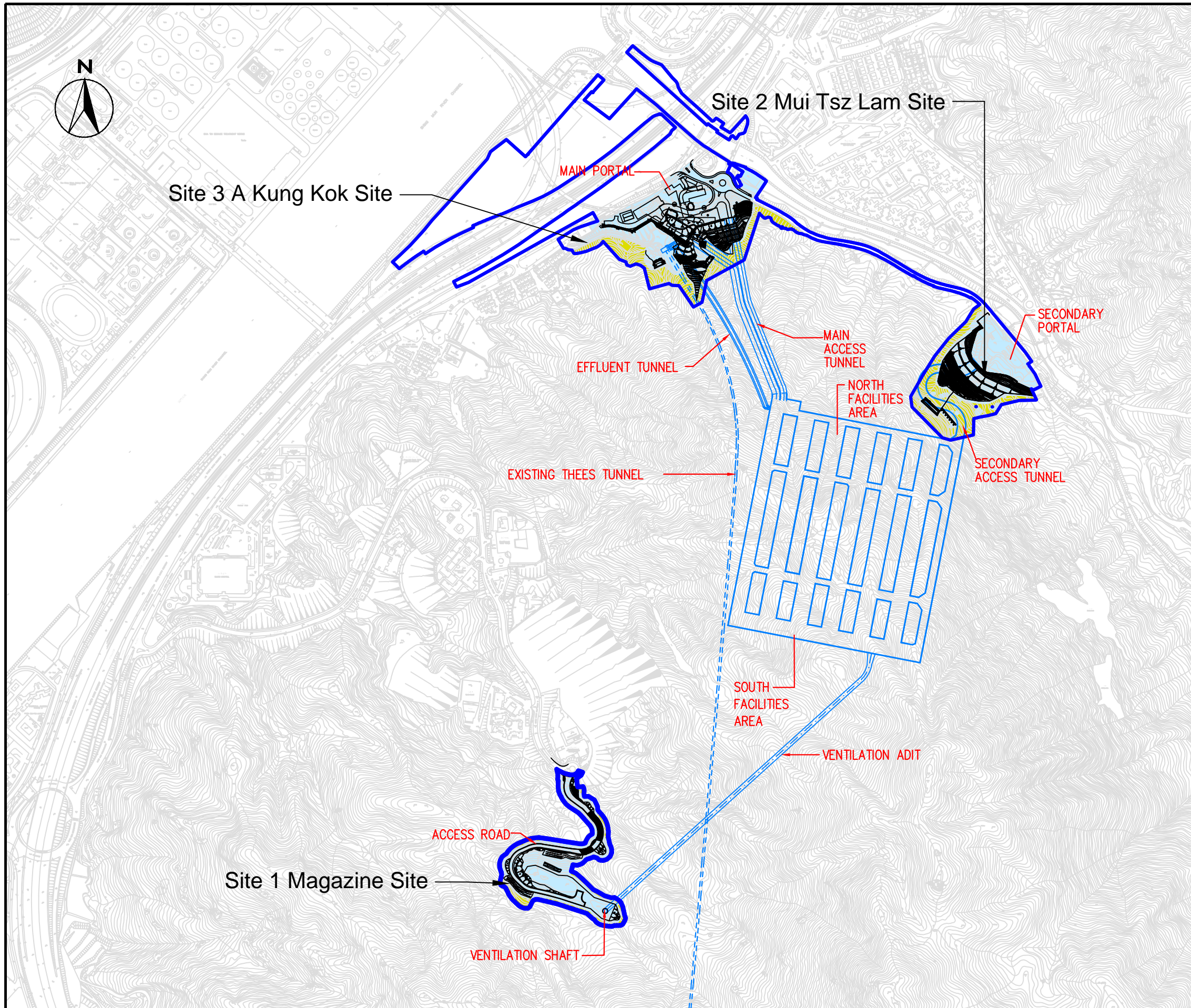
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### Legend

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

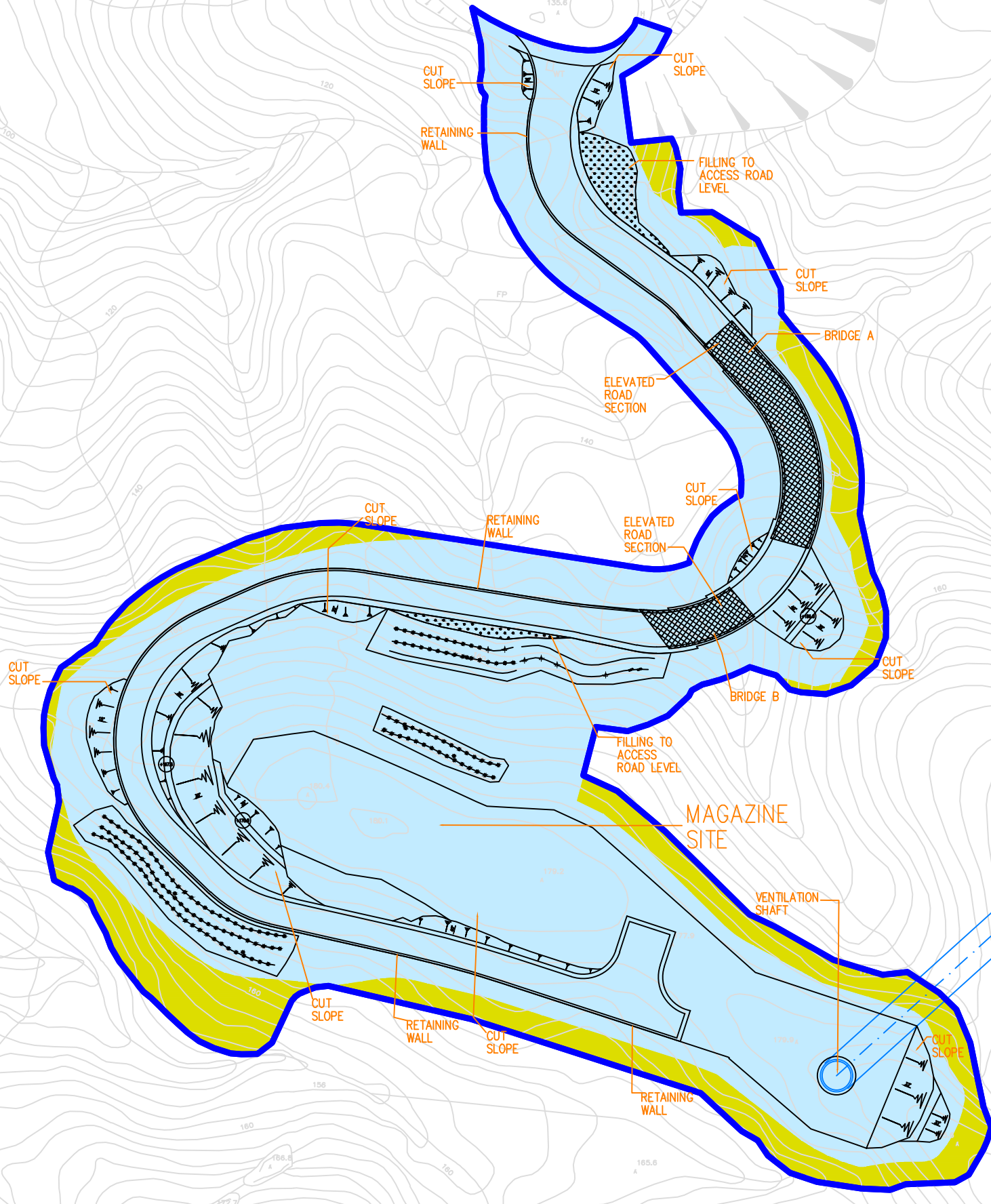
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JOB No.	IA18064	FIGURE No.	1a
		REV	2



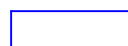
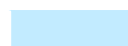

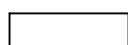

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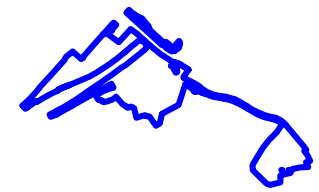
- Project Boundary
- Works Area
- Protection zone for vegetation to be retained
- Aboveground Works
- Underground Works

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JOB No.	IA18064	FIGURE No.	1b
		REV	1



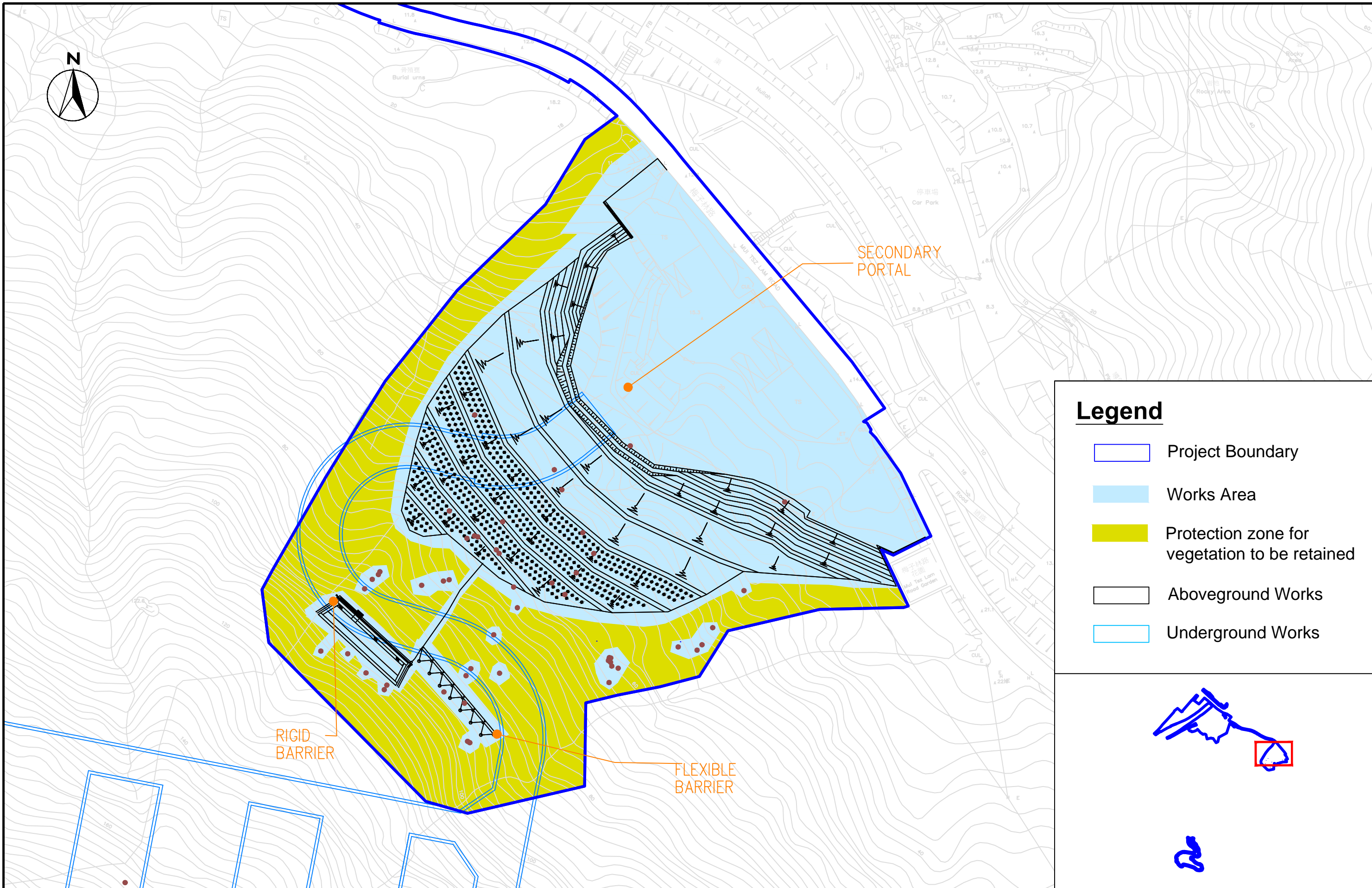
### Legend

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


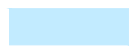

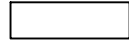



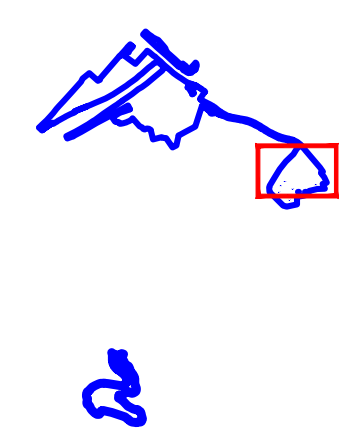
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JOB No.	IA18064	FIGURE No.	1c
		REV	1



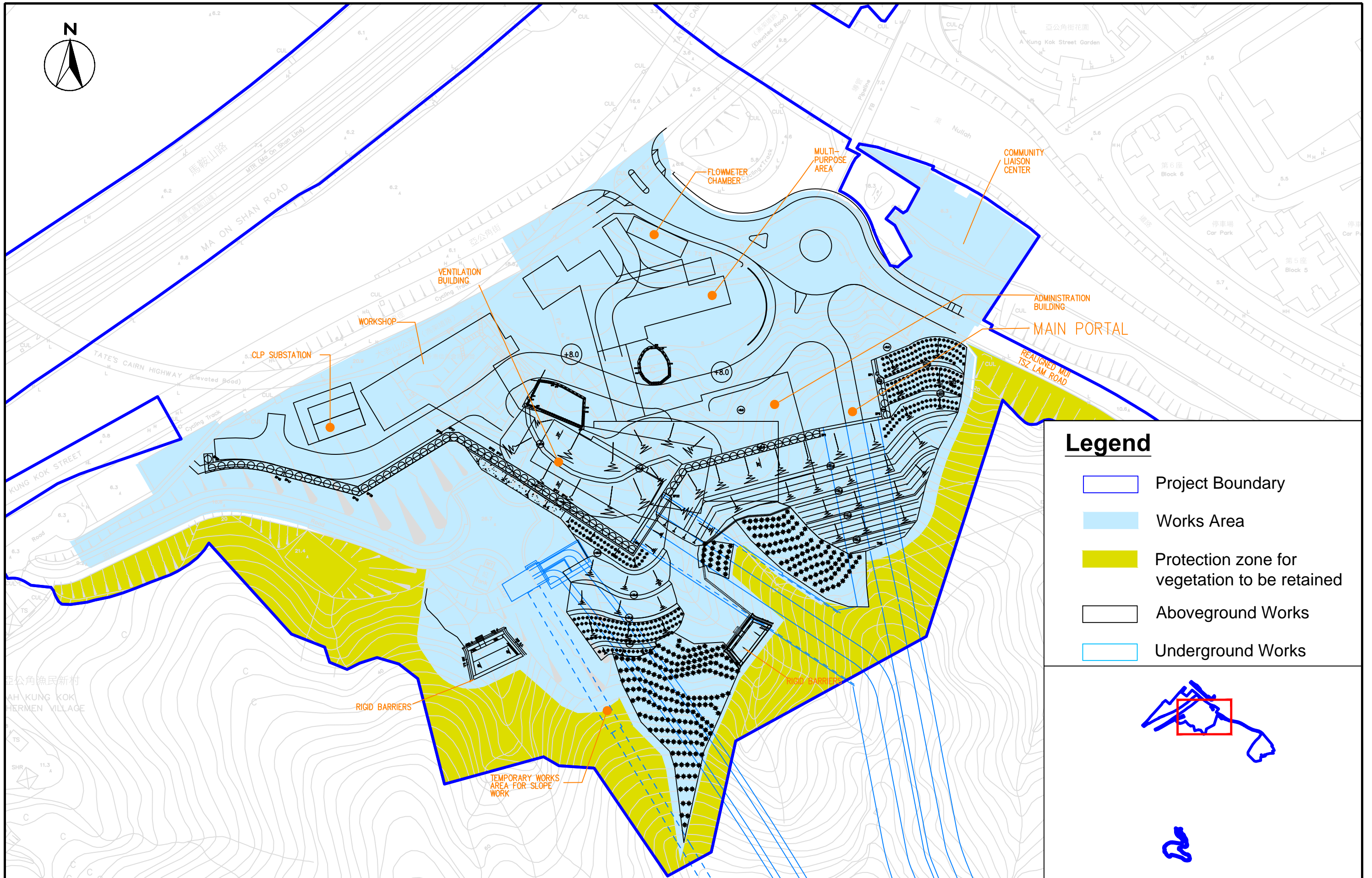
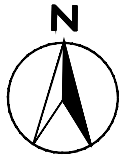


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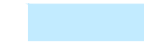

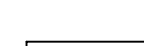

-  Project Boundary
-  Works Area
-  Protection zone for vegetation to be retained
-  Aboveground Works
-  Underground Works

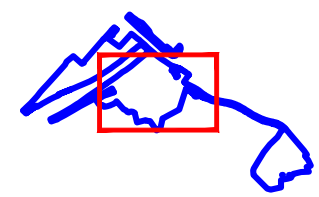


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### Legend


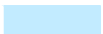


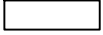


-  Project Boundary
-  Works Area
-  Protection zone for vegetation to be retained
-  Aboveground Works
-  Underground Works

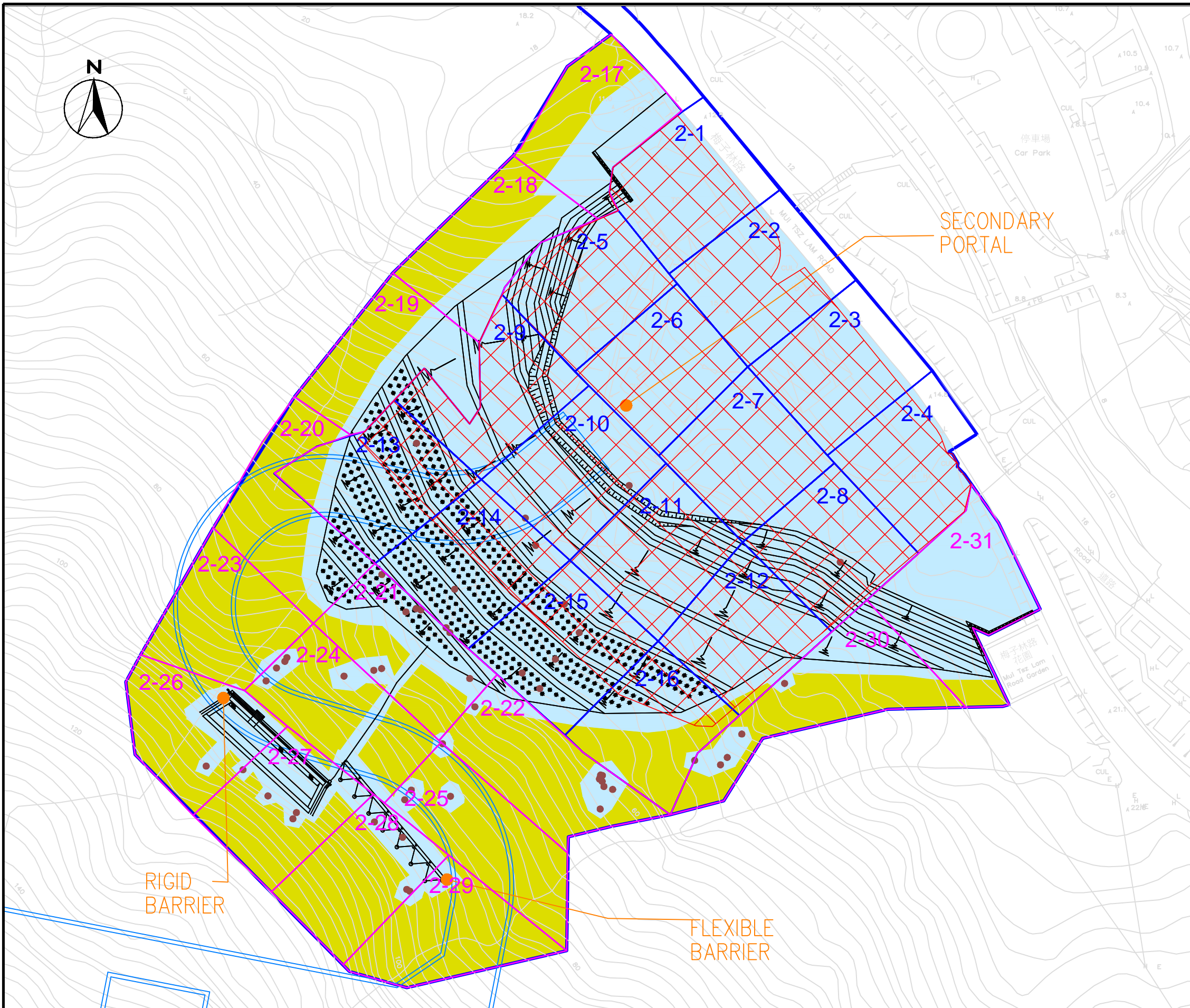


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JOB No.	IA18064	FIGURE No.	1e
		REV	1



**LEGEND**

-  Works Area in Approved Detailed Vegetation Survey Report (Version 8.1) & Protection and Transplantation Proposal (Version 7.1)
-  Works Area after Change of Design
-  Previously Surveyed Grid
-  Newly Surveyed Grid
-  Aboveground Works in Latest Design
-  Underground Works in Latest Design
-  Protection Zone for Vegetation

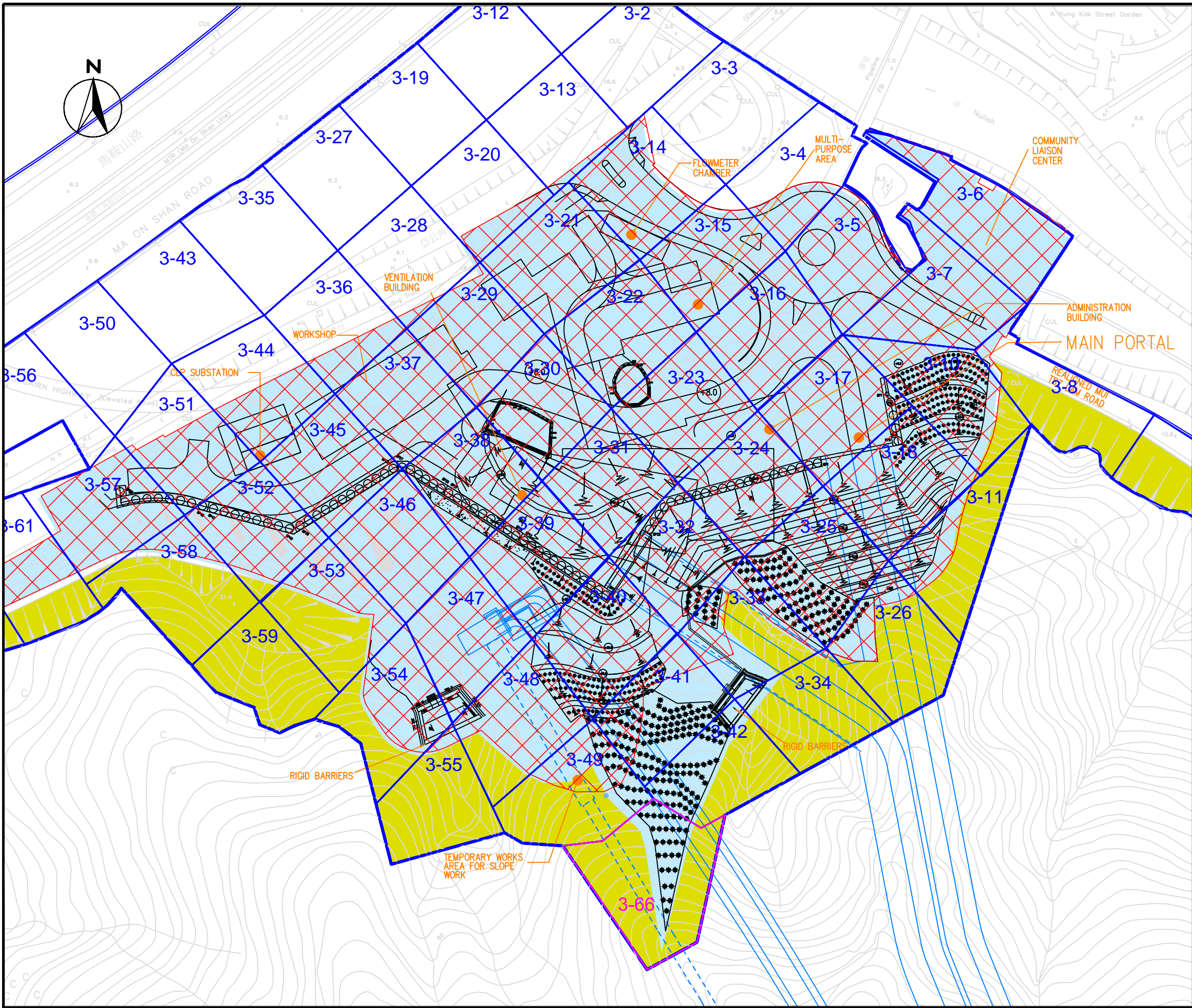


Contract No. SPW 09/2018  
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works

**Comparison of Works Area and Survey Effort between Past and Current Designs (Site 2 Mui Tze Lam Site)**



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PROJECT NO.	IA18064	FIGURE NO.	1f
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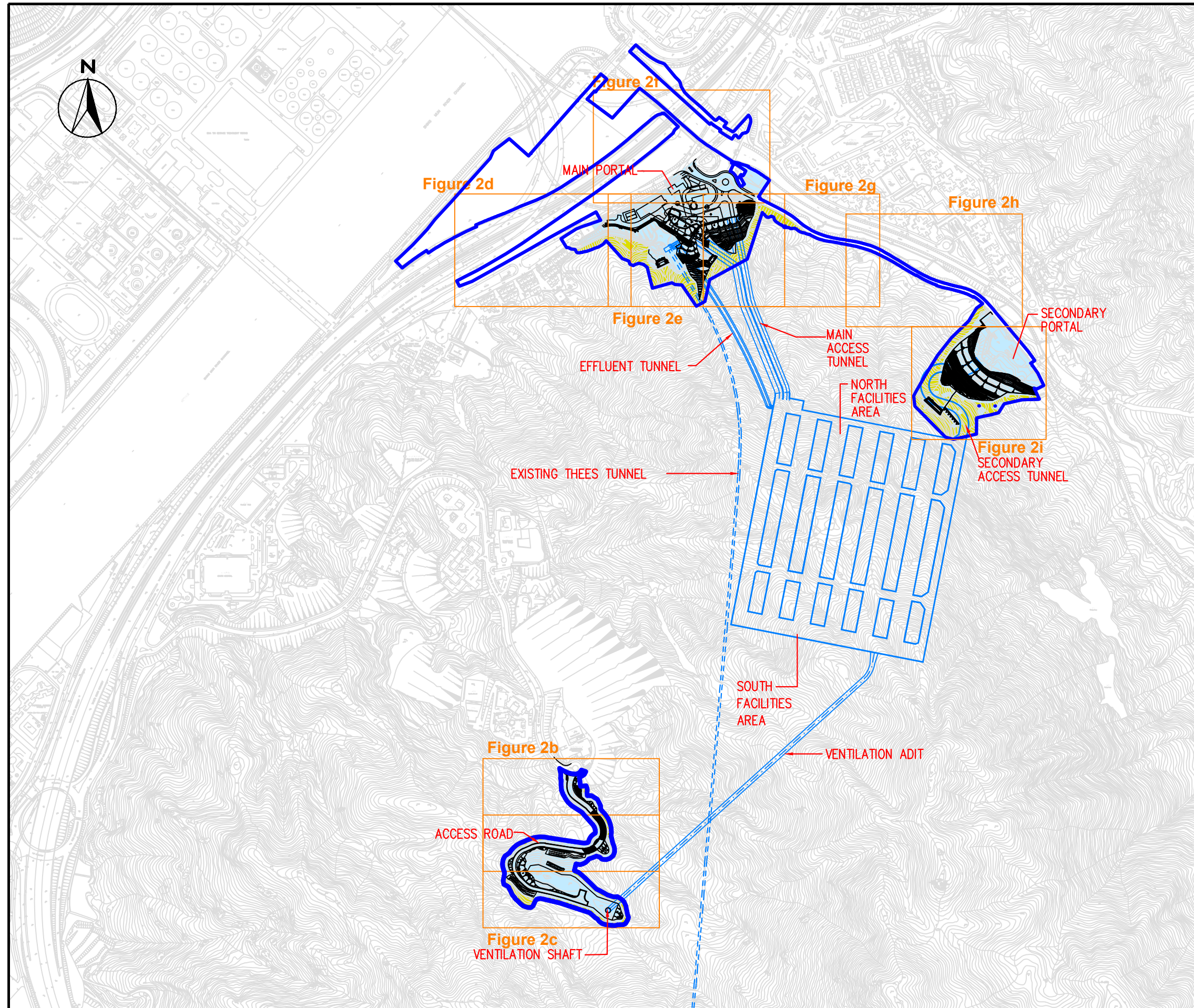
**LEGEND**

- Works Area in Approved Detailed Vegetation Survey Report (Version 8.1) & Protection and Transplantation Proposal (Version 7.1)
- Works Area after Change of Design
- Previously Surveyed Grid
- Newly Surveyed Grid
- Aboveground Works in Latest Design
- Underground Works in Latest Design
- Protection Zone for Vegetation



Contract No. SPW 09/2018  
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works  
**Comparison of Works Area and Survey Effort between Past and Current Designs (Site 3 A Kung Kok Site)**

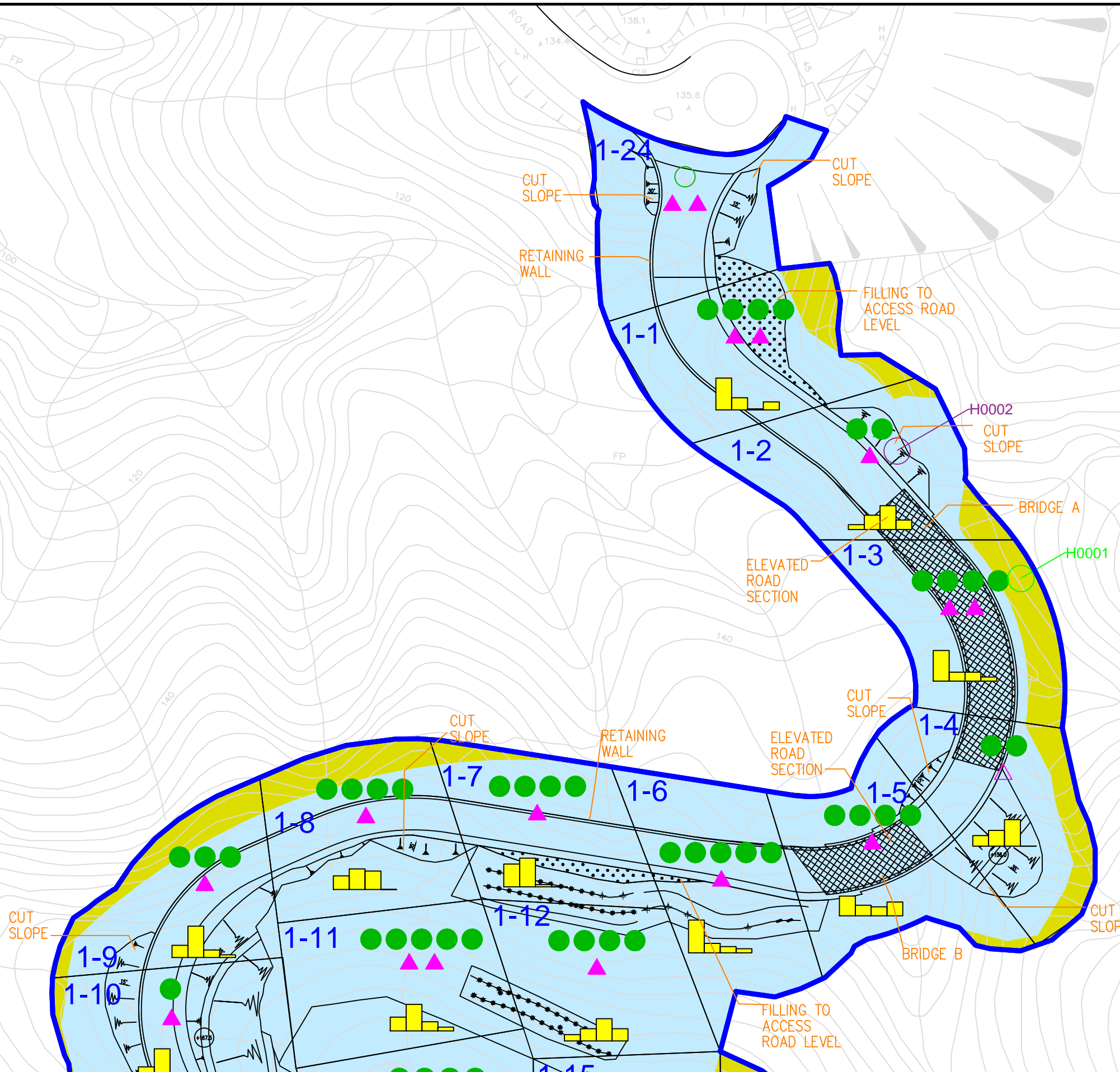
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PROJECT NO.	IA18064	FIGURE NO.	1g
		REV	1



### Legend

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

SCALE	1:7000 @ A3	DATE	JUL 2020
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JOB No.	IA18064	FIGURE No.	2a
		REV	1



**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 - 2500

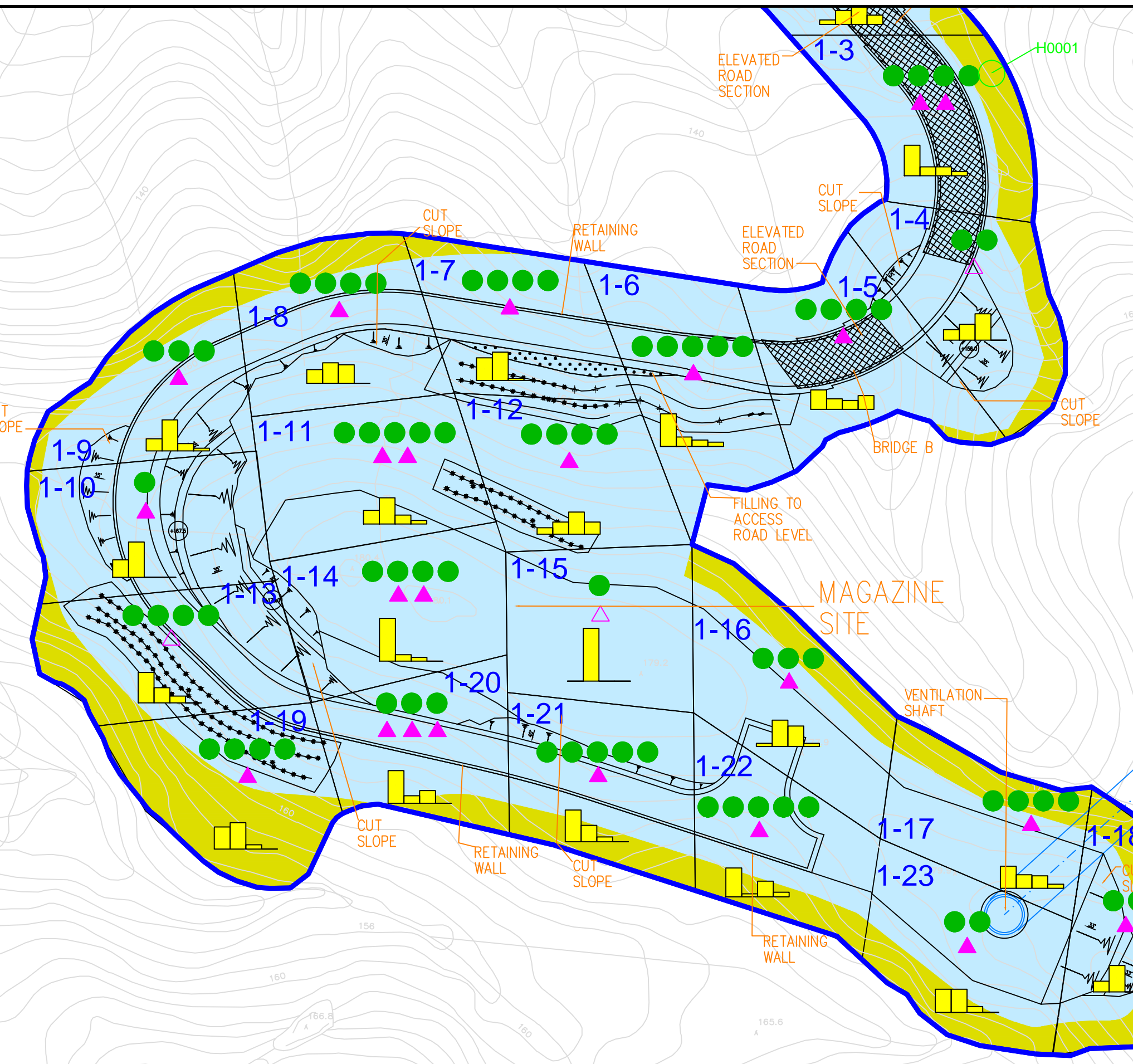
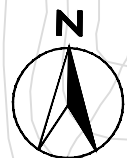
**Percentage of *Diospyros vaccinioides***

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

Height (m)

**Coverage of *Gnetum luofuense***

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



**Legend**

- Project boundary
- Survey Grid
- Works Area

Recommendations of Plant Species of Conservation Importance Observed:

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

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

**Quantity of *Diospyros vaccinioides***

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2500

**Percentage of *Diospyros vaccinioides***

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

Height (m)

**Coverage of *Gnetum luofuense***

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



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

**Legend**

- 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 - 2500

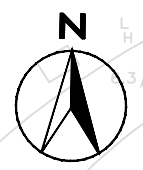
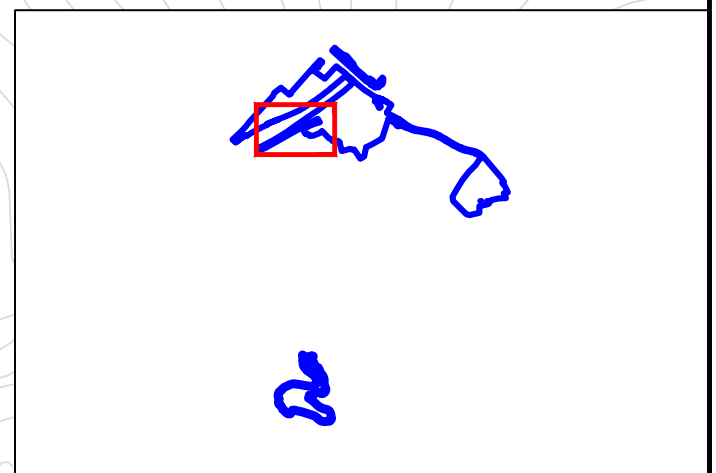
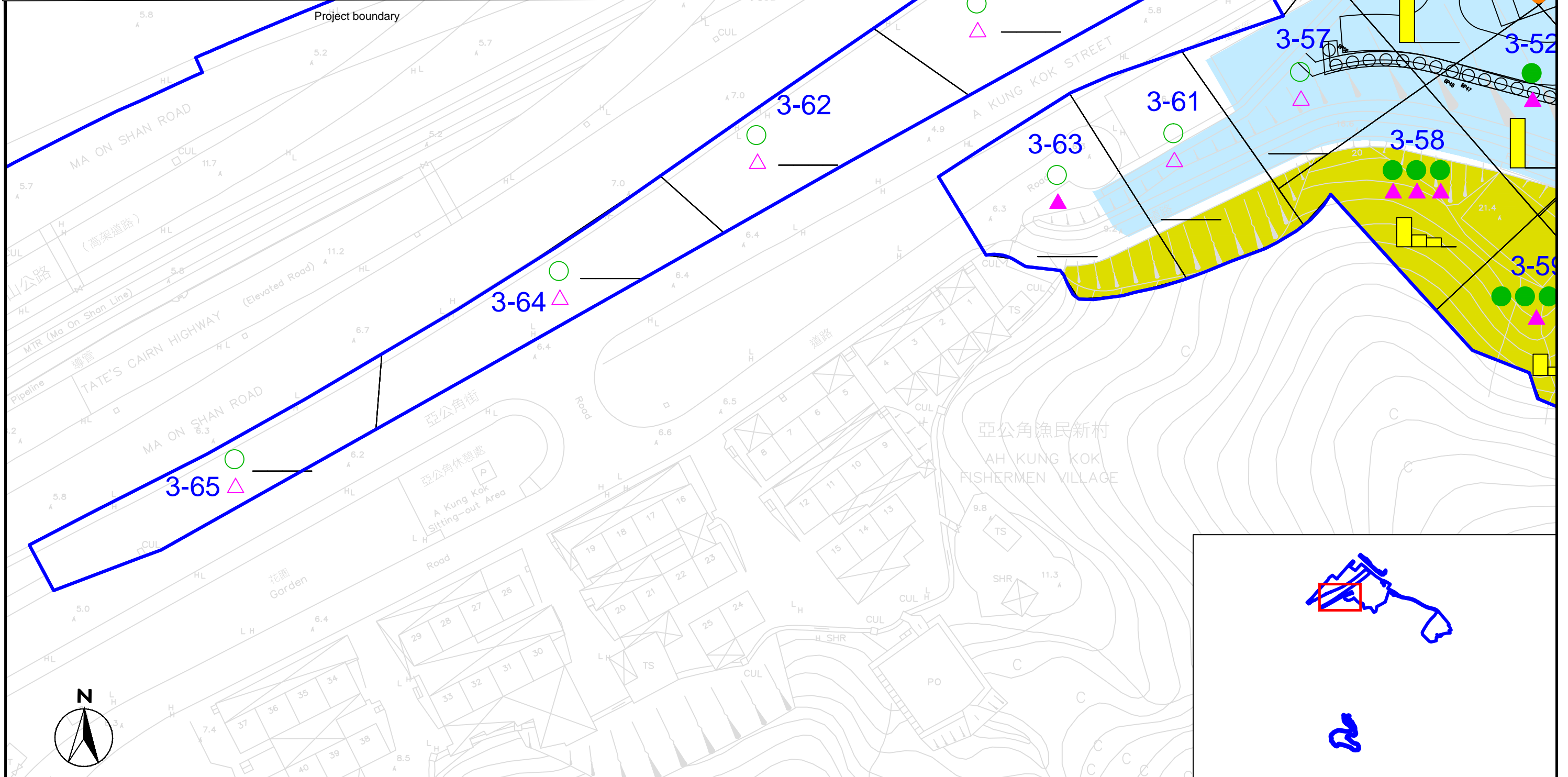
**Coverage of *Gnetum luofuense***

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

**Percentage of *Diospyros vaccinioides***

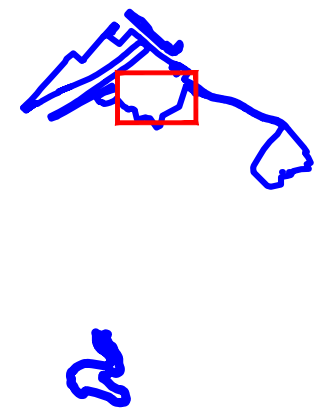
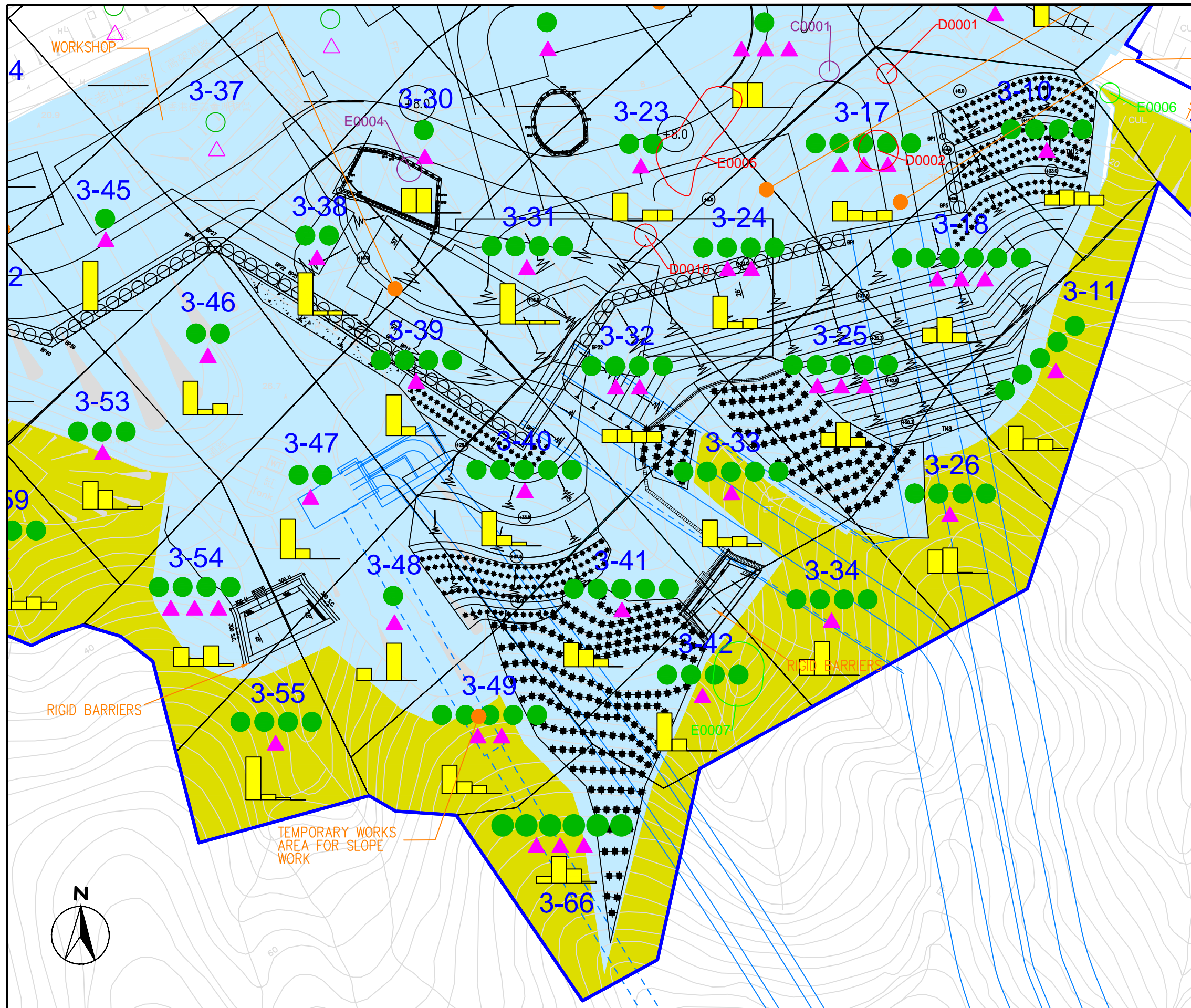
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Bar 2	1-2
Bar 3	2-3
Bar 4	>3

Height (m)



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JOB No.	IA18064	FIGURE No.	2d
		REV	2





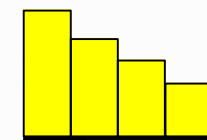
**Legend**

- Project boundary
  - Survey Grid
  - Works Area
  - Protection Zone for Vegetation
  - Retain
  - Transplant
  - Fell
- Recommendations of Plant Species of Conservation Importance Observed:
- 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 - 2500

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	AUG 2020	
CHECK	BC	DRAWN	MY	
JOB No.	IA18064	FIGURE No.	2e	REV 2



**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

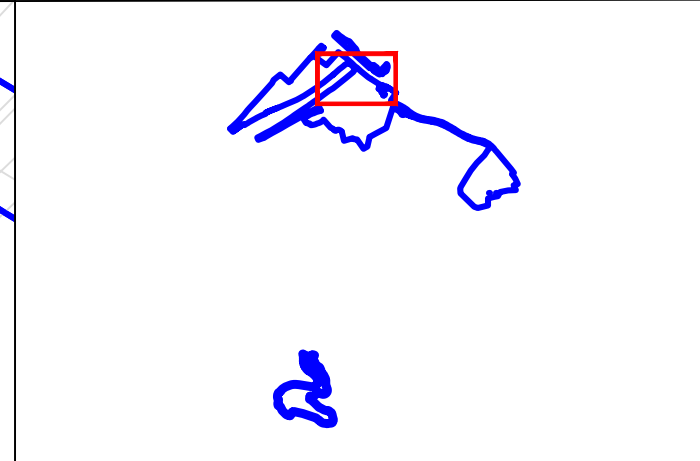
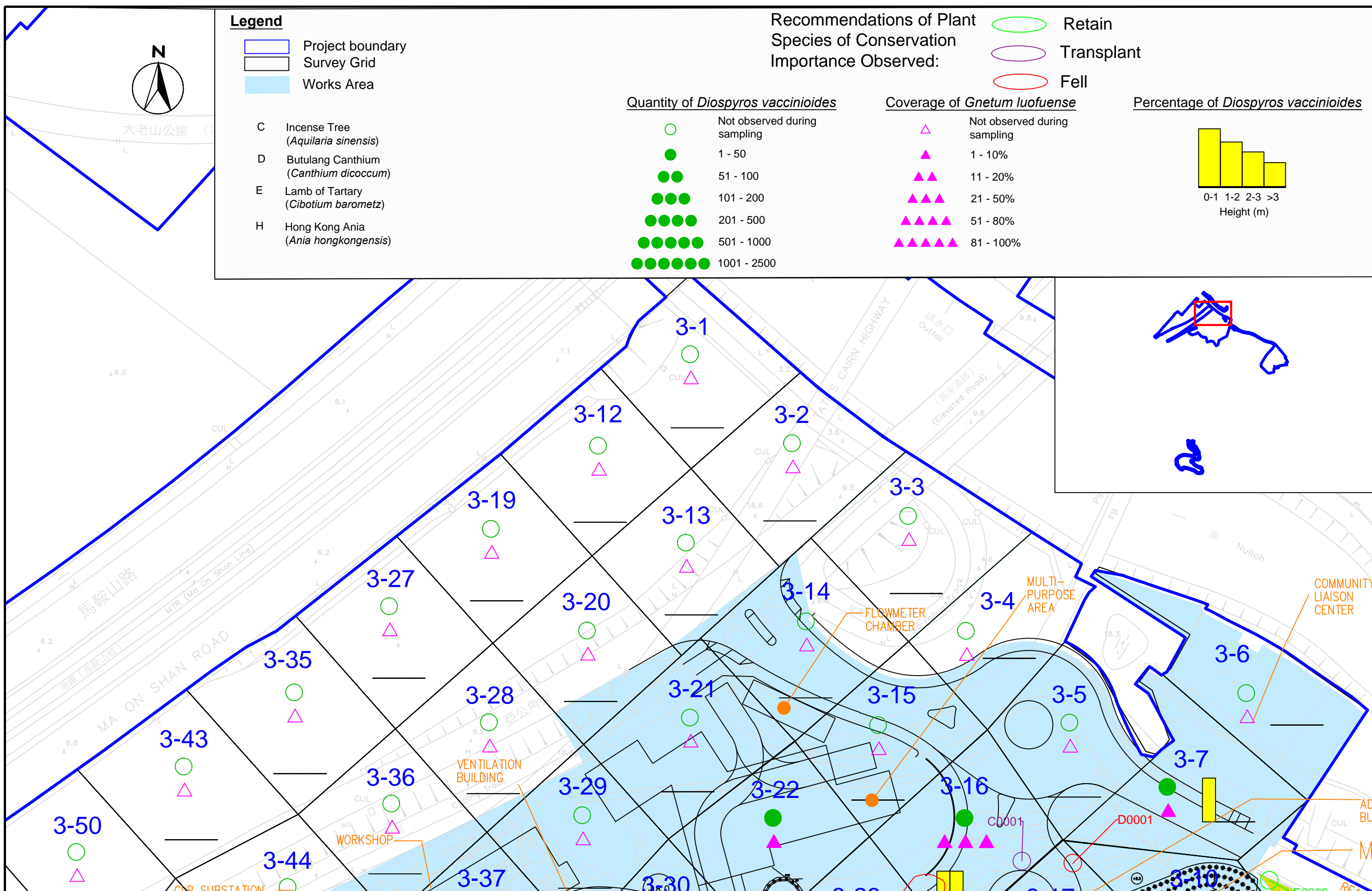
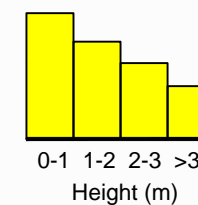
Quantity of *Diospyros vaccinioides*

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2500

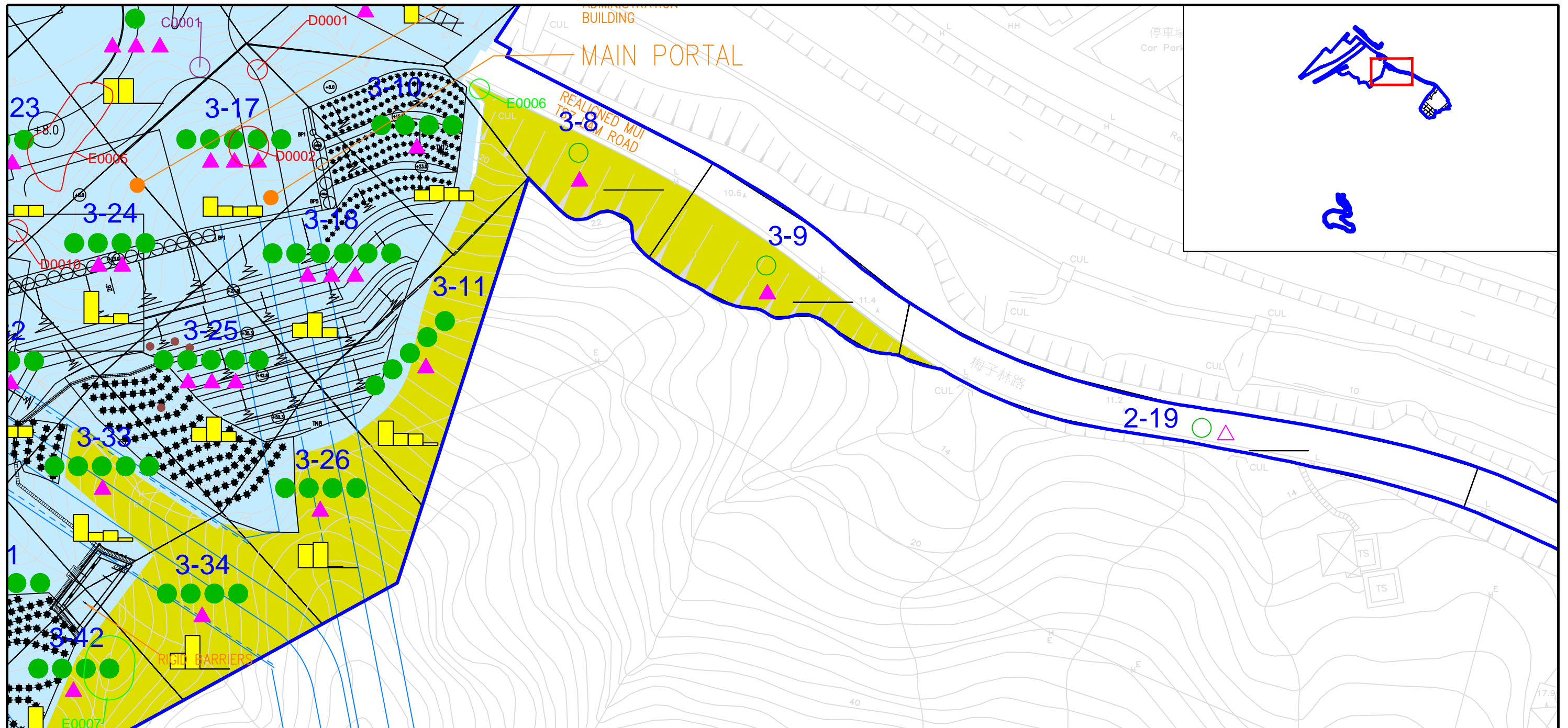
Coverage of *Gnetum luofuense*

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

Percentage of *Diospyros vaccinioides*



SCALE	1:800 @ A3	DATE	JUL 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	2f
		REV	2



**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

Quantity of <i>Diospyros vaccinioides</i>		Coverage of <i>Gnetum luofuense</i>		Percentage of <i>Diospyros vaccinioides</i>
	Not observed during sampling		Not observed during sampling	<p>0-1 1-2 2-3 &gt;3 Height (m)</p>
	1 - 50		1 - 10%	
	51 - 100		11 - 20%	
	101 - 200		21 - 50%	
	201 - 500		51 - 80%	
	501 - 1000		81 - 100%	
	1001 - 2500			



**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

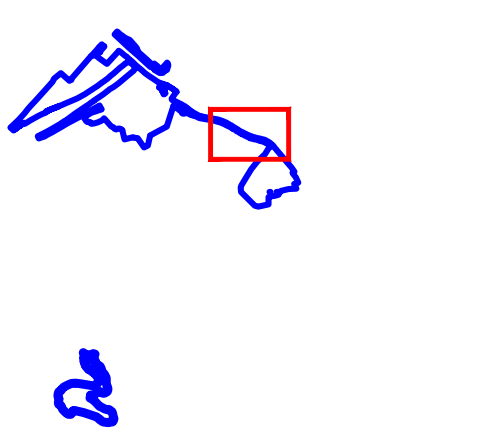
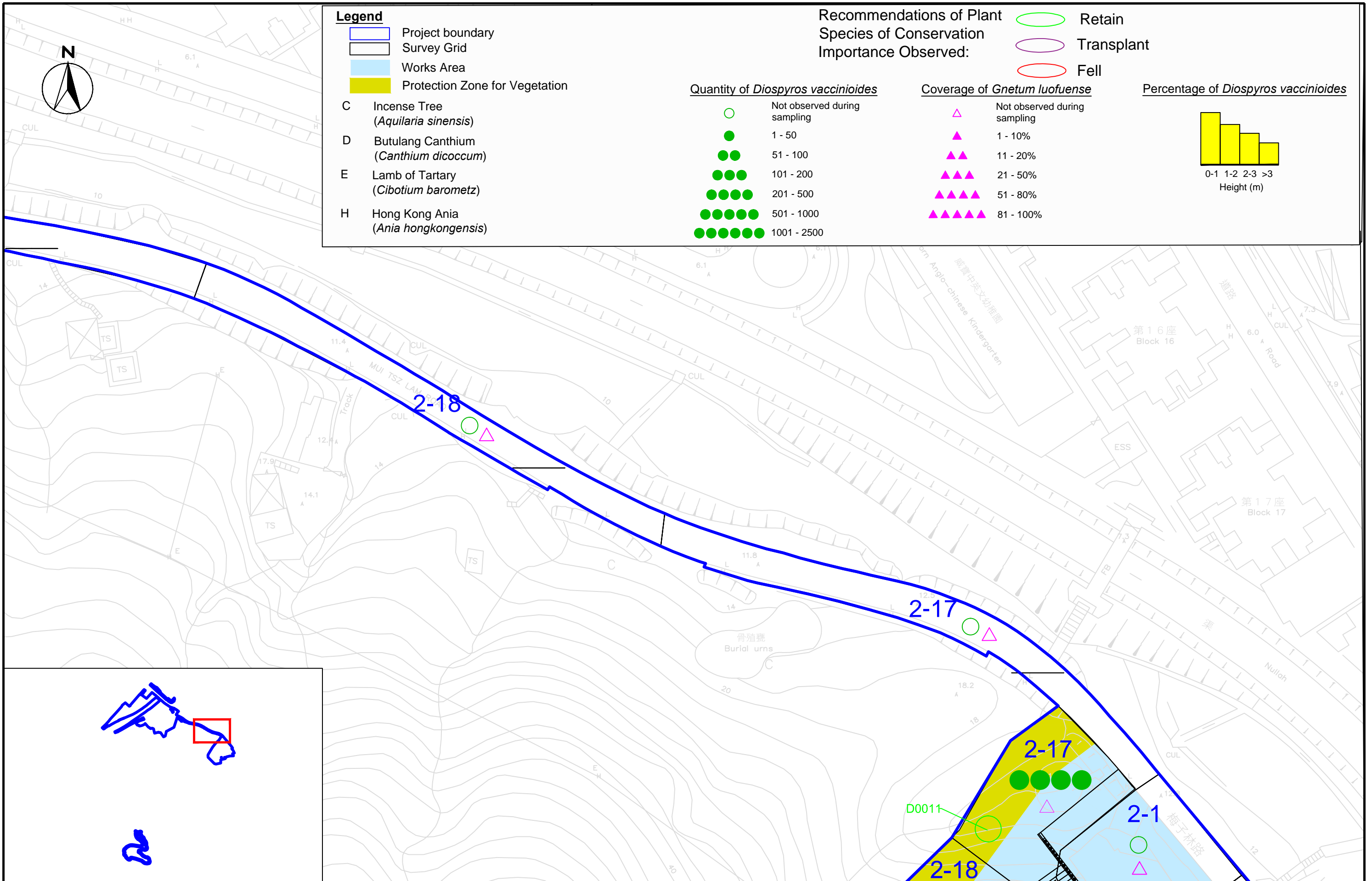
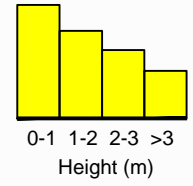
**Quantity of *Diospyros vaccinioides***

- Not observed during sampling
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 500
- 501 - 1000
- 1001 - 2500

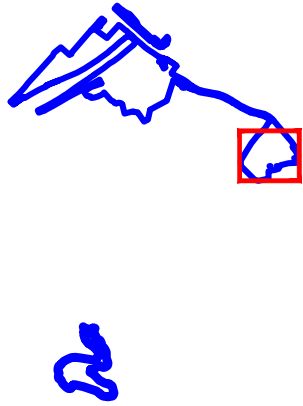
**Coverage of *Gnetum luofuense***

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

**Percentage of *Diospyros vaccinioides***



SCALE	1:800 @ A3	DATE	JUL 2020
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JOB No.	IA18064	FIGURE No.	2h
		REV	2



**Legend**

Project boundary  
 Survey Grid  
 Works Area

Recommendations of Plant Species of Conservation Importance Observed:

Retain  
 Transplant  
 Fell  
 Fell & Transplant

C Incense Tree (*Aquilaria sinensis*)  
 D Butulang Canthium (*Canthium dicoccum*)  
 E Lamb of Tartary (*Cibotium barometz*)  
 F Buttercup Orchid (*Spathoglottis pubescens*)  
 I Hong Kong Eagle's Claw (*Artabotrys hongkongensis*)

Protection Zone for Vegetation

**Quantity of *Diospyros vaccinioides***

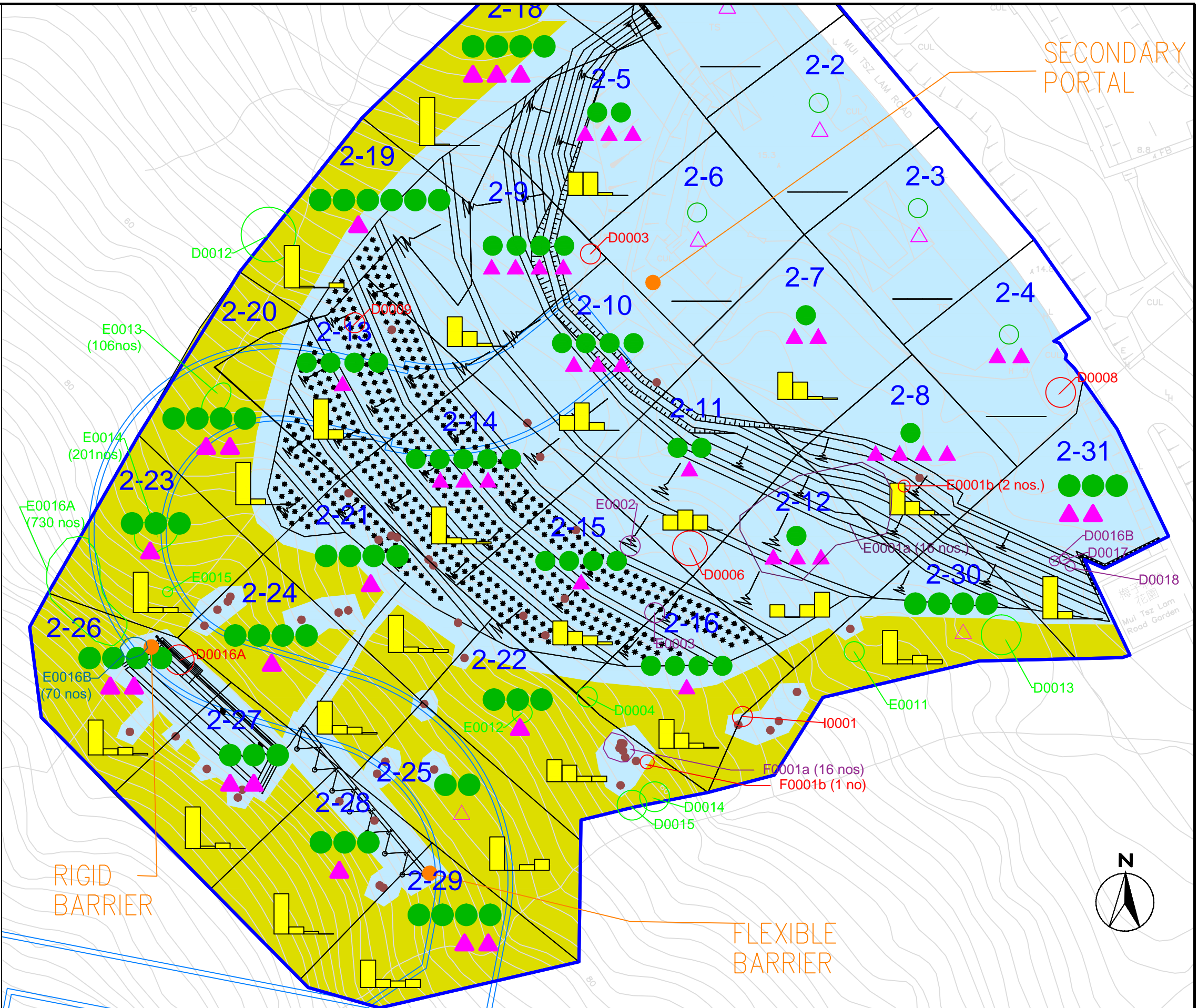
Not observed during sampling  
 1 - 50  
 51 - 100  
 101 - 200  
 201 - 500  
 501 - 1000  
 1001 - 2500

**Percentage of *Diospyros vaccinioides***

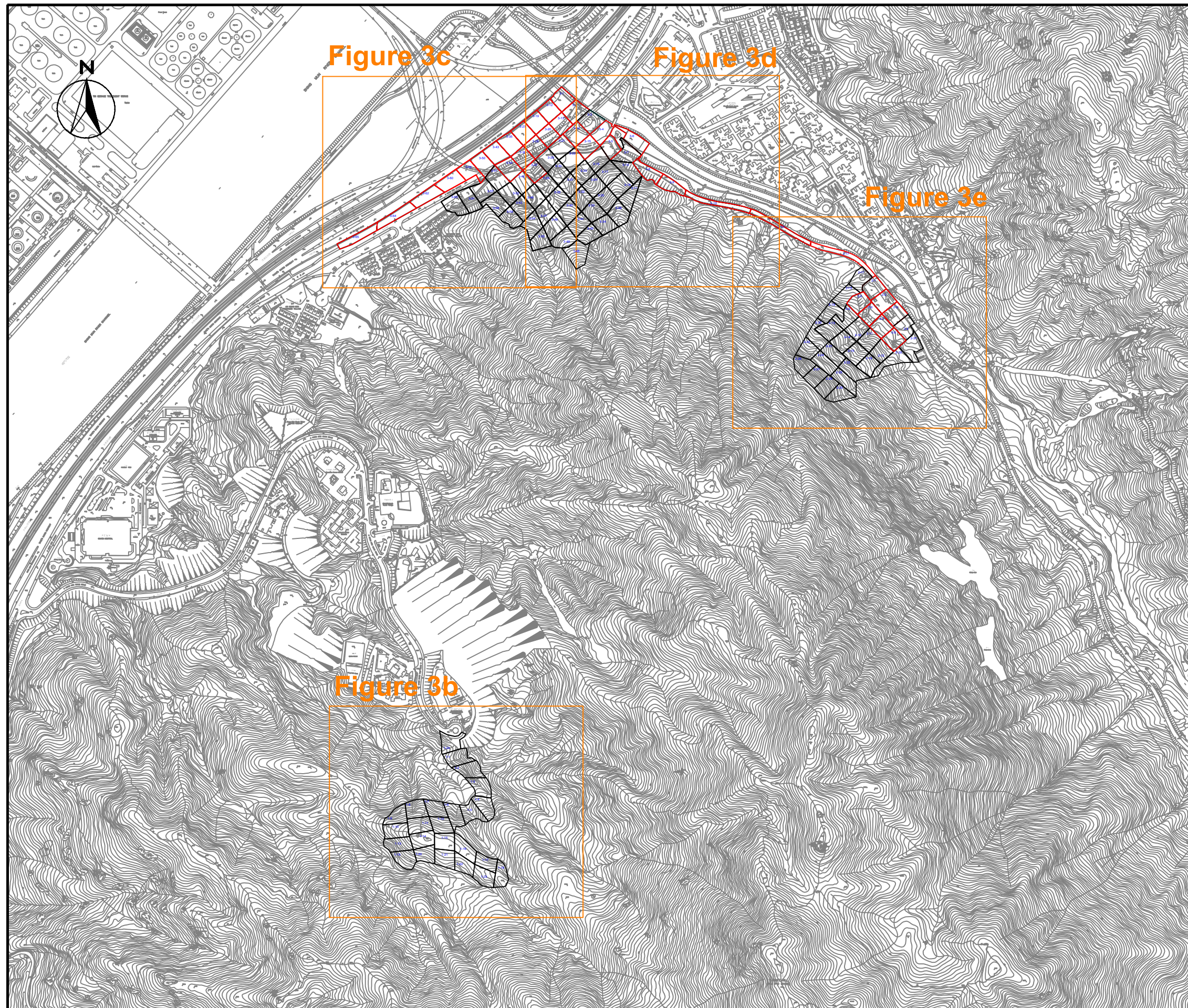
0-1 1-2 2-3 >3  
 Height (m)

**Coverage of *Gnetum luofuense***

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



SCALE	1:800 @ A3	DATE	JUL 2020	
CHECK	BC	DRAWN	MY	
JOB No.	IA18064	FIGURE No.	2i	REV 2

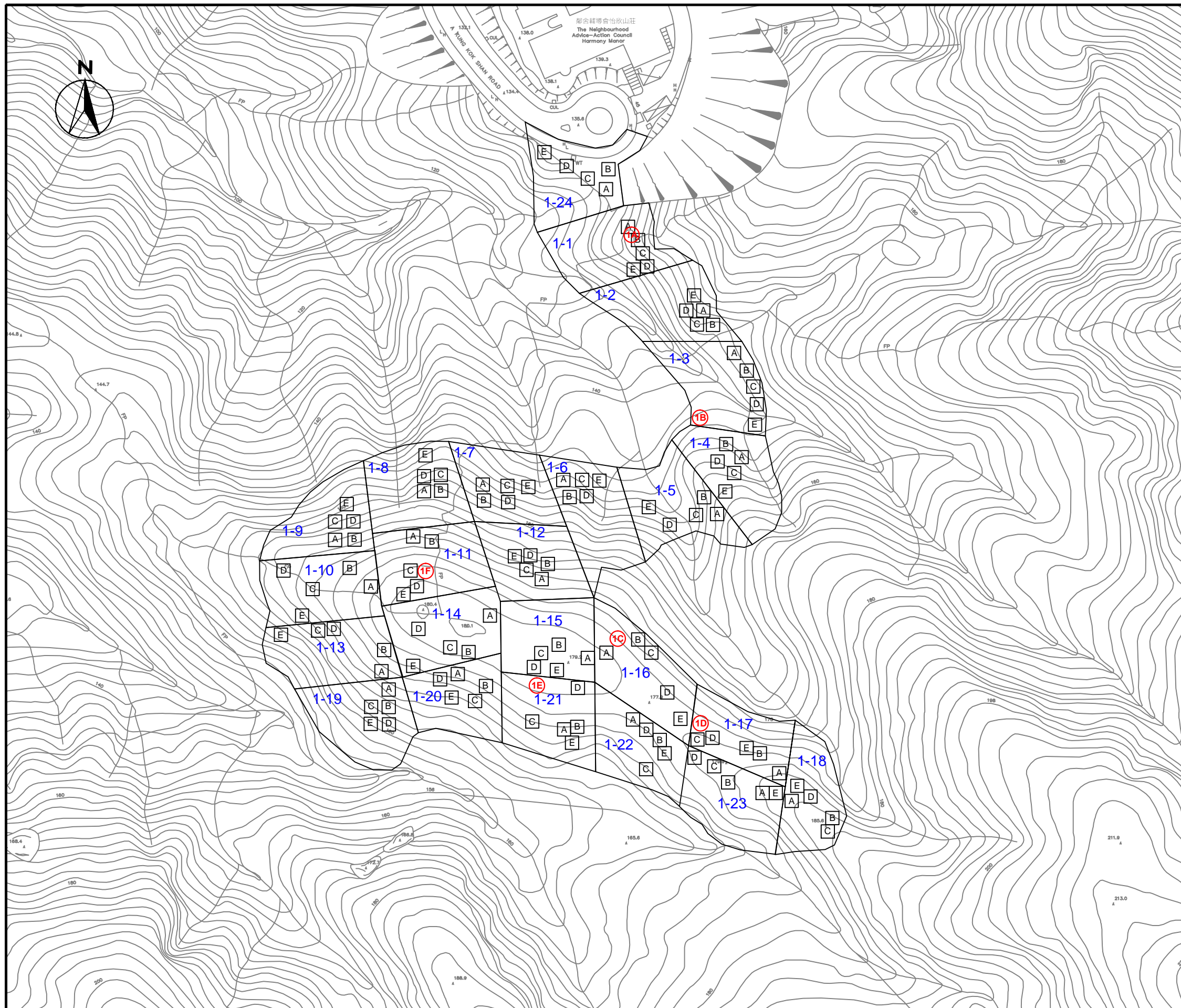


### Legend

- 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	JUL 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	3a
		REV	2

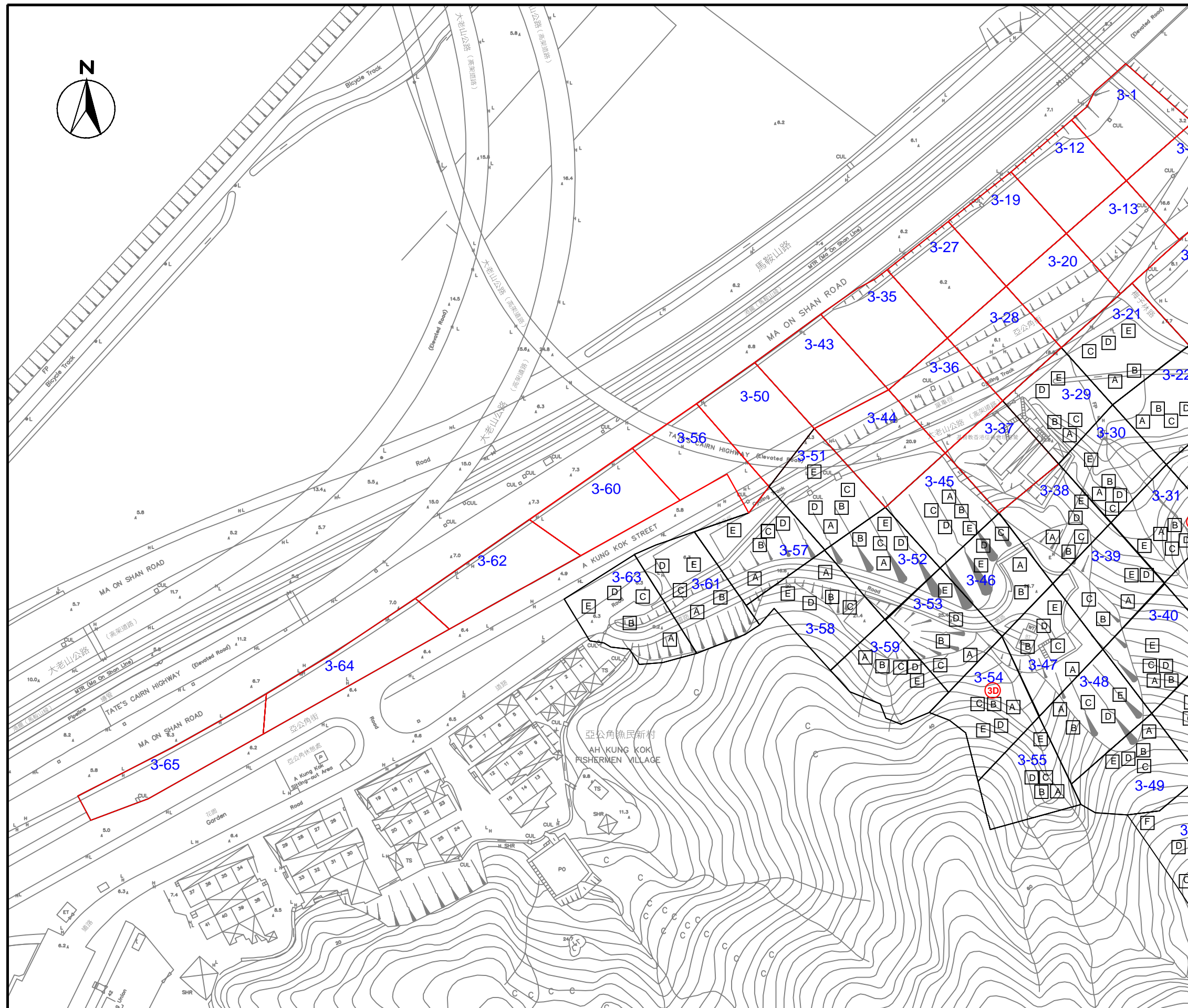
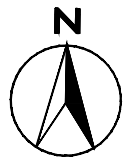


### Legend

- Walkthrough Survey
- Sampling Survey
- A 5m x 5m Small Grid  
(For estimation of average density in the corresponding 1000m<sup>2</sup> grid)
- 1A 5m x 5m Small 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	JUL 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	3b
		REV	2



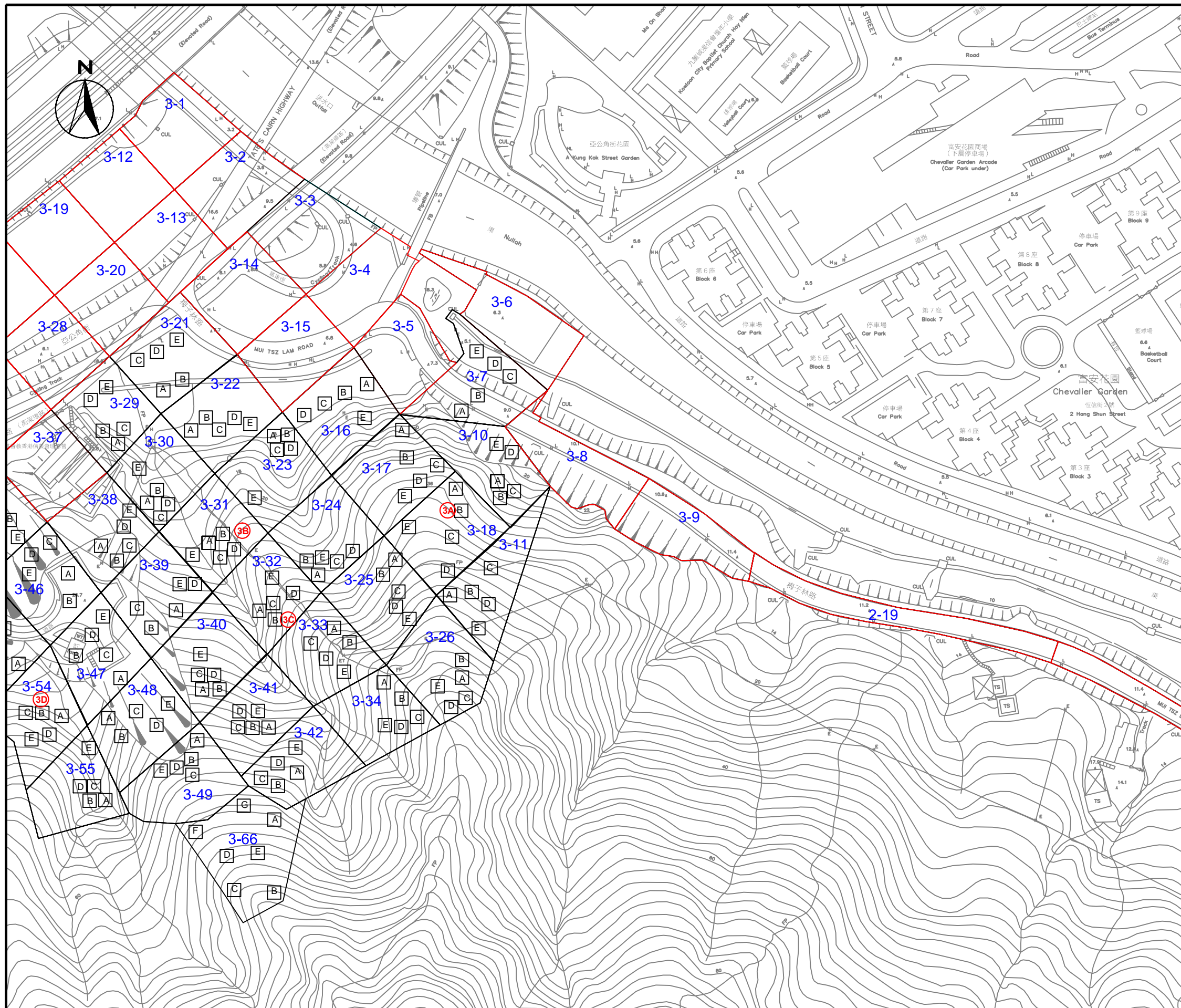
### Legend

- Walkthrough Survey
- Sampling Survey
- A 5m x 5m Small Grid  
(For estimation of average density in the corresponding 1000m<sup>2</sup> grid)
- 1A 5m x 5m Small 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	JUL 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	3c
		REV	2



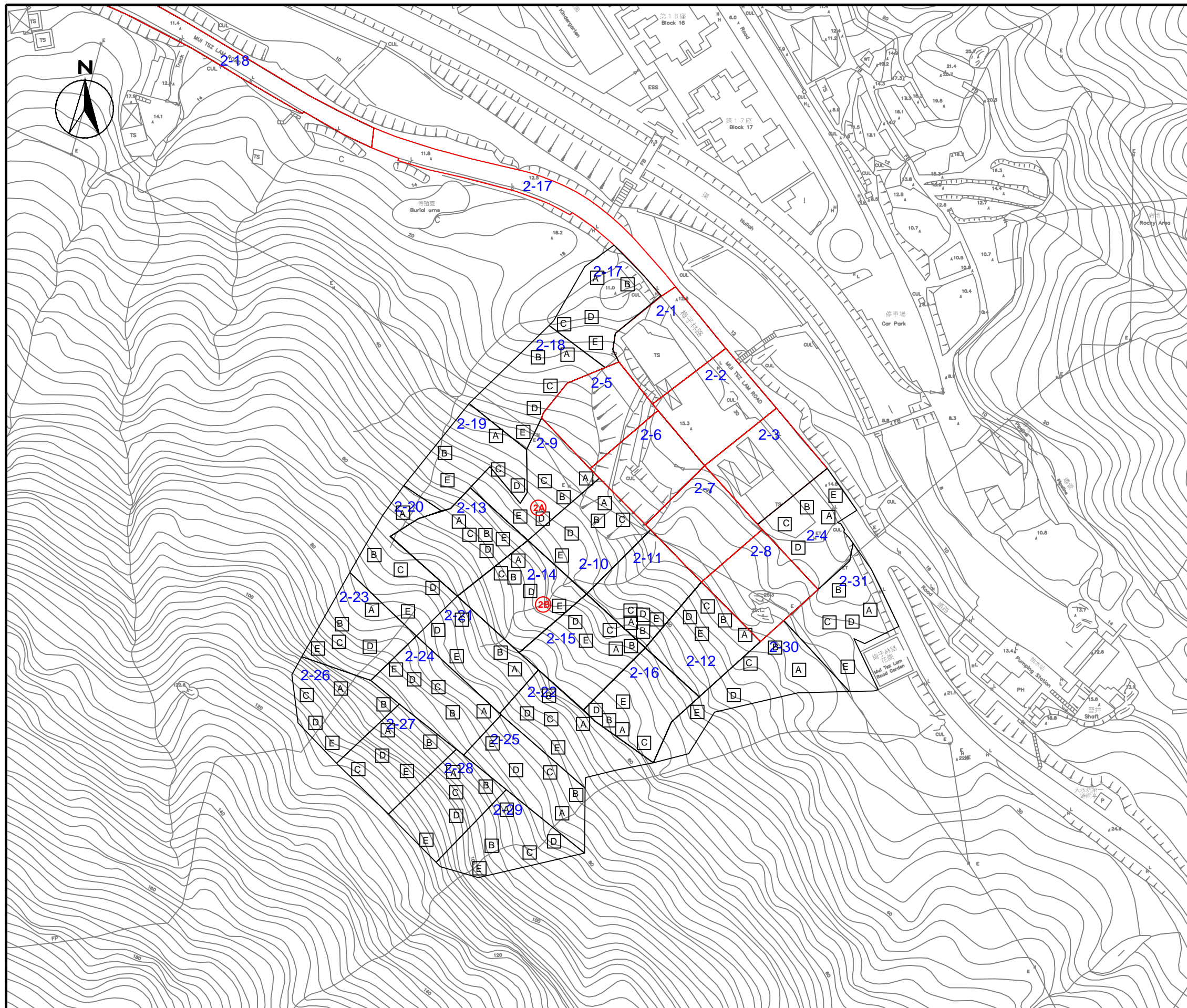


### Legend

- Walkthrough Survey
- Sampling Survey
- A 5m x 5m Small Grid  
(For estimation of average density in the corresponding 1000m<sup>2</sup> grid)
- 1A 5m x 5m Small 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	JUL 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	3d
		REV	2

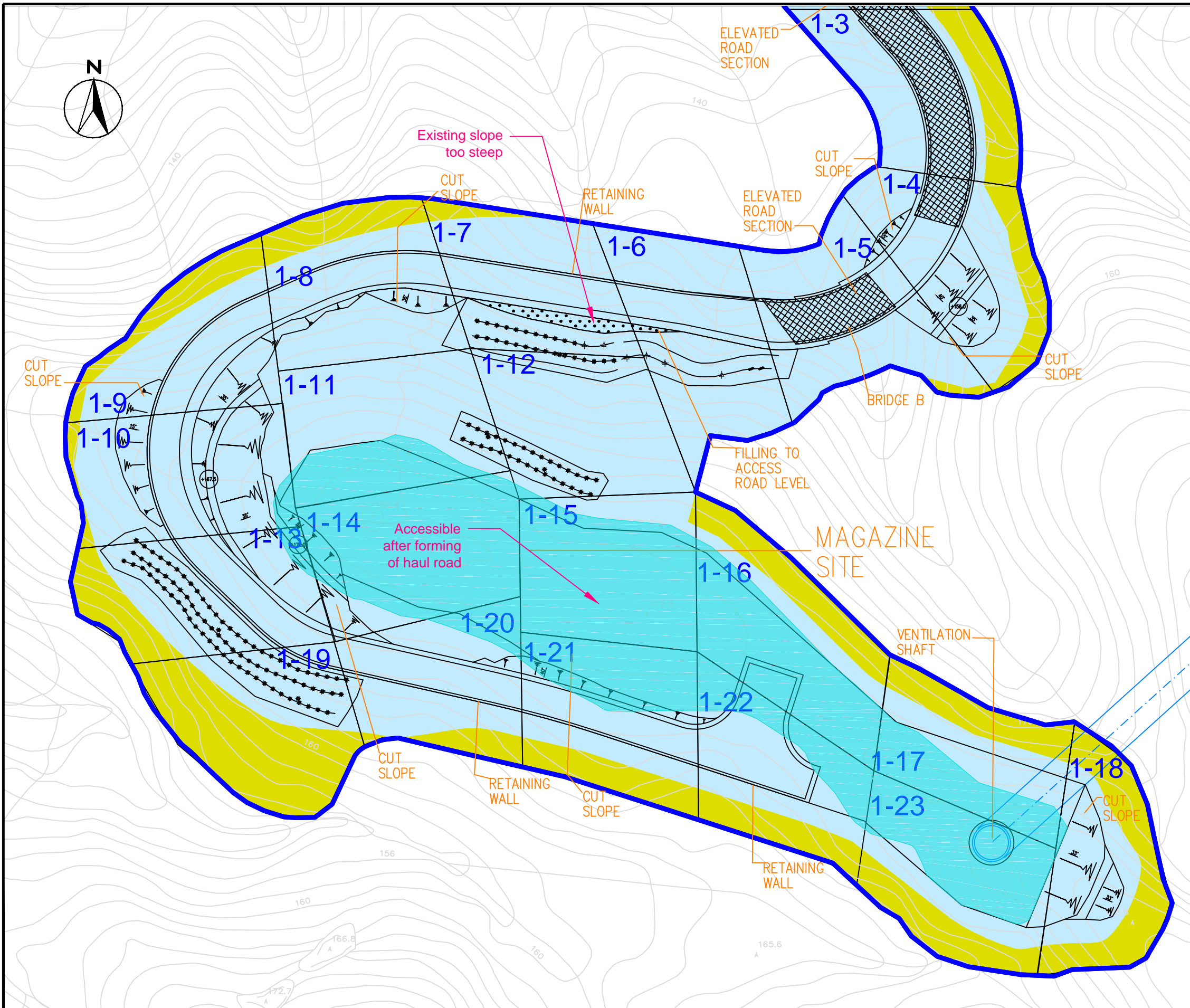


### Legend

- Walkthrough Survey
- Sampling Survey
- A 5m x 5m Small Grid  
(For estimation of average density in the corresponding 1000m<sup>2</sup> grid)
- 1A 5m x 5m Small 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	JUL 2020	
CHECK	BC	DRAWN	MY	
JOB No.	IA18064	FIGURE No.	3e	REV 1



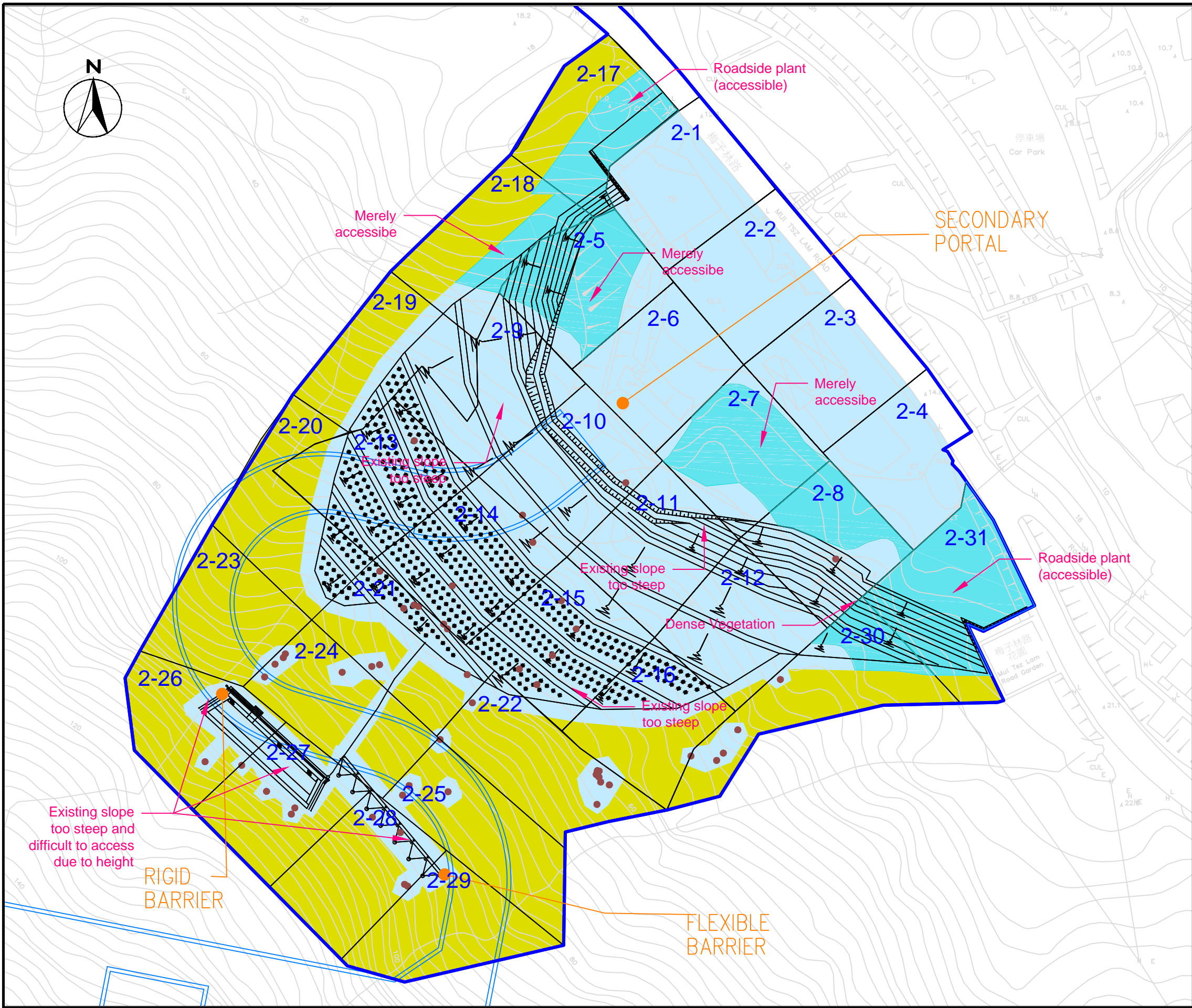
**LEGEND**

- Project boundary
- Survey Grid
- Works Area
- Protection Zone for Vegetation
- Gentle Area Accessible for Transplantation



Contract No. SPW 09/2018  
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works  
**Area Accessible for Transplantation of Small Persimmon (Site 1 Magazine Site)**

SCALE	A3 1:8000	DATE	AUG 20
CHECK	BC	DRAWN	MY
PROJECT NO.	IA18064	FIGURE NO.	4a
		REV	—



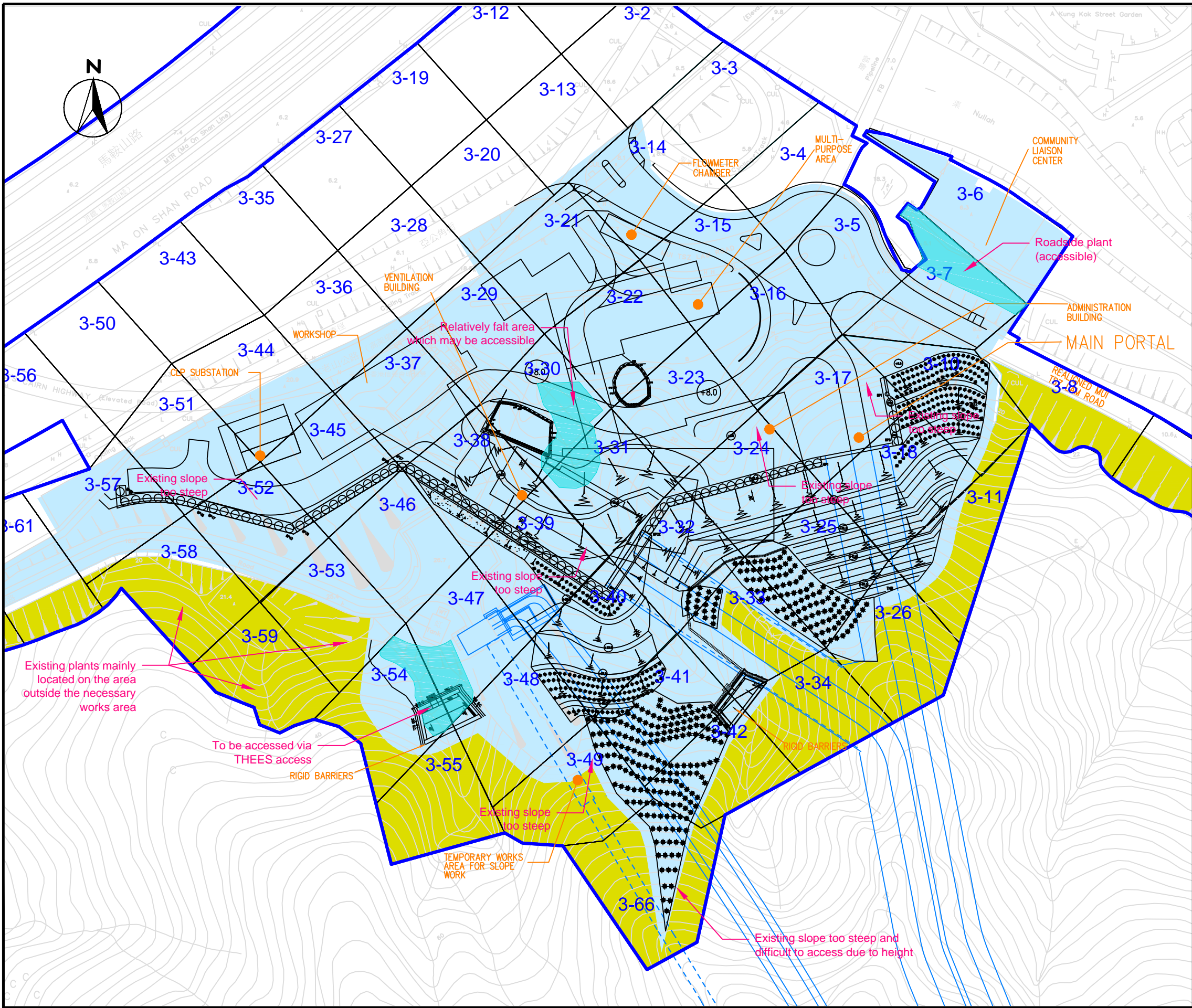
**LEGEND**

- Project boundary
- Survey Grid
- Works Area
- Protection Zone for Vegetation
- Gentle Area Accessible for Transplantation



Contract No. SPW 09/2018  
 Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works  
**Area Accessible for Transplantation of Small Persimmon(Site 2 Mui Tze Lam Site)**

SCALE	A3 1:10000	DATE	AUG 20
CHECK	BC	DRAWN	MY
PROJECT NO.	IA18064	FIGURE NO.	4b
		REV	—



**LEGEND**

- Project boundary
- Survey Grid
- Works Area
- Protection Zone for Vegetation
- Gentle Area Accessible for Transplantation



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

To be accessed via THEES access  
RIGID BARRIERS

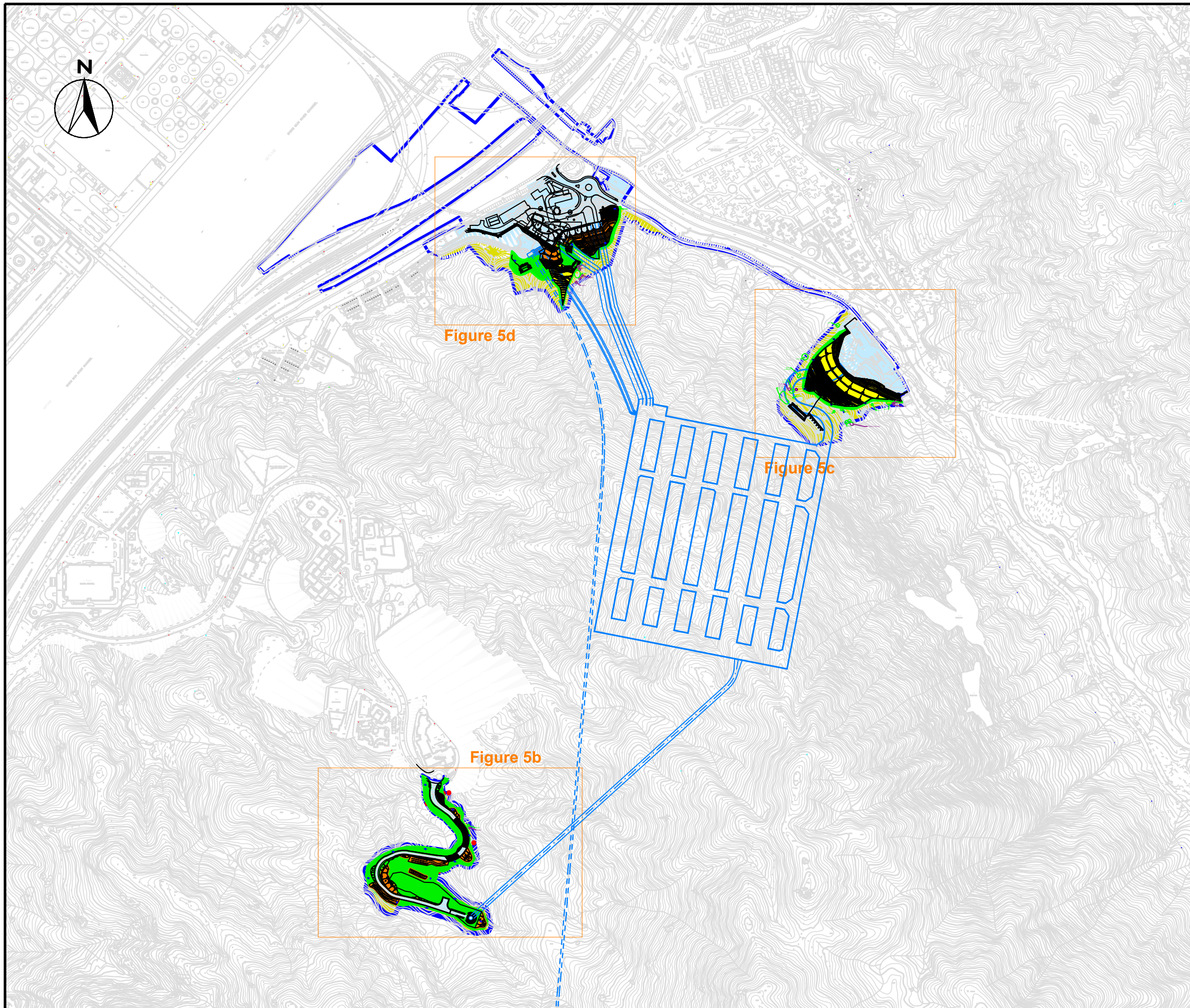
TEMPORARY WORKS AREA FOR SLOPE WORK

Existing slope too steep and difficult to access due to height



Contract No. SPW 09/2018  
Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works  
**Area Accessible for Transplantation of Small Persimmon (Site 3 A Kung Kok Site)**

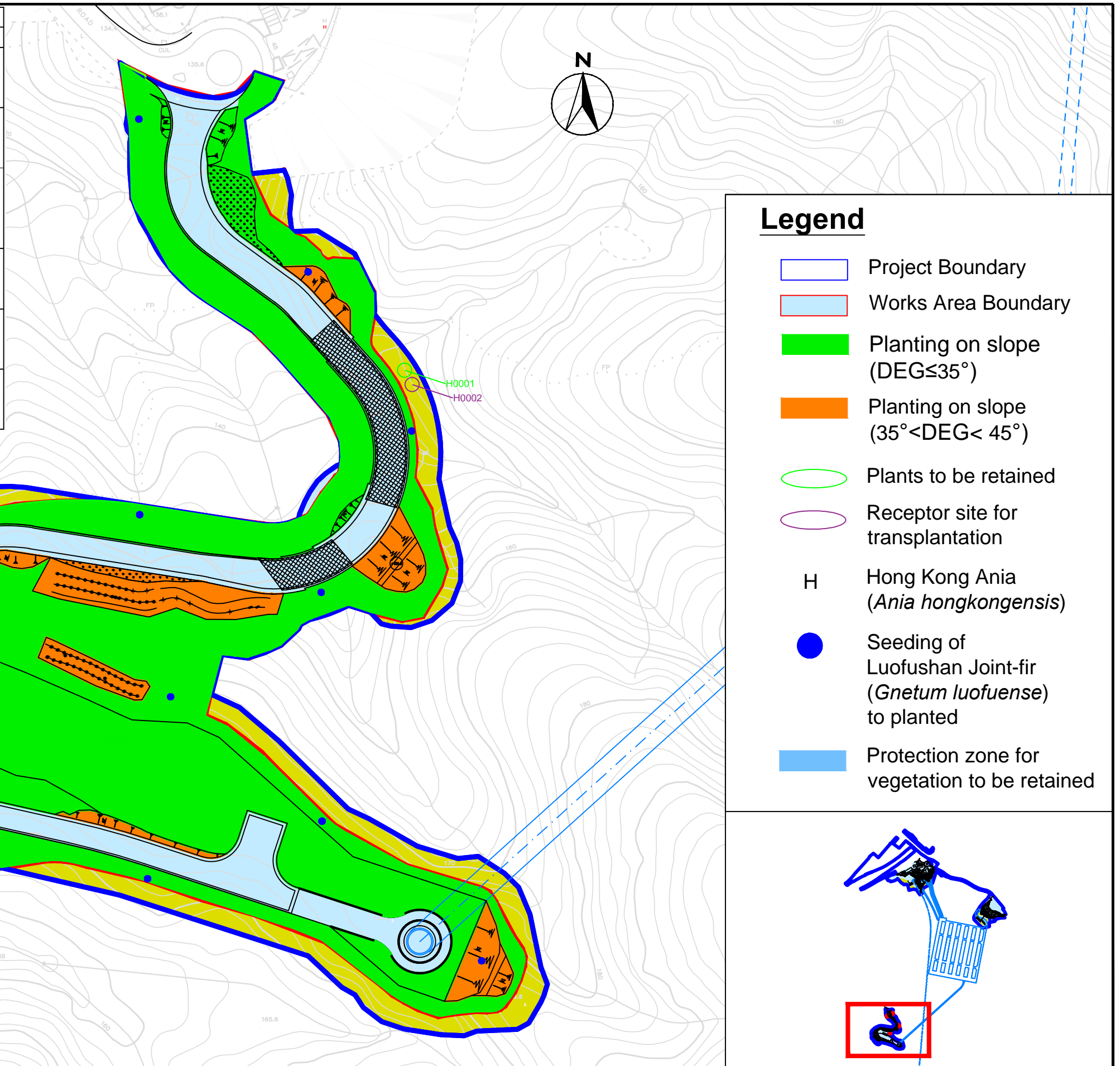
SCALE	A3 1:8000	DATE	AUG 20
CHECK	BC	DRAWN	MY
PROJECT NO.	IA18064	FIGURE NO.	4c
		REV	—



- ### Legend
- Project Boundary
  - Works Area Boundary
  - Planting on slope (DEG ≤ 35°)
  - Planting on slope (35° < DEG < 45°)
  - Other Planting on slope (35° < DEG < 45°)
  - 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	SEP 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	5a
		REV	4

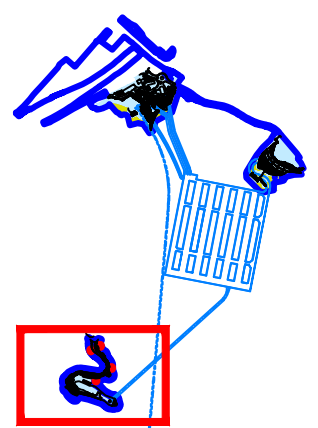
Planting Area	Receptor Site for	
	Transplantation	Compensation
Green - Slope $\leq 35^\circ$	Small Persimmon <i>Diospyros Vaccinioides</i> (~700 nos.)	Butulang Canthium <i>Canthium dicoccum</i> (9 nos. of Whip Trees)
		Luofushan Joint-fir <i>Gnetum luofuense</i> (9 nos. of Seedlings)
Orange - $35^\circ < \text{Slope} < 45^\circ$	N/A	Small Persimmon <i>Diospyros Vaccinioides</i> (~3,550 nos. of Seedlings and Broadcast Seeding)
		Luofushan Joint-fir <i>Gnetum luofuense</i> (3 nos. of Seedlings)
Outside Works Area	Purple Bulb Orchid <i>Ania hongkongensis</i> (H0002)	N/A



### Legend

- Project Boundary
- Works Area Boundary
- Planting on slope ( $\text{DEG} \leq 35^\circ$ )
- Planting on slope ( $35^\circ < \text{DEG} < 45^\circ$ )
- 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

Receptor Site for H0002



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 1 Magazine Site)

SCALE	1:1500 @ A3	DATE	SEP 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	5b
		REV	-

Receptor Site for D0016B, D0017 & D0018



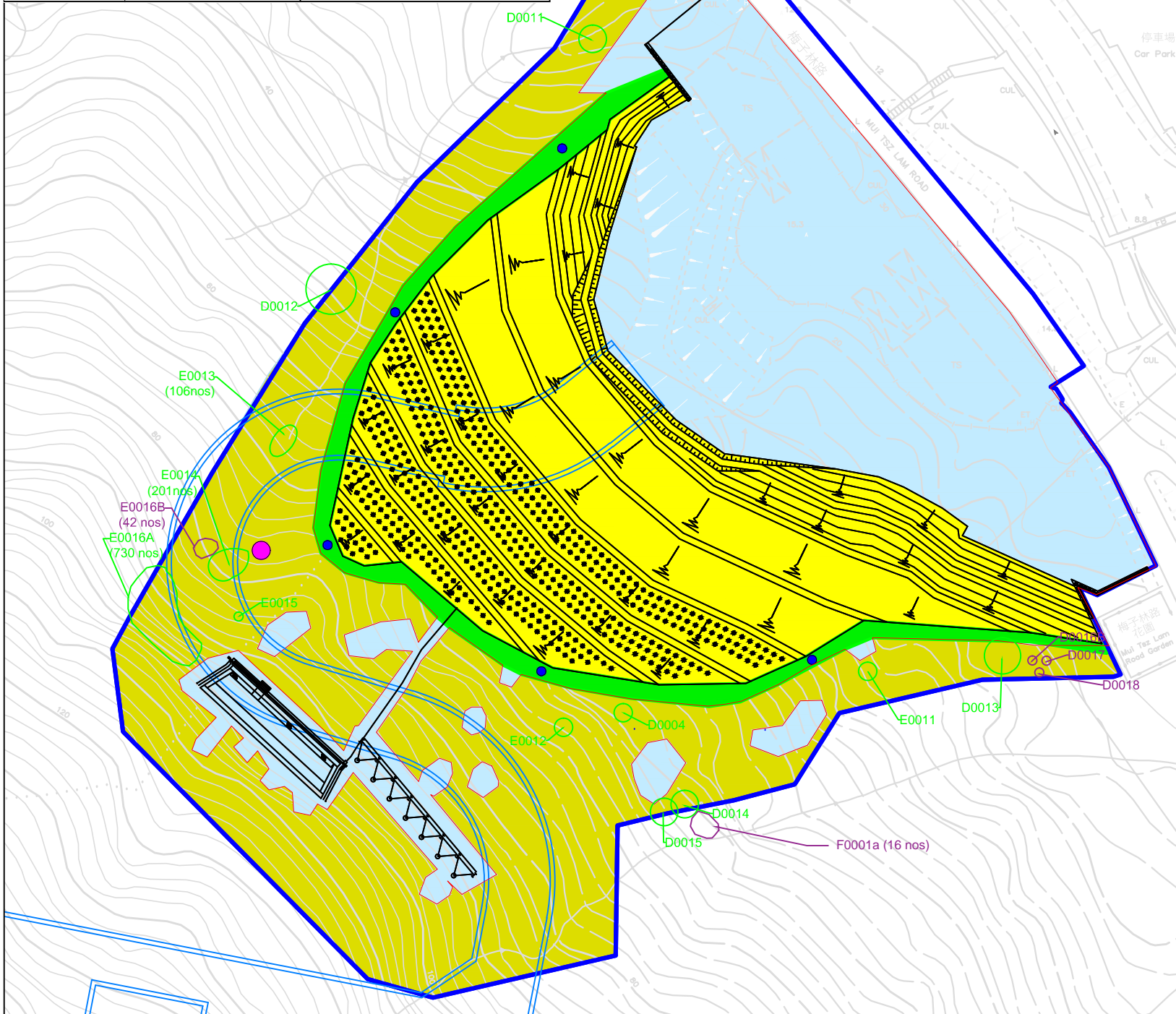
Receptor Site for E0016B & Planting Location of Hong Kong's Eagle Claw



Receptor Site for F0001A

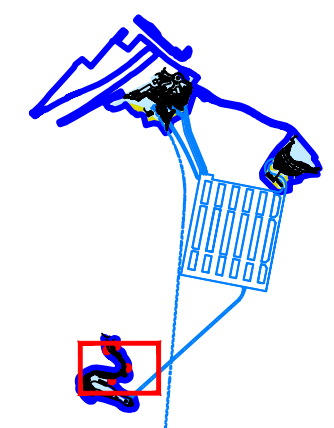


Planting Area	Receptor Site for	
	Transplantation	Compensation
Green - Slope $\leq 35^\circ$	N/A	Luofushan Joint-fir <i>Gnetum luofuense</i> (5 nos. of Seedlings, 50m spacing)
Outside Works Area	Lamb of Tartary <i>Cibotium barometz</i> (E0016B)	N/A
	Butulang Canthium <i>Canthium dicoccum</i> (D0016B, D0017, D0018) Buttercup Orchid <i>Spathoglottis pubescens</i> (F0001A)	
	Hong Kong Eagle's Claw <i>Artabotrys hongkongensis</i> (1 no. of Seedling)	



Legend

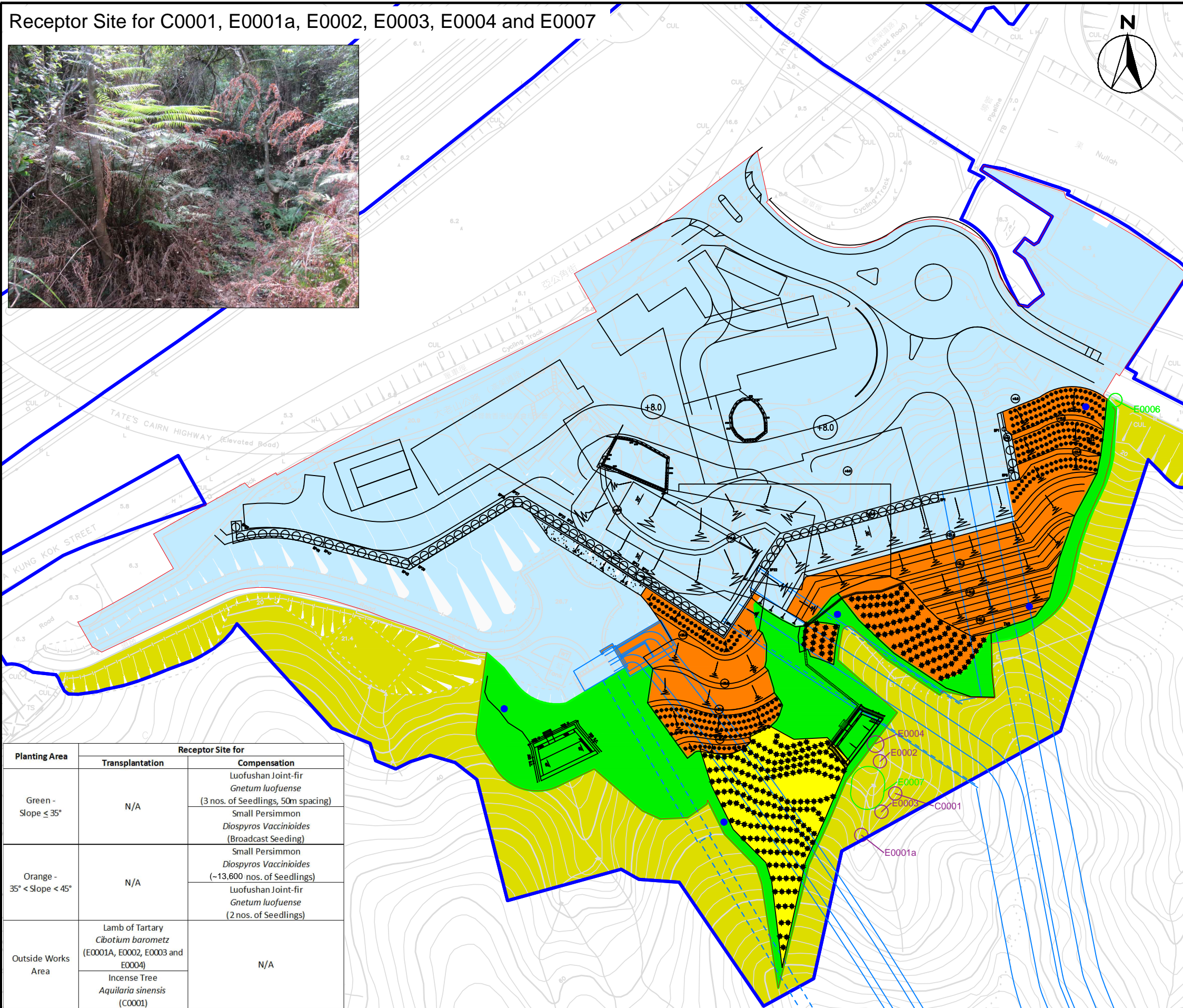
- Project Boundary
- Works Area
- Protection zone for vegetation to be retained
- Planting on slope (DEG  $\leq 35^\circ$ )
- Other Planting on slope (DEG  $\leq 35^\circ$ )
- Plants to be retained
- Recipient Site for Translocation
- D Butulang Canthium (*Canthium dicoccum*)
- E Lamb of Tartary (*Cibotium barometz*)
- F Buttercup Orchid (*Spathoglottis pubescens*)
- Planting location for Luofushan Joint-fir (*Gnetum luofuense*) seedling
- Planting location for Hong Kong's Eagle Claw (*Artabotrys hongkongensis*) seedling



SCALE	1:800 @ A3	DATE	SEP 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	5c
		REV	-



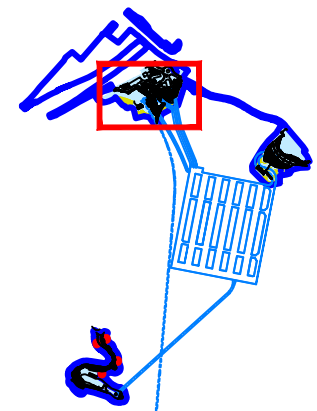
Receptor Site for C0001, E0001a, E0002, E0003, E0004 and E0007



**Legend**

- Project Boundary
- Works Area Boundary
- Protection zone for vegetation to be retained
- Planting on slope (DEG ≤ 35°)
- Planting on slope (35° < DEG < 45°)
- Other Planting on slope (35° < DEG < 45°)
- Plants to be retained
- Receptor site for transplantation
- C Incense Tree (*Aquilaria sinensis*)
- D Butulang Canthium (*Canthium dicoccum*)
- E Lamb of Tartary (*Cibotium barometz*)
- Seeding of Luofushan Joint-fir (*Gnetum luofuense*) to be planted

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> (~13,600 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, E0002, E0003 and E0004) Incense Tree <i>Aquilaria sinensis</i> (C0001)	N/A



SCALE	1:1500 @ A3	DATE	SEP 2020
CHECK	BC	DRAWN	MY
JOB No.	IA18064	FIGURE No.	5d
		REV	-

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**APPENDIX A  
VEGETATION SURVEY RESULTS**

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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 <sup>2</sup> )	Small Persimmon <i>Diospyros vaccinioides</i>					
		Density (no./m <sup>2</sup> )	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%
<b>Total Estimated Individual</b>			<b>6,092 (~6,090)</b>	<b>45%</b>	<b>29%</b>	<b>18%</b>	<b>8%</b>

Grid No.	Average Coverage of Luofushan Joint-fir <i>Gnetum luofuense</i>	
	%	m <sup>2</sup>
	1 - 1	20
1 - 2	4	44
1 - 3	12	128
1 - 4	0	0
1 - 5	4	43
1 - 6	8	87
1 - 7	1	10
1 - 8	3	33
1 - 9	7	67
1 - 10	1	11
1 - 11	17	186
1 - 12	1	10
1 - 13	0	0
1 - 14	14	154
1 - 15	0	0
1 - 16	6	68
1 - 17	8	69
1 - 18	5	44
1 - 19	4	43
1 - 20	41	375
1 - 21	9	96
1 - 22	4	38
1 - 23	7	74
1 - 24	12	130
<b>Average Coverage</b>		<b>8%</b>
<b>Estimated Coverage (m<sup>2</sup>)</b>		<b>1,929 (~1,930)</b>

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 <sup>2</sup> )	Small Persimmon <i>Diospyros vaccinioides</i>					
		Density (no./m <sup>2</sup> )	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	960	0.216	207	100%	0%	0%	0%
2 - 18	988	0.232	229	97%	3%	0%	0%
2 - 19	990	2.104	2,083	85%	3%	1%	10%
2 - 20	997	0.328	327	85%	12%	0%	2%
2 - 21	917	0.288	264	75%	11%	8%	6%
2 - 22	1,032	0.144	149	44%	33%	11%	11%
2 - 23	913	0.168	153	81%	10%	10%	0%
2 - 24	997	0.232	231	66%	17%	14%	3%
2 - 25	1,000	0.072	72	67%	0%	11%	22%
2 - 26	926	0.264	244	70%	12%	15%	3%
2 - 27	926	0.152	141	84%	5%	11%	0%
2 - 28	914	0.168	154	81%	14%	5%	0%
2 - 29	921	0.248	228	55%	16%	13%	16%
2 - 30	1,151	0.384	442	67%	8%	17%	8%
2 - 31	1,142	0.104	119	85%	15%	0%	0%
<b>Estimated Total Individual</b>			<b>7,538</b> <b>(~7,540)</b>	<b>73%</b>	<b>14%</b>	<b>7%</b>	<b>6%</b>

Grid No.	Average Coverage of Luofushan Joint-fir <i>Gnetum luofuense</i>	
	%	m <sup>2</sup>
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	23	227
2 - 19	4	40
2 - 20	16	160
2 - 21	3	28
2 - 22	3	31
2 - 23	2	18
2 - 24	7	70
2 - 25	0	0
2 - 26	15	139
2 - 27	19	176
2 - 28	1	9
2 - 29	13	120
2 - 30	0	0
2 - 31	14	160
<b>Average Coverage</b>		<b>13%</b>
<b>Estimated Coverage (m<sup>2</sup>)</b>		<b>3,978</b> <b>(~3,980)</b>

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 <sup>2</sup> )	Small Persimmon <i>Diospyros vaccinioides</i>					
		Density (no./m <sup>2</sup> )	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 <sup>2</sup>
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 <sup>2</sup> )	Small Persimmon <i>Diospyros vaccinioides</i>					
		Density (no./m <sup>2</sup> )	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%
3 - 66	1,382	1.256	1736	14%	54%	29%	4%
<b>Estimated Total Individual</b>			<b>12,855</b> (~12,860)	<b>44%</b>	<b>32%</b>	<b>19%</b>	<b>5%</b>

Grid No.	Average Coverage of Luofushan Joint-fir <i>Gnetum luofuense</i>	
	%	m <sup>2</sup>
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
3 - 66	25	346
<b>Average Coverage</b>		<b>4%</b>
<b>Estimated Coverage (m<sup>2</sup>)</b>		<b>2,975</b> (~2,980)

Appendix A - Vegetation Survey Results (Species other than Small Persimmon and 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	D0011	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	5	0.12	3	Fair	Fair	Medium	Fair	Medium	Retain			1						tilted trunk
2	D0012	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	8	0.23	5.5	Fair	Fair	Medium	Fair	Medium	Retain									TB0175
2	D0013	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	6	0.12	4	Good	Good	High	Good	Medium	Retain									TB0244
2	D0014	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	6	0.08	3	Fair	Good	High	Fair	Low	Retain									Inclined, grow between rocks
2	D0015	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	6	0.08	3	Fair	Good	High	Fair	Low	Retain									Inclined, grow between rocks
2	D0016A	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	8	0.12	3	Fair	Poor	Low	Fair	Low	Fell	1	1			1	1			TB0043, invaded by termites
2	D0016B	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	3	0.05	1	Good	Good	Medium	Good	High	Transplant	1								Immature
2	D0017	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	1.3	0.03	0.3	Good	Good	Medium	Good	High	Transplant	1								Immature
2	D0018	1	魚骨木	Butulang Canthium	<i>Canthium dicoccum</i>	1.6	0.05	0.5	Good	Good	Medium	Good	High	Transplant	1								Immature, tangled by liana
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
2	E0011	1	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Good	-	-	Low	Retain									Immature, grow on rock
2	E0012	1	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Good	-	-	Medium	Retain									Immature
2	E0013	106	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Fair	-	-	Low	Retain									-
2	E0014	21	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Good	-	-	Medium	Retain									-
2	E0015	21	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Good	-	-	High	Retain									Immature
2	E0016A*	730	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Good	-	-	Medium	Retain									Many are growing on rock
2	E0016B*	70	金毛狗	Lamb of Tartary	<i>Cibotium barometz</i>	-	-	-	Good	Good	-	-	Medium	Transplant (42 nos.) & Fell (28 nos.)	1				1	1			On slope
2	F0001A	16	荷舌蘭	Buttercup Orchid	<i>Spathoglottis pubescens</i>	-	-	-	Good	Good	-	-	Medium	Transplant	1								On slope
2	F0001B	1	荷舌蘭	Buttercup Orchid	<i>Spathoglottis pubescens</i>	-	-	-	Good	Good	-	-	Medium	Fell	1				1				Grows between rocks
2	I0001	1	香港鷹爪花	Hong Kong Eagle's Claw	<i>Artabotrys hongkongensis</i>	-	-	5m	Fair	Fair	-	-	Low	Fell	1					1			Scandent shrub, grows between rocks
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

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**APPENDIX B**  
**PHOTOGRAPHIC RECORD**

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H0001 Purple Bulb Orchid *Ania hongkongensis*



H0002 Purple Bulb Orchid *Ania hongkongensis*

**Appendix B1 – Photographic Record (Site 1)**

Appendix B – Photographic Record



D0003 Butulang Canthium *Canthium dicoccum*



D0004 Butulang Canthium *Canthium dicoccum*



D0006 Butulang Canthium *Canthium dicoccum*



D0008 Butulang Canthium *Canthium dicoccum*

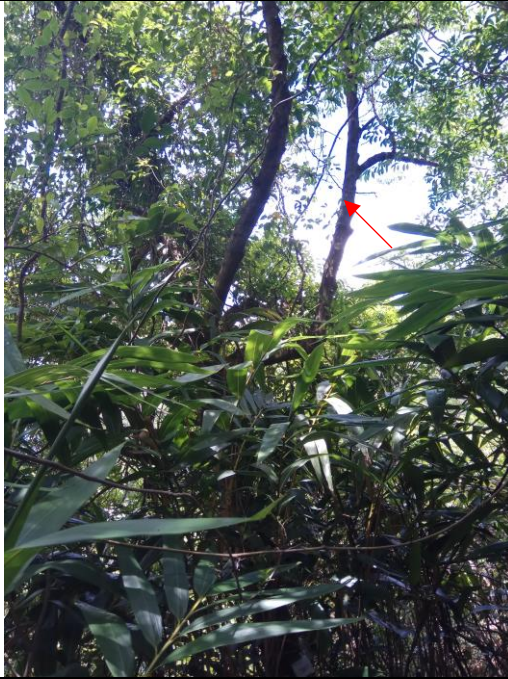
**Appendix B2 – Photographic Record (Site 2)**



D0011 Butulang Canthium *Canthium dicoccum*



Close up of D0011 Butulang Canthium *Canthium dicoccum*



D0012 Butulang Canthium *Canthium dicoccum*



D0013 Butulang Canthium *Canthium dicoccum*

**Appendix B2 – Photographic Record (Site 2)**

Appendix B – Photographic Record



D0014 Butulang Canthium *Canthium dicoccum*



D0015 Butulang Canthium *Canthium dicoccum*



D0016A Butulang Canthium *Canthium dicoccum*



D0016B Butulang Canthium *Canthium dicoccum*

Appendix B2 – Photographic Record (Site 2)

Appendix B – Photographic Record



D0017 Butulang Canthium *Canthium dicoccum*



D0018 Butulang Canthium *Canthium dicoccum*



E0001a Lamb of Tartary *Cibotium barometz*



E0001b Lamb of Tartary *Cibotium barometz*

**Appendix B2 – Photographic Record (Site 2)**

Appendix B – Photographic Record



E0002 Lamb of Tartary *Cibotium barometz*



E0003 Lamb of Tartary *Cibotium barometz*



E0011 Lamb of Tartary *Cibotium barometz*



E0012 Lamb of Tartary *Cibotium barometz*

Appendix B2 – Photographic Record (Site 2)

Appendix B – Photographic Record



E0013 Lamb of Tartary *Cibotium barometz*



E0014 Lamb of Tartary *Cibotium barometz*



E0015 Lamb of Tartary *Cibotium barometz*

Appendix B2 – Photographic Record (Site 2)



E0016 Lamb of Tartary *Cibotium barometz*



Appendix B – Photographic Record



F0001A Buttercup Orchid *Spathoglottis pubescens*



F001A Buttercup Orchid *Spathoglottis pubescens*



F001A Zoom up of Buttercup Orchid  
*Spathoglottis pubescens*



F001B Buttercup Orchid *Spathoglottis pubescens*  
(grows between rocks)

Appendix B2 – Photographic Record (Site 2)



10001 Hong Kong Eagle's Claw (*Artabotrys hongkongensis*)

Appendix B2 – Photographic Record (Site 2)

Appendix B – Photographic Record



C0001 Incense Tree *Aquilaria sinensis*



D0001 Butulang *Canthium dicoccum*



D0002 Butulang *Canthium dicoccum*



D0010 Butulang *Canthium dicoccum*

Appendix B3 – Photographic Record (Site 3)

Appendix B – Photographic Record



E0004 Lamb of Tartary *Cibotium barometz*



E0006 Lamb of Tartary *Cibotium barometz*



E0005 Lamb of Tartary *Cibotium barometz*

**Appendix B3 – Photographic Record (Site 3)**



E0007 Lamb of Tartary *Cibotium barometz*

**Appendix B3 – Photographic Record (Site 3)**



Grid 1-12



Grid 3-25



Grid 3-16

Example of Small Persimmon *Diospyros Vaccinioides*

**Appendix B4 – Photographic Record (Example of Floral Species of Conservation Importance)**



Grid 2-5



Grid 3-55



Grid 3-41



Grid 1-9

Example of Small Persimmon *Diospyros Vaccinioides*

**Appendix B4 – Photographic Record (Example of Floral Species of Conservation Importance)**



Grid 3-10



Grid 2-5



Grid 3-11



Grid 3-25

Example of Luofushan Joint-fir *Gnetum lufuense*

**Appendix B4 – Photographic Record (Example of Floral Species of Conservation Importance)**



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

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

Site 1

Magazine Site

Grid No.	Works Area (m <sup>2</sup> )	Small Persimmon <i>Diospyros vaccinioides</i>		Luofushan Joint-fir <i>Gnetum luofuense</i>	
		Density (no./m <sup>2</sup> )	Affected Individuals	% Coverage	Affected Area (m <sup>2</sup> )
1 - 1	935.9	0.424	397	20	187
1 - 2	1,003.2	0.088	88	4	40
1 - 3	806.2	0.192	155	12	97
1 - 4	827.9	0.080	66	0	0
1 - 5	1,016.1	0.280	285	4	41
1 - 6	1,086.0	0.584	634	8	87
1 - 7	894.2	0.224	200	1	9
1 - 8	887.5	0.184	163	3	27
1 - 9	719.5	0.176	127	7	50
1 - 10	1,054.0	0.024	25	1	11
1 - 11	1,093.0	0.464	507	17	186
1 - 12	1,000.0	0.456	456	1	10
1 - 13	870.1	0.192	167	0	0
1 - 14	1,100.0	0.336	370	14	154
1 - 15	1,030.9	0.024	25	0	0
1 - 16	840.7	0.144	121	6	50
1 - 17	620.9	0.304	189	8	50
1 - 18	457.2	0.080	37	5	23
1 - 19	378.2	0.304	115	4	15
1 - 20	807.0	0.168	136	41	331
1 - 21	843.3	0.520	439	9	76
1 - 22	734.0	0.552	405	4	29
1 - 23	784.8	0.072	57	7	55
1 - 24	1,086.0	0.000	0	12	130
<b>Total Area</b>	<b>20,876.6</b>	<b>Total Individual</b>	<b>5,164</b>	<b>Total Area</b>	<b>1,658</b>
			(~ 5,160)		(~1,660)

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

Site 2 Mui Tzs Lam Site

Grid No.	Works Area (m <sup>2</sup> )	Small Persimmon <i>Diospyros vaccinioides</i>		Luofushan Joint-fir <i>Gnetum luofuense</i>	
		Density (no./m <sup>2</sup> )	Affected Individuals	% Coverage	Affected Area (m <sup>2</sup> )
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	0.000	0	20	181
2 - 5	963.0	0.055	53	24	231
2 - 6	931.0	0.000	0	0	0
2 - 7	967.0	0.032	31	20	193
2 - 8	932.0	0.012	11	58	541
2 - 9	907.0	0.500	454	59	535
2 - 10	1,008.0	0.236	238	30	302
2 - 11	960.0	0.080	77	6	58
2 - 12	910.8	0.011	10	34	310
2 - 13	930.6	0.288	268	10	93
2 - 14	1,034.0	0.584	604	23	238
2 - 15	1,031.7	0.264	272	5	52
2 - 16	452.2	0.480	217	5	23
2 - 17	524.1	0.216	113	0	0
2 - 18	409.8	0.232	95	23	94
2 - 19	491.5	2.104	1,034	4	20
2 - 20	261.3	0.328	86	16	42
2 - 21	559.7	0.288	161	3	17
2 - 22	190.7	0.144	27	3	6
2 - 23	20.5	0.168	3	2	0
2 - 24	245.3	0.232	57	7	17
2 - 25	104.1	0.072	7	0	0
2 - 26	312.1	0.264	82	15	47
2 - 27	380.5	0.152	58	19	72
2 - 28	223.6	0.168	38	1	2
2 - 29	60.4	0.248	15	13	8
2 - 30	469.7	0.384	180	0	0
2 - 31	1,053.0	0.104	110	14	147
<b>Total Area</b>	<b>20,323.6</b>	<b>Total Individual</b>	<b>4,301</b>	<b>Total Individual</b>	<b>3,229</b>
			<b>(~4,300)</b>		<b>(~3,230)</b>

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

Site 3

A Kung Kok Site

Grid No.	Works Area (m <sup>2</sup> )	Small Persimmon <i>Diospyros vaccinioides</i>		Luofushan Joint-fir <i>Gnetum luofuense</i>	
		Density (no./m <sup>2</sup> )	Affected Individuals	% Coverage	Affected Area (m <sup>2</sup> )
3 - 1	0.0	0.000	0	0	0
3 - 2	1.4	0.000	0	0	0
3 - 3	0.0	0.000	0	0	0
3 - 4	280.0	0.000	0	0	0
3 - 5	885.4	0.000	0	0	0
3 - 6	1,073.8	0.000	0	0	0
3 - 7	1,090.6	0.016	17	0	0
3 - 8	913.4	0.000	0	5	46
3 - 9	0.0	0.000	0	5	0
3 - 10	905.3	0.392	355	0	0
3 - 11	315.7	0.767	242	6	19
3 - 12	0.0	0.000	0	0	0
3 - 13	54.3	0.000	0	0	0
3 - 14	1,097.0	0.000	0	0	0
3 - 15	969.0	0.000	0	0	0
3 - 16	1,063.0	0.010	10	23	244
3 - 17	1,068.0	0.702	749	21	224
3 - 18	1,101.2	1.067	1,175	22	242
3 - 19	969.0	0.000	0	0	0
3 - 20	932.0	0.000	0	0	0
3 - 21	1,107.0	0.000	0	0	0
3 - 22	1,032.0	0.000	0	0	0
3 - 23	1,010.0	0.072	73	4	40
3 - 24	971.0	0.392	381	19	184
3 - 25	1,066.0	0.889	948	21	224
3 - 26	305.2	0.344	105	0	0
3 - 27	993.0	0.000	0	0	0
3 - 28	931.0	0.000	0	0	0
3 - 29	912.0	0.000	0	0	0
3 - 30	909.0	0.016	15	0	0
3 - 31	921.0	0.384	354	1	9
3 - 32	942.0	0.480	452	18	170
3 - 33	680.0	0.896	609	0	0
3 - 34	67.0	0.272	18	0	0
3 - 35	1,084.0	0.000	0	0	0
3 - 36	938.0	0.000	0	0	0
3 - 37	911.0	0.000	0	0	0
3 - 38	960.0	0.104	100	0	0
3 - 39	1,009.0	0.224	226	2	20
3 - 40	1,069.9	0.672	719	4	43
3 - 41	369.5	0.552	204	1	4
3 - 42	519.0	0.408	212	0	0
3 - 43	1,105.0	0.000	0	0	0
3 - 44	1,101.0	0.000	0	0	0
3 - 45	934.0	0.032	30	2	19
3 - 46	990.0	0.072	71	1	10
3 - 47	892.1	0.080	71	6	54
3 - 48	845.7	0.032	27	10	85
3 - 49	406.0	0.688	279	11	45
3 - 50	1,021.0	0.000	0	0	0
3 - 51	640.3	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 <sup>2</sup> )	Small Persimmon <i>Diospyros vaccinioides</i>		Luofushan Joint-fir <i>Gnetum luofuense</i>	
		Density (no./m <sup>2</sup> )	Affected Individuals	% Coverage	Affected Area (m <sup>2</sup> )
3 - 52	862.5	0.032	28	0	0
3 - 53	445.6	0.128	57	1	4
3 - 54	616.0	0.488	301	26	160
3 - 55	37.5	0.224	8	7	3
3 - 56	965.0	0.000	0	0	0
3 - 57	894.1	0.000	0	0	0
3 - 58	157.6	0.136	21	30	47
3 - 59	0.0	0.376	0	4	0
3 - 60	1,087.0	0.000	0	0	0
3 - 61	308.0	0.000	0	0	0
3 - 62	0.0	0.000	0	0	0
3 - 63	61.0	0.000	0	4	0 *
3 - 64	0.0	0.000	0	0	0
3 - 65	0.0	0.000	0	0	0
3 - 66	373.2	1.256	469	25	93
<b>Total Area</b>	<b>45,168.3</b>	<b>Total Individual</b>	<b>8,352</b>	<b>Total Area</b>	<b>1,989</b>
			<b>(~8,350)</b>		<b>(~1,990)</b>

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

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**APPENDIX D  
CURRICULUM VITAE OF QUALIFIED  
ECOLOGIST**

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**COMPANY** CINOTECH CONSULTANTS LIMITED  
**POSITION** PRINCIPAL ENVIRONMENTAL CONSULTANT  
**PROFESSION** ENVIRONMENTAL SCIENTIST  
**NATIONALITY** CHINESE

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**PROFESSIONAL QUALIFICATIONS & AFFILIATIONS**

- BSc in Environmental Protection, The University of Hong Kong, 2010
  - Corporate Member, The Hong Kong Institution of Environmental Impact Assessment (HKIEIA), 2020
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**LANGUAGES**

Cantonese, English, Mandarin

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**KEY EXPERIENCE**

Betty Choi has over 10-year experience in environmental studies. Since joining Cinotech, Betty has been responsible for ecological impact assessment for infrastructure development projects, which involve field survey, data collection and drafting of assessment reports.

Being the Project Manager for Environmental Impact Assessment (EIA) projects and planning studies and Audit Team Leader for Environmental Monitoring and Audit (EM&A) projects, Betty is responsible for day-to-day communication with the government department, client and project team, providing advices on projects and ensuring the project is on track. Examples of major development projects include EIA for *Po Toi O Sewerage Works*, EIA for *Wang Tong River Bridge* and EM&A for *Tseung Kwan O - Lam Tin Tunnel Design and Construction*. She is also a certified BEAM Pro for new building (BEAM Pro No.: BP2018-0056), and is involved in provision of advice, data collection, review of supporting documents and drafting of assessment reports.

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**PROFESSIONAL HISTORY**

2019 – Present	Principal Environmental Consultant, Cinotech Consultants Limited
2013 – 2018	Senior Environmental Consultant, Cinotech Consultants Limited
2012 – 2013	Environmental Consultant, Cinotech Consultants Limited
2010 – 2012	Assistant Environmental Consultant, Cinotech Consultants Limited
Jun – Aug 2009	Internship, Hong Kong Wetland Park

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**VOLUNTEER**

- 2012-present            Surveyor for “House Swift and Barn Swallow Nests Survey in Hong Kong”  
by Hong Kong Bird Watching Society
- 2018-present            Butterfly Surveyor for Green Power
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**PROFESSIONAL EXPERIENCE AND RECORD****TERRESTRIAL ECOLOGICAL IMPACT ASSESSMENT & TREE SURVEYS****Aberdeen Boat Club, Middle Island Development, Phase III, IV, V (2018 – present)**

Managed a team for this EIA Study. Conducted Fisheries and Marine Ecological Impact Assessment, including habitat identification, intertidal surveys (rocky shore and sandflat) in Middle Island and analysis of coral and benthic grab survey data. Also conducted vegetation survey for option selection.

**Associated Outdoor Facilities for the New Prison, Ká Hó, Coloane, Macau (2017 – present)**

Managed a team for this EIA Study. Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly) in Ká Hó Reservoir Natural Park and its vicinity in Macau.

**Comprehensive Residential and Open Space Development at Various Lots in DD 129, Lau Fau Shan, Yuen Long (2016 – 2019)**

Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly) near Tin Yuet Road.

**Cycle Tracks Connecting North West New Territories with North East New Territories – (Extension), Minor Sections Investigation, Design and Construction (2010 – 2013)**

Conducted Tree Survey and Archeological Impact Assessment for the proposed cycle track sections in Sam Mun Tsai and Tai Wo.

**Development of Mong Tung Wan for Columbarium (2011 – 2012)**

Conducted Ecological Impact Assessment, including terrestrial and freshwater surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly) in Mong Tung Wan.

**Discovery Bay Maintenance Dredging – Project Profile (2012)**

Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly), intertidal surveys in rocky shores and benthic grab surveys in Yi Pak Wan, Discovery Bay.

**Drainage Improvement in Northern Hong Kong Island - Western Lower Catchment Works (2012)**

Conducted Tree Survey along the nullah next to Queen’s College and prepared tree survey report with compensatory planting proposal.

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**EIA for Residential Development at TN20 & TN24 Taipa, Macau (2019 – 2020)**

Managed a team for this EIA Study. Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly)) in the Site near Avenida Dr. Sun Yat Sen and Taipa Grande Natural Park in Taipa.

**Environmental Team Baseline Surveys for Sha Tin Cavern Sewage Treatment Works (2018 – present)**

Conducted Detailed Vegetation Survey for plant species of conservation importance at four vegetated sites near A Kung Kok Shan Road, A Kung Kok Road, Mui Tsz Lam Road and Ex-Custom and Excise Department Vehicle Detention Center. Prepared Detailed Vegetation Survey Report, and Protection and Transplantation Proposal.

**Expansion of Mountain Bike Trail Networks in Mui Wo and Chi Ma Wan, South Lantau - Design and Construction (2016 – 2018)**

Managed a team for this Environmental Study. Conducted Ecological Impact Assessment, including terrestrial and freshwater surveys (habitat identification, vegetation survey, daytime and nocturnal fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) for three sites in Mui Wo and Chi Ma Wan. Also carried out assessments on air quality, noise, water quality and waste management.

**Four Proposed Small Houses on Lots 476 S.A ss.1, 476 S.A RP, 476 S.B. ss.2, 476 S.B ss.3, 476 S.C ss.2 & 476 S.C RP in D.D.289, Tai Po (2015)**

Managed a team for this Planning Study. Conducted vegetation survey to identify plant species of conservation importance *Pavetta hongkongensis* within the Site in Ko Tong.

**Improvement to Fan Kam Road (Feasibility Study) (2010 – 2013)**

Conducted Tree Survey and Ecological Impact Assessment, including terrestrial and freshwater surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) along Fan Kam Road. Also carried out Carbon Audit and Cultural Heritage Impact Assessment.

**Improvement to Fan Kam Road (Investigation) (2013 – 2015)**

Conducted Tree Survey and Ecological Impact Assessment, including terrestrial and freshwater surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) along Fan Kam Road. Also carried out Carbon Audit.

**Improvement to Tung Chung Road between Lung Tseng and Cheung Sha (2010)**

Assisted in Tree Risk Assessment in Tung Chung Road.

**Landslip Prevention and Mitigation Programme, 2010, Package F, Landslip Prevention and Mitigation Works – Lantau (2011 – 2012)**

Conducted Ecological Impact Assessment, including terrestrial and freshwater surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) in Ngong Ping, Lower Keung Shan and Sham Shek Tsuen (Lantau).

**Landslip Prevention and Mitigation Programme, 2011, Package G, Landslip Prevention and Mitigation Works – Investigation, Design and Construction (2013 – 2016)**

Managed a team for this LPM Study. Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) in four sites in Sai Kung (near Wong Chuk Shan New Village, Sai Kung Outdoor Training Camp, Clear Water Bay Road) and Lantau (Luk Wu). Prepared Tree Preservation and Removal Plan for Luk Wu.

**Landslip Prevention and Mitigation Programme, 2014, Package D, Landslip Prevention and Mitigation Works – Investigation, Design and Construction (2015 – present)**

Managed a team for this LPM Study. Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, daytime and nocturnal fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) in Hing Keng Shek (Sai Kung), Bride's Pool Road (Tai Po) and Route Twisk. Prepared Project Profiles for Bride's Pool Road and Route Twisk. Also prepared Tree Preservation and Removal Plan for Hing Keng Shek.

**Ling Wan Temple Development and Conservation - Feasibility Study for Stage 1A (2016 – 2017)**

Managed a team for this Planning Study. Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, daytime and nocturnal fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) for the proposed extension of Ling Wan Temple in Lam Tsuen. Also conducted drainage and sewerage appraisals.

**Multi-Purpose Sports Complex at Kai Tak Area Environmental Impact Assessment & Traffic Impact Assessment Studies – Investigation (2014 – 2016)**

Conducted Tree Survey and Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly)) in Kai Tak Development Area for this EIA Study.

**New Wang Tong River Bridge, Mui Wo - Environmental Impact Assessment and Drainage Impact Assessment Studies (2014 – 2016)**

Managed a team for this EIA Study. Conducted Tree Survey and Ecological Impact Assessment, including terrestrial and estuarine surveys (habitat identification, vegetation survey, daytime and nocturnal fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and estuarine fish)) in Wang Tong.

**Port Shelter Sewerage, Stage 3 – Sewerage Works at Po Toi O Environmental Impact Assessment Studies – Investigation (2013 – 2016)**

Managed a team for this EIA Study. Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, daytime and nocturnal fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly)); intertidal surveys (Rocky Shore, Sandflat, Mudflat) and benthic grab surveys. Analyzed coral survey data. Also carried out fisheries impact assessment, waste management implications and prepared Environmental Monitoring and Audit Manual.

**Preliminary Environmental Review & Drainage/Sewage Impact Assessment for Swimming Pool Complex and Open Space in Remaining portion of district Open Space in Area 107, Tin Shui Wai (2017)**

Conducted Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, daytime and nocturnal fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly)) in Tin Shui Wai.

**Prevention and Mitigation Programme 2014 Package D, Landslip Prevention and Mitigation Works. Investigation, Design and Construction behind house Nos. 18, 19 and 22, Ha Yeung Village, Hang Hau (2016)**

Conducted Tree Survey in the Site in Ha Yeung.

**Proposed Mixed Use Development at New Kowloon Inland Lot (“NKIL”) No. 6568 (2019)**

Conducted Ecological Site Appraisal for HK-BEAM v.1.2 SA5 assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, odonate and butterfly)) in Kai Tak Development Area.

**Proposed Residential House at D.D. CCL 942, Nam Tam, Cheung Chau (2015)**

Conducted Vegetation Survey to identify plant species of conservation importance in the Site in Nam Tam.

**Review of Toilet Facilities in Various Country Parks in Hong Kong, Package 1 (2018 – 2020)**

Conducted Ecological Impact Assessment, including vegetation survey at 10 potential sites for construction of new toilet facilities in various Country Parks and Special Areas.

**Section 12A Rezoning Application for Proposed “Private Garden of Remembrance” Use in Lot 169 and subsections in DD 219, Kei Pik Shan, Sai Kung (2014 – 2016)**

Managed a team for this Planning Study. Conducted Tree Survey and Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly)) in Kei Pik Shan.

**S16 Application for 875-877 Lai Chi Kok Road (2016 – 2017)**

Managed a team for this Planning Study. Conducted Tree Survey in the Site near Lai Chi Kok Road.

**Section 16 Planning Application for Proposed Film Studio in “Recreation” and “Green Belt” Zones. Lots 287(Part), 288(Part), 289SA, 289RP, 295, 299 and adjoining government land in DD247 Ho Chung, Sai Kung (2013, 2017, 2018)**

Managed a team for this Planning Study. Conducted Tree Survey in the Site in Ho Chung and prepared S16 applications and submissions for condition compliance.

**Section 16 Planning Application for Proposed House Development in “Unspecified Use” Area at Lots No. 484, 489, 491, 492 and 493 in D.D. 311, Keung Shan, Lantau Island (2013 – 2014)**

Managed a team for this Planning Study. Conducted Tree Survey and Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly)) in Keung Shan.

**Section 16 Planning Application for Proposed Religious Institution in “Village Type Development” Zone at Lots No. 8, 9, 10, 11 &14 in DD271, Tan Ka Wan, Tai Po, New Territories (2013 – 2014)**

Managed a team for this Planning Study. Conducted Tree Survey and Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly)) in Tan Ka Wan.

**Site Formation and Foundation Works for New Eastern Terrace for Proposed Residential Development at 1-15 New Eastern Terrace, 5-11 Dragon Road, Tin Hau, North Point, Hong Kong (2011)**

Conducted Ecological Site Appraisal, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly)) and Weekly Site Inspection for HK-BEAM 04 submission.

**Small Housing Development at Uk Tau, Sai Kung (2012)**

Conducted Tree Survey and Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate and butterfly)) in Uk Tau.

**The Establishment of an Agricultural Park in Kwu Tung South - Investigation, Design and Construction (2015 – present)**

Managed a team for this Environmental Study. Conducted Ecological Impact Assessment, including terrestrial and freshwater surveys (habitat identification, vegetation survey, daytime and nocturnal fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) in >80 ha area in Tsui Keng and Cheung Lek.

**Tin Wan Concrete Batching Plant (2010)**

Conducted Tree Survey.

**Upgrading of Rising Mains between NENT Landfill Leachate Pumping Station and Lin Ma Hang Road Leachate Pumping Station – Investigation and Design (2014 – 2015)**

Conducted Tree Survey and Ecological Impact Assessment, including terrestrial surveys (habitat identification, vegetation survey, fauna surveys (avifauna, mammal, herpetofauna, odonate, butterfly and freshwater communities)) along Lin Ma Hang Road and NENT Access Road.

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**APPENDIX E**  
**ESTIMATION OF TRANSPLANTABLE**  
**SMALL PERSIMMON**

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## Appendix E - Estimation of Transplantable Small Persimmon

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

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

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

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

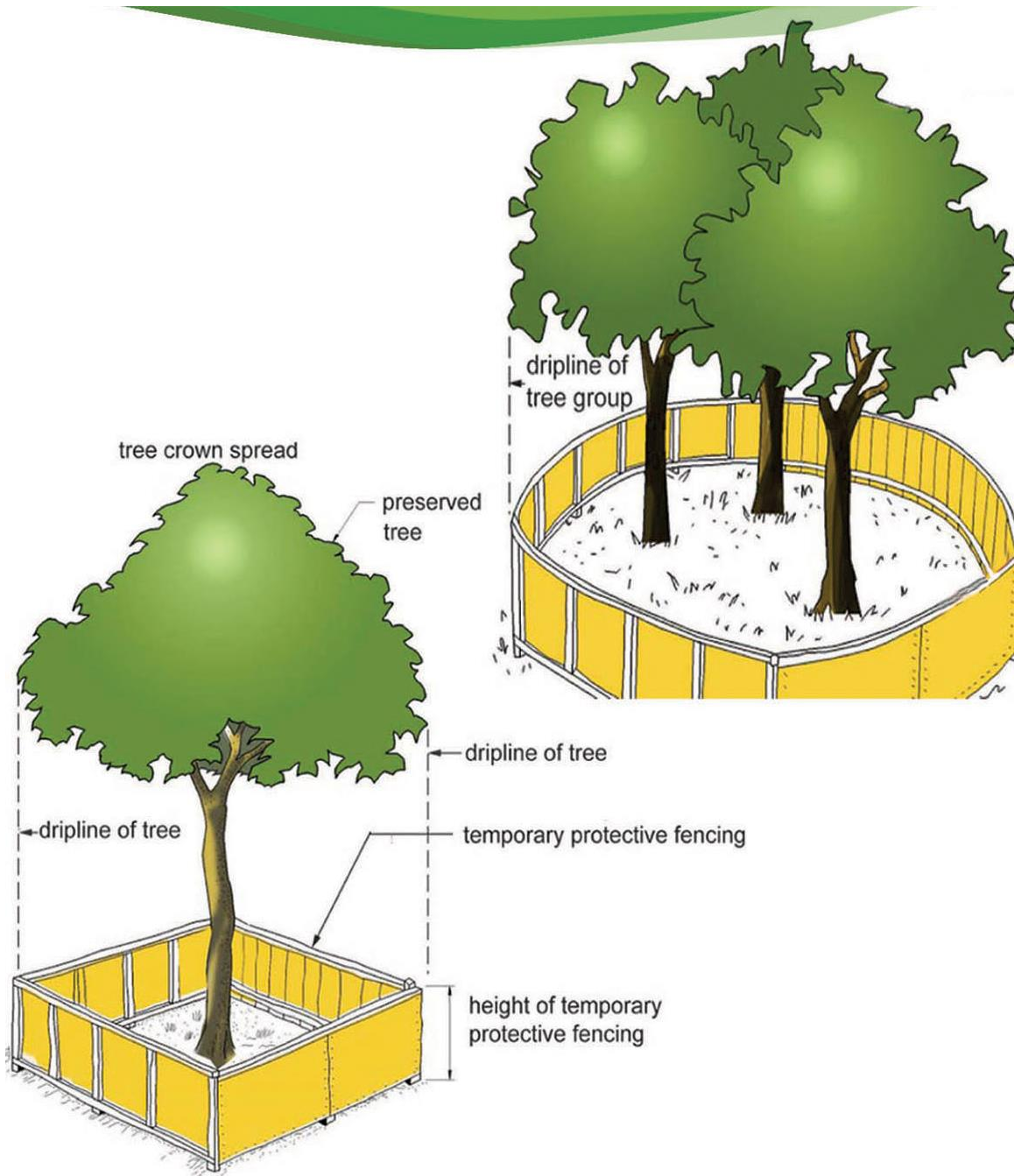
- \* • Young individual with vigorous growth (<0.5m in height)
- Grown away from other woody plants
- Grown away from obstacles (e.g. rocks, man-made structures)
- Not grown on steep slope (>40 degree)

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

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## Appendix F – Typical Design of Tree Protection Zone





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**APPENDIX G  
ACTUAL TRANPLANTATION  
STATISTICS OF SMALL PERSIMMON**

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**Theoretical No. of Transplantable Small Persimmon in Site 1 and Site 3**

Drawing No.	Grid no.	Grid Area (m2) [A]	Percentage of Accessible Area within Grid [B]	Density of Small Persimmon [C]	No. of Small Persimmon in Accessible Area [D]
2c	1-11	1093	30%	0.464	152
	1-14	1100	70%	0.336	259
	1-15	1037	80%	0.024	20
	1-16	1139	60%	0.144	98
	1-17	864	50%	0.304	131
	1-20	915	35%	0.072	23
	1-21	1064	20%	0.552	117
	1-22	942	30%	0.52	147
	1-23	1064	5%	0.168	9
<b>Sub-total:</b>					<b>956</b>

Drawing No.	Grid no.	Grid Area (m2) [A]	Percentage of Accessible Area within Grid [B]	Density of Small Persimmon [C]	No. of Small Persimmon in Accessible Area [D]
2e	3-54	1022	30%	0.488	150
	3-47	967	15%	0.08	12
	3-30	909	50%	0.016	7
	3-31	921	20%	0.384	71
<b>Sub-total:</b>					<b>240</b>

Drawing No.	Grid no.	Grid Area (m2) [A]	Percentage of Accessible Area within Grid [B]	Density of Small Persimmon [C]	No. of Small Persimmon in Accessible Area [D]
2f	3-Jul	1092	80%	0.055	48
<b>Sub-total:</b>					<b>48</b>

**Total: 1244**

**No. of Actual Transplantable Small Persimmon in Site 1 and Site 3**

Site	No. of Small Persimmon in Accessible Area (Theoretical)	Actual No. of transplantable Small Persimmon	%
1	956	228	24%
3	288	40	14%
<b>Total</b>	<b>1244</b>	<b>268</b>	<b>22%</b>