CEDD Contract No. GE/2016/01

Landslip Prevention and Mitigation Programme, 2016, Package K
Landslip Prevention and Mitigation Works in Hong Kong Island, Kowloon, the New Territories and Outlying Islands

Slope Upgrading Works of Feature No. 12NW-C/C8
Above Ha Yeung and Leung Fai Tin Along Clear Water Bay Road, Sai Kung

Project Profile

Fugro (Hong Kong) Limited

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1. INTRODUCTION

1.1 Project Title

The project title is Slope Upgrading Works of the Feature No.12NW-C/C8, above Ha Yeung and Leung Fai Tin along Clear Water Bay Road, Sai Kung (hereinafter referred to as 'the Project'). The project is implemented under CEDD Contract No. GE/2016/01- Landslip Prevention and Mitigation Programme, 2016, Package K, Landslip Prevention and Mitigation Works in Hong Kong Island, Kowloon, the New Territories and Outlying Islands.

1.2 Purpose and Nature of the Project

In 2010, the 10-year Extended Landslip Preventive Measures (LPM) Programme, which focused on known high-risk man-made slopes affecting major roads and developments in Hong Kong was completed. To continue with the LPM works, the Geotechnical Engineering Office (GEO) of the Civil Engineering and Development Department (CEDD) has launched a Landslip Prevention and Mitigation Programme (LPMitP) to dovetail the LPM Programme to deal with the remaining landslide risk coming from man-made slopes and natural hillside catchments. The objective of the LPMitP is to contain the landslide risks in Hong Kong within an "as low as reasonably practicable" level that is commensurate with the international best practice in risk management.

Man-made slopes with potential landslide risk are typically dealt with by slope stabilization works. Installation of soil nails is the most commonly used measures.

The man-made slope (Feature No. 12NW-C/C8) is a soil and rock cut slope, with a maximum height of about 24m, a length of 180m and an average angle of about 48 degrees. The slope surface is densely vegetated with shrubs and trees. Existing maintenance access and surface channels can be found throughout the whole feature and they are of fair conditions. The Project covers Feature No. 12NW-C/C8 which is located within the "Conservation Area" specified in the Clear Water Bay Peninsula South Outline Zoning Plan No. S/SK-CWBS/2. An undeveloped green belt is situated above the slope crest while Clear Water bay Road is situated at the slope toe, which is a two-way two-lane carriageway. The feature has a plan area of about 3300m^2, of which approximately 90% of the surface area is covered with dense vegetation and 10% of the surface area is covered with sprayed concrete.

A study had been undertaken by GEO of CEDD on the man-made slope (Feature No. 12NW-C/C8). The study concluded that the man-made slope within the Project site (hereinafter referred to as "the Works Site") is below the current safety standard, which may affect the downhill village houses at Ha Yeung and Leung Fai Tin and Clear Water Bay Road. Therefore, slope upgrading works are required at the Works Site to ensure public safety.

1.3 Name of Project proponent

The project proponent is the GEO of CEDD of the Hong Kong Special Administrative Region (HKSAR).

1.4 Location and Scale of the Project

The Works Site is located at Clear Water Bay Road above Ha Yeung and Leung Fai Tin. Two proposed areas for grout mixing, one located at the southern tip of the Feature No. 12NW-C/C8 while the other near the junction of Clear Water Bay Road and Leung Fai Tin Upper Road to avoid encroachment to an existing stream course. The location of the proposed slope upgrading works is shown in **Figure 1**. Overview of the surrounding environment of the Project is shown in **Plate 1**.

The extent of the Works Site is approximately 3300m^2. The key scopes of the proposed slope upgrading works mainly comprise of installation of soil nails, drainage modification works, construction of maintenance berm and landscape works. The proposed area for grout mixing is the associated sites to be used to facilitate the carrying out of the slope upgrading works(hereinafter referred to as the "Works Areas). No works will be conducted outside the Works Site. Landscaping works including planting of shrubs and groundcover and hydroseeding will be carried out.

1.5 Number and Types of Designated Projects to be Covered by the Project Profile

The Works Site of the Project falls within a Conservation Area (CA) under the approved Clear Water Bay Peninsula South Outline Zoning Plan No. S/SK-CWBS/2 (**Figure 2**). According to Item Q.1, Part 1 of Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO), the Project is classified as a Designated Project (DP) and an Environmental Permit (EP) is required prior to the commencement of the construction works. Fugro (Hong Kong) Limited (FHK) was appointed by GEO of CEDD under Agreement No. CE53/2014(GE) to undertake the application for EP for the proposed slope upgrading works at feature No. 12NW-C/C8.

1.6 Name and Telephone Number of Contact Person

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2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Outline of Planning

The proposed slope upgrading works in the Works Site will be implemented under contract No. GE/2016/01. GEO of CEDD is the Project Proponent with overall responsibility for the planning, design and construction works. FHK, as the appointed Consultant of GEO, will undertake the application for EP for the proposed slope upgrading works at feature No. 12NW-C/C8. The proposed works will be implemented by a Contractor appointed by CEDD.

The proposed slope upgrading works within the Works Site will involve below major activities:

1. **Installation of soil nails and rock slope stabilization –** involves drilling into soil/rock (8 - 12m drilling depth), followed by installation of soil nails (about 522 nos.) with drillhole size of 150mm in diameter at approximately 1.5 - 2m spacing. The methodology for installation of soil nails is given in **Appendix E**.

2. **Drainage and maintenance staircases modification works and construction of maintenance berm** – involves modification of concrete surface drains to control surface runoff, modification of maintenance staircases and construction of maintenance berm to facilitate slope maintenance.

3. **Landscaping works** – involves planting of shrubs and fern and hydroseeding on the soil nailed areas

Local consultation on the Project was conducted by Sai Kung District Office on November 2017. A total of 4 local personalities (including Hang Hau Rural Committee Chairmen, Sai Kung District Council Member of the relevant constituency and Village Representatives of Ha Yeung Villages) were consulted. No objections to the Project were received.

2.2 Tentative Project Programme

The Construction period is expected to last for 12 months. The project is scheduled to be commenced in July 2018 and to be completed in June 2019. The tentative project programme is illustrated in **Table 2.1**.

Table 2.1 – Tentative Construction Programme

Major Activities (Estimated duration)	Month											
	Jul 18	Aug 18	Sep 18	Oct 18	Nov 18	Dec 18	Jan 19	Feb 19	Mar 19	Apr 19	May 19	Jun19
Site mobilization and site clearance (1 month)												
Installation of soil nails, raking drains (8 months)												
Rock slope stabilization works (8 months)												
Drainage and maintenance staircases modification works and construction of maintenance berm (1 month)												
Landscaping works (1 month)												
Site demobilization (1 month)												

2.3 Interactions with Other Projects

According to the best available information at the time of preparation of this Project Profile, there are no concurrent construction activities for LPMit Project in the vicinity. The project "Natural Terrain Hazard Mitigation Works at Study Area No. 12NW-C/SA1 above Leung Fai Tin along Clear Water Bay Road, Sai Kung" located in the vicinity was completed.

3. MAJOR ELEMENT OF THE SURROUNDING ENVIRONMENT

3.1 Noise

Representative noise sensitive receivers (NSRs) identified within 300m of the Works Site are listed in **Table 3.1** and illustrated in **Figure 2**.

Table 3.1 Representative Noise Sensitive Receivers (NSRs)

NSR	Description	Type	No. of Storey	Distance from Works Site (m)
1	No. 5, Village House, Ha Yueng	Residential	3	35
2	No. 2, Village House, Ha Yueng	Residential	2	28
3	No. 70-71, Village House, Leung Fai Tin	Residential	3	63
4	No. 1, Village House, Leung Fai Tin	Residential	3	39

The major source of existing noise level would be the traffic noise from the Clear Water Bay Road. According to "The Annual Traffic Census 2015" published by the Transport Department, the traffic flow of this section of Clear Water Bay Road is moderate and is expected to be higher during weekends and public holidays.

3.2 Air Quality

Representative air sensitive receivers (ASRs) identified within 300m of the Works Site are listed in **Table 3.2** and illustrated in **Figure 2**.

Table 3.2 Representative Air Sensitive Receivers (ASRs)

ASR	Description	Type	No. of Storey	Distance from Works Site (m)
1	No. 5, Village House, Ha Yueng	Residential	3	35
2	No. 2, Village House, Ha Yueng	Residential	2	28
3	No. 70-71, Village House, Leung Fai Tin	Residential	3	63
4	No. 1, Village House, Leung Fai Tin	Residential	3	39

Due to the lack of on-site air quality monitoring data for the Works Site of the Project at Leung Fai Tin and Ha Yeung, the annual average concentrations of pollutants measured at the air monitoring station of Environmental Protection Department (EPD) at Kwun Tong (at a distance of 6.37 km from the Works Site) would be used as a reference to provide information on the background air pollutant levels.

The annual average concentrations of SO_2, RSP (PM10), FSP (PM2.5) and NO_2 recorded at Kwun Tong Air Monitoring Station as reported in the "Air Quality in Hong Kong 2014" and "Air Quality in Hong Kong 2015" published by EPD are compared against the annual Air Quality Objectives (AQOs) under the Air Pollution Control Ordinance. The results are summarized in **Table 3.3**.

Table 3.3 The Annual Averages of Gaseous Pollutants Recorded at EPD's Kwun Tong Air Monitoring Station

Pollutant	Annual Average Concentration (μg/m^3)					Annual AQOs
	2012	2013	2014	2015	2016	
Sulphur Dioxide (SO_2)	11	12	11	8	8	-
Respirable Suspended Particulates (PM10)	43	52	51	44	37	50
Fine Suspended Particulates (PM2.5)	28	33	31	27	23	35
Nitrogen Dioxide (NO_2)	59	59	54	55	54	40

Vehicle passing through Clear Water Bay Road is the major source of air pollution in the vicinity of the Works Site for the Project. No other source of existing air pollution has been identified. The level of air pollution from vehicular emissions is expected to be relatively low given the location of the project is in rural area with relatively low traffic flow. It is expected the background air pollution levels at the proposed Works Site are lower than those obtained at the Kwun Tong Air Monitoring Station since the source of the pollutants at Kwun Tong monitoring station are mainly due to heavy traffic flow in commercial area comparing to the relatively low traffic flow on Clear Water Bay Road.

3.3 Water Quality

No existing stream or sensitive water body is identified within the Works Site while a stream course is located at about 2m beyond the southern end of the Works Site **(Figure 2)**. During the construction phase, runoff and drainage from construction site would be the major sources of potential water quality impacts. Sewage generated from onsite construction workforce would also be another potential source of pollution.

3.4 Ecology

Habitat & Vegetation

Desktop Study shows the Proposed Works Site locates at the edge of continuous woodland. Field survey conducted on 14th August and 3rd November 2016 verified the habitat contained a secondary forest at western part with plantation of exotic tree species *Acacia confusa* (台灣相思) near the road at the east (**Figures 4A and 4B; Plate 2**). Dominated native tree species includes *Alangium chinense* (八角楓) and *Machilus chekiangensis* (浙江潤楠), with the understory occupied by some dominant local shrub and herbaceous species, e.g. *Desmos chinensis* (假鷹爪), *Maes aperlarius* (鯽魚膽) and *Psychotri aasiatica* (山大刀). The canopy cover of the woodland is moderately dense in general. The height of the forest is ranged from 5m to 10m. No stream was identified in the proposed Works Site while a stream course is located about 2m outside the southern tip of the Works Site, the works boundary is mainly cut off by parallel concrete ditches.

All plants including ferns, gymnosperms and angiosperms found in the proposed Works Site were recorded by direct observation. Plant individuals which were hard to approach were identified using a pair of 10 x 42 binoculars. The relative abundance of each plant species in the Proposed Works Site was also estimated. For all the plant species recorded, its status in Hong Kong was assessed according to Corlett *et al.* (2000) with updates from published and unpublished data and personal observations.

A total of 76 plant species were recorded on the proposed Works Site, including 32 trees, 22 shrubs, 14 climbers, 5 herbaceous species and 3 fern species (**Appendix B**). All but one of the recorded species is either very common or common in Hong Kong. Although Corlett *et al.* (2000) stated *Boehmeria nivea* (苧麻) has a restricted distribution, updated information indicates it is common in Hong Kong (AFCD and SCBG, 2007).

Our field survey confirmed the presence and distribution of plant species of conservation importance as indicated by previous tree surveys appointed by CEDD's sub-consultant. They are *Aquilaria sinensis* (土沉香) and *Pavetta hongkongensis* (香港大沙葉). A third kind of plant species of conservation importance, *Gnetum luofuense* (羅浮買麻藤), is a climber and was identified by this ecological survey. Particular attention was paid during the survey to assess whether any of them will be affected by the upcoming slope works. Details of the findings for these three kinds of plant species of conservation importance are described in below 3 paragraphs.

Aquilaria sinensis(土沉香)

A total of at least 60 individuals of *Aquilaria sinensis* (土沉香) were recorded within the Proposed Works Site. All but one (T38) are either saplings, seedlings or small trees that ranged from 0.3 to 5.5m in height, with a diameter at breast height (DBH) of 34mm in average (only one seedling has DBH larger than 95mm) (**Appendix B**). They are generally growing in groups rather than spread out the Works Site, concentrating along the northwest boundary outside the soil nailing area behind the concrete ditch (**Figures 4A and 4B**). The largest patch within soil nailing area is tree group A20, which contains at least 17 saplings and seedlings in the central west boundary. However, the design has already been taken this into consideration and no soil nail would be installed in this zone.

In terms of both healthiness and form (refer to **Appendix B)**, all saplings were generally in good to fair condition. Tree group A32 at the northern tip near T275 and T276, as well as the mature T38, were in fair to poor health and form. Three of their trunks have been topped while the other three were also harvested or damaged (**Plate 3**).

Aquilaria sinensis (土沉香) is of conservation importance according to the Technical Memorandum on Environmental Impact Assessment Process of the EIA Ordinance (Cap 499). It is protected by Protection of Endangered Species of Animals and Plants Ordinance (Cap.586). It is listed as rare and precious plant of Hong Kong (AFCD, 2003), with a vulnerable (VU) status in IUCN Red List (IUCN, 2016) and Near Threatened (NT) status in China. It is also listed in Plant Red Data Book (Fu and Jin, 1992) and classified as wild plant under State Protection Category II.

Pavetta hongkongensis(香港大沙葉)

Two saplings and one seedling of *Pavetta hongkongensis* (香港大沙葉) were recorded within the Proposed Works Site (**Figures 4A and 4B; Plate 3**). All of them located outside the soil nailing area behind the concrete ditch. This species is protected by the Forestry Regulations under the Forests and Countryside Ordinance (Cap 96).

Gnetuml luofuense (羅浮買麻藤)

Two patches of *Gnetum luofuense* (羅浮買麻藤), a climbing gymnosperm, were recorded in the southwestern part of the Proposed Works Site. This climber grows up in tree canopy with hanging vine network above ground level. The growing point is difficult to be traced under woodland but usually in area with more vines in larger diameter (**Figures 4A and 4B; Plate 3**).

This species is listed as NT in IUCN Red list (IUCN, 2016) due to the potential declining threat caused by habitat loss. However, it is not protected under Cap.96 or Cap. 586 and is common in Hong Kong forest (Corlett *et al.*, 2000).

Distribution of the three plant species of conservation importance indicates that the population inhabits near the edge of more natural secondary forest. While those more mature trees which have been damaged or harvested, saplings have started regenerating into the woodland mixed with exotic tree plantation.

Fauna

All wild birds are protected in Hong Kong by the Wild Animals Protection Ordinance (Cap. 170). A total of six bird species were recorded in low number, including *Pycnonotus sinensis*(白頭鵯), *Zosterops japonicas*(暗綠繡眼鳥), *Orthotomus sutorius*(長尾縫葉鶯), *Copsychus saularis* (鵲鴝), Myophonus caeruleus (紫嘯鶇) and *Parus cinereus* (蒼背山雀) (**Appendix B**). They are either common or abundant throughout Hong Kong. No signs of breeding birds or nests were recorded during the survey. These small-sized species would not be affected by the works as the continuous woodland surrounding the Works Site would provide plenty of suitable habitats and resources for its inhabitation.

Based on the ecological survey that carried out in wet season, including night surveys, revealed that there was no species of mammals, herpetofauna, butterflies and Odonates being encountered within the proposed Works Site. Although Lesser Spiny Frog (Quasipaa exilispinosa) was previously recorded in area next to the proposed Works Site (Project Profile for "Natural Terrain Hazard Mitigation Works at Study Area No. 12NW-C/SA1 above Leung Fai Tin along Clear Water Bay Road, Sai Kung" under application no. DIR-225/2013), the Works Site would unlikely act as a breeding site or important feeding site since there is no stream habitat to provide such resources.

Lesser Spiny Frog (*Quasipaa exilispinosa*) is listed as Vulnerable (VU) in IUCN Red List with a Potential Global Concern as assessed by Fellowes *et al.* (2002).

3.5 Landscape and Visual

Based on desktop study on maps and photographs, the major landscape elements of the surrounding area include hillside woodland, the Clear Water Bay Road and residential blocks at Ha Yeung and Leung Fai Tin. Field survey assessment has identified three Landscape Resources (LRs) and three Landscape Characters Areas (LCAs). The Zone of Visual Influence (ZVI), LRs and LCAs are illustrated in **Figure 6**. Photographic records of the various LRs and LCAs are shown in **Plate 4**.

LR1 Hillside Woodland:

The Proposed Works Site is embedded in the woodland mix of native trees and exotic plantation at the west of Clear Water Bay Road. This LR is characterised by various species of native plant dominated by *Alangium chinense* (八角楓) and *Machilus chekiangensis* (浙江潤楠),as well as the recorded three kinds of plant species of conservation importance, which include *Aquilaria sinensis* (土沉香), *Pavetta hongkongensis* (香港大沙葉)and *Gnetum luofuense*(羅浮買麻藤).Previous tree surveys conducted in August 2017 by CEDD's landscape consultant under CEDD Agreement No. CE 23/2016 (GE) estimated that there is about 291 trees in the Works Site, where dominant tree (DBH>= 95mm) were also observed as *Acacia confusa* (台灣相思), followed by *Castanopsis fissa* (黧蒴錐) **(Appendix C)**. The average tree size was found 8.3m in height, 5.2m in crown spread with average DBH of 0.19m. A full list of plant species recorded in the Works Site during our ecological assessment is presented in **Appendix B**. The whole Proposed Works Site is designated as Conservation Area while a green belt exists between the opposite side of Clear Water Bay Road and Village Development Area. Therefore the overall sensitivity of this hillside woodland is considered to be high.

LR2 Village Development Area:

This LR is characterised by low rise and low density residential areas of village houses at Ha Yeung and Leung Fai Tin. This LR is readily capable of accommodating change and its sensitivity is considered to be low.

LR3 Major Transportation Corridor:

Clear Water Bay Road is the main traffic road separating the Proposed Works Site on the west and the Village Development Area on the east. This LR is readily capable of accommodating change and its sensitivity is considered to be low.

LCA1 Hillside Landscape:

This LCA comprises hillside west to the Clear Water Bay Road. The overall sensitivity of this LCA is considered to be high.

LCA2 Urban Fringe Village Landscape:

This LCA encompasses the low density residential area including village houses at Ha Yeung and Leung Fai Tin, as well as some nearby woodland in green belt and conservation area. This developed residential area is a common landscape and the overall sensitivity is considered to be low.

LCA3 Transportation Corridor Landscape:

This LCA refers to the transportation network of Clear Water Bay Road and the access roads connecting Ha Yeung and Leung Fai Tin villages. The overall sensitivity of this road, which receives high traffic disturbance, is considered to be low.

Visual Elements

For identifying visual elements in the proposed Works Site and their surrounding environment, the Zone of Visual Influence (ZVI) is defined which includes all areas from which the Works Site can be fully, partly, or not seen, or the view-shed formed by natural/ man-made features such as existing ridgelines, built development or woodland. The visibility of the Works from key Visually Sensitive Receivers (VSR) is verified through field surveys and desktop study of topographical plans and satellite maps.

The continuous patch of wooded hillside terrain along Clear Water Bay Road and the ridgeline of Ha Yeung Shan hiking track form the major scenic backdrop within the ZVI. The green belt between the Village Development Area (LR2) and the proposed Works Site block much of the view from the villages (**Figure 6**). The proposed works are also located within the dense hillside woodland in which the topography and existing trees will screen the construction works from most of the surrounding areas. Two proposed areas for grout mixing to facilitate the works are located at the southern tip of the Works Site, and near the junction of Clear Water Bay Road and Leung Fai Tin Upper Road. Visual impact within such ZVI is expected to be low and restricted to two identified Visually Sensitive Receivers (VSR) identified and described as below.

The first VSR are identified as the localized residents of Ha Yeung and Leung Fai Tin, with one block close to the junction of Clear Water Bay and Ha Yeung Road, and the other two blocks near the junction of Leung Fai Tin Upper Road adjoining Clear Water Bay Road (VSR1); the second VSR is identified as the highly mobile travellers along these road sections (VSR2). Residents in other blocks further away from the two road junctions are at lower elevation. With further screening by the existing woodland in between the separation distance, these residents would hardly experience a glimpsed view towards the Works Site. Location and visual area of each VSR, and locations of Vantage Point (VP) are mapped on **Figures 5A and 5B**. Corresponding photographs are shown in **Plate 5**.

3.6 Cultural Heritage

Desktop review and field survey found no declared monuments and proposed or Grade 1–3 historic buildings listed by the Antiquities and Monument Office (AMO) at the Proposed Works Site and the surrounding environment. There is also no Sites of Archaeological Interest (SAI) listed by the AMO, where the nearest SAI locates at least 1km from the Proposed Works Site. Therefore, no essential terrestrial archaeological survey is considered.

4. POSSIBLE IMPACT ON THE ENVIRONMENT

4.1 Potential Environmental Impacts during Construction Phase

4.1.1 Noise

The major noise source will be vehicular visits for transportation of equipment and materials to the site as well as the use of Powered Mechanical Equipment (PME). Due to limited numbers of vehicle visits per day, the noise impact from vehicular visits is considered to be insignificant.

The items of PME that are likely to be required for each of the activities are identified and summarized in **Table 4.1**.

Table 4.1 Summary of PME Used During Construction Phase

Stage (duration)	PME Type	ID code [1]
Works Area for Grout Mixing		
Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)	Air compressor, air flow > 30m^3/min	CNP 003
	Generator, slienced, 75dB(A) at 7m	CNP 102
	Grout mixer	Not Applicable
	Grout pump	Not Applicable
Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road) (Period from 1/7/2018 to 30/6/2019)	Air compressor, air flow > 30m^3/min	CNP 003
	Generator, slienced, 75dB(A) at 7m	CNP 102
	Grout mixer	Not Applicable
	Grout pump	Not Applicable
Major Activities in Works Site		
Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	Not Applicable
Installation of soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)	Compressor and pneumatic drilling rig	BS D.10/Ref. no.2 [2]
Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)	Breaker, hand-held, mass ≤ 10 kg	CNP 023
	Agitator (electric)	Not Applicable
	Poker, vibratory, hand-held	CNP 170
	Water pump (electric)	CNP 281
	Saw, circular, Wood	CNP 201
	Drill/grinder, hand-held (electric)	CNP 065
	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	Not Applicable
Drainage and maintenance staircases modification works and construction of maintenance berm	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	Not Applicable
	Breaker, hand-held, mass ≤ 10 kg	CNP 023

Stage (duration)	PME Type	ID code [1]
(Period from 1/4/2019 to 30/4/2019)	Saw, circular, Wood	CNP 201
	Water pump (electric)	CNP 281
	Agitator (electric)	Not Applicable
	Poker, vibratory, hand-held	CNP 170
Landscaping works (Period from 1/5/2019 to 31/5/2019)	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	Not Applicable
Site demobilization (Period from 1/6/2019 to 30/6/2019)	Breaker, hand-held, mass ≤ 10 kg	CNP 023
	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	Not Applicable

Note:

[1] - The ID code and Sound Power Levels (SWLs) of the PMEs are referenced to "Technical Memorandum on Noise from Construction Work Other Than Percussive Piling" and EPD's guidance "Sound power levels of other commonly used PME" available at below website:

http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf

[2] - British Standard BS5228-1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

The assessment methodology outlined in "Technical Memorandum on Noise from Construction Work Other Than Percussive Piling" had been followed in predicting the construction noise levels at the representative NSRs (NSR1-4). **Table 4.2** presents the range of the unmitigated noise levels predicted at the representative NSRs for the construction works at the Works Site. Detailed calculations are presented in **Appendix A**.

Table 4.2 Range of Predicted Construction Noise Levels for Construction Works at the Works Site and Works Area (Unmitigated Scenario)

NSR	Description	Predicted Noise Levels, dB(A)	EIAO-TM Noise Limit, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	65 – 80	75	Yes
2	No. 2, Village House, Ha Yueng	71 – 82	75	Yes
3	No. 70-71, Village House, Leung Fai Tin	59 – 76	75	Yes
4	No. 1, Village House, Leung Fai Tin	83 – 84	75	Yes

The predicted construction noise levels at NSR1 – NSR4 under unmitigated scenario will exceed the required noise limit 75dB(A). Therefore, noise mitigation measures are required to reduce the noise level to an acceptable level. Detailed mitigation measures are presented in **Section 5.1.1**.

4.1.2 Air Quality

There will be dust emissions from excavation works as well as gaseous emissions from construction plant and vehicles when the works are carried out. The main sources of fugitive dust emissions include site excavation, drilling operation, truck movement and material handling.

Regarding to the nature of the slope upgrading works, no significant earthworks or open excavation will be required. Only some minor open excavation and concrete casting would be required for soil nail installation. Number of construction plant on site would also be limited such that gaseous emissions from the operation of construction plant should not be a concern and the dust impact would be low.

Dust could be generated from minor excavation, drilling operations and concrete casting. Other dust source may be from stockpiling of construction materials. Given the limited number of plants and equipment to be used, the dust impact should not be a concern and the impact is considered to be low.

However, given the proximity of nearby ASRs to the proposed work sites, it will be important to ensure that sufficient dust control measures as required in the Air Pollution Control (Construction Dust) Regulation are implemented so that any potential dust emission impact on the ASRs could be alleviated to acceptable levels. The specific measures required are listed in **Section 5.1.2**.

4.1.3 Water Quality

During the construction phase, runoff from construction site would be the main sources of potential water quality impacts. Appropriate measures in accordance with the guidelines stipulated in EPD's Practice Note for Professional Persons on Construction Site Drainage ProPECC PN1/94 would be implemented as far as practicable to minimize potential water quality impacts. Runoff and drainage from the Works Site will be collected and treated properly before discharging to nearest public sewers. Chemical toilets will be provided on-site and a licensed waste collector will be deployed to collect and handle the sewage generated from the workers. No adverse water quality impact is expected with the provision of proper site drainage system and implementation of the mitigation measures recommended in **Section 5.1.3**.

4.1.4 Waste Management

The proposed slope stabilization works at the Works Site will generate the following types of waste:

- Inert Construction and demolition (C&D) materials: mainly consist of inert excavated materials (e.g. soil, broken concrete) generated from construction of the soil nailing works;
- A small quantity of non-inert C&D materials that comprise timber, plastic and other solid waste would also be generated;
- General refuse mainly consists of food waste from onsite workers;
- Any chemical waste such as lubricating oils generated from maintenance of construction equipment and vehicles.

A summary of estimated quantities of each type of waste materials generated from the proposed works is presented in **Table 4.3**.

Table 4.3 Summary of Each Type of Waste Materials Generated

Type of Waste	Source	Estimated Volume (m^3)	Designated Waste Handling Facilities
Inert C&D materials	Concrete Staircase	10	Tseung Kwan O Area 137 Fill Bank
	Stepped Channel	10	
	Sprayed concrete cover	40	
	400mm apron setup	10	
	Drilling of soil nails and excavation for soil nail head	130	
Non-inert C&D materials	Site clearance	10	NENT Landfill
Total		210	

C&D materials will be sorted and transported to the designated area. The inert C&D materials will be disposed to Public Fill Reception Facility in Tseung Kwan O Area 137 managed by CEDD and the non-inert C&D materials that are not recyclable will be disposed to North East New Territories (NENT) Landfill managed by EPD.

The estimated quantity of general refuse is 0.2 tonnes. Sufficient waste disposal points and different categories of enclosed refuse bins will be provided on-site. Recycle bins will be provided during construction phase to minimize the generation of general refuse. The general refuse generated during construction phase will be collected regularly and disposed at NENT Landfill.

The estimated quantity of chemical waste is 0.1 tonnes. The Contractor shall register as a Chemical Waste Producer when chemical wastes are generated onsite. All Chemical wastes shall be properly handled, stored, labelled, packaged and collected by licensed chemical waste collector in accordance with the requirement of the Waste Disposal (Chemical Waste) (General) Regulation.

The feature was man-made slope on natural terrains. No potential contaminating land use was identified within the Works Site. As such, land contamination issue is not anticipated during construction phase.

Provided that the excavation works is limited and the wastes generated from the construction works are handled, transported, recycled and disposed of in accordance with the good site practices (as recommended in **Section 5.1.4)**, undesirable waste management implications are not anticipated at the Works Site and the associated Works Area during construction phase.

4.1.5 Ecology

Potential ecological impacts during construction of the proposed Works would be:

- Loss or disturbance of existing trees in the hillside woodland;
- Loss or disturbance of any species of conservation importance recorded

Approximately 3,300m^2 of ground covering vegetation will be cleared for the installation of 522 soil nails (with drillhole size of 150mm diameter). Most soil nail will be installed in the mixed woodland

with exotic plantation of *Acacia confusa* (台灣相思), understory vegetation here are dominated by common plant species (**Appendix B**).

Although three kinds of plant species of conservation importance were found existing within the Proposed Works Site, namely *Aquilaria sinensis* (土沉香), *Pavetta hongkongensis* (香港大沙葉) and *Gnetum luofuense* (羅浮買麻藤), most plant species of conservation importance were encountered outside soil nailing area, separated by concrete ditch. The largest patch within soil nailing area is tree group A20, which contains at least 17 saplings and seedlings in the central west boundary. However, the works have already been designed such that no soil nails would be installed in this zone. Mitigation measures are proposed in **Section 5.1.5** for reducing the ecological impact to vegetation loss and potential disturbance of any plant species of conservation importance recorded. None of the plant species of conservation importance will be pruned or damaged due to the works. The two patches of *Gnetum luofuense* (羅浮買麻藤) are growing among the canopy above the ground, therefore no plant species of conservation importance would be directly affected due to the LPMit works.

There was no faunal species of conservation importance being observed. Six common bird species was observed along this forest edge next to the Clear Water Bay Road with high traffic volume. There was no sign of breeding or bird nest being found within the proposed Works Site. No mammals, herpetofauna, butterflies and Odonates were detected. Although Lesser Spiny Frog (Quasipaa exilispinosa) was previously recorded in area next to the proposed Works Site (Project Profile for "Natural Terrain Hazard Mitigation Works at Study Area No. 12NW-C/SA1 above Leung Fai Tin along Clear Water Bay Road, Sai Kung" under application no. DIR-225/2013), the Works Site would unlikely act as a breeding site or important feeding site since there is no stream habitat to provide such resources.

Due to limited footprint, limited wildlife use in the proposed Works Site, in-situ preservation of all trees and no direct impacts to all plant species of conservation importance, magnitude of change in hillside woodland and potential adverse ecological impacts resulting from possible vegetation clearance are considered to be small.

4.1.6 Landscape and Visual

Magnitude of change of LRs/ LCAs and visual elements resulting from construction and/ or operation of the Works depends on compatibility of the Works with the surrounding landscape, duration of impacts, scale of development and reversibility of change, viewing distance, and potential blockage of view.

Significance of landscape and visual impacts depends on the magnitude of change of landscape and visual elements in the environment and sensitivity of receivers to the change. The evaluation matrix is tabulated in **Table 4.4** below.

Table 4.4 Matrix of Significance of Landscape and Visual Impacts

		Receptor Sensitivity (LR/ LCA/ VSR)		
		Low	**Medium**	**High**
Magnitude of Change	**Negligible**	None	None	None
	Small	Slight	Slight to Moderate	Moderate
	Intermediate	Slight to Moderate	Moderate	Moderate to Substantial
	Large	Moderate	Moderate to Substantial	Substantial

Potential landscape and visual impacts during construction of the proposed works would be:

- Changes in LR1 and LCA1 due to site clearance and soil nailing works
- Visual impacts to various VSR

There is flexibility to adjust the exact locations of soil nails in accordance with the findings of the topographical survey to avoid any tree felling. Vegetation clearance of ground cover would be approximately 3,300m^2. Temporary vegetation loss is reversible while non-reversible permanent loss will be compensated by hydroseeding and re-vegetation as a mitigation measure. Hessian bags will be placed on top of soil nail heads as per CEDD Standard Drawing No. C2106/4E for hydroseeding as a measure for re-vegetation. Existing concrete stairway will be demolished and replaced by steel maintenance staircase with lockable gate. Existing 300mm wide stepped drainage channel will be demolished and replaced by 375mm wide stepped drainage channel. Existing sprayed concrete cover will be removed in order to apply corresponding exposed rock slope treatment. There will be no expansion in non-vegetated landscape for maintenance access and rocked area, except minimal widening in the stepped concrete channel.

During construction phase of the Works, hoarding with colour compatible to the surrounding will be erected around the Works Site and the two Works Areas for grout mixing. Therefore, demolition works, soil nailing and rock slope treatment works would only be visible to site staff but not to local residents of Ha Yeung and Leung Fai Tin (VSR1); and travellers moving along traffic road (VSR2). Most residential blocks at Ha Yeung and Leung Fai Tin are in lower elevation than the proposed Works Site. With woodland in the green belt acting as a natural screening, residents staying in these blocks can hardly see the proposed Works Site. Duration of construction phase is expected to last for 12 months.

Based on results of assessment mentioned above, clearance of ground vegetation due to the proposed works will result in intermediate magnitude of change in LR1 and small magnitude of change in LCA1. Impact significance would be Moderate to Substantial for LR1 and Moderate for LCA1. The magnitude of change to LR2, LR3, LCA2 and LCA3 is considered negligible as these are already developed area and outside the Works Site. The resulting impact on existing LR2, LR3, LCA2 and LCA3 arising from the Proposed Works during the construction phase is expected as none in impact significance. Magnitude of change and impact significance on various LR, LCA and VSR is summarized in **Tables 4.5**.

Table 4.5 Impact significance to various receptors due to the slope works

Receptor Code	Name	Sensitivity	Magnitude of Change	Impact Significance
LR1	Hillside Woodland	High	Intermediate	Moderate to Substantial
LR2	Village Development Area	Low	Negligible	None
LR3	Major Transportation Corridor	Low	Negligible	None
LCA1	Hillside Landscape	High	Small	Moderate
LCA2	Urban Fringe Village Landscape	Low	Negligible	None
LCA3	Transportation Corridor Landscape	Low	Negligible	None
VSR1	Localised residents of Ha Yeung and Leung Fai Tin	Low	Negligible	None
VSR2	Travellers along Clear Water Bay Road and junction of Ha Yeung Road and Leung Fai Tin Upper Road adjoining Clear Water Bay Road	Medium	Small	Slight to Moderate

Overall Impact Significance: Slight – Moderate

4.1.7 Cultural Heritage

There is no cultural heritage resource to be affected by the proposed slope upgrading works.

4.2 Potential Environmental Impacts during Operation Phase

4.2.1 Noise

There will be no activities relating to the Project during operation phases, therefore no adverse impacts on noise quality is anticipated.

4.2.2 Air Quality

There will be no activities relating to the Project during operation phases, therefore no adverse impacts on air quality is anticipated.

4.2.3 Water Quality

There will be no activities relating to the Project during operation phases, therefore no adverse impacts on water quality is anticipated.

4.2.4 Waste Management

There will be no activities relating to the Project during operation phases, therefore no adverse environmental impact from wastes is anticipated.

4.2.5 Ecology

There will be no activities relating to the Project during operation phases, therefore no adverse impacts on ecology is anticipated.

4.2.6 Landscape and Visual

Although soil nailing would change part of the landscape, all trees and plant species will be retained except hazardous trees which pose imminent risk of failure, would be removed in accordance with Development Bureau's Technical Circular (Works) No. 7/2015 on Tree Preservation. Permanent vegetation loss will be compensated by hydroseeding and re-vegetation of native shrubs and fern. Since most VSR are either highly mobile along the road or situated along the naturally downslope terrain with green belt of woodland in between, such changes basically pose very insignificant landscape and visual impacts during operational phase.

4.2.7 Cultural Heritage

As there are no cultural heritage resources in the vicinity of the Works Site, there will be no impact during operational phase.

5. ENVIRONMENTAL MITIGATION MEASURES

5.1 Environmental Mitigation Measures during Construction Phase

5.1.1 Noise

As mentioned in **Section 4.1.1**, the predicted construction noise levels at NSR1 – NSR4 under unmitigated scenario will exceed the required noise limit 75dB(A). Therefore, noise mitigation measures are required to reduce the noise level to an acceptable level.

Movable noise barriers are proposed for noise screening. Noisy PMEs shall be operated behind movable noise barriers comprised of minimum 50mm thick sound absorbing lining with surface mass in excess of 10kg/m^2, and a minimum of 10mm thick plywood (or 1mm thick steel backing). Height of the movable barriers varies to suit the equipment and location, and that there will be no direct line of sight to the equipment from the NSRs. In general, movable noise barrier can achieve a 5dB(A) reduction for movable PMEs and 10dB(A) reduction for stationary PMEs while the enclosed ones can achieve a 15dB(A) reduction depending on the actual design.

Table 5.1 presents the range of the mitigated noise levels predicted at the representative NSRs for the construction works. Detailed calculations are presented in **Appendix A.**

Table 5.1 Range of Predicted Construction Noise Levels for Construction Works at the Works Site and Works Area with Implementation of Noise Mitigation Measures

NSR	Description	Predicted Noise Levels, dB(A)	EIAO-TM Noise Limit, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	59 – 70	75	No
2	No. 2, Village House, Ha Yueng	61 – 72	75	No
3	No. 70-71, Village House, Leung Fai Tin	54 – 66	75	No
4	No. 1, Village House, Leung Fai Tin	71 – 73	75	No

In addition to movable noise barriers, Good site practices will considerably reduce any potential noise impact from construction works on NSRs. The following measures shall be implemented during the construction phase for the proposed works in the Works Site:

- The contractor shall submit the method of work, including the PME and sound-reducing measures intended to be used to the Engineer for approval before the commencement of any construction works;
- The number of PME used shall be kept to a minimum. Only well-maintained plant and equipment shall be used;
- Regular maintenance shall be provided to all plant and equipment;
- Equipment shall be shut down or throttled down to a minimum when they are not in use;

- Silencer and/or mufflers shall be used on the construction equipment to reduce noise without impairing machine efficiency. Purpose-built movable noise barriers shall be employed as necessary;

- No construction activities will be allowed during 7pm to 7am on weekdays and anytime on Sundays and Public Holidays.

5.1.2 Air Quality

The dust mitigation measures stipulated in the Air Pollution Control (Construction Dust) Regulation shall be applied to minimize fugitive dust emissions from the Works Site during the works. These dust control measures include:

- Erection of hoarding of not less than 2.4m high from ground level along the Works Site and Works Area boundary that connects a road or other area accessible to the public, where appropriate;

- Any excavation or earth moving operation shall be sprayed with water to maintain the entire surface wet;

- Cover stockpile of dusty materials and debris by impervious sheeting or sprayed with water to maintain the whole surface wet.

- Any debris shall be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the 3 sides.

- Water spraying will be implemented during soil nailing.

5.1.3 Water Quality

The Contractor shall comply with the Water Pollution Control Ordinance (WPCO) and its subsidiary regulations. Site runoff shall be monitored according to the guidelines stipulated in EPD's Professional Persons Environmental Consultative Committee Practice Note (ProPECC PN 1/94) "Construction Site Drainage".

All surface runoff from the Works Site generated from construction works, dust control and vehicle washing etc, shall be collected and directed towards de-silting facilities for treatment before discharging into stormwater drains or natural streams. The following measures should be implemented by the Contractor:

- Typical grout mixing machine is 2m x 2m in size (approximately) on plan only and the actual location of the machine will be determined on site such that it will be situated away from the natural stream course as far as practicable.

- Ground surface of the proposed areas for grout mixing will be covered with tarpaulins and hessian sand bags will be provided along the perimeter as mitigation measures to prevent grout spillage to adjacent areas outside the Works Site or Works Areas.

- The entire Works Site including the Works Areas will be fenced off by hoarding.
- Perimeter channels should be provided at site boundaries of Works Site where necessary to intercept storm runoff from outside the Works Site;
- Channels, earth bunds or sand bag barriers shall be provided onsite to properly direct storm water to the silt removal facilities provided;
- No excavated material, silt, debris, rubbish, cements, slurry or construction waste shall be deposited into natural stream;
- All trade effluent, foul, contaminated water, cooling water or hot water shall not be discharged into any public sewers, stormwater drains, channels, stream courses or the sea;
- Open stockpiles of construction materials should be prevented as far as practicable or, where unavoidable, should be covered with impervious sheeting such as tarpaulin or fabric during rainstorms;
- Portable chemical toilet facilities shall be provided on site and a licensed water collector will be appointed by the Contractor for regular collection of foul water;
- All site discharges shall comply with the terms and conditions of a valid discharge license issued by EPD;
- Contractor will be required to carry out regular site cleaning and tidying throughout the construction period. Regular environmental inspections will be carried out during the construction period to ensure the site is clean and tidy;
- It is suggested that tool box talk on site run-off control be carried out by the Contractor to increase the awareness of the workers; and
- The Contractor shall not permit any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the Works Site onto any adjoining land.

5.1.4 Waste Management

The Contractor shall comply with the Waste Disposal Ordinance and its subsidiary regulations and the Waste Disposal (Chemical Waste) (General) Regulation. Provided that good site practices are strictly complied, adverse environmental impacts related to waste management are not expected from the proposed works at the Works Site. Waste management practices below are recommended:

- The possible reuse of waste materials onsite shall be investigated and exhausted by the Contractor prior to consideration of treatment or disposal off-site;
- The Contractor shall be responsible for identifying what materials could be reused or recycled, where onsite or offsite. For offsite reuse or recycling, the contractor shall arrange for the collection of the recyclable materials;

- Different types of wastes shall be sorted on-site, stored and stockpiled properly to promote reuse or recycling. Waste storage area shall be handled properly;

- Surplus C&D materials (inert and non-inert) generated from the proposed works requiring disposal shall be properly transported by dump truck with mechanical cover to the designated disposal facilities managed by CEDD and EPD. In order to monitor the proper disposal of C&D materials and to control fly-tipping, a trip-ticket system shall be implemented by the Contractor and monitored as a standard item in the relevant technical audit, in accordance with the requirements specified in DEVB TC(W) No. 6/2010 Trip Ticket System for Disposal of Construction & Demolition Materials;

- The Contractor shall sign up as a Chemical Waste Producer if chemical wastes such as spent lubricants are generated onsite. All chemical waste shall be properly handled, stored, labelled, packaged and collected in accordance with the requirements of the Waste Disposal (Chemical Waste) (General) Regulation;

- The Contractor shall ensure that a sufficient number of covered bins are provided onsite for containment of general refuse. These bins shall be emptied on a daily basis and collected waste shall be disposed of properly; and

- The Contractor shall arrange toolbox talks to workers on relevant topics including site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling.

5.1.5 Ecology

Most plant species of conservation importance located outside soil nailing area behind the existing ditch along the western boundary of the Proposed Works Site. Hoarding will be set up along the ditch to create a no entry zone. Alignments and spacing of soil nails have been optimized to preserve all trees and plant species of conservation importance recorded in the Proposed Works Site as far as practicable. None of any tree individual (DBH>= 95mm) will be felled and all will be retained in-situ. All three species of plant species of conservation importance recorded within the proposed Works Site will also be retained in-situ.

Regarding fauna, only six common bird species were encountered without any signs of breeding or nesting during ecological survey. These small-sized species would not be affected by the works as the continuous woodland surrounding the Works Site would provide plenty of suitable habitats and resources for their inhabitation. Although Lesser Spiny Frog (*Quasipaa exilispinosa*) was previously recorded nearby the stream next to the proposed Works Site and may occur at the proposed Works Site (see **Section 4.1.5**), the proposed Works Site would unlikely act as a breeding site or important feeding site since there is no stream to provide such habitat. The surrounding woodland would also acts as a corridor for the frog to access the stream outside the Works Site. An Ecologist shall be engaged to conduct a condition survey to verify any presence of Lesser Spiny Frog within the Works Site before commencement of construction and during its active period (i.e. wet season, April to October) at construction phase. Translocation may be applied according to Ecologist's recommendations for AFCD's agreement.

As mentioned in **Section 4.1.5**, there will be temporary and permanent vegetation loss due to soil nailing works. Such loss will be compensated by hydroseeding and re-vegetation of native shrubs

and fern over the 3,300m^2 Proposed Works Site. The aim of hydroseeding is to allow the bare ground to be covered by fast growing grass, so that it helps to prevent erosion of soil, and loss of moisture and nutrients. This would facilitate natural recolonization of common plants, as well as the establishment of planted shrubs and fern. Besides, the greening work also mitigates landscape and visual impacts.

During installation of soil nails (including drilling works) and replacement of maintenance staircases and drainage channels, the tree protection zone (TPZ) as defined in **Section 5.1.6** will be maintained as far as possible in order to minimize impacts on the existing trees of common species. For any existing trees located close to the proposed works, those tree trunks should be wrapped in hessian (as a form of protective wrapping) in accordance with GEO Publication No. 1/2011 to avoid mechanical damage to the tree trunks (see **Figure 7**). The contractor shall remove these temporary protective armouring and protective mulching from the Works Site upon completion of the Works after agreement of the Engineer. The contractor will be required to comply with specifications on Preservation and Protection of Trees in the General Specification for Civil Engineering Works (GS) and Particular Specification (PS) of Contract No. GE/2016/01. Reference will also be made to Development Bureau's Technical Circular (Works) No. 7/2015 on Tree Preservation. Some preservation and protection measures for trees are outlined below:

When instructed by the Engineer, plank armouring the tree shall be installed for enhanced protection. Temporary protective mulching may also be installed to cover the entire TPZ, with relevant Standard Drawings and Sketches in Appendices A and O to the Particular Specification (PS). The contractor may also be instructed to lay double, overlapping, thick metal sheet coverings or other materials of equivalent strength as agreed by the Engineer on top of the temporary protective mulching to provide additional protection from soil compaction due to passage or operation of equipment or machinery. All these protective measures should be approved by the Engineer and provided by the contractor prior to the commencement of site clearance, demolition and construction of the slope upgrading works and any other site operations which may affect the trees.

Alternative construction methods, including construction of steel maintenance staircases to "bridge over" extensive tree roots on slope during the construction of the maintenance access will be adopted wherever necessary and practical. This helps to avoid direct encroachment upon tree roots of any existing trees in the Works Site.

For plant species of conservation importance, the dripline for mature individuals and 2m radius for seedlings should be maintained to avoid potential impacts to existing plants. It should be clarified that the two patches of climber species *Gnetum luofuense* (羅浮買麻藤) are growing among the canopy above the ground without direct contact with any ground works except the growing point. Growing point and crown spread of climber can be difficult to trace among woodland. A plant specialist should be appointed for on-site recommendation. As none of the tree individual (DBH>= 95mm) will be felled and all will be retained in-situ, there will be no tree felling in area where the two patches of *Gnetum luofuense* (羅浮買麻藤) occur. Hence this climber species that grows on canopy would not be affected. In case the growing point can be traced successfully in the course of site clearance prior to commencement of construction works, a 2m setback from the growing point should be applied. All individuals of *Aquilaria sinensis* (土沉香; a total of at least 60 individuals), *Pavetta hongkongensis* (香港大沙葉; a total of three individuals) and *Gnetum luofuense* (羅浮買麻藤; two patches) will be retained in-situ, as all slope stabilization works have been proposed at a minimum of 2 m away from these individuals. The following protective measures are proposed to preserve the plant species of conservation importance and trees:

- A detailed baseline tree survey in accordance with Development Bureau's Technical Circular (Works) No. 7/2015 on Tree Preservation will be conducted by a qualified arborist to update the number, locations and conditions of all existing trees within the Works Site prior to commencement of construction works.

- Prior to commencement of construction works, a verification survey will be carried out by a plant specialist to update the location and conditions of all plant species of conservation importance, including seedling, sapling and small trees, within the Works Site. No plant species of conservation importance will be affected by the construction works.

- All plant species of conservation importance within the Works Site will be tagged and fenced off either in group or individually as protection zones to prevent from being damaged or disturbed during construction. Fence of orange nets with at least 1.5m height are recommended as protection fences to surround the protection zones/ exclusion zones to alert the construction workers / site staff Illustration of temporary protective fencing for the protected species is shown in **Figure 7**.

- Same protection measures will be implemented to protect any additional individuals of plant species of conservation importance identified during regular monitoring to ensure no plant species of conservation importance will be affected by the works during the construction phase.

- An induction training by the plant specialist should be provided to all site personnel (both supervisory staff and workers) in order to brief them on the plant preservation and their importance within the Works Site.

- Monitoring of every individual of the plant species of conservation importance within the Works Site should be performed at regular time interval to ensure their condition and healthiness. The monitoring work will be carried out by a plant specialist on a monthly basis during construction phase.

- The monthly monitoring reports prepared by the plant specialist shall include photographic records to present the updated conditions of the protected plant specimens and all existing trees within the Works Site. All the baseline survey reports (prepared prior to commencement of construction works) and the monitoring reports (prepared over the construction phase) shall be endorsed by an Independent Environmental Checker (IEC), if required by relevant conditions in the environmental permit, before submission to relevant government department(s). The final monitoring report should include a summary with photos to illustrate all the plant of conservation importance before and upon completion of the construction works. No plant species of conservation importance shall be affected by the construction works.

- For area affected by vegetation clearance for soil nailing activities, raking drains, drainage modification works, construction of maintenance berms, and provision of working space, hydroseeding and plantation of native shrubs and fern will be applied as compensatory measure to the temporary vegetation loss.

No trees would be felled due to the proposed slope upgrading works. For the tree proposed to be retained, their conditions would be further monitored and reviewed during construction phase.

Should these trees and any others be found posing imminent risk of failure during the construction phase, removal of these hazardous trees will be carried out in accordance with Development Bureau's Technical Circular (Works) No. 7/2015 on Tree Preservation.

Tree pruning, if required, shall be kept to a minimum. The extent of tree pruning will be determined on site by the Engineer together with the qualified arborist. Reference will be made to Development Bureau's General Guideline on Tree Pruning and the PS. The pruning will be carried out by qualified personnel and supervised by qualified arborist on site. This is important to ensure no trees' canopies will be over-pruned or adversely impacted due to malpractice of tree works. Any tree treatments under routine arboricultural maintenance shall follow Development Bureau's Technical Circular (Works) No. 7/2015 on Tree Preservation and any tree removal on site shall be approved by relevant authorities beforehand. No plant species of conservation importance could be pruned or affected by this work.

Good Site Practices

The following good site practice shall be implemented during the construction phase for the proposed works in the Works Site to avoid and minimize the potential disturbance to the surrounding habitats:

- No haul road/access road will be formed within the Works Site as all plants and equipment will be delivered uphill by site workers using working platform only to minimize disturbance to vegetation. The chosen temporary stockpiling area shall be far away from the identified plant species of conservation importance;
- Construction activities will be restricted to the clearly defined Works Site;
- Works Area will be reinstated immediately after completion of the construction works;
- Disposal and treatment of waste will be carried out timely and properly. Reference is also made to **Section 5.1.4**;
- Open fires will be strictly prohibited to prevent any risk of hill fire;
- Fire-fighting equipment should be provided in the Works Site and Works Areas before the commencement of works;
- Proper implementation of the above mitigation measures shall be ensured by the resident site personnel.

5.1.6 Landscape and Visual

All mature trees will be retained and the dense continuous canopy would provide natural green screening effect to various VSR. The change of existing woodland (LR1 and LCA1) is anticipated to be temporary and reversible. Permanent vegetation loss on ground cover would be due to the construction of permanent structures (steel maintenance staircase and surface drains). With implementation of the mitigation measures proposed for ecology in **Section 5.1.5**, construction of soil nail, maintenance staircases and surface drains would minimise vegetation clearance in LR1 and confined to non-protected shrubs and herbs.

- All temporary and permanent vegetation loss would be compensated by hydroseeding and re-vegetation by planting of shrubs and fern, as recommended in the **Section 5.1.5**.

- The locations and the footprint of the proposed works have been revised and selected in the design to avoid any tree felling.

- There is flexibility to adjust the exact locations of soil nails in accordance with the findings of the topographical survey to avoid affecting existing trees.

- In order to minimize the impacts on the roots of the existing trees of common species, drilling of soil nails will be undertaken to avoid the nails being encroached into the TPZ of existing trees of common species as defined below:

  For trees with trunk diameter less than 300mm:
  Half diameter of dripline or 1.5m from tree trunk (whichever is greater)

  For trees with trunk diameter greater than 300mm:
  Full diameter of dripline or 1.5m from tree trunk (whichever is greater)

  To avoid potential damage on existing trees, if the proposed soil nails are inevitably verified on site as falling within the TPZ, the proposed drill holes shall be adjusted onsite to avoid disturbance to any roots, in particular, the anchoring roots. Such onsite adjustment of drill holes disposition, if found necessary, shall be supervised by a competent person (such as qualified arborist) and timely liaison with the Engineer. Nevertheless, the onsite adjustment of drill holes disposition would be carried out in accordance with specifications on Preservation and Protection of Trees in the General Specification (GS) for Civil Engineering Works and Particular Specification (PS) of Contract No. GE/2016/01. It is a common practice that soil nail drill holes will be located in a way that the structures to be placed into the drill holes, including the surface elements of the structures such as soil nail heads, are at a minimum distance of 500mm from the trunks of common species (see GS Cl. 26.12(1)(a)). The proposed soil nail arrangement with the incorporation of TPZ is shown in **Figures 8A, 8B** and **8C**.

- All the identified protected/ plant species of conservation importance will be enclosed within the protection zones/ exclusion zones within the dripline of the tree or tree group as indicated in **Figure 7**. For seedling/ sapling and small trees with conservation importance to be preserved on site, the protection zones/ exclusion zones should be set up at least 2m radius from them. In case the growing point can be traced successfully in the course of site clearance prior to commencement of construction works, a 2m setback from the growing point of the climbing species *Gnetum luofuense* (羅浮買麻藤) should be applied.

- Alternative construction methods, including construction of steel maintenance access/ staircases to "bridge over" extensive tree roots on slope during the construction of the maintenance access will be adopted wherever necessary and practical.

- Monitoring of every individual of the plant species of conservation importance within/ in close vicinity of the Works Site should be carried out by a plant specialist on a monthly basis during construction phase. Monthly monitoring reports prepared by the plant specialist shall be endorsed by an Independent Environmental Checker (IEC), if required by relevant conditions in the environmental permit, before submission to relevant government department(s). The final monitoring report should include a summary with photos to illustrate all the plant of conservation importance before and upon completion of the construction

works. No plant species of conservation importance shall be affected by the construction works.

Temporary scaffolding, working platforms would be erected for work activities and mobilising equipment, to further reduce impacts on existing trees and all protected species/ plant species of conservation importance.

As a good site practice in relevant construction contract, a plant specialist will provide adequate briefing to workers and site staff to avoid trespassing or occupying the fenced off areas, take part in setting out the works areas based on the updated survey results to be conducted prior to the commencement of construction, and carry out monthly site audit during construction.

To minimise the visual impact as far as practicable, hoarding of approximately 2.4m high should be erected at the Works Site boundary where construction or working area may be visible from the tree layers along Clear Water Bay Road. As the hoarding itself would also be a potential source of visual impact to the key VSR, decorative panels in accordance with the standard of CEDD, as illustrated in **Appendix D**, will be applied on hoarding as mitigation measures to reduce visual impact.

5.1.7 Cultural Heritage

No cultural heritage resources would be affected by the proposed slope upgrading works. However, a precautionary engineering design on the location of anchors and the alignments would be adopted to minimise the impact on any built structures (e.g. the grave).

5.2 Environmental Mitigation Measures during Operation Phase

5.2.1 Noise

No adverse impact on noise is anticipated during operation phase of the Project, therefore no mitigation measure is required.

5.2.2 Air Quality

No adverse impact on air quality is anticipated during operation phase of the Project, therefore no mitigation measure is required.

5.2.3 Water Quality

No adverse impact on water quality is anticipated during operation phase of the Project, therefore no mitigation measure is required.

5.2.4 Waste Management

No adverse environmental impact from wastes is anticipated during operation phase of the Project, therefore no mitigation measure is required.

5.2.5 Ecology

Ecological impact during operational phase is avoidable and is not anticipated when the proposed mitigation measures during construction phase are implemented.

5.2.6 Landscape and Visual

Although soil nailing would change part of the landscape, as most VSR are situated along the naturally downslope terrain with roadside trees and man-made slope features in between, such change basically poses very insignificant landscape and visual impacts during operational phase.

Hydroseeding and plantation of native shrubs and fern will be applied to the soil nailing area. A schematic diagram of landscape treatment works is shown in **Figure 7.** Native species shall be used in the hydroseeding mix and plant for re-vegetation as far as possible (**Table 5.2**).

After completion of the slope upgrading works, the Contractor that to be appointed by GEO of CEDD under this Project will look after the new planting works (include the condition and effectiveness of hydroseeding and shrub planting) under the twelve-months Establishment Period/Maintenance Period, before handing over to the Maintenance Parties.

Table 5.2 List of native shrub and fern selected for re-vegetation

Shrub	Size	Spacing	% mix	Remarks
a. *Melastoma sanguineum* 毛蕊 b. *Ardisia crenata* 朱砂根 c. *Psychotria asiatica* 山大刀 d. *Nephrolepis auriculata* 腎蕨	350(H) x 350 (S) mm	500 mm	25% each	Pit-planting

Note:

[1] - Native species shall be used as far as possible. The compositions of shrubs are recommendation only and the actual composition may be adjusted based on the availability of nursery stock during the detailed design stage.

5.2.7 Cultural Heritage

No adverse environmental impact on culture heritage is anticipated during operation phase of the Project, therefore no mitigation measure is required.

6. CONCLUSION

6.1 Potential Environmental Impacts and Proposed Mitigation Measures

The potential environmental impacts arising from this Designated Project and the proposed key mitigation measures are summarised in **Table 6.1**.

Table 6.1 Summary of potential environmental impacts and proposed mitigation measures

Potential Impact	Proposed Mitigation Measures
Noise	
Construction Phase: • Noise generated from construction activities	**Construction Phase:** • Using Movable noise barrier • Using quiet PME • Implementing good site practice • Regular maintenance of PME • Shut down equipment when not in use • No construction activities will be allowed during 7pm to 7am on weekdays and anytime on Sundays and Public Holidays.
Operational phase: • No impact	**Operational phase:** • Not required
Air Quality	
Construction Phase: • Dust generated from the construction activities and stockpiling of soil/ rock	**Construction Phase:** Dust control measures as stipulated in the Air Pollution Control (Construction Dust) Regulation (Cap. 311R) of Air Pollution Control Ordinance (APCO) (Cap. 311), including: • Erection of hoarding of not less than 2.4m high • Spray with water during any excavation or earth moving operation • Cover stockpile of dusty materials and debris by impervious sheeting or sprayed with water to maintain the whole surface wet • Cover debris by impervious sheeting or store debris in a debris collection area sheltered on the top and the 3 sides • Spray with water during soil nailing

Potential Impact	Proposed Mitigation Measures
Operational Phase: • No impact	**Operational phase:** • Not required
Water Quality	
Construction Phase: • Potential site run-off to the nearby water course affecting the water quality **Operational Phase:** • No impact	**Construction Phase:** • Implementation of good site practice to control runoff • Provision of proper site drainage system, channels, earth bunds or sand bag barriers shall be provided onsite to properly direct storm water or site runoff into the silt removal facilities provided **Operational phase:** • Not required
Waste	
Construction Phase: • Generation of C&D waste, general refuse and chemical wastes **Operational Phase:** • No impact	**Construction Phase:** • Reuse or recycle C&D materials • On-site sorting of C&D waste. Proper handling of waste storage area • Implementation of trip ticket system • Proper handle of chemical waste • Sufficient number of covered bins shall be provided • Toolbox talks to workers regarding site cleaning and proper handling of waste materials **Operational phase:** • Not required
Ecology	
Construction phase: • Temporary and permanent vegetation loss of 3,300 m^2 due to the soil nailing	**Construction phase:** • Implement good site practice to minimize site clearance and disturbance to existing

Potential Impact	Proposed Mitigation Measures
activities, replacement of steel maintenance staircases and drainage channels. Potential damage on retained trees. • Pruning of common tree species, if required, to be kept to a minimum, in order to facilitate the construction activities. • Potential damage to the three plant species of conservation importance, including *Aquilaria sinensis* (土沉香), *Pavetta hongkongensis* (香港大沙葉) and *Gnetum luofuense*(羅浮買麻藤).	vegetation. • Erection of hoarding of not less than 2.4m high from ground level along the ditch outside the soil nailing area. The TPZ as defined in **Section 5.1.6** for common tree species will be maintained as far as possible within the Works Site. When it is not practical under area with high density of common tree species, where soil nails will inevitably be installed within some of the TPZ due to public safety concern, drill holes shall be at a minimum distance of 500mm from the trunks of common species. • Tree trunks should be wrapped in hessian as protective wrapping by the contractor prior to the commencement of site clearance, demolition and construction of the slope upgrading works and any other site operations which may affect the trees. Plank armouring the tree shall be installed for enhanced protection when instructed by the Engineer. • When instructed by the Engineer, temporary protective mulching may also be installed to cover the entire TPZ. Double, overlapping, thick metal sheet coverings or other materials of equivalent strength on top of the temporary protective mulching may be necessary to provide additional protection from soil compaction due to passage or operation of equipment or machinery. Other methods such as "bridge over" tree roots would be adopted wherever necessary and practical. • Temporary protective armouring and protective mulching from the Works Site shall be removed upon completion of the Works after agreement of the Engineer. • Hydroseeding and plantation of native shrubs and fern will be applied as compensatory measure for vegetation loss. • Pruning of common tree species, if required, shall only be conducted by qualified and approved workers; and will be supervised by qualified arborist. Pruning shall refer to Development Bureau's "General Guidelines on Tree Pruning". No trees would be felled due to the proposed works. If the retained trees are found posing imminent risk of failure

Potential Impact	Proposed Mitigation Measures
	during the construction phase, removal of these hazardous trees will be carried out in accordance with Development Bureau's Technical Circular (Works) No. 7/2015 on Tree Preservation. • A detailed tree survey will be carried out to update the number, locations and conditions of all existing trees within the Works Site. Besides, the location and conditions of all plant species of conservation importance, including seedling, sapling and small trees, within the Works Site would be updated and verified through a vegetation survey. • Alignments and spacing of soil nails would be optimized to preserve all trees and plant species of conservation importance recorded in the proposed Works Site as far as practicable. • All plant species of conservation importance will be fenced off. TheTPZ shall be the dripline of the tree or tree group for mature specimens and 2m radius for seedlings/ saplings and small trees, ferns or herbs. There will be no tree felling in area where the two patches of *Gnetum luofuense* (羅浮買麻藤) occur. Hence this climber species that grows on canopy would not be affected. In case the growing point can be traced successfully in the course of site clearance prior to commencement of construction works, a 2m setback from any successfully traced growing point of the climbing species *Gnetum luofuense*(羅浮買麻藤) should be applied. Each individual of these plant species would be monitored regularly during the works. • An Ecologist shall be engaged to conduct a condition survey to verify any presence of Lesser Spiny Frog within the Works Site before commencement of construction and during its active period (i.e. wet season, April to October) at construction phase. Translocation may be applied according to Ecologist's recommendations for AFCD's agreement.

Potential Impact	Proposed Mitigation Measures
Operational phase: • No impact	**Operational phase:** • Not required
Landscape & Visual	
Construction phase: • Landscape change due to temporary and permanent vegetation loss • Potential impacts to existing trees • Unsightly work activities and mobilisation of equipment might be visible • Erection of hoarding itself would be a potential source of visual impact	**Construction phase:** • Retain all trees (DBH>= 95 mm) and plant species of conservation importance as a natural screen. Proposed mitigation measures for potential ecological impacts are also applicable here. • Temporary and permanent vegetation loss would be compensated by hydroseeding and re-vegetation, as proposed under the Ecology section above. • Locations and footprint of the proposed works have been revised and selected in the design to avoid any tree felling. • Exact locations of soil nails are flexible to be adjusted in accordance with findings of topographical survey to avoid affecting existing trees. • The TPZ as defined in **Section 5.1.6** for common tree species will be maintained as far as possible within the Works Site. To avoid potential damage on existing trees, if the proposed soil nails are inevitably verified on site as falling within the TPZ, the proposed drill holes shall be adjusted onsite to avoid disturbance to any roots, in particular, the anchoring roots. Such onsite adjustment of drill holes disposition, if found necessary, shall be supervised by a competent person (such as qualified arborist) and timely liaison with the Engineer. Drill holes shall be at a minimum distance of 500mm from the trunks of common species. • For the seedling/ sapling and small trees with conservation importance to be preserved on site, exclusive protection zone should be set up at least 2m radius from them. • Alternative methods of "bridging over" extensive tree roots by steel maintenance access/ staircases as proposed under the

Potential Impact	Proposed Mitigation Measures
	Ecology section above. • Temporary scaffolding, working platforms would be established for work activities and mobilising equipment to reduce impacts on existing trees and plant species of conservation importance. • All working staff should restrict to confirmed permanent alignments for work activities and mobilisation of equipment. • Hoarding of approximately 2.4m high should be erected at the Works Site boundary where construction or working area may be visible from the tree layers along Clear Water Bay Road. • Decorative panels with CEDD standard will be applied on hoarding to relieve visual impact. • Since there are a number of rare or protected species within or in the proximity of the site boundary, a plant specialist shall monitor and liaise with other disciplines to minimise the impact on these valuable trees by avoidance works within the TPZ and exclusive prevention zone as far as practicable. The plant specialist will be employed under the Environmental Team during the construction stage for site monitoring, and preferably be engaged in the early design stage. • Monthly monitoring reports shall be endorsed by an Independent Environmental Checker (IEC), if required by relevant conditions in the environmental permit, before submission to relevant government department(s).
Operational phase: • Physical structure of the soil nails	**Operational phase:** • Aesthetic landscape work of hydroseeding and plantation of native shrub and fern will be applied to the soil nailing area.
Cultural Heritage	
Construction phase: • No impact	**Construction phase:** • Not required

Potential Impact	Proposed Mitigation Measures
Operational phase: • No impact	**Operational phase:** • Not required

6.2 Generic Good Site Practices for Incorporation into Construction Contract Drawing

During the design stage of Landslip Prevention and Mitigation Works at natural terrain, Country Parks/ Protected Area and Conservation Area, detection of species of conservation importance with high ecological concern can be common.

On the basis of the generic mitigation measures set out in **Table 6.1**, a set of good site practices can be drawn up for incorporation into the construction contract drawing to follow. The following key practices modified from Section 5 ensure the proposed works would have no direct impact on the species of conservation importance and existing trees. The set of good site practice includes but not be limited to:

- All plant and equipment will be delivered uphill by site workers using working platform only. No haul road/ access road will be formed.
- A detailed baseline survey should be conducted by the plant specialist before commencement of construction updating the number, locations and conditions of species of conservation importance and all existing trees within the Works Site.
- All plant species of conservation importance shall be tagged by a plant specialist and fenced off. The fenced off area (i.e. tree/ plant protection zone) shall be based on that specified in the project profile or as agreed with the plant specialist on site.
- Provide adequate briefing to site staff to avoid trespassing or occupying the fenced off areas, and be careful at all time during construction.
- Employment of a plant specialist to take part in setting out the Works Site; monitor all plant species of conservation importance during site clearance, construction activities, landscape works, etc.; supervise the proper implementation of these good site practices and protective measures recommended in the Project Profile; and prepare a monthly monitoring report showing the site audit information and the updated conditions of the species of conservation importance and all existing trees within the Works Site. The monthly monitoring reports shall be checked by an Independent Environmental Checker (IEC). The final monitoring report should include a summary with photos to illustrate all the plant of conservation importance before and upon completion of the construction works. No plant species of conservation importance shall be affected by the construction works.

7 USE OF PREVIOUSLY APPROVED ENVIRONMENTAL IMPACT ASSESSMENT REPORT

There is no previously approved Environmental Impact Assessment Report for this Project.

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Figures

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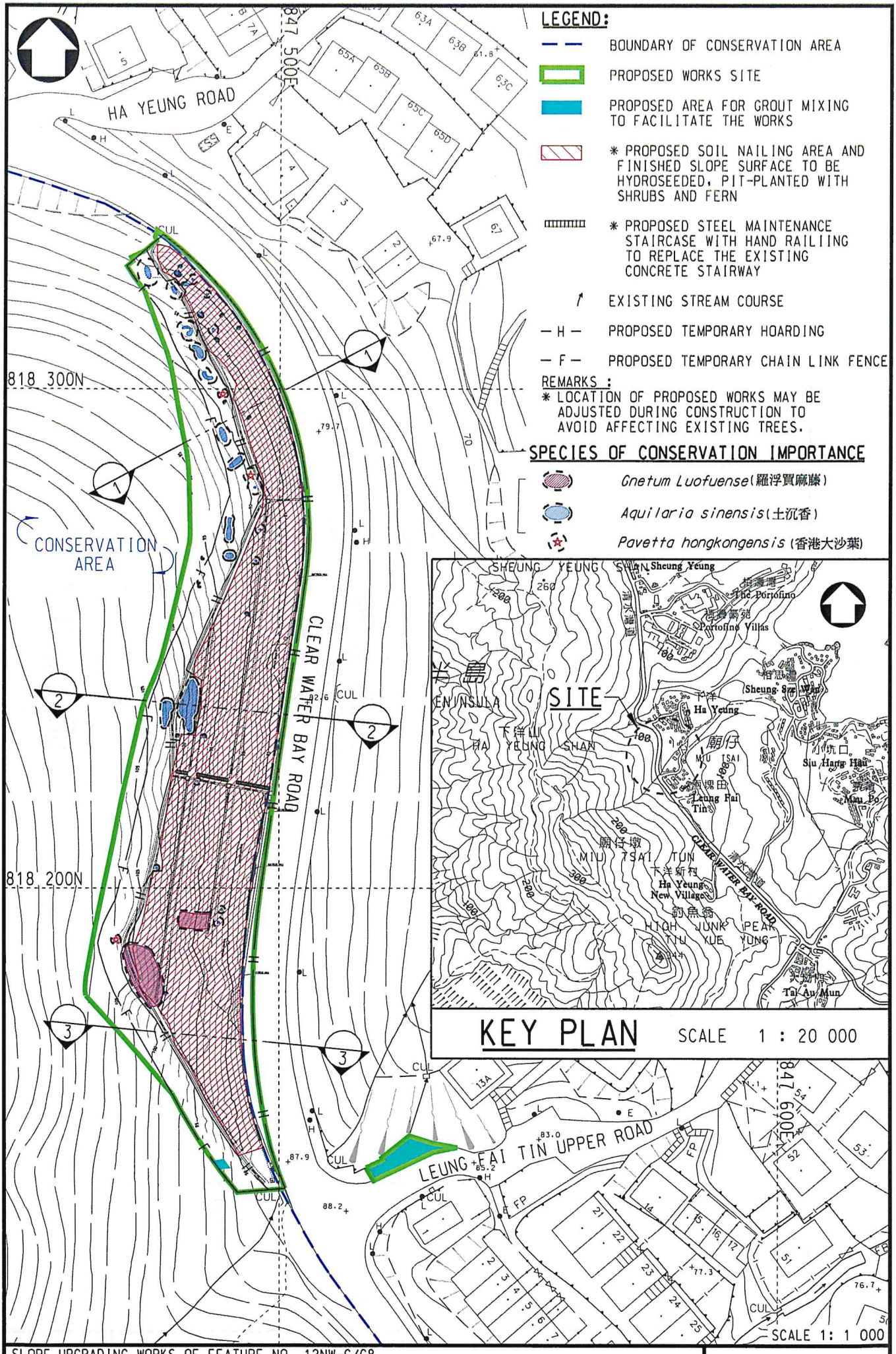

SLOPE UPGRADING WORKS OF FEATURE NO. 12NW-C/C8
ABOVE HA YEUNG AND LEUNG FAI TIN ALONG CLEAR WATER BAY ROAD, SAI KUNG
PROPOSED SLOPE UPGRADING WORKS

FIGURE 1

H:\misc\sketch\12nwcc8\SK-C8-27_33\SK-C8-33a.dgn

15/5/2018

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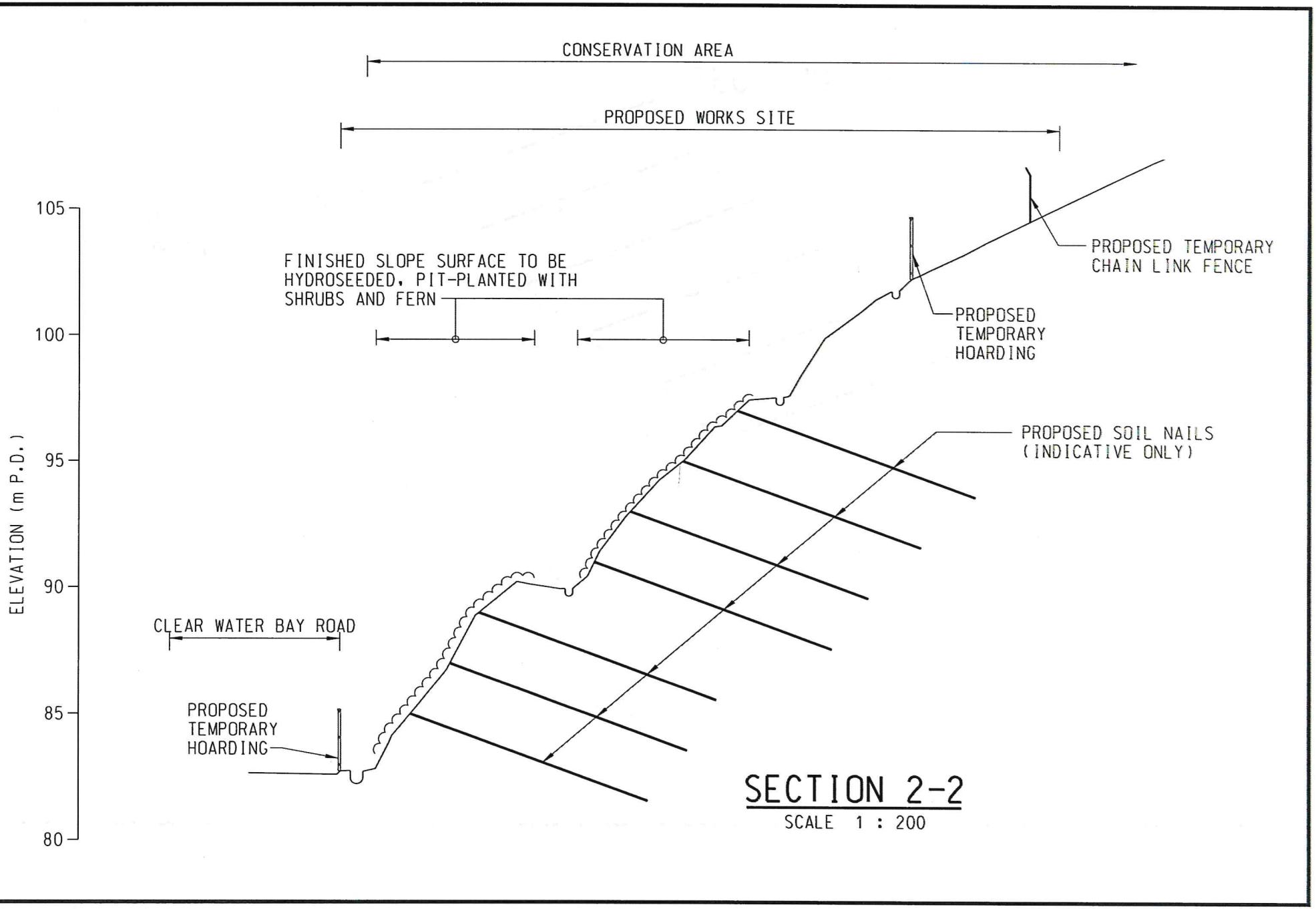
15/5/2018

SLOPE UPGRADING WORKS OF FEATURE NO. 12NW-C/C8 ABOVE HA YEUNG AND LEUNG FAI TIN ALONG CLEAR WATER BAY ROAD, SAI KUNG PROPOSED SLOPE UPGRADING WORKS

FIGURE 1A

SECTION 1-1

SCALE 1 : 200



SLOPE UPGRADING WORKS OF FEATURE NO. 12NW-C/C8 ABOVE HA YEUNG AND LEUNG FAI TIN ALONG CLEAR WATER BAY ROAD, SAI KUNG PROPOSED SLOPE UPGRADING WORKS

FIGURE 1B

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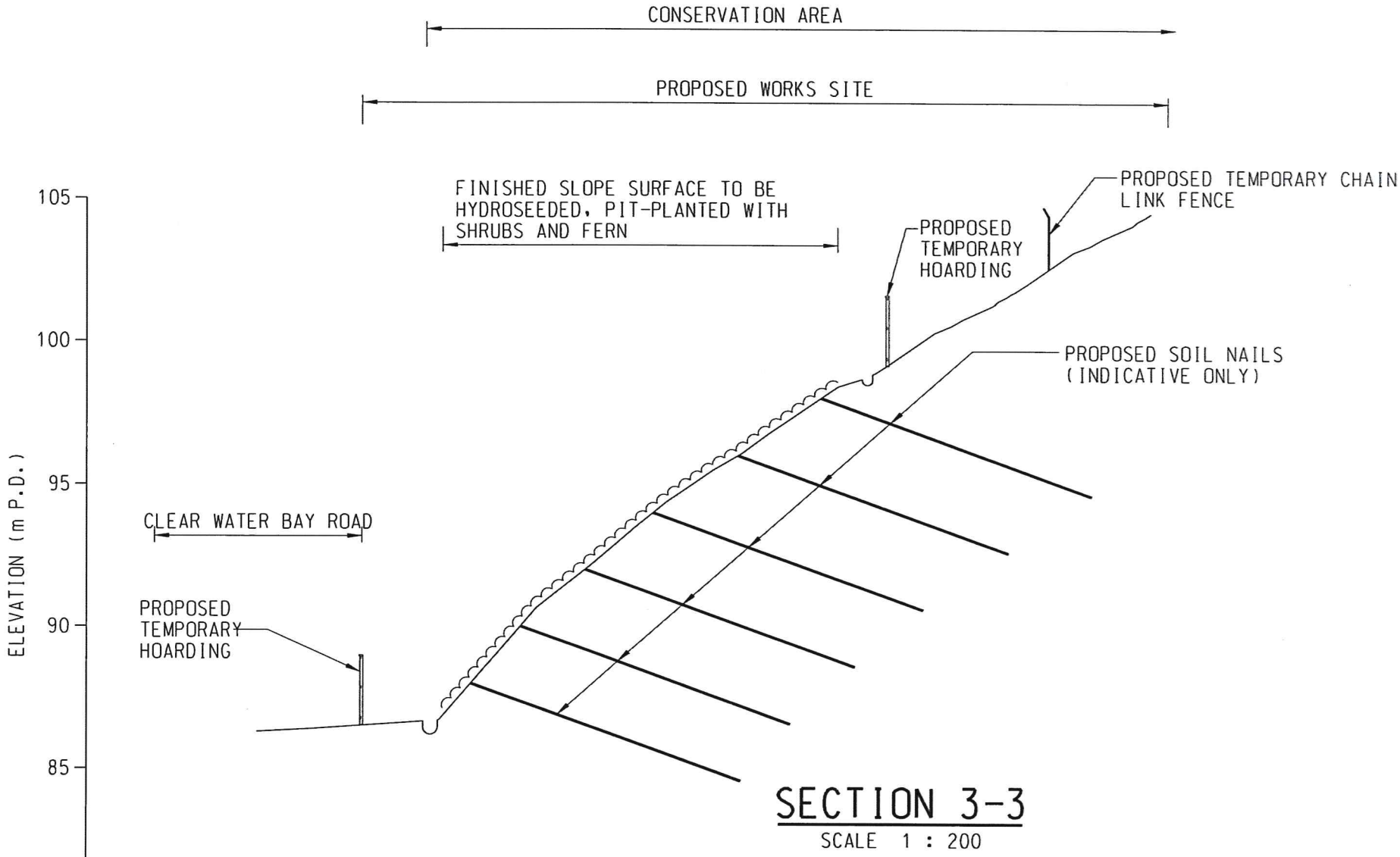
1552018



SECTION 3-3

SCALE 1 : 200

SLOPE UPGRADING WORKS OF FEATURE NO. 12NW-C/C8 ABOVE HA YEUNG AND LEUNG FAI TIN ALONG CLEAR WATER BAY ROAD, SAI KUNG
PROPOSED SLOPE UPGRADING WORKS

FIGURE 1C

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15/5/2018

CAD. FILE NO. : E:\FHK\CE 53_2014\Special Task\To EPD (10.5.18)\From Jack\Figure 2 cad 2013 - Standard\Figure 2 cad 2013.dwg

PLOTTED BY : Patrick, 11 May,2018 - 4:12pm

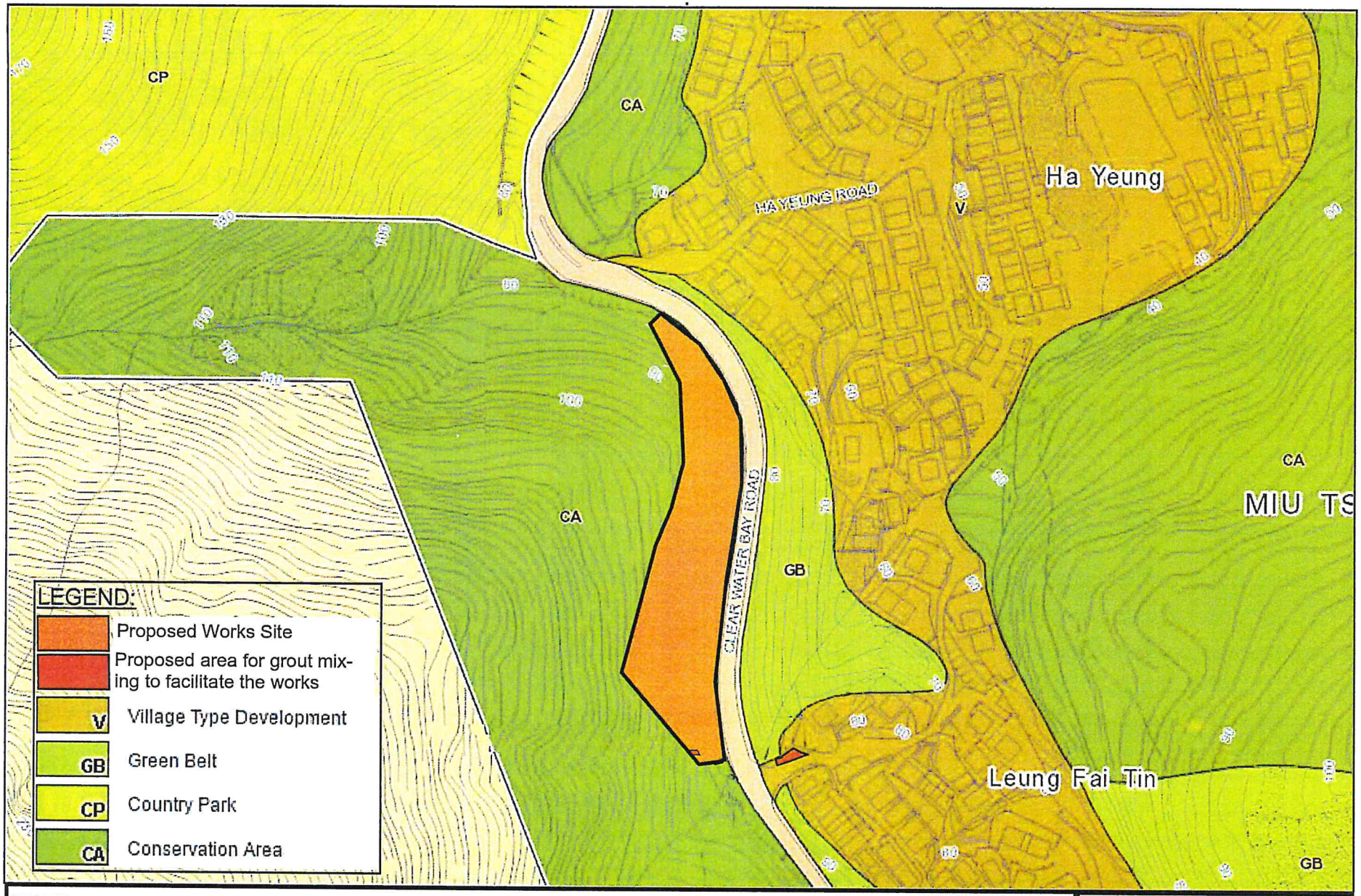
LEGEND:

- PROPOSED WORKS SITE
- NSR/ASR — NOISE SENSITIVE RECEIVERS/ AIR SENSITIVE RECEIVERS
- PROPOSED AREA FOR GROUT MIXING TO FACILITATE THE WORKS
- CONSERVATION AREA
- FEATURE BOUNDARY

TITLE :

LOCATION OF AIR/NOISE SENSITIVE RECEIVERS

SCALE	PART OF SURVEY SHEET NO.
1 : 1500	12NW-22D
FEATURE NO. : 12NW-C/C8 CLEAR WATER BAY ROAD	FIGURE NO. : FIGURE 2

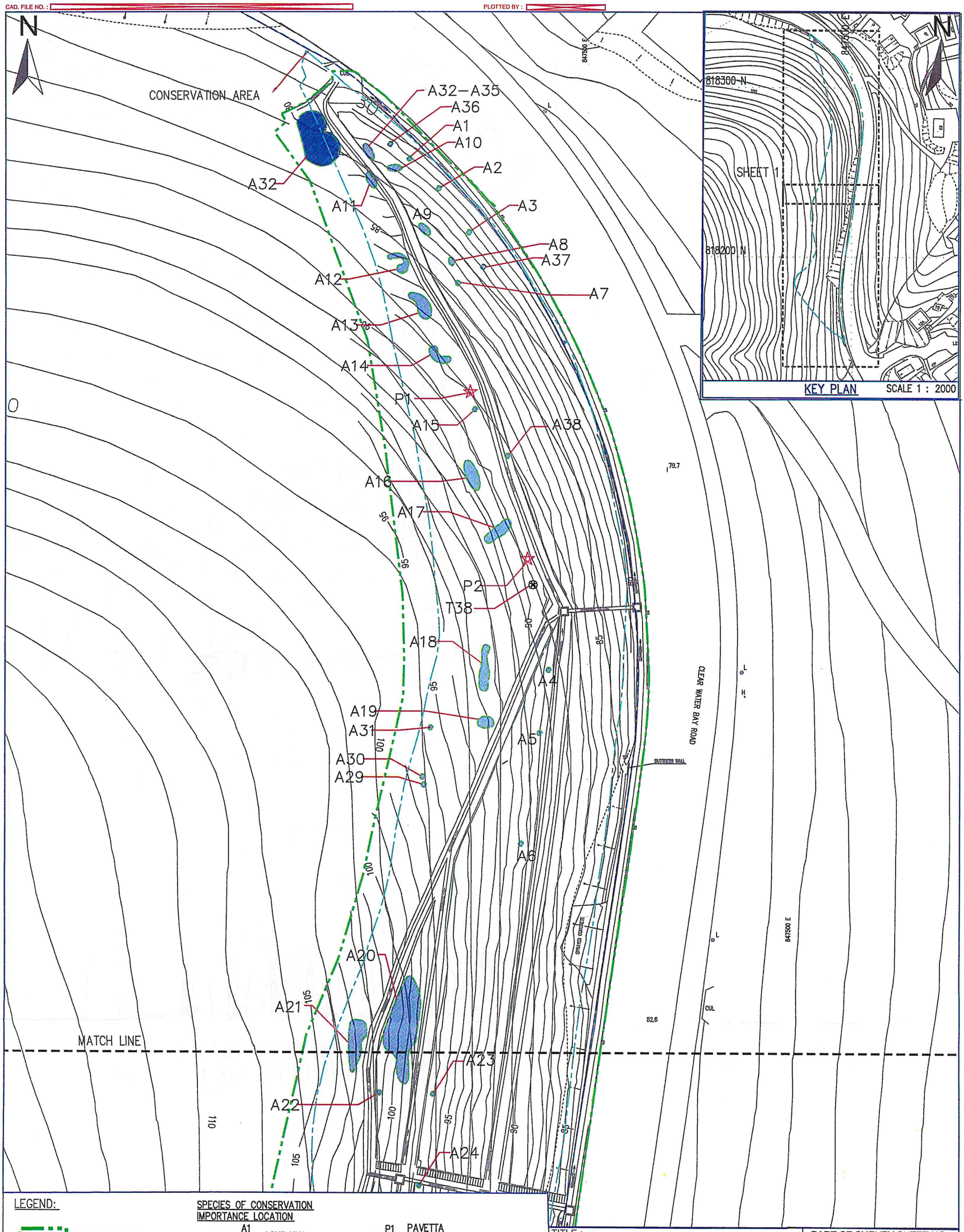


TITLE: EXTRACT OF THE APPROVED CLEAR WATER BAY PENINSULA SOUTH OUTLINE ZONING PLAN NO. S/SK-CWBS/2

FIGURE 3

CAD. FILE NO. :

PLOTTED BY :



LEGEND:

- PROPOSED WORKS SITE
- PROPOSED AREA FOR GROUT MIXING TO FACILITATE THE WORKS
- CONSERVATION AREA
- FEATURE BOUNDARY

SPECIES OF CONSERVATION IMPORTANCE LOCATION

- A1 AQUILARIA SINENSIS ZONE
- G1 GNETUM LUOFUENSE ZONE
- P1 PAVETTA HONGKONGENSIS ZONE
- T38 AQUILARIA SINENSIS

TITLE :

HABITAT MAP AND DISTRIBUTION OF PLANT SPECIES OF CONSERVATION IMPORTANCE RECORDED OF PROPOSED WORKS SITE 12NW-C/C8 (SHEET 1 OF 2)

FEATURE NO. : 12NW-C/C8

CLEAR WATER BAY ROAD

SCALE 1 : 500

PART OF SURVEY SHEET NO.

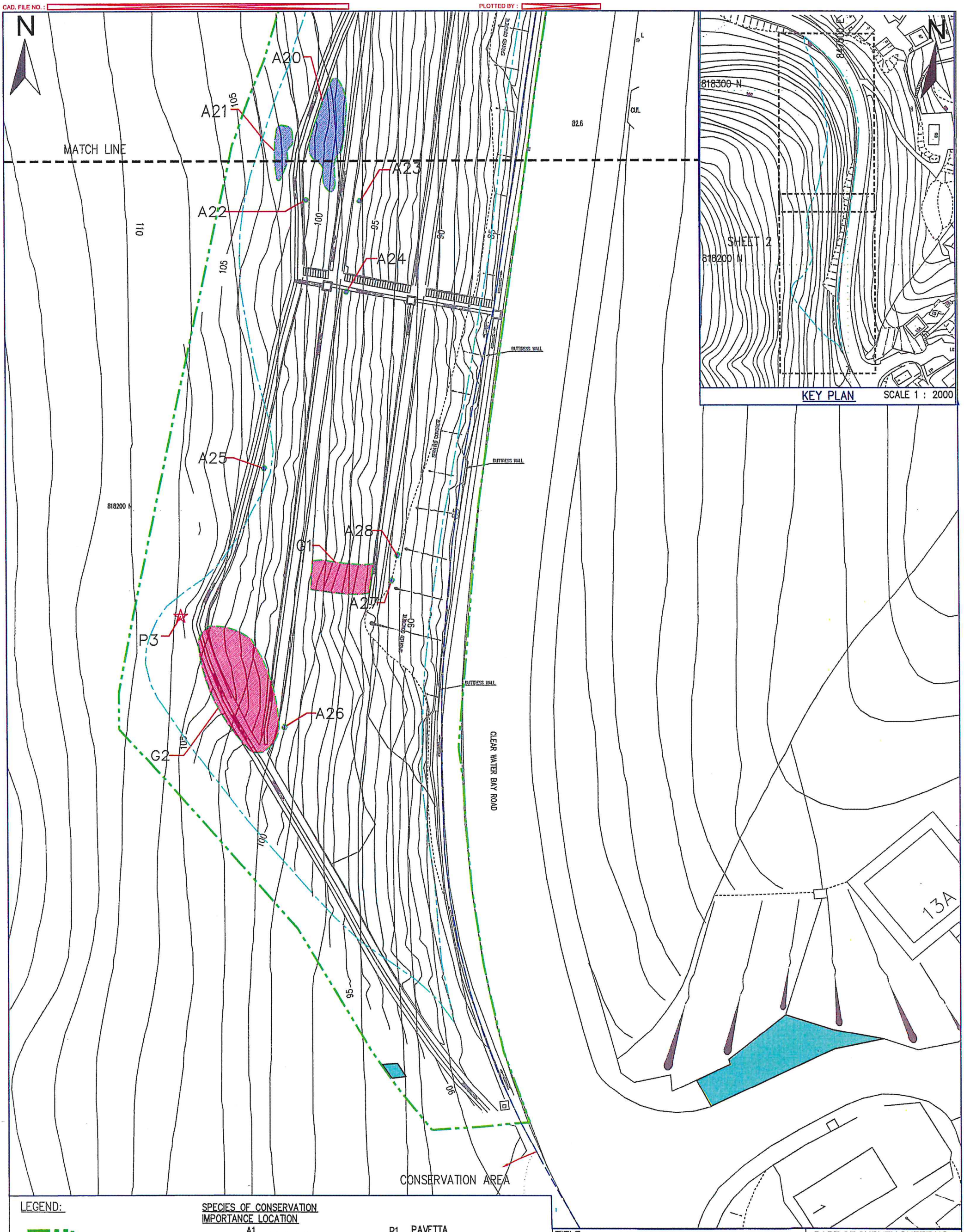
12NW-22D

FIGURE NO. :

FIGURE 4A

CAD. FILE NO. :

PLOTTED BY :



LEGEND:

- PROPOSED WORKS SITE
- PROPOSED AREA FOR GROUT MIXING TO FACILITATE THE WORKS
- CONSERVATION AREA
- FEATURE BOUNDARY

SPECIES OF CONSERVATION IMPORTANCE LOCATION

- A1 AQUILARIA SINENSIS ZONE
- G1 GNETUM LUOFUENSE ZONE
- P1 PAVETTA HONGKONGENSIS ZONE
- T38 AQUILARIA SINENSIS

TITLE :
HABITAT MAP AND DISTRIBUTION OF PLANT SPECIES OF CONSERVATION IMPORTANCE RECORDED OF PROPOSED WORKS SITE 12NW-C/C8 (SHEET 2 OF 2)

FEATURE NO. : 12NW-C/C8
CLEAR WATER BAY ROAD

SCALE
1 : 500

PART OF SURVEY SHEET NO.
12NW-22D

FIGURE NO. :
FIGURE 4B

CAD. FILE NO. :

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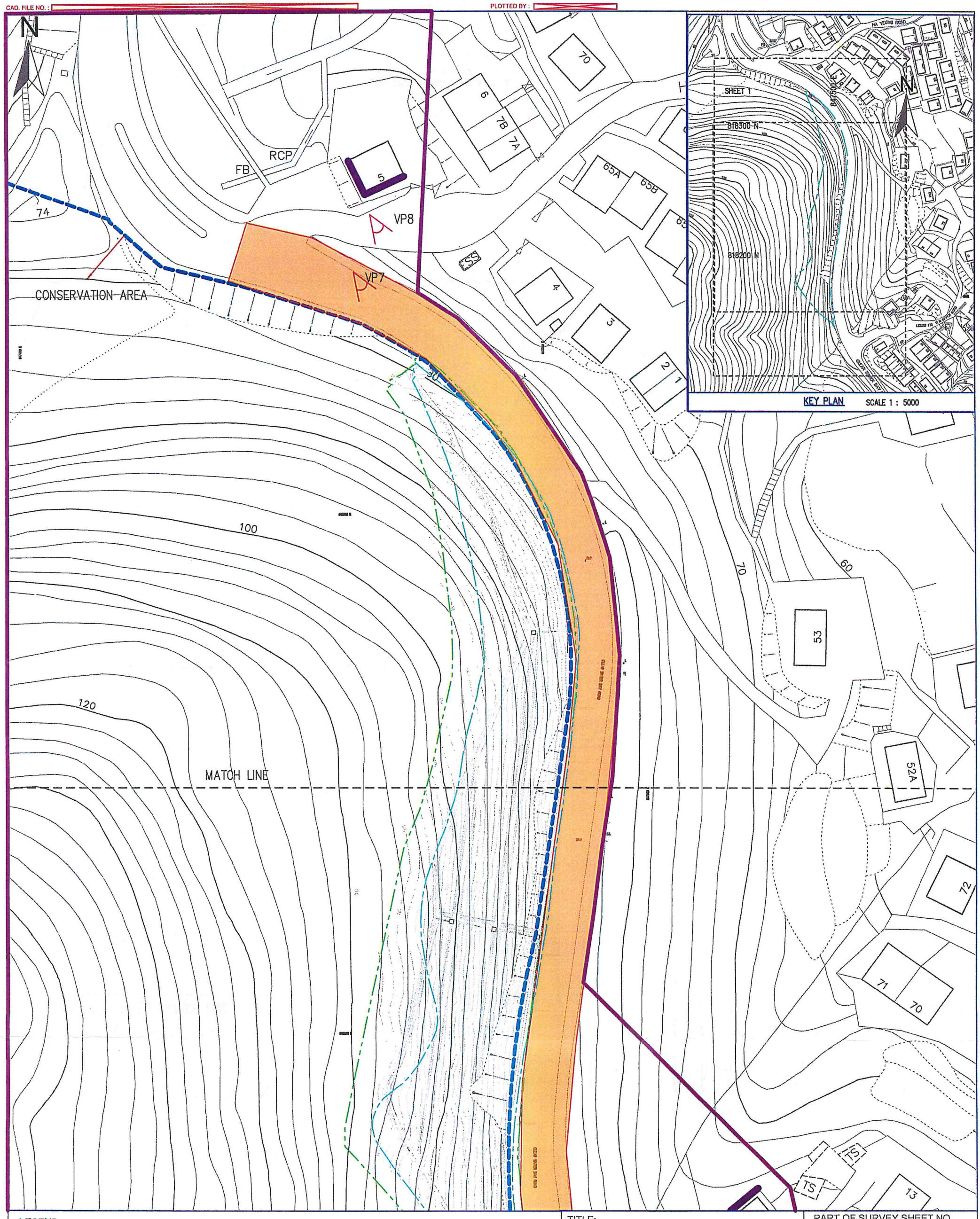


LEGEND:

- ZONE OF VISUAL INFLUENCE (ZVI)
- CONSERVATION AREA
- VANTAGE POINT (VP)
- PROPOSED WORKS SITE
- PROPOSED AREA FOR GROUT MIXING TO FACILITATE THE WORKS
- FEATURE BOUNDARY
- VISIBLE AREA OF VSR2 (RESIDENTS OF HA YEUNG AND LEUNG FAI TIN)
- VISIBLE AREA OF VSR2 (TRAVELLERS ALONG HA YEUNG ROAD , LEUNG FAI TIN UPPER ROAD AND CLEAR WATER BAY ROAD

TITLE:

LOCATION OF VISUAL SENSITIVE RECEIVERS (VSRs) AND VANTAGE POINTS (VP) (SHEET 1 OF 2)

PART OF SURVEY SHEET NO.

12NW-22D

FEATURE NO. : 12NW-C/C8

CLEAR WATER BAY ROAD

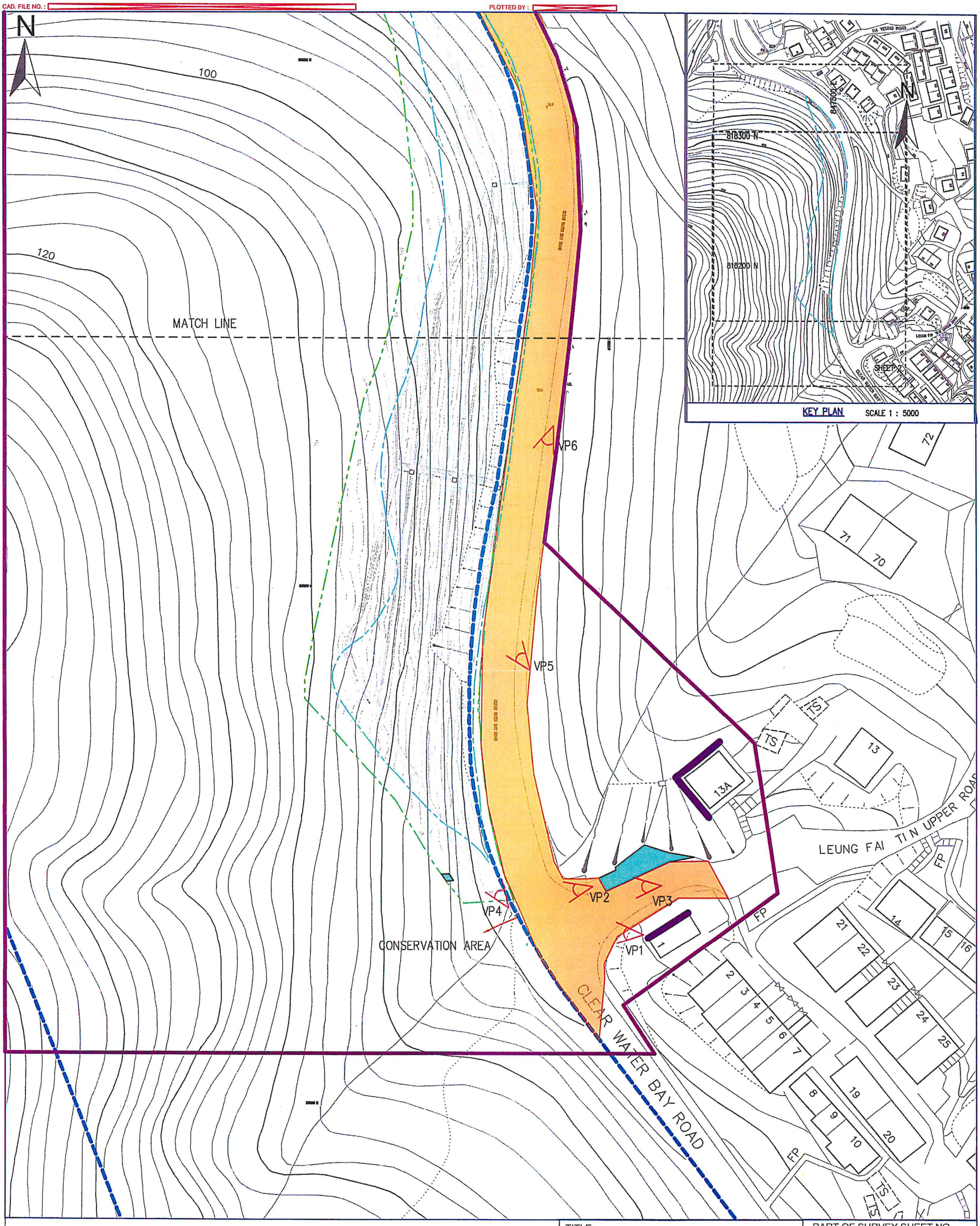
SCALE: 1 : 1000

FIGURE NO. :

FIGURE 5A

CAD. FILE NO. :

PLOTTED BY :



LEGEND:

- ZONE OF VISUAL INFLUENCE (ZVI)
- CONSERVATION AREA
- VANTAGE POINT (VP)
- PROPOSED WORKS SITE
- PROPOSED AREA FOR GROUT MIXING TO FACILITATE THE WORKS
- FEATURE BOUNDARY
- VISIBLE AREA OF VSR2 (RESIDENTS OF HA YEUNG AND LEUNG FAI TIN)
- VISIBLE AREA OF VSR2 (TRAVELLERS ALONG HA YEUNG ROAD , LEUNG FAI TIN UPPER ROAD AND CLEAR WATER BAY ROAD

TITLE:
LOCATION OF VISUAL SENSITIVE RECEIVERS (VSRs) AND VANTAGE POINTS (VP) (SHEET 2 OF 2)

PART OF SURVEY SHEET NO.
12NW-22D

FEATURE NO. : 12NW-C/C8
CLEAR WATER BAY ROAD

SCALE: 1 : 1000

FIGURE NO. :
FIGURE 5B

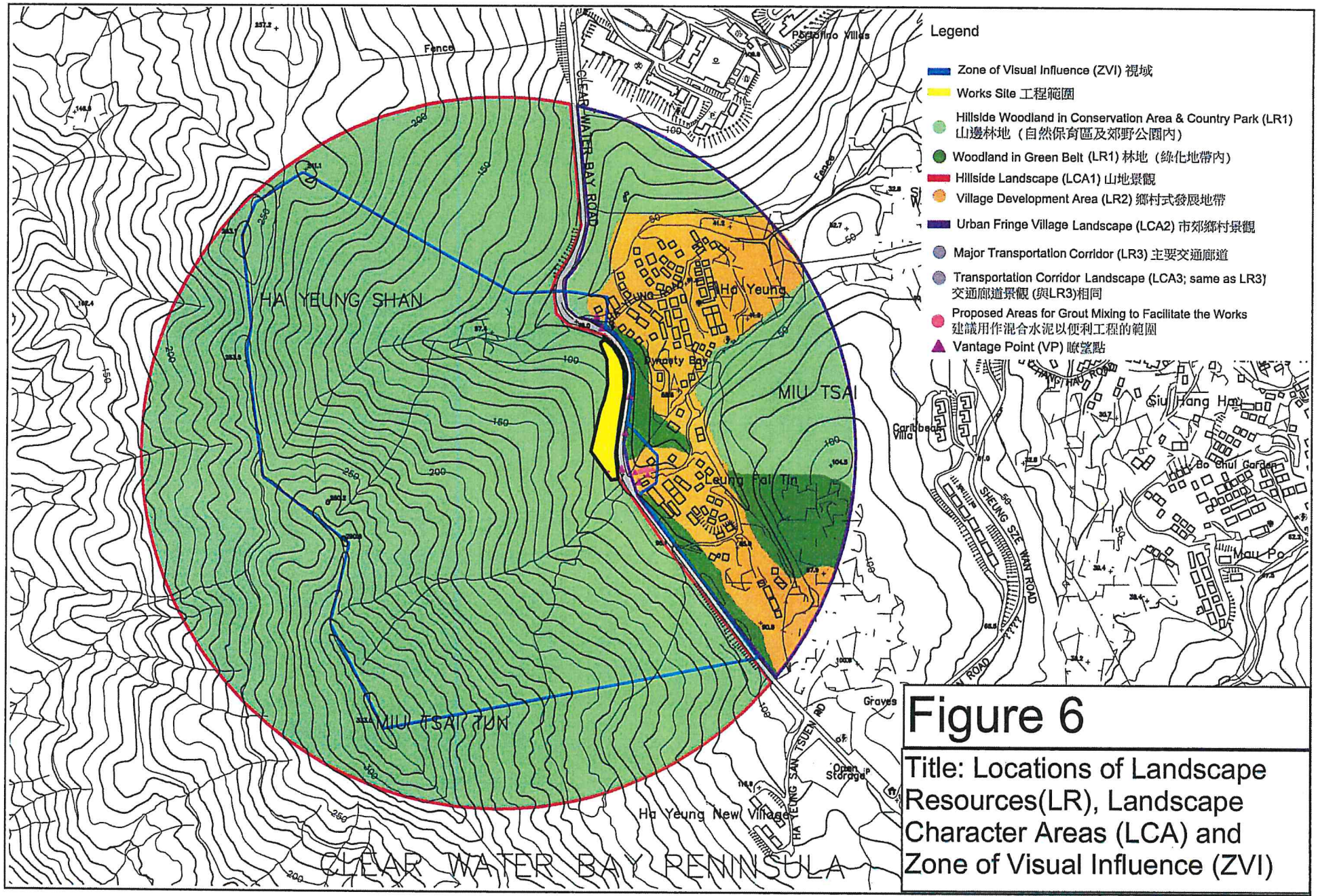
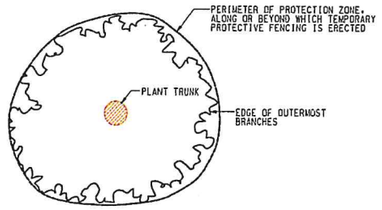


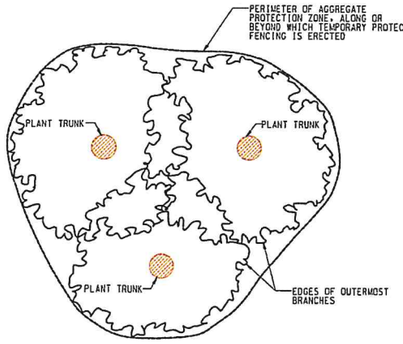
Figure 6

Title: Locations of Landscape Resources(LR), Landscape Character Areas (LCA) and Zone of Visual Influence (ZVI)

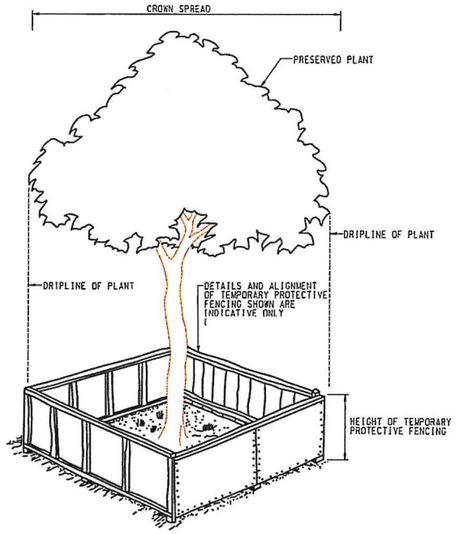
Scale: 1:7000



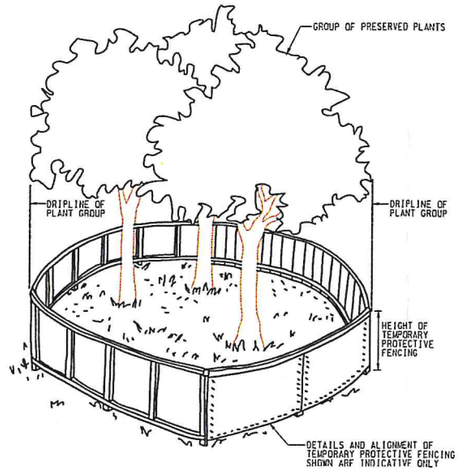
PLAN OF INDIVIDUAL PLANT
DIAGRAMMATIC



PLAN OF GROUP OF PLANTS
DIAGRAMMATIC

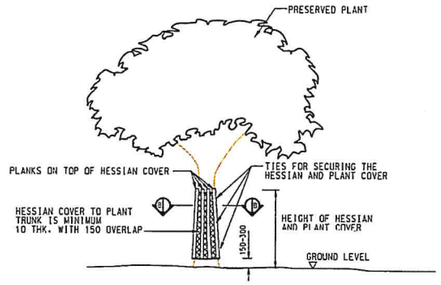


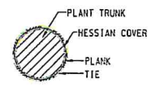
TEMPORARY PROTECTIVE FENCING
(INDIVIDUAL PLANT)
DIAGRAMMATIC



TEMPORARY PROTECTIVE FENCING
(GROUP OF PLANTS)
DIAGRAMMATIC

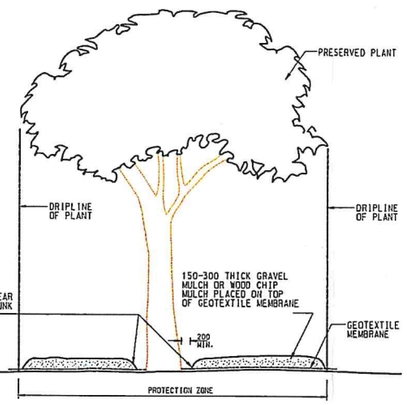
TEMPORARY PROTECTIVE HESSIAN ARMOURING
DIAGRAMMATIC





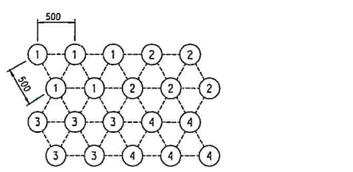
SECTION B-B

TEMPORARY PROTECTIVE HESSIAN AND PLANK ARMOURING
DIAGRAMMATIC

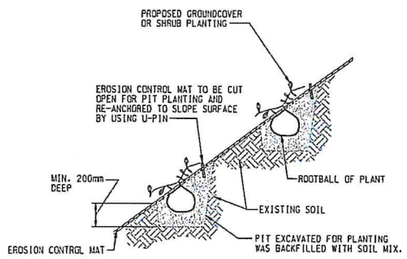


TEMPORARY PROTECTIVE MULCHING
DIAGRAMMATIC

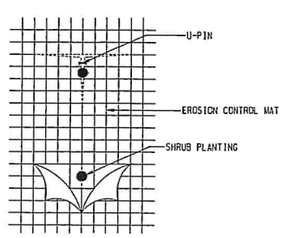
PROTECTIVE MEASURES FOR TREES AND PLANTS WITH DBH ≤ 95mm OF CONSERVATION IMPORTANCE WITHIN PROTECTION ZONE



PLANTING MATRIX FOR SHRUB AND GROUNDCOVER PLANTING AT HYDROSEEDING AREA
N.T.S



PLANTING DETAIL FOR GROUNDCOVER OR SHRUB PLANTING
N.T.S.



EROSION CONTROL MAT-CUT DETAIL
N.T.S.

PLANTING SCHEDULE FOR SHRUB AND GROUNDCOVER PLANTING AT HYDROSEEDING AREA

CODE	SCIENTIFIC NAME	CHINESE NAME	TYPE	SIZE (m) (HEIGHT x SPREAD)	SPACING(mm)
1	*Melastoma sanguineum*	羊茶	SHRUB	350 x 350	500
2	*Psychotria asiatica*	九節	SHRUB	350 x 350	500
3	*Ardisia crenata*	紫金牛	SHRUB	350 x 350	500
4	*Nephrolepis auriculata*	蜈蚣草	GROUNDCOVER	200 x 250	500

SCHEDULE OF HYDROSEEDING MIX

GRASS (APRIL TO AUGUST)

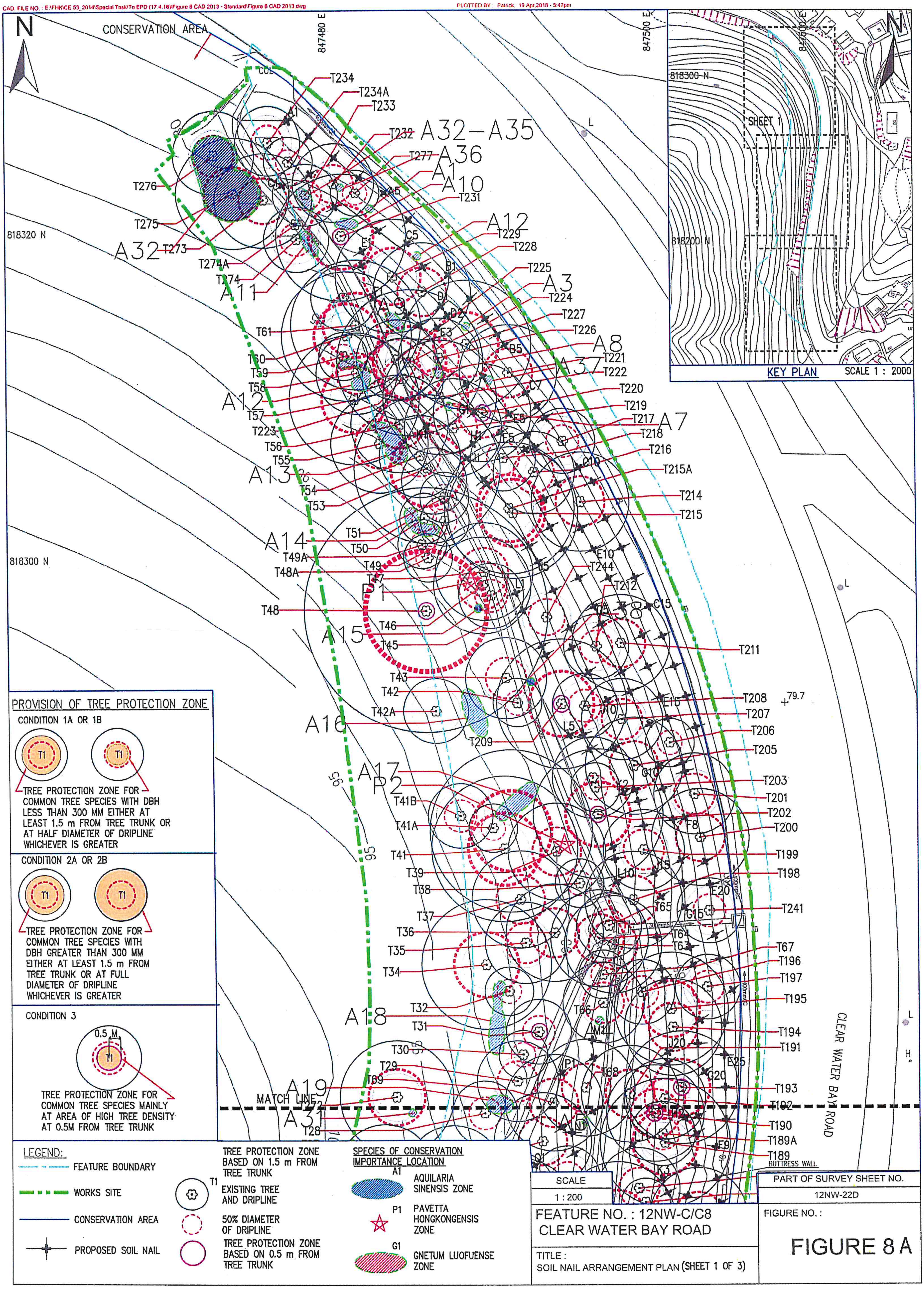
BERMUDA *(Cynodon dactylon)*	13-15 g/m²
BAHIA *(Paspalum notatum)*	8-10 g/m²
RHODES *(Chloris gayana)*	1-4 g/m²
TOTAL	25 g/m² (MIN.)

GRASS (SEPTEMBER TO MARCH)

BERMUDA *(Cynodon dactylon)*	15 g/m²
BAHIA *(Paspalum notatum)*	10 g/m²
RYE *(Lolium perenne)*	5 g/m²
TOTAL	30 g/m² (MIN.)

Title:
Protective Measures for Trees and All Plant Species of Conservation Importance within Protection Zone

Figure 7


N
CONSERVATION AREA
847480 E
847500 E
818320 N
818300 N
KEY PLAN
SCALE 1 : 2000
SHEET 1
818300 N
818200 N
MATCH LINE
CLEAR WATER BAY ROAD
BUTTRESS WALL
79.7
95
T234
T234A
T233
T232
A32–A35
T277
A36
A1
A10
T231
A12
T229
T228
T225
A3
T224
T227
T226
A8
A37
T221
T222
T220
T219
T217
A7
T218
T216
T215A
T214
T215
T244
T212
T211
T208
T207
T206
T205
T209
T203
T201
T202
T200
T199
T198
T241
T67
T196
T197
T195
T194
T191
T193
T192
T190
T189A
T189
T276
T275
A32
T273
T274A
T274
A11
T61
T60
T59
T58
A12
T57
T223
T56
T55
A13
T54
T53
T51
A14
T50
T49A
T48A
T49
T47
P1
T48
T46
A15
T45
T43
T42
T42A
A16
A17
P2
T41B
T41A
T41
T39
T38
T37
T36
T35
T34
A18
T32
T31
T30
T29
T69
A19
A31
T28
T65
T64
T63
T66
T68
PROVISION OF TREE PROTECTION ZONE
CONDITION 1A OR 1B
T1
TREE PROTECTION ZONE FOR COMMON TREE SPECIES WITH DBH LESS THAN 300 MM EITHER AT LEAST 1.5 m FROM TREE TRUNK OR AT HALF DIAMETER OF DRIPLINE WHICHEVER IS GREATER
CONDITION 2A OR 2B
TREE PROTECTION ZONE FOR COMMON TREE SPECIES WITH DBH GREATER THAN 300 MM EITHER AT LEAST 1.5 m FROM TREE TRUNK OR AT FULL DIAMETER OF DRIPLINE WHICHEVER IS GREATER
CONDITION 3
0.5 M
TREE PROTECTION ZONE FOR COMMON TREE SPECIES MAINLY AT AREA OF HIGH TREE DENSITY AT 0.5M FROM TREE TRUNK
LEGEND:
FEATURE BOUNDARY
WORKS SITE
CONSERVATION AREA
PROPOSED SOIL NAIL
TREE PROTECTION ZONE BASED ON 1.5 m FROM TREE TRUNK
EXISTING TREE AND DRIPLINE
50% DIAMETER OF DRIPLINE
TREE PROTECTION ZONE BASED ON 0.5 m FROM TREE TRUNK
SPECIES OF CONSERVATION IMPORTANCE LOCATION
A1 AQUILARIA SINENSIS ZONE
P1 PAVETTA HONGKONGENSIS ZONE
G1 GNETUM LUOFUENSE ZONE
SCALE
1 : 200
FEATURE NO. : 12NW-C/C8
CLEAR WATER BAY ROAD
TITLE :
SOIL NAIL ARRANGEMENT PLAN (SHEET 1 OF 3)
PART OF SURVEY SHEET NO.
12NW-22D
FIGURE NO. :
FIGURE 8 A

CAD. FILE NO. : E:\FHK\CE 53_2014\Special Task\To EPD (17.4.18)\Figure 8 CAD 2013 - Standard\Figure 8 CAD 2013.dwg PLOTTED BY : Patrick, 19 Apr,2018 - 5:48pm

N

MATCH LINE

818260 N

818240 N

818220 N

MATCH LINE

818300 N

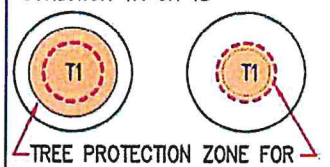
818200 N

SHEET 2

KEY PLAN SCALE 1 : 2000

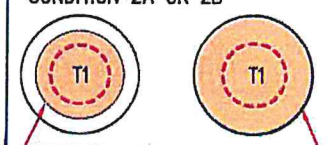
PROVISION OF TREE PROTECTION ZONE

CONDITION 1A OR 1B



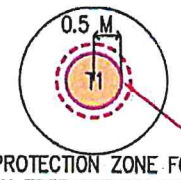
TREE PROTECTION ZONE FOR COMMON TREE SPECIES WITH DBH LESS THAN 300 MM EITHER AT LEAST 1.5 m FROM TREE TRUNK OR AT HALF DIAMETER OF DRIPLINE WHICHEVER IS GREATER

CONDITION 2A OR 2B



TREE PROTECTION ZONE FOR COMMON TREE SPECIES WITH DBH GREATER THAN 300 MM EITHER AT LEAST 1.5 m FROM TREE TRUNK OR AT FULL DIAMETER OF DRIPLINE WHICHEVER IS GREATER

CONDITION 3



TREE PROTECTION ZONE FOR COMMON TREE SPECIES MAINLY AT AREA OF HIGH TREE DENSITY AT 0.5M FROM TREE TRUNK

LEGEND:

- FEATURE BOUNDARY
- WORKS SITE
- CONSERVATION AREA
- PROPOSED SOIL NAIL
- TREE PROTECTION ZONE BASED ON 1.5 m FROM TREE TRUNK
- T1 EXISTING TREE AND DRIPLINE
- 50% DIAMETER OF DRIPLINE
- TREE PROTECTION ZONE BASED ON 0.5 m FROM TREE TRUNK

SPECIES OF CONSERVATION IMPORTANCE LOCATION

- A1 AQUILARIA SINENSIS ZONE
- P1 PAVETTA HONGKONGENSIS ZONE
- G1 GNETUM LUOFUENSE ZONE

SCALE	PART OF SURVEY SHEET NO.
1 : 200	12NW-22D

FEATURE NO. : 12NW-C/C8
CLEAR WATER BAY ROAD

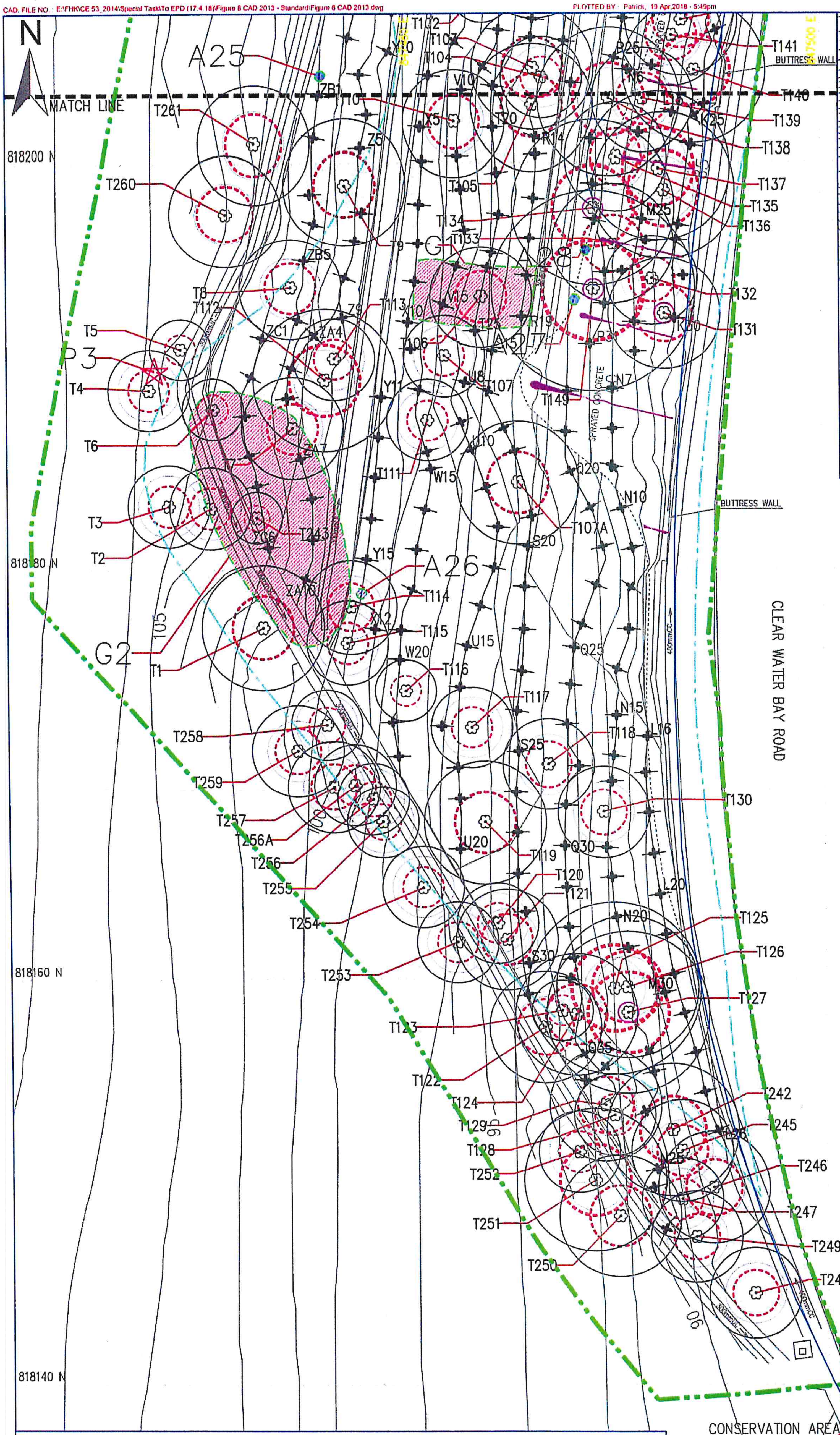
TITLE :
SOIL NAIL ARRANGEMENT PLAN (SHEET 2 OF 3)

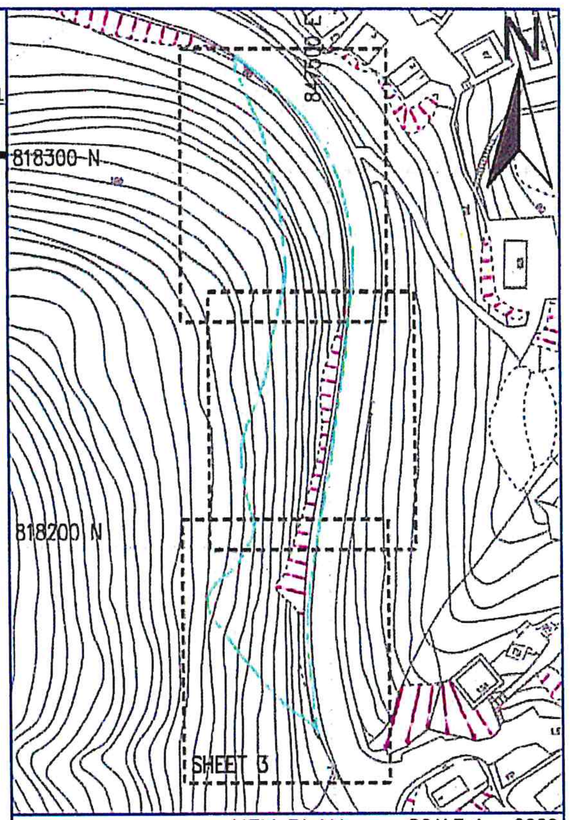
FIGURE NO. :

FIGURE 8 B

CAD. FILE NO. : E:\FHK\CE 53_2014\Special Task\To EPD (17.4.18)\Figure 8 CAD 2013 - Standard\Figure 8 CAD 2013.dwg

PLOTTED BY : Patrick, 19 Apr,2018 - 5:49pm





KEY PLAN SCALE 1 : 2000

PROVISION OF TREE PROTECTION ZONE

CONDITION 1A OR 1B

TREE PROTECTION ZONE FOR COMMON TREE SPECIES WITH DBH LESS THAN 300 MM EITHER AT LEAST 1.5 m FROM TREE TRUNK OR AT HALF DIAMETER OF DRIPLINE WHICHEVER IS GREATER

CONDITION 2A OR 2B

TREE PROTECTION ZONE FOR COMMON TREE SPECIES WITH DBH GREATER THAN 300 MM EITHER AT LEAST 1.5 m FROM TREE TRUNK OR AT FULL DIAMETER OF DRIPLINE WHICHEVER IS GREATER

CONDITION 3

0.5 M

TREE PROTECTION ZONE FOR COMMON TREE SPECIES MAINLY AT AREA OF HIGH TREE DENSITY AT 0.5M FROM TREE TRUNK

LEGEND:

- FEATURE BOUNDARY
- WORKS SITE
- CONSERVATION AREA
- PROPOSED SOIL NAIL
- TREE PROTECTION ZONE BASED ON 1.5 m FROM TREE TRUNK
- T1 EXISTING TREE AND DRIPLINE
- 50% DIAMETER OF DRIPLINE
- TREE PROTECTION ZONE BASED ON 0.5 m FROM TREE TRUNK

SPECIES OF CONSERVATION IMPORTANCE LOCATION

- A1 AQUILARIA SINENSIS ZONE
- P1 PAVETTA HONGKONGENSIS ZONE
- G1 GNETUM LUOFUENSE ZONE

SCALE	FEATURE NO. : 12NW-C/C8 CLEAR WATER BAY ROAD	PART OF SURVEY SHEET NO.
1 : 200	TITLE : SOIL NAIL ARRANGEMENT PLAN (SHEET 3 OF 3)	12NW-22D
		FIGURE NO. : FIGURE 8C

Plates

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Plate 1 Overview of the Surrounding Environment of the Project

Source: HKSAR Government

Plate 1 (Continued) Overview of the Surrounding Environment of the Project

man-made slope (Feature No. 12NW-C/C8)

Plate 2 Representative Photographs of Habitats. Secondary forest (above) and exotic plantation of *Acacia confusa* (台灣相思).

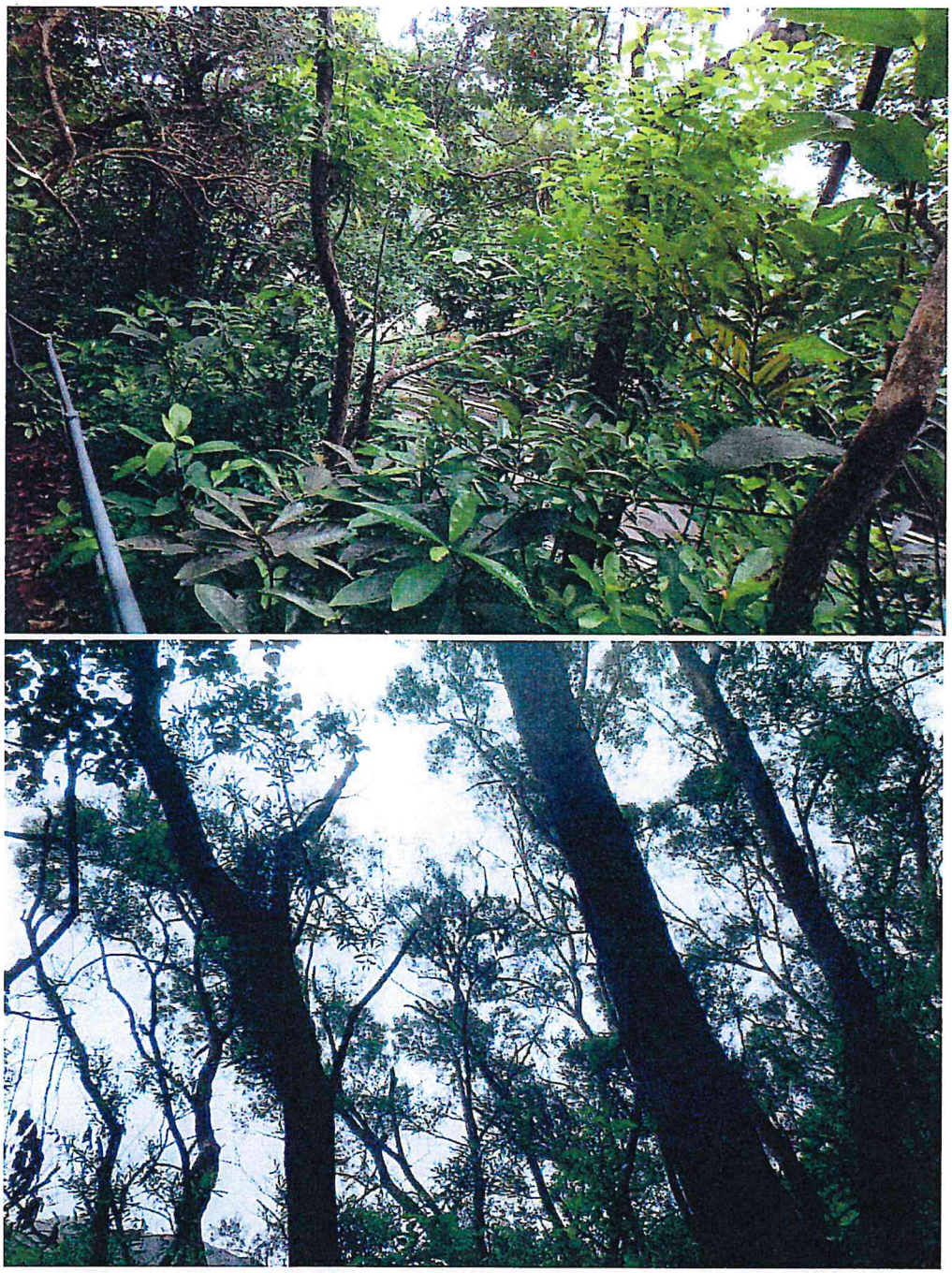


Plate 3 Representative Photographs of Plant Species of Conservation Importance Recorded in the Southern Portion of Proposed Works Area 12NW-C/C8.

First row left to right: *Aquilaria sinensis* (土沉香) seedlings, sapling near the ditch, trunk of adult tree being topped, fallen log observed in ditch.

Second row left to right: *Pavetta hongkongensis* (香港大沙葉), climbing vines of *Gnetum luofuense* (羅浮買麻藤), fruits of *Gnetum luofuense* (羅浮買麻藤).

AS1

C01

T275 & 276

T275 & 276

P3

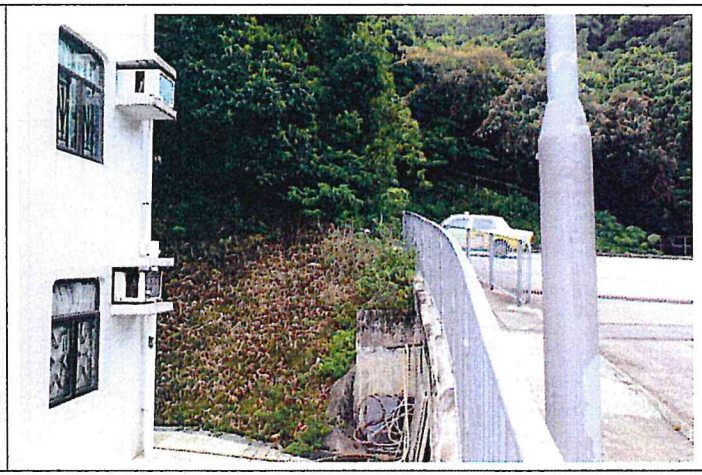
Among AS26, T6, T7, T243

Among AS 27, 28, T18, T19, T106

Plate 4 Representative photographs of Landscape Resources (LR) and Landscape Character Areas (LCA)

	
Hillside Woodland (LR1); Hillside Landscape (LCA1)	Village Development Area (LR2); Urban Fringe Village Landscape (LCA2)
	
Major Transportation Corridor (LR3); Transportation Corridor Landscape (LCA3)	

Plate 5 Representative photographs of Visually Sensitive Receivers (VSR) and Vantage Point (VP) corresponding to Figure 5A and 5B.

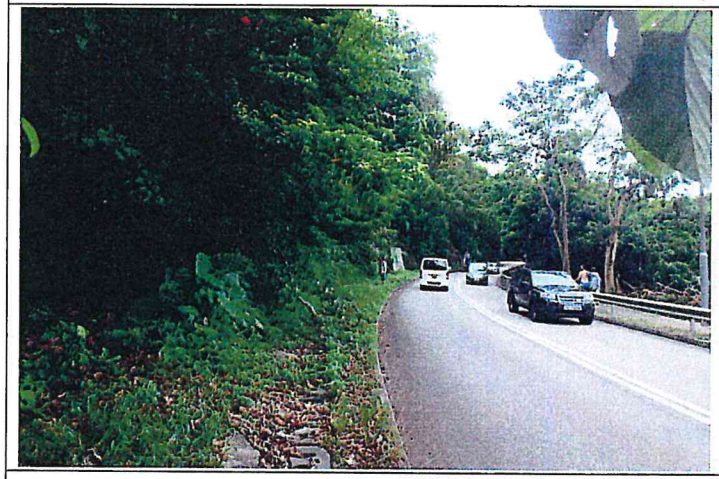


VP1: View of the second and third floor is blocked by green belt of trees between the house and the Proposed Works Site. First floor located at lower elevation than the Clear Water Bay Road and can hardly view the Proposed Works Site

VP2: Road junction of Leung Fai Tin Upper Road and Clear Water Bay Road

VP3: Further down of VP2 at a lower elevation of Clear Water Bay Road. Red arrow will be used for the next photo

Another block opposite to VP1: View of the third floor is largely blocked by green belt of trees between the house and the Proposed Works Site (left). Red arrow denotes the same patch of woodland of the previous photo. Other village houses at Leung Fai Tin locate further down below embedded by the green belt (right)



VP4:Southern tip of the Proposed Works Site

VP5: View of the Proposed Works Site is confined by the curve of Clear Water Bay Road (southern end)

VP6: Road opposite to the middle section of the Proposed Works Site

VP7: View of the Proposed Works Site is confined by the curve of Clear Water Bay Road (northern end)

VP8: View from VSR1 at Ha Yeung Road is largely blocked by the woodland in green belt.

Northern tip of Proposed Works Site is actually not visible at road junction of Ha Yeung Road and Clear Water Bay Road.

Despite opposite to the northern tip of the Proposed Works Site, this residential block locates at lower elevation of Clear Water Bay Road and falls outside the Zone of Visual Influence (ZVI). Moreover, its view to the Work Site is totally blocked by the woodland of green belt.

Appendix A

Construction Noise Impact Assessment

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List of PME Used

Stage (duration)	PME Type	ID code [1]	Quantity	Percentage on time (%)
Works Area for Grout Mixing				
Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)	Air compressor, air flow > 30m^3/min	CNP003	1	100
	Generator, slienced, 75dB(A) at 7m	CNP102	1	100
	Grout mixer	N.A.	1	100
	Grout pump	N.A.	1	100
Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road) (Period from 1/7/2018 to 30/6/2019)	Air compressor, air flow > 30m^3/min	CNP003	1	100
	Generator, slienced, 75dB(A) at 7m	CNP102	1	100
	Grout mixer	N.A.	1	100
	Grout pump	N.A.	1	100
Major Activities in Works Site				
Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	1	80
Installation of soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)	Compressor and pneumatic drilling rig	BS D.10/Ref. no.2 [2]	2	90
Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)	Breaker, hand-held, mass ≤ 10 kg	CNP023	2	80
	Agitator (electric)	N.A.	1	30
	Poker, vibratory, hand-held	CNP170	1	30
	Water pump (electric)	CNP281	1	30
	Saw, circular, Wood	CNP201	1	30
	Drill/grinder, hand-held (electric)	CNP065	2	80
	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	1	80
Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	1	80
	Breaker, hand-held, mass ≤ 10 kg	CNP023	1	80
	Saw, circular, Wood	CNP201	1	30
	Water pump (electric)	CNP281	1	30
	Agitator (electric)	N.A.	1	30
	Poker, vibratory, hand-held	CNP170	1	30
Landscaping works (Period from 1/5/2019 to 31/5/2019)	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	1	30
Site demobilization (Period from 1/6/2019 to 30/6/2019)	Breaker, hand-held, mass ≤ 10 kg	CNP023	1	50
	Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	1	20

Note:

[1] - The ID code and Sound Power Levels (SWLs) of the PMEs are referenced to "Technical Memorandum on Noise from Construction Work Other Than Percussive Piling" and EPD's guidance "Sound power levels of other commonly used PME" available at below website:
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf

[2] - British Standard BS5228-1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

Unmitigated Scenario

Slope Upgrading Works for Feature No. 12NW-C/C8

Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Air compressor, air flow > 30m³/min	CNP 003	104	1	104	100%	0	0	104
Generator, silenced, 75dB(A) at 7m	CNP 102	100	1	100	100%	0	0	100
Grout mixer	N.A.	90	1	90	100%	0	0	90
Grout pump	N.A.	105	1	105	100%	0	0	105
							Total	108

Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road)(Period from 1/7/2018 to 30/6/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Air compressor, air flow > 30m³/min	CNP 003	104	1	104	100%	0	0	104
Generator, silenced, 75dB(A) at 7m	CNP 102	100	1	100	100%	0	0	100
Grout mixer	N.A.	90	1	90	100%	0	0	90
Grout pump	N.A.	105	1	105	100%	0	0	105
							Total	108

Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	60%	-1	0	104
							Total	104

Installation of Soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)

PME used	ID code [2]	SWL[2], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Compressor and pneumatic drilling rig	BS D.10/Ref. no.2 [2]	112	2	115	90%	-1	0	114
							Total	114

Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Breaker, hand-held, mass ≤ 10 kg	CNP023	108	2	111	80%	-1	0	110
Agitator	N.A.	90	1	90	30%	-5	0	85
Poker, vibratory, hand-held	CNP170	113	1	113	30%	-5	0	108
Water pump (electric)	CNP281	88	1	88	30%	-5	0	83
Saw, circular, Wood	CNP201	108	1	108	30%	-5	0	103
Drill/grinder, hand-held (electric)	CNP065	98	2	101	80%	-1	0	100
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	80%	-1	0	104
							Total	111

Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	80%	-1	0	104
Breaker, hand-held, mass ≤ 10 kg	CNP023	108	1	108	80%	-1	0	107
Saw, circular, Wood	CNP201	108	1	108	30%	-5	0	103
Water pump (electric)	CNP281	88	1	88	30%	-5	0	83
Agitator (electric)	N.A.	90	1	90	30%	-5	0	85
Poker, vibratory, hand-held	CNP170	113	1	113	30%	-5	0	108
							Total	112

Landscaping works (Period from 1/5/2019 to 31/5/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	30%	-5	0	100
							Total	100

Site demobilization (Period from 1/6/2019 to 30/6/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Breaker, hand-held, mass ≤ 10 kg	CNP023	108	1	108	50%	-3	0	105
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	20%	-7	0	98
							Total	106

Note:
[1] - The ID code and Sound Power Levels (SWLs) of the PMEs are referenced to "Technical Memorandum on Noise from Construction Work Other Than Percussive Piling" and EPD's guidance "Sound power levels of other commonly used PME" available at below website:
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLs.pdf
[2] - British Standard BS5228-1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

Unmitigated Scenario

Slope Upgrading Works for Feature No. 12NW-C/C8

Calculation of Construction Noise Level due to Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to storage area A), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL dB(A)	CNL Standard	Exceedance
1	No. 5, Village House, Ha Yueng	108	201	-54	3	57	75	NO
2	No. 2, Village House, Ha Yueng	108	160	-52	3	59	75	NO
3	No. 70-71, Village House, Leung Fai Tin	108	81	-46	3	65	75	NO
4	No. 1, Village House, Leung Fai Tin	108	38	-40	3	71	75	NO

Calculation of Construction Noise Level due to Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road)(Period from 1/7/2018 to 30/6/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to storage area B), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL dB(A)	CNL Standard	Exceedance
1	No. 5, Village House, Ha Yueng	108	226	-55	3	56	75	NO
2	No. 2, Village House, Ha Yueng	108	176	-53	3	58	75	NO
3	No. 70-71, Village House, Leung Fai Tin	108	76	-46	3	65	75	NO
4	No. 1, Village House, Leung Fai Tin	108	11	-29	3	82	75	YES

Calculation of Construction Noise Level due to Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL dB(A)	CNL Standard	Exceedance
1	No. 5, Village House, Ha Yueng	104	35	-39	3	68	75	NO
2	No. 2, Village House, Ha Yueng	104	28	-37	3	70	75	NO
3	No. 70-71, Village House, Leung Fai Tin	104	63	-44	3	63	75	NO
4	No. 1, Village House, Leung Fai Tin	104	39	-40	3	67	75	NO

Calculation of Construction Noise Level due to Installation of Soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL dB(A)	CNL Standard	Exceedance
1	No. 5, Village House, Ha Yueng	114	35	-39	3	78	75	YES
2	No. 2, Village House, Ha Yueng	114	28	-37	3	80	75	YES
3	No. 70-71, Village House, Leung Fai Tin	114	63	-44	3	73	75	NO
4	No. 1, Village House, Leung Fai Tin	114	39	-40	3	77	75	YES

Calculation of Construction Noise Level due to Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL dB(A)	CNL Standard	Exceedance
1	No. 5, Village House, Ha Yueng	111	35	-39	3	75	75	NO
2	No. 2, Village House, Ha Yueng	111	28	-37	3	77	75	YES
3	No. 70-71, Village House, Leung Fai Tin	111	63	-44	3	70	75	NO
4	No. 1, Village House, Leung Fai Tin	111	39	-40	3	74	75	NO

Calculation of Construction Noise Level due to Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL dB(A)	CNL Standard	Exceedance
1	No. 5, Village House, Ha Yueng	112	35	-39	3	76	75	YES
2	No. 2, Village House, Ha Yueng	112	28	-37	3	78	75	YES
3	No. 70-71, Village House, Leung Fai Tin	112	63	-44	3	71	75	NO
4	No. 1, Village House, Leung Fai Tin	112	39	-40	3	75	75	YES

Calculation of Construction Noise Level due to Landscaping works (Period from 1/5/2019 to 31/5/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL dB(A)	CNL Standard	Exceedance
1	No. 5, Village House, Ha Yueng	100	35	-39	3	64	75	NO
2	No. 2, Village House, Ha Yueng	100	28	-37	3	66	75	NO
3	No. 70-71, Village House, Leung Fai Tin	100	63	-44	3	59	75	NO
4	No. 1, Village House, Leung Fai Tin	100	39	-40	3	63	75	NO

Calculation of Construction Noise Level due to Site demobilization (Period from 1/6/2019 to 30/6/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL dB(A)	CNL Standard	Exceedance
1	No. 5, Village House, Ha Yueng	106	35	-39	3	70	75	NO
2	No. 2, Village House, Ha Yueng	106	28	-37	3	72	75	NO
3	No. 70-71, Village House, Leung Fai Tin	106	63	-44	3	65	75	NO
4	No. 1, Village House, Leung Fai Tin	106	39	-40	3	69	75	NO

Predicted Monthly Construction Noise Levels (Unmitigated Scenario

Major Activities (Slope Upgrading Works for Feature No. 12NW-C/C8)	Year	2018						2019					
	Month	7	8	9	10	11	12	1	2	3	4	5	6
Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)													
Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road) (Period from 1/7/2018 to 30/6/2019)													
Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)													
Installation of Soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)													
Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)													
Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)													
Landscaping works (Period from 1/5/2019 to 31/5/2019)													
Site demobilization (Period from 1/6/2019 to 30/6/2019)													

Major Activities (Slope Upgrading Works for Feature No. 12NW-C/C8)	NSR		CNL, dB(A)											
Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)	1	No. 5, Village House, Ha Yueng	57	57	57	57	57	57	57	57	57	57	57	57
	2	No. 2, Village House, Ha Yueng	59	59	59	59	59	59	59	59	59	59	59	59
	3	No. 70-71, Village House, Leung Fai Tin	65	65	65	65	65	65	65	65	65	65	65	65
	4	No. 1, Village House, Leung Fai Tin	71	71	71	71	71	71	71	71	71	71	71	71
Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road) (Period from 1/7/2018 to 30/6/2019)	1	No. 5, Village House, Ha Yueng	56	56	56	56	56	56	56	56	56	56	56	56
	2	No. 2, Village House, Ha Yueng	58	58	58	58	58	58	58	58	58	58	58	58
	3	No. 70-71, Village House, Leung Fai Tin	65	65	65	65	65	65	65	65	65	65	65	65
	4	No. 1, Village House, Leung Fai Tin	82	82	82	82	82	82	82	82	82	82	82	82
Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)	1	No. 5, Village House, Ha Yueng	68											
	2	No. 2, Village House, Ha Yueng	70											
	3	No. 70-71, Village House, Leung Fai Tin	63											
	4	No. 1, Village House, Leung Fai Tin	67											
Installation of Soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)	1	No. 5, Village House, Ha Yueng		78	78	78	78	78	78	78	78			
	2	No. 2, Village House, Ha Yueng		80	80	80	80	80	80	80	80			
	3	No. 70-71, Village House, Leung Fai Tin		73	73	73	73	73	73	73	73			
	4	No. 1, Village House, Leung Fai Tin		77	77	77	77	77	77	77	77			
Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)	1	No. 5, Village House, Ha Yueng		75	75	75	75	75	75	75	75			
	2	No. 2, Village House, Ha Yueng		77	77	77	77	77	77	77	77			
	3	No. 70-71, Village House, Leung Fai Tin		70	70	70	70	70	70	70	70			
	4	No. 1, Village House, Leung Fai Tin		74	74	74	74	74	74	74	74			
Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)	1	No. 5, Village House, Ha Yueng										76		
	2	No. 2, Village House, Ha Yueng										78		
	3	No. 70-71, Village House, Leung Fai Tin										71		
	4	No. 1, Village House, Leung Fai Tin										75		
Landscaping works (Period from 1/5/2019 to 31/5/2019)	1	No. 5, Village House, Ha Yueng											64	
	2	No. 2, Village House, Ha Yueng											66	
	3	No. 70-71, Village House, Leung Fai Tin											59	
	4	No. 1, Village House, Leung Fai Tin											63	
Site demobilization (Period from 1/6/2019 to 30/6/2019)	1	No. 5, Village House, Ha Yueng												70
	2	No. 2, Village House, Ha Yueng												72
	3	No. 70-71, Village House, Leung Fai Tin												65
	4	No. 1, Village House, Leung Fai Tin												69
Overall CNL (dB(A))	NSR													MAX
	1	No. 5, Village House, Ha Yueng	69	80	80	80	80	80	80	80	80	76	65	70	80
	2	No. 2, Village House, Ha Yueng	71	82	82	82	82	82	82	82	82	78	67	72	82
	3	No. 70-71, Village House, Leung Fai Tin	69	76	76	76	76	76	76	76	76	71	59	65	76
	4	No. 1, Village House, Leung Fai Tin	83	84	84	84	84	84	84	84	84	83	83	83	84

Mitigated Scenario

Slope Upgrading Works for Feature No. 12NW-C/C8

Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Air compressor, air flow > 30m³/min	CNP 003	104	1	104	100%	0	-15	89
Generator, silenced, 75dB(A) at 7m	CNP 102	100	1	100	100%	0	-15	85
Grout mixer	N.A.	90	1	90	100%	0	-10	80
Grout pump	N.A.	105	1	105	100%	0	-10	95
							Total	96

Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road)(Period from 1/7/2018 to 30/6/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Air compressor, air flow > 30m³/min	CNP 003	104	1	104	100%	0	-15	89
Generator, silenced, 75dB(A) at 7m	CNP 102	100	1	100	100%	0	-15	85
Grout mixer	N.A.	90	1	90	100%	0	-10	80
Grout pump	N.A.	105	1	105	100%	0	-10	95
							Total	96

Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	80%	-1	-5	99
							Total	99

Installation of Soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)

PME used	ID code [2]	SWL[2], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	
Compressor and pneumatic drilling rig	BS D.10/Ref. no.2 [2]	112	2	115	90%	-1	-10	104
							Total	104

Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Breaker, hand-held, mass ≤ 10 kg	CNP023	108	2	111	80%	-1	-10	100
Agitator	N.A.	90	1	90	30%	-5	-10	75
Poker, vibratory, hand-held	CNP170	113	1	113	30%	-5	-10	98
Water pump (electric)	CNP281	88	1	88	30%	-5	-10	73
Saw, circular, Wood	CNP201	108	1	108	30%	-5	-10	93
Drill/grinder, hand-held (electric)	CNP065	98	2	101	80%	-1	-10	90
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	80%	-1	-5	99
							Total	102

Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	80%	-1	-5	99
Breaker, hand-held, mass ≤ 10 kg	CNP023	108	1	108	80%	-1	-10	97
Saw, circular, Wood	CNP201	108	1	108	30%	-5	-10	93
Water pump (electric)	CNP281	88	1	88	30%	-5	-10	73
Agitator (electric)	N.A.	90	1	90	30%	-5	-10	75
Poker, vibratory, hand-held	CNP170	113	1	113	30%	-5	-10	98
							Total	103

Landscaping works (Period from 1/5/2019 to 31/5/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	30%	-5	-5	95
							Total	95

Site demobilization (Period from 1/6/2019 to 30/6/2019)

PME used	ID code [1]	SWL[1], dB(A)	No. of PME	Total SWL, dB(A)	% of time	% on time correction, dB(A)	Screening, dB(A)	Corrected SWL, dB(A)
Breaker, hand-held, mass ≤ 10 kg	CNP023	108	1	108	50%	-3	-10	95
Dump truck, 5.5 tonne < gross vehicle weight ≤ 38 tonne	N.A.	105	1	105	20%	-7	-5	93
							Total	97

Note:

[1] - The ID code and Sound Power Levels (SWLs) of the PMEs are referenced to "Technical Memorandum on Noise from Construction Work Other Than Percussive Piling" and EPD's guidance "Sound power levels of other commonly used PME" available at below website:
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf

[2] - British Standard BS5228-1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

Mitigated Scenario (with movable noise barrier or enclosure

Slope Upgrading Works for Feature No. 12NW-C/C8

Calculation of Construction Noise Level due to Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to storage area A), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL, dB(A)	CNL Standard, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	96	201	-54	3	45	75	NO
2	No. 2, Village House, Ha Yueng	96	160	-52	3	47	75	NO
3	No. 70-71, Village House, Leung Fai Tin	96	81	-46	3	53	75	NO
4	No. 1, Village House, Leung Fai Tin	96	38	-40	3	59	75	NO

Calculation of Construction Noise Level due to Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road)(Period from 1/7/2018 to 30/6/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to storage area B), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL, dB(A)	CNL Standard, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	96	226	-55	3	44	75	NO
2	No. 2, Village House, Ha Yueng	96	176	-53	3	46	75	NO
3	No. 70-71, Village House, Leung Fai Tin	96	76	-46	3	53	75	NO
4	No. 1, Village House, Leung Fai Tin	96	11	-29	3	70	75	NO

Calculation of Construction Noise Level due to Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL, dB(A)	CNL Standard, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	99	35	-39	3	63	75	NO
2	No. 2, Village House, Ha Yueng	99	28	-37	3	65	75	NO
3	No. 70-71, Village House, Leung Fai Tin	99	63	-44	3	58	75	NO
4	No. 1, Village House, Leung Fai Tin	99	39	-40	3	62	75	NO

Calculation of Construction Noise Level due to Installation of Soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL, dB(A)	CNL Standard, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	104	35	-39	3	68	75	NO
2	No. 2, Village House, Ha Yueng	104	28	-37	3	70	75	NO
3	No. 70-71, Village House, Leung Fai Tin	104	63	-44	3	63	75	NO
4	No. 1, Village House, Leung Fai Tin	104	39	-40	3	67	75	NO

Calculation of Construction Noise Level due to Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL, dB(A)	CNL Standard, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	102	35	-39	3	66	75	NO
2	No. 2, Village House, Ha Yueng	102	28	-37	3	68	75	NO
3	No. 70-71, Village House, Leung Fai Tin	102	63	-44	3	61	75	NO
4	No. 1, Village House, Leung Fai Tin	102	39	-40	3	65	75	NO

Calculation of Construction Noise Level due to Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL, dB(A)	CNL Standard, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	103	35	-39	3	67	75	NO
2	No. 2, Village House, Ha Yueng	103	28	-37	3	69	75	NO
3	No. 70-71, Village House, Leung Fai Tin	103	63	-44	3	62	75	NO
4	No. 1, Village House, Leung Fai Tin	103	39	-40	3	66	75	NO

Calculation of Construction Noise Level due to Landscaping works (Period from 1/5/2019 to 31/5/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL, dB(A)	CNL Standard, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	95	35	-39	3	59	75	NO
2	No. 2, Village House, Ha Yueng	95	28	-37	3	61	75	NO
3	No. 70-71, Village House, Leung Fai Tin	95	63	-44	3	54	75	NO
4	No. 1, Village House, Leung Fai Tin	95	39	-40	3	58	75	NO

Calculation of Construction Noise Level due to Site demobilization (Period from 1/6/2019 to 30/6/2019)

	NSR	Total SWL, dB(A)	Distance (NSR to Works Site), m	Distance Correction, dB(A)	Façade Correction, dB(A)	CNL, dB(A)	CNL Standard, dB(A)	Exceedance
1	No. 5, Village House, Ha Yueng	97	35	-39	3	61	75	NO
2	No. 2, Village House, Ha Yueng	97	28	-37	3	63	75	NO
3	No. 70-71, Village House, Leung Fai Tin	97	63	-44	3	56	75	NO
4	No. 1, Village House, Leung Fai Tin	97	39	-40	3	60	75	NO

Predicted Monthly Construction Noise Levels (Mitigated Scenario

Major Activities (Slope Upgrading Works for Feature No. 12NW-C/C8)	Year	2018						2019					
	Month	7	8	9	10	11	12	1	2	3	4	5	6
Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)													
Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road) (Period from 1/7/2018 to 30/6/2019)													
Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)													
Installation of Soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)													
Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)													
Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)													
Landscaping works (Period from 1/5/2019 to 31/5/2019)													
Site demobilization (Period from 1/6/2019 to 30/6/2019)													

Major Activities (Slope Upgrading Works for Feature No. 12NW-C/C8)		NSR	CNL, dB(A)												
Works Area for Grout Mixing (at southern tip of the feature) (Period from 1/7/2018 to 30/6/2019)	1	No. 5, Village House, Ha Yueng	45	45	45	45	45	45	45	45	45	45	45	45	
	2	No. 2, Village House, Ha Yueng	47	47	47	47	47	47	47	47	47	47	47	47	
	3	No. 70-71, Village House, Leung Fai Tin	53	53	53	53	53	53	53	53	53	53	53	53	
	4	No. 1, Village House, Leung Fai Tin	59	59	59	59	59	59	59	59	59	59	59	59	
Works Area for Grout Mixing (near junction of Clear Water Bay Road and Leung Fai Tin Upper Road) (Period from 1/7/2018 to 30/6/2019)	1	No. 5, Village House, Ha Yueng	44	44	44	44	44	44	44	44	44	44	44	44	
	2	No. 2, Village House, Ha Yueng	46	46	46	46	46	46	46	46	46	46	46	46	
	3	No. 70-71, Village House, Leung Fai Tin	53	53	53	53	53	53	53	53	53	53	53	53	
	4	No. 1, Village House, Leung Fai Tin	70	70	70	70	70	70	70	70	70	70	70	70	
Site mobilization and site clearance (Period from 1/7/2018 to 31/7/2018)	1	No. 5, Village House, Ha Yueng	63												
	2	No. 2, Village House, Ha Yueng	65												
	3	No. 70-71, Village House, Leung Fai Tin	58												
	4	No. 1, Village House, Leung Fai Tin	62												
Installation of Soil nailing, raking drain (Period from 1/8/2018 to 31/3/2019)	1	No. 5, Village House, Ha Yueng		68	68	68	68	68	68	68	68				
	2	No. 2, Village House, Ha Yueng		70	70	70	70	70	70	70	70				
	3	No. 70-71, Village House, Leung Fai Tin		63	63	63	63	63	63	63	63				
	4	No. 1, Village House, Leung Fai Tin		67	67	67	67	67	67	67	67				
Rock slope stabilization works (Period from 1/8/2018 to 31/3/2019)	1	No. 5, Village House, Ha Yueng		66	66	66	66	66	66	66	66				
	2	No. 2, Village House, Ha Yueng		68	68	68	68	68	68	68	68				
	3	No. 70-71, Village House, Leung Fai Tin		61	61	61	61	61	61	61	61				
	4	No. 1, Village House, Leung Fai Tin		65	65	65	65	65	65	65	65				
Drainage and maintenance staircases modification works and construction of maintenance berm (Period from 1/4/2019 to 30/4/2019)	1	No. 5, Village House, Ha Yueng										67			
	2	No. 2, Village House, Ha Yueng										69			
	3	No. 70-71, Village House, Leung Fai Tin										62			
	4	No. 1, Village House, Leung Fai Tin										66			
Landscaping works (Period from 1/5/2019 to 31/5/2019)	1	No. 5, Village House, Ha Yueng											59		
	2	No. 2, Village House, Ha Yueng											61		
	3	No. 70-71, Village House, Leung Fai Tin											54		
	4	No. 1, Village House, Leung Fai Tin											58		
Site demobilization (Period from 1/6/2019 to 30/6/2019)	1	No. 5, Village House, Ha Yueng												61	
	2	No. 2, Village House, Ha Yueng												63	
	3	No. 70-71, Village House, Leung Fai Tin												56	
	4	No. 1, Village House, Leung Fai Tin												60	
Overall CNL (dB(A))		NSR													MAX
	1	No. 5, Village House, Ha Yueng	63	70	70	70	70	70	70	70	70	67	59	61	70
	2	No. 2, Village House, Ha Yueng	65	72	72	72	72	72	72	72	72	69	61	63	72
	3	No. 70-71, Village House, Leung Fai Tin	60	66	66	66	66	66	66	66	66	62	54	56	66
	4	No. 1, Village House, Leung Fai Tin	71	73	73	73	73	73	73	73	73	72	71	71	73

Appendix B

Ecological Survey Data

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List of Plant Species Recorded in the Proposed Works Site 12NW-C/C8. Species of conservation importance is highlighted in yellow.

Species Name	Chinese Name	Exotic Species	Growth Form	Commonness in HK[1]	Relative Abundance[2]
Acacia confusa	台灣相思	Exotic	Tree	Very Common	++++
Acronychia pedunculata	山油柑	Native	Tree	Very Common	+++
Adiantum flabellulatum	扇葉鐵線蕨	Native	Fern	Very common	++
Aidia canthioides	香楠	Native	Shrub	Very Common	++
Alangium chinense	八角楓	Native	Tree	Common	++++
Alocasia macrorrhizos	海芋	Native	Herb	Very Common	++
Aporusa dioica	銀柴	Native	Tree	Very Common	+++
Aquilaria sinensis	土沉香	Native	Tree	Common	60
Archidendron lucidum	亮葉猴耳環	Native	Tree	Common	+
Ardisia quinquegona	羅傘樹	Native	Shrub	Very Common	+++
Blechnum orientale	烏毛蕨	Native	Fern	Very Common	++
Boehmeria nivea	苧麻	Native	Shrub	Restricted	+++
Breynia fruticosa	黑面神	Native	Shrub	Very common	++
Bridelia tomentosa	土蜜樹	Native	Shrub	Very common	+++
Canthium dicoccum	魚骨木	Native	Tree	Common	+
Castanopsis fissa	黧蒴錐	Native	Tree	Common	+++
Cayratia corniculata	角花烏蘞莓	Native	Climber	Very Common	++++
Celtis sinensis	朴樹	Native	Tree	Common	++
Cinnamomum parthenoxylon	黃樟	Native	Tree	Common	+
Dalbergia hancei	藤黃檀	Native	Climber	Common	++
Daphniphyllum calycinum	牛耳楓	Native	Tree	Common	++
Desmodium heterocarpon	假地豆	Native	Herb	Very Common	+
Desmos chinensis	假鷹爪	Native	Shrub	Common	++++
Diospyros eriantha	烏柿	Native	Tree	Very Common	+++
Diospyros morrisiana	羅浮柿	Native	Tree	Very Common	+++
Elaeocarpus chinensis	華杜英	Native	Tree	Common	+
Eurya nitida	細齒葉柃	Native	Shrub	Very Common	++
Ficus hirta	粗葉榕	Native	Shrub	Common	+++
Ficus hispida	對葉榕	Native	Tree	Very Common	+++
Ficus pumila	薜荔	Native	Climber	Very Common	+++
Ficus variegata	青果榕	Native	Tree	Common	++
Ficus variolosa	變葉榕	Native	Tree	Very Common	++
Gardenia jasminoides	梔子	Native	Shrub	Common	++
Glochidion eriocarpum	毛果算盤子	Native	Shrub	Very Common	+
Glochidion wrightii	白背算盤子	Native	Shrub	Very Common	+
Gnetum luofuense	羅浮買麻藤	Native	Climber	Very Common	2
Ilex asprella	梅葉冬青	Native	Shrub	Very Common	++
Ilex pubescens	毛冬青	Native	Shrub	Very Common	++
Lopthatherum gracile	淡竹葉	Native	Herb	Very Common	++
Lygodium japonicum	海金沙	Native	Climber	Very Common	+++
Machilus chekiangensis	浙江潤楠	Native	Tree	Very Common	++++
Maesa perlarius	鯽魚膽	Native	Shrub	Common	++++

Mallotus paniculatus	白楸	Native	Tree	Very Common	++
Melastoma sanguineum	毛菴	Native	Shrub	Very Common	+
Melicope pteleifolia	密茱萸	Native	Shrub	Common	++
Meliosma rigida	筆羅子	Native	Tree	Common	++
Microcos nervosa	破布葉	Native	Shrub	Common	++
Mikania micrantha	薇甘菊	Exotic	Climber	Very Common	++
Miscanthus floridulus	五節芒	Native	Herb	Common	+
Mussaenda pubescens	玉葉金花	Native	Climber	Very Common	++++
Pavetta hongkongensis	香港大沙葉	Native	Shrub	Common	3
Pouzolzia zeylanica	霧水葛	Native	Herb	Common	+++
Psychotria asiatica	山大刀	Native	Shrub	Very Common	++++
Psychotria serpens	蔓九節	Native	Climber	Very Common	+++
Pteris semipinnata	半邊旗	Native	Fern	Very Common	++++
Reevesia thyrsoidea	梭羅樹	Native	Tree	Common	++
Rhodomyrtus tomentosa	桃金娘	Native	Shrub	Very Common	++
Rhus succedanea	野漆	Native	Shrub	Common	+++
Sarcandra glabra	草珊瑚	Native	Shrub	Very Common	+
Schefflera heptaphylla	鵝掌柴	Native	Tree	Very Common	+++
Smilax china	菝葜	Native	Climber	Very Common	++
Smilax glabra	土茯苓	Native	Climber	Very Common	++
Sterculia lanceolata	假蘋婆	Native	Tree	Very Common	+++
Strophanthus divaricatus	羊角拗	Native	Climber	Common	++
Symplocos glauca	羊舌樹	Native	Tree	Common	+
Syzygium hancei	韓氏蒲桃	Native	Tree	Common	++
Syzygium levinei	山蒲桃	Native	Tree	Common	+++
Tetracera asiatica	錫葉藤	Native	Climber	Very Common	+++
Tylophora ovata	娃兒藤	Native	Climber	Common	+
Uvaria macrophylla	紫玉盤	Native	Climber	Common	++++
Zanthoxylum avicennae	簕欓花椒	Native	Tree	Common	++

Note:

1. Commonness follows Corlett et al. (2000) Hong Kong Vascular Plants: Distribution and Status.

N/A : Not Applicable

2. Relative abundance: ++++ = abundant, +++ = common, ++ = uncommon and + = scarce

Abundance is provided for plant species of conservation importance

Details of all recorded plant species of conservation importance in the Proposed Works Site 12NW-C/C8.

Tree / Group reference number	Species Name	Chinese Name	DBH (mm)[1]	Height (m)	Spread (m)	Re-sprout[2]	Form[3]	Health	Tree survival rate after transplanting	Remarks
AS1	*Aquilaria sinensis*	土沉香	–	1.5	–	No	Good	Good	Medium	
AS1	*Aquilaria sinensis*	土沉香	50	4	3	No	Good	Good	Low	
AS2	*Aquilaria sinensis*	土沉香	30	3.5	1.5	No	Good	Good	Low	
AS3	*Aquilaria sinensis*	土沉香	–	1	–	No	Good	Good	Medium	
AS3	*Aquilaria sinensis*	土沉香	20	2.5	1	No	Good	Good	Low	
AS4	*Aquilaria sinensis*	土沉香	60	5.5	4	No	Good	Good	Low	
AS4	*Aquilaria sinensis*	土沉香	20	3	1.5	No	Good	Good	Low	
AS4	*Aquilaria sinensis*	土沉香	–	1.6	–	No	Good	Good	Low	
AS5	*Aquilaria sinensis*	土沉香	–	1	–	No	Good	Good	Medium	
AS6	*Aquilaria sinensis*	土沉香	15	2.2	1	No	Good	Good	Low	
AS7	*Aquilaria sinensis*	土沉香	25	3	1	No	Good	Good	Low	
AS7	*Aquilaria sinensis*	土沉香	20	2.5	3	No	Good	Good	Low	
AS8	*Aquilaria sinensis*	土沉香	–	1.5	–	No	Good	Good	Low	
AS9	*Aquilaria sinensis*	土沉香	30	4	2.5	No	Good	Good	Low	
AS10	*Aquilaria sinensis*	土沉香	30	3.5	1.5	No	Good	Good	Low	
AS10	*Aquilaria sinensis*	土沉香	–	0.4	–	No	Good	Good	Medium	
C01	*Aquilaria sinensis*	土沉香	–	0.5	–	No	Good	Good	Medium	
C02	*Aquilaria sinensis*	土沉香	–	0.6	–	No	Good	Good	Medium	
C03	*Aquilaria sinensis*	土沉香	–	0.6	–	No	Good	Good	Medium	
C03	*Aquilaria sinensis*	土沉香	–	0.3	–	No	Good	Good	Medium	
C03	*Aquilaria sinensis*	土沉香	–	0.3	–	No	Good	Good	Medium	
C06	*Aquilaria sinensis*	土沉香	50	4	2	No	Good	Good	Low	
C11	*Aquilaria sinensis*	土沉香	–	0.5	–	No	Good	Good	Medium	
C11	*Aquilaria sinensis*	土沉香	–	1	–	No	Good	Good	Medium	
C14	*Aquilaria sinensis*	土沉香	–	0.3	–	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	20	2.2	1.5	No	Good	Good	Low	
AS20	*Aquilaria sinensis*	土沉香	–	1.6	–	No	Good	Good	Low	
AS20	*Aquilaria sinensis*	土沉香	–	1.2	–	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	–	1.2	–	No	Good	Good	Medium	

Tree / Group reference number	Species Name	Chinese Name	DBH (mm)[1]	Height (m)	Spread (m)	Re-sprout[2]	Form[3]	Health	Tree survival rate after transplanting	Remarks
AS20	*Aquilaria sinensis*	土沉香	-	1	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	1	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	1.2	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	1.8	-	No	Good	Good	Low	
AS20	*Aquilaria sinensis*	土沉香	-	1.7	-	No	Good	Good	Low	
AS20	*Aquilaria sinensis*	土沉香	-	1.3	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	1.6	-	No	Good	Good	Low	
AS20	*Aquilaria sinensis*	土沉香	-	1.2	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	1.4	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	1.3	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	0.5	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	1	-	No	Good	Good	Medium	
AS20	*Aquilaria sinensis*	土沉香	-	1.2	-	No	Good	Good	Medium	
AS22	*Aquilaria sinensis*	土沉香	-	1	-	No	Good	Good	Medium	
AS23	*Aquilaria sinensis*	土沉香	25	2.5	1.5	No	Good	Good	Low	
AS24	*Aquilaria sinensis*	土沉香	20	2	1	No	Good	Good	Low	
AS25	*Aquilaria sinensis*	土沉香	20	1.7	1	No	Good	Good	Low	
AS26	*Aquilaria sinensis*	土沉香	10	2	1	No	Good	Good	Low	
AS27	*Aquilaria sinensis*	土沉香	30	4	2	No	Good	Good	Low	
AS28	*Aquilaria sinensis*	土沉香	15	2.5	2	No	Good	Good	Low	
Near AS26, T6, T7, T243	*Gnetum luofuense*	羅浮買麻藤	30	Climber growing up in tree canopy with hanging vine network above ground level			Good	Good	Low	
Near AS27, AS28, T8, T9, T106	*Gnetum luofuense*	羅浮買麻藤	30				Good	Good	Low	
Trees that listed below were located outside soil nailing area behind the concrete ditch drainage										
T38	*Aquilaria sinensis*	土沉香	110	7	4	No	Fair	Fair	Low	Harvested at base
Near T275 & 276	*Aquilaria sinensis*	土沉香	30	3	3	No	Good	Good	Low	

Tree / Group reference number	Species Name	Chinese Name	DBH (mm)[1]	Height (m)	Spread (m)	Re-sprout[2]	Form[3]	Health	Tree survival rate after transplanting	Remarks
Near T275 & 276	*Aquilaria sinensis*	土沉香	40	4	2	No	Good	Good	Low	
Near T275 & 276	*Aquilaria sinensis*	土沉香	10	1.5	0.8	No	Good	Good	Medium	
Near T275 & 276	*Aquilaria sinensis*	土沉香	40	4	2.5	No	Fair	Fair	Low	Trunk damaged
Near T275 & 276	*Aquilaria sinensis*	土沉香	40	4	3	No	Fair	Fair	Low	Trunk damaged
Near T275 & 276	*Aquilaria sinensis*	土沉香	70	2.5	0	Yes	Poor	Poor	Low	Trunk being topped
Near T275 & 276	*Aquilaria sinensis*	土沉香	60	2	0	Yes	Poor	Poor	Low	Trunk being topped
Near T275 & 276	*Aquilaria sinensis*	土沉香	130	1.5	0	Yes	Poor	Poor	Low	Trunk being topped
Near T275 & 276	*Aquilaria sinensis*	土沉香	30	4	1.5	No	Good	Good	Low	
Near T275 & 276	*Aquilaria sinensis*	土沉香	15	2	0.3	No	Good	Good	Low	
AS11	*Aquilaria sinensis*	土沉香	30	2.5	2	No	Good	Good	Low	
AS11	*Aquilaria sinensis*	土沉香	30	2	1.5	No	Good	Good	Low	
AS11	*Aquilaria sinensis*	土沉香	-	1	-	No	Good	Good	Medium	
AS11	*Aquilaria sinensis*	土沉香	10	1.5	0.5	No	Good	Good	Medium	
AS11	*Aquilaria sinensis*	土沉香	-	0.4	-	No	Good	Good	Medium	
AS12	*Aquilaria sinensis*	土沉香	10	1.5	1	No	Good	Good	Medium	
AS12	*Aquilaria sinensis*	土沉香	20	2	1	No	Good	Good	Low	
AS13	*Aquilaria sinensis*	土沉香	-	0.3	-	No	Good	Good	Medium	
AS13	*Aquilaria sinensis*	土沉香	-	1	-	No	Good	Good	Medium	
AS13	*Aquilaria sinensis*	土沉香	-	1.5	-	No	Good	Good	Medium	
AS14	*Aquilaria sinensis*	土沉香	60	5	2	No	Good	Good	Low	
AS14	*Aquilaria sinensis*	土沉香	40	3	1.5	No	Good	Good	Low	
AS14	*Aquilaria sinensis*	土沉香	20	2.5	1	No	Good	Good	Low	
AS15	*Aquilaria sinensis*	土沉香	-	0.7	0.3	No	Good	Good	Medium	

Tree / Group reference number	Species Name	Chinese Name	DBH (mm)[1]	Height (m)	Spread (m)	Re-sprout[2]	Form[3]	Health	Tree survival rate after transplanting	Remarks
AS16	*Aquilaria sinensis*	土沉香	30	2.5	1.5	No	Good	Good	Low	
AS16	*Aquilaria sinensis*	土沉香	50	3	2	No	Good	Good	Low	
AS17	*Aquilaria sinensis*	土沉香	-	1.2	-	No	Good	Good	Medium	
AS18	*Aquilaria sinensis*	土沉香	2	2	1	No	Good	Good	Low	
AS18	*Aquilaria sinensis*	土沉香	-	1	-	No	Good	Good	Medium	
AS19	*Aquilaria sinensis*	土沉香	-	1.2	1	No	Good	Good	Medium	
AS19	*Aquilaria sinensis*	土沉香	-	1	1	No	Good	Good	Medium	
AS21	*Aquilaria sinensis*	土沉香	-	1.2	1	No	Good	Good	Medium	
AS21	*Aquilaria sinensis*	土沉香	-	0.5	0.5	No	Good	Good	Medium	
AS21	*Aquilaria sinensis*	土沉香	-	0.5	0.5	No	Good	Good	Medium	
AS21	*Aquilaria sinensis*	土沉香	-	1	0.5	No	Good	Good	Medium	
AS21	*Aquilaria sinensis*	土沉香	-	1	0.5	No	Good	Good	Medium	
AS29	*Aquilaria sinensis*	土沉香	-	1.3	0.5	No	Good	Good	Medium	
AS30	*Aquilaria sinensis*	土沉香	-	1.2	0.5	No	Good	Good	Medium	
AS31	*Aquilaria sinensis*	土沉香	-	1	0.5	No	Good	Good	Medium	
P1	*Pavetta hongkongensis*	香港大沙葉	-	2	-	No	Good	Good	Low	
P2	*Pavetta hongkongensis*	香港大沙葉	30	4	2	No	Good	Good	Low	
P3	*Pavetta hongkongensis*	香港大沙葉	-	1	-	No	Good	Good	Medium	

Notes:

1 DBH (diameter at breast height) were measured for each sizeable individual. Base diameter of the main stem was measured instead if the trunk was seriously damaged (e.g. topped). No DBH and spread could be obtained from seedlings or saplings.

2 Presence of re-sprout was generally resulted from heavy trunk damage, e.g. topping, from illegal logging activities.

3 Form of tree taper, overall tree performance and structure were considered for determining the tree and crown form of each individual plant (Matheny and Clark, 1994).

4 Foliage condition, presence of epicormic and root condition were considered for determining the healthiness of plants (Matheny and Clark, 1994).

5 Survival rate is assessed as low for seedlings with 1.5m in height or above; and medium (50% chance of survive) for sapling below 1.5m

6 All observations and remarks of tree condition were made in August 2016.

Bird species and abundance recorded during the ecological surveys in the Proposed Works Site 12NW-C/C8.

Common Name	Species Name	Chinese Name	Commonness[1]	Status in Hong Kong[2]	Conservation Status[3]	Number
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	Abundant	Resident	-	2
Japanese White-eye	*Zosterops japonicus*	暗綠繡眼鳥	Abundant	Resident	-	5
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	Common	Resident	-	1
Oriental Magpie Robin	*Copsychus saularis*	鵲鴝	Abundant	Resident	-	1
Blue Whistling Thrush	*Myophonus caeruleus*	紫嘯鶇	Common	Resident	-	1
Cinereous Tit	*Parus cinereus*	蒼背山雀	Common	Resident	-	2

Notes:

1. Commonness as per AFCD database. Available at http://www.afcd.gov.hk/english/conservation/hkbiodiversity/database/search.asp?lang=en.
2. Status according to Viney *et al*. The Birds of Hong Kong and South China (2005) (8th Edition):
3. All wild birds are protected under Wild Animal Protection Ordinance (Cap. 170)

Appendix C

Tree Schedule of Common Tree Species

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Tree Schedule of Common Tree Species
常見樹木表

Tree No. 編號	Species 種類		Tree Measurements 樹木大小		
	Scientific Name 學名	Chinese Name 中文名	Height (m) 高 (米)	DBH (mm) 胸徑(米)	Crown Spread (m) 樹冠(米)
T1	*Machilus chekiangensis*	浙江潤楠	8.0	210	6.0
T2	*Canthium dicoccum*	魚骨木	7.0	200	4.0
T3	*Machilus chekiangensis*	浙江潤楠	7.0	150	4.0
T4	*Tetradium glabrifolium*	楝葉吳茱萸	6.5	200	4.0
T5	*Machilus chekiangensis*	浙江潤楠	7.5	140	3.0
T6	*Tetradium glabrifolium*	楝葉吳茱萸	4.0	150	3.0
T7	*Acacia confusa*	台灣相思	8.5	150	5.0
T8	*Acacia confusa*	台灣相思	7.0	250	5.0
T9	*Schefflera heptaphylla*	鵝掌柴	8.0	180	6.0
T10	*Castanopsis fissa*	黧蒴錐	7.0	130	4.0
T11	*Castanopsis fissa*	黧蒴錐	6.0	250	4.0
T12	*Castanopsis fissa*	黧蒴錐	5.0	180	5.0
T13	*Castanopsis fissa*	黧蒴錐	5.0	250	4.0
T14	*Cinnamomum parthenoxylon*	黃樟	7.0	130	4.0
T15	*Castanopsis fissa*	黧蒴錐	7.0	160	4.0
T16	*Adinandra millettii*	黃瑞木	6.0	170	2.0
T17	*Acacia confusa*	台灣相思	9.0	220	5.0
T19	*Castanopsis fissa*	黧蒴錐	10.0	220	5.0
T20	*Aporusa dioica*	銀柴	6.0	120	4.0
T21	*Castanopsis fissa*	黧蒴錐	11.0	400	10.0
T22	*Castanopsis fissa*	黧蒴錐	10.0	200	6.0
T23	*Acronychia pedunculata*	山油柑	5.0	150	3.0
T23A	*Diospyros morrisiana*	羅浮柿	6.0	150	3.0
T24	*Cinnamomum parthenoxylon*	黃樟	10.0	170	3.0
T24A	*Zanthoxylum ailanthoides*	椿葉花椒	7.0	150	3.0
T25	*Castanopsis fissa*	黧蒴錐	14.0	450	11.0
T26	*Castanopsis fabri*	羅浮錐	8.0	200	6.0
T27	*Castanopsis fissa*	黧蒴錐	12.0	220	6.0
T28	*Machilus chekiangensis*	浙江潤楠	10.0	180	4.0
T29	*Castanopsis fissa*	黧蒴錐	9.0	200	5.0
T30	*Diospyros morrisiana*	羅浮柿	6.0	120	3.0
T31	*Sterculia lanceolata*	假蘋婆	6.0	110	4.0
T32	*Aporusa dioica*	銀柴	7.0	110	3.0
T34	*Castanopsis fissa*	黧蒴錐	8.0	500	8.0
T35	*Aporusa dioica*	銀柴	8.0	140	5.0
T36	*Castanopsis fissa*	黧蒴錐	12.0	330	6.0

Tree No. 編號	Species 種類		Tree Measurements 樹木大小		
	Scientific Name 學名	Chinese Name 中文名	Height (m) 高 (米)	DBH (mm) 胸徑(米)	Crown Spread (m) 樹冠(米)
T37	*Garcinia oblongifolia*	嶺南山竹子	9.0	200	6.0
T39	*Castanopsis fissa*	黧蒴錐	12.0	400	6.0
T41	*Machilus chekiangensis*	浙江潤楠	12.0	360	9.0
T41A	*Aporusa dioica*	銀柴	9.0	150	3.0
T41B	*Diospyros morrisiana*	羅浮柿	5.0	100	4.0
T42	*Castanopsis fabri*	羅浮錐	6.0	180	3.0
T42A	*Syzygium hancei*	韓氏蒲桃	5.0	150	4.0
T43	*Schefflera heptaphylla*	鵝掌柴	6.0	120	5.0
T45	*Diospyros morrisiana*	羅浮柿	8.0	130	4.0
T46	*Mallotus paniculatus*	白楸	8.0	130	6.0
T47	*Mallotus paniculatus*	白楸	4.0	100	6.0
T48	*Castanopsis fissa*	黧蒴錐	11.0	400	15.0
T48A	*Schefflera heptaphylla*	鵝掌柴	4.0	120	3.0
T49	*Castanopsis fissa*	黧蒴錐	6.0	130	3.0
T49A	*Machilus chekiangensis*	浙江潤楠	6.0	120	3.0
T50	*Aporusa dioica*	銀柴	7.0	150	3.0
T51	*Castanopsis fissa*	黧蒴錐	10.0	170	3.0
T53	*Castanopsis fissa*	黧蒴錐	11.0	230	9.0
T54	*Castanopsis fissa*	黧蒴錐	10.0	150	5.0
T55	*Schefflera heptaphylla*	鵝掌柴	8.0	200	6.0
T56	*Machilus chekiangensis*	浙江潤楠	13.0	240	6.0
T57	*Castanopsis fissa*	黧蒴錐	13.0	600	8.0
T58	*Syzygium hancei*	韓氏蒲桃	8.0	160	5.0
T59	*Machilus chekiangensis*	浙江潤楠	7.0	200	3.0
T60	*Castanopsis fissa*	黧蒴錐	12.0	280	8.0
T61	*Castanopsis fissa*	黧蒴錐	12.0	220	8.0
T63	*Mallotus paniculatus*	白楸	4.0	150	6.0
T64	*Acacia confusa*	台灣相思	8.0	250	6.0
T65	*Acacia confusa*	台灣相思	8.0	120	4.0
T66	*Acacia confusa*	台灣相思	10.0	250	5.0
T67	*Zanthoxylum ailanthoides*	椿葉花椒	5.0	120	3.0
T68	*Castanopsis fissa*	黧蒴錐	10.0	220	6.0
T69	*Cinnamomum parthenoxylon*	黃樟	10.0	220	6.0
T70	*Acacia confusa*	台灣相思	12.0	200	4.0
T71	*Castanopsis fissa*	黧蒴錐	12.0	350	6.0
T72	*Acacia confusa*	台灣相思	12.0	250	7.0
T73	*Aporusa dioica*	銀柴	6.0	100	5.0
T74	*Acacia confusa*	台灣相思	12.0	250	8.0

Tree No. 編號	Species 種類		Tree Measurements 樹木大小		
	Scientific Name 學名	Chinese Name 中文名	Height (m) 高 (米)	DBH (mm) 胸徑(米)	Crown Spread (m) 樹冠(米)
T75	*Acacia confusa*	台灣相思	11.0	220	5.0
T76	*Acacia confusa*	台灣相思	12.0	320	7.0
T77	*Acacia confusa*	台灣相思	14.0	250	7.0
T78	*Acacia confusa*	台灣相思	11.5	250	8.0
T78A	*Castanopsis fissa*	黧蒴錐	7.0	100	3.0
T79	*Mallotus paniculatus*	白楸	7.0	120	6.0
T80	*Mallotus paniculatus*	白楸	9.0	110	5.0
T81	*Acacia confusa*	台灣相思	10.0	180	6.0
T82	*Acacia confusa*	台灣相思	9.0	220	5.5
T83	*Acacia confusa*	台灣相思	8.0	130	5.0
T84	*Castanopsis fissa*	黧蒴錐	7.0	160	3.0
T85	*Acacia confusa*	台灣相思	12.0	220	8.0
T86	*Mallotus paniculatus*	白楸	10.0	120	4.0
T87	*Acacia confusa*	台灣相思	6.0	120	3.5
T88	*Acacia confusa*	台灣相思	10.0	230	7.0
T89	*Acacia confusa*	台灣相思	10.0	190	8.0
T90	*Acacia confusa*	台灣相思	8.0	170	5.0
T91	*Acacia confusa*	台灣相思	14.0	250	6.0
T92	*Acacia confusa*	台灣相思	7.5	210	5.5
T94	*Castanopsis fissa*	黧蒴錐	9.0	200	6.0
T95	*Acacia confusa*	台灣相思	6.0	150	6.0
T96	*Acacia confusa*	台灣相思	9.0	260	7.0
T97	*Acacia confusa*	台灣相思	12.0	200	5.0
T98	*Acacia confusa*	台灣相思	8.0	170	4.0
T99	*Cinnamomum parthenoxylon*	黃樟	7.0	150	4.0
T100	*Acacia confusa*	台灣相思	6.0	180	5.0
T101	*Mallotus paniculatus*	白楸	7.0	140	6.0
T102	*Cinnamomum parthenoxylon*	黃樟	6.5	110	3.0
T103	*Acacia confusa*	台灣相思	8.0	250	6.0
T104	*Cinnamomum parthenoxylon*	黃樟	6.0	130	4.0
T105	*Acacia confusa*	台灣相思	9.0	250	6.0
T106	*Cinnamomum parthenoxylon*	黃樟	6.5	150	5.0
T107	*Mallotus paniculatus*	白楸	6.5	120	4.0
T107A	*Cinnamomum parthenoxylon*	黃樟	7.0	150	6.0
T108	*Machilus chekiangensis*	浙江潤楠	5.5	120	3.0
T109	*Aporusa dioica*	銀柴	4.0	100	3.0
T110	*Acacia confusa*	台灣相思	6.5	200	5.0
T111	*Acacia confusa*	台灣相思	5.0	140	4.0
T112	*Acacia confusa*	台灣相思	7.0	270	7.0

Tree No. 編號	Species 種類		Tree Measurements 樹木大小		
	Scientific Name 學名	Chinese Name 中文名	Height (m) 高 (米)	DBH (mm) 胸徑(米)	Crown Spread (m) 樹冠(米)
T113	*Schefflera heptaphylla*	鵝掌柴	6.0	170	4.0
T114	*Cinnamomum parthenoxylon*	黃樟	8.0	200	4.5
T115	*Diospyros morrisiana*	羅浮柿	4.5	130	4.0
T116	*Schefflera heptaphylla*	鵝掌柴	6.0	100	3.0
T117	*Cinnamomum parthenoxylon*	黃樟	7.0	110	4.0
T118	*Cinnamomum parthenoxylon*	黃樟	6.0	170	4.5
T119	*Mallotus paniculatus*	白楸	6.0	160	6.0
T120	*Meliosma rigida*	筆羅子	4.0	120	4.0
T121	*Machilus chinensis*	華潤楠	7.0	200	5.0
T122	*Schefflera heptaphylla*	鵝掌柴	8.0	200	5.5
T123	*Sterculia lanceolata*	假蘋婆	11.0	130	3.0
T124	*Cinnamomum parthenoxylon*	黃樟	11.0	250	6.0
T125	*Cinnamomum parthenoxylon*	黃樟	13.0	280	8.5
T126	*Cinnamomum parthenoxylon*	黃樟	13.0	280	7.0
T127	*Cinnamomum parthenoxylon*	黃樟	13.0	310	8.0
T128	*Aporusa dioica*	銀柴	7.0	130	4.0
T129	*Zanthoxylum ailanthoides*	椿葉花椒	6.5	130	5.5
T130	*Acacia confusa*	台灣相思	3.5	200	4.5
T131	*Acacia confusa*	台灣相思	8.0	200	5.5
T132	*Acacia confusa*	台灣相思	4.0	110	4.5
T133	*Acacia confusa*	台灣相思	10.5	230	6.0
T134	*Acacia confusa*	台灣相思	8.0	250	8.0
T135	*Acacia confusa*	台灣相思	7.0	250	5.0
T136	*Acacia confusa*	台灣相思	6.0	200	7.0
T137	*Acacia confusa*	台灣相思	8.0	200	7.0
T138	*Acacia confusa*	台灣相思	8.0	210	7.0
T139	*Acacia confusa*	台灣相思	8.0	220	5.0
T140	*Acacia confusa*	台灣相思	8.5	280	7.0
T141	*Acacia confusa*	台灣相思	7.5	140	5.0
T142	*Acacia confusa*	台灣相思	8.0	180	5.5
T143	*Acacia confusa*	台灣相思	8.5	180	5.5
T144	*Acacia confusa*	台灣相思	9.0	210	6.0
T145	*Acacia confusa*	台灣相思	10.0	210	6.0
T146	*Acacia confusa*	台灣相思	7.5	120	3.0
T147	*Acacia confusa*	台灣相思	7.0	120	5.0
T148	*Acacia confusa*	台灣相思	6.0	170	5.5
T149	*Acacia confusa*	台灣相思	8.0	340	10.0
T150	*Acacia confusa*	台灣相思	8.0	200	6.0
T151	*Acacia confusa*	台灣相思	12.0	230	6.0

Tree No. 編號	Species 種類		Tree Measurements 樹木大小		
	Scientific Name 學名	Chinese Name 中文名	Height (m) 高 (米)	DBH (mm) 胸徑(米)	Crown Spread (m) 樹冠(米)
T152	*Acacia confusa*	台灣相思	7.0	150	5.5
T153	*Acacia confusa*	台灣相思	11.5	200	6.0
T154	*Acacia confusa*	台灣相思	12.5	230	6.0
T155	*Acacia confusa*	台灣相思	8.0	100	4.5
T156	*Acacia confusa*	台灣相思	7.0	100	4.5
T157	*Acacia confusa*	台灣相思	12.0	200	5.0
T158	*Acacia confusa*	台灣相思	12.0	200	5.0
T159	*Acacia confusa*	台灣相思	6.0	200	3.0
T160	*Acacia confusa*	台灣相思	10.0	150	6.0
T161	*Acacia confusa*	台灣相思	4.0	120	3.0
T162	*Acacia confusa*	台灣相思	4.0	220	2.5
T163	*Acacia confusa*	台灣相思	8.0	180	4.5
T164	*Acacia confusa*	台灣相思	10.0	200	5.5
T165	*Acacia confusa*	台灣相思	10.0	230	6.0
T166	*Acacia confusa*	台灣相思	10.0	300	6.0
T167	*Acacia confusa*	台灣相思	12.0	300	7.0
T168	*Acacia confusa*	台灣相思	10.0	150	4.0
T169	*Acacia confusa*	台灣相思	9.0	230	6.0
T171	*Acacia confusa*	台灣相思	8.0	230	5.0
T172	*Acacia confusa*	台灣相思	12.0	300	6.0
T173	*Acacia confusa*	台灣相思	11.0	250	6.0
T174	*Acacia confusa*	台灣相思	11.0	220	5.0
T176	*Acacia confusa*	台灣相思	10.0	220	7.0
T177	*Acacia confusa*	台灣相思	11.0	250	9.0
T178	*Acacia confusa*	台灣相思	13.0	250	8.0
T178A	*Acacia confusa*	台灣相思	7.0	250	8.0
T179	*Acacia confusa*	台灣相思	9.0	110	6.0
T180	Dead tree	枯樹	6.0	140	3.0
T181	*Acacia confusa*	台灣相思	10.0	220	5.0
T182	*Acacia confusa*	台灣相思	12.0	220	5.0
T183	*Acacia confusa*	台灣相思	12.0	250	6.0
T184	*Acacia confusa*	台灣相思	6.0	100	3.0
T185	*Acacia confusa*	台灣相思	11.0	260	7.0
T186	*Mallotus paniculatus*	白楸	8.0	200	6.0
T187	*Acacia confusa*	台灣相思	7.0	140	3.0
T188	*Acacia confusa*	台灣相思	11.0	220	5.0
T189	*Acacia confusa*	台灣相思	11.0	230	8.0
T189A	*Acacia confusa*	台灣相思	7.0	100	4.0
T190	*Acacia confusa*	台灣相思	13.0	300	6.0

Tree No. 編號	Species 種類		Tree Measurements 樹木大小		
	Scientific Name 學名	Chinese Name 中文名	Height (m) 高 (米)	DBH (mm) 胸徑(米)	Crown Spread (m) 樹冠(米)
T191	*Acacia confusa*	台灣相思	11.0	180	6.0
T192	*Castanopsis fissa*	黧蒴錐	7.0	150	5.0
T193	*Acacia confusa*	台灣相思	8.0	300	7.0
T194	*Castanopsis fissa*	黧蒴錐	8.0	140	6.0
T195	*Acacia confusa*	台灣相思	9.0	250	7.0
T196	*Castanopsis fissa*	黧蒴錐	10.0	170	4.0
T197	*Castanopsis fissa*	黧蒴錐	8.0	130	4.0
T198	*Machilus chekiangensis*	浙江潤楠	11.0	250	6.0
T199	*Castanopsis fissa*	黧蒴錐	8.0	170	5.0
T200	*Acacia confusa*	台灣相思	8.0	220	6.0
T201	*Acacia confusa*	台灣相思	6.0	130	5.0
T202	*Castanopsis fissa*	黧蒴錐	8.0	450	8.0
T203	*Machilus chekiangensis*	浙江潤楠	7.0	110	3.0
T205	*Castanopsis fissa*	黧蒴錐	8.0	200	6.0
T206	*Castanopsis fissa*	黧蒴錐	7.0	200	3.0
T207	*Castanopsis fissa*	黧蒴錐	7.5	190	5.0
T208	*Castanopsis fissa*	黧蒴錐	4.0	200	4.0
T209	*Castanopsis fissa*	黧蒴錐	10.0	300	8.0
T211	*Castanopsis fissa*	黧蒴錐	7.0	250	6.0
T212	*Castanopsis fissa*	黧蒴錐	8.0	110	4.0
T214	*Castanopsis fissa*	黧蒴錐	7.0	250	6.0
T215	*Acacia confusa*	台灣相思	11.0	250	8.0
T215A	*Castanopsis fissa*	黧蒴錐	13.0	280	8.0
T216	*Castanopsis fissa*	黧蒴錐	8.0	180	5.0
T217	*Acacia confusa*	台灣相思	7.0	150	4.0
T218	*Castanopsis fissa*	黧蒴錐	8.0	120	4.0
T219	*Castanopsis fissa*	黧蒴錐	7.0	120	6.0
T220	*Castanopsis fissa*	黧蒴錐	8.0	160	6.0
T221	*Acacia confusa*	台灣相思	7.0	210	6.0
T222	*Castanopsis fissa*	黧蒴錐	11.0	240	7.0
T223	*Castanopsis fissa*	黧蒴錐	11.0	160	5.0
T224	*Acacia confusa*	台灣相思	10.0	280	9.0
T225	*Schefflera heptaphylla*	鵝掌柴	6.0	150	5.0
T226	*Castanopsis fissa*	黧蒴錐	11.0	150	5.0
T227	*Castanopsis fissa*	黧蒴錐	11.0	250	8.0
T228	*Acacia confusa*	台灣相思	7.0	150	6.0
T229	*Castanopsis fissa*	黧蒴錐	10.0	250	7.0
T231	*Acacia confusa*	台灣相思	11.0	300	8.0
T232	*Castanopsis fissa*	黧蒴錐	9.0	220	5.0

Tree No. 編號	Species 種類		Tree Measurements 樹木大小		
	Scientific Name 學名	Chinese Name 中文名	Height (m) 高 (米)	DBH (mm) 胸徑(米)	Crown Spread (m) 樹冠(米)
T233	*Diospyros morrisiana*	羅浮柿	7.0	100	4.0
T234	*Sterculia lanceolata*	假蘋婆	6.0	150	4.0
T234A	*Alangium chinense*	八角楓	5.0	100	3.0
T235	*Acacia confusa*	台灣相思	9.5	160	7.0
T236	*Acacia confusa*	台灣相思	9.0	180	5.5
T237	*Acacia confusa*	台灣相思	8.5	150	3.0
T238	*Acacia confusa*	台灣相思	9.0	150	4.0
T239	*Acacia confusa*	台灣相思	12.0	230	4.0
T240	*Acacia confusa*	台灣相思	12.0	200	6.0
T241	*Mallotus paniculatus*	白楸	6.0	100	4.0
T242	*Ficus hispida*	對葉榕	10.0	170	6.5
T243	*Diospyros morrisiana*	羅浮柿	8.0	100	2.5
T244	*Cinnamomum parthenoxylon*	黃樟	5.5	140	4.5
T245	*Mallotus paniculatus*	白楸	7.0	170	5.0
T246	*Ficus hispida*	對葉榕	7.0	220	5.5
T247	*Mallotus paniculatus*	白楸	7.0	150	4.0
T248	*Sterculia lanceolata*	假蘋婆	7.5	130	4.5
T249	*Sterculia lanceolata*	假蘋婆	8.0	170	4.5
T250	*Ficus fistulosa*	水同木	8.0	250	6.0
T251	*Machilus chekiangensis*	浙江潤楠	11.0	280	7.0
T252	*Machilus chekiangensis*	浙江潤楠	7.0	180	4.0
T253	*Syzygium hancei*	韓氏蒲桃	5.5	350	4.0
T254	*Machilus chinensis*	華潤楠	14.0	130	4.0
T255	*Syzygium levinei*	山蒲桃	6.0	160	3.5
T256	*Acronychia pedunculata*	山油柑	7.0	140	3.5
T257	*Machilus chekiangensis*	浙江潤楠	8.0	140	4.5
T257A	*Aporusa dioica*	銀柴	5.0	180	4.0
T258	*Gardenia jasminoides*	梔子	5.0	100	3.5
T259	*Machilus chekiangensis*	浙江潤楠	7.0	200	4.5
T260	*Machilus chekiangensis*	浙江潤楠	7.5	200	5.5
T261	*Reevesia thyrsoidea*	梭羅樹	6.0	110	5.5
T262	*Castanopsis fissa*	黧蒴錐	10.0	520	6.0
T263	*Castanopsis fissa*	黧蒴錐	10.0	300	5.0
T264	*Diospyros morrisiana*	羅浮柿	9.0	180	5.0
T265	*Diospyros morrisiana*	羅浮柿	8.0	130	5.0
T265A	*Castanopsis fissa*	黧蒴錐	7.0	150	4.0
T266	*Machilus chekiangensis*	浙江潤楠	7.0	160	5.0
T267	*Castanopsis fissa*	黧蒴錐	14.0	400	9.0
T268	*Cinnamomum parthenoxylon*	黃樟	12.0	330	7.0

Tree No. 編號	Species 種類		Tree Measurements 樹木大小		
	Scientific Name 學名	Chinese Name 中文名	Height (m) 高 (米)	DBH (mm) 胸徑(米)	Crown Spread (m) 樹冠(米)
T269	*Machilus chekiangensis*	浙江潤楠	12.0	180	5.0
T270	*Castanopsis fissa*	黧蒴錐	15.0	220	6.0
T271	*Machilus chekiangensis*	浙江潤楠	13.0	160	6.0
T272	*Acacia confusa*	台灣相思	14.0	330	7.0
T273	*Mallotus paniculatus*	白楸	7.0	160	6.0
T274	*Mallotus paniculatus*	白楸	6.0	260	4.0
T274A	Dead tree	枯樹	4.0	220	0.0
T275	*Schefflera heptaphylla*	鵝掌柴	8.0	220	7.0
T276	*Mallotus paniculatus*	白楸	5.0	140	5.0
T277	*Schefflera heptaphylla*	鵝掌柴	6.5	110	3.0

Appendix D

Layout of Decorative Panels on Hoarding

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Scheme A

Scheme B

Appendix E

Methodology for Installation of Soil Nails

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Methodology for Installation of Soil Nails

The technique of soil nailing has been well-established for over 20 years in Hong Kong. This method has long been used under the Landslip Preventive Measures (LPM) Programme for the upgrading works to man-made features (including slopes and retaining walls). Due to the ease of mobilization of plant/equipment and construction, the soil nailing method has also been applied in the present Landslip Prevention and Mitigation (LPMit) Programme for mitigation works at natural hillsides in last decade.

The methodology of soil nailing works at natural hillsides and man-made features is generalized as below:

- General site review and determine tree protection zones
- Protection measures to existing trees
- Erection of scaffold, temporary access
- Setting out of soil nails and typical layout of temporary working platform (There is flexibility to adjust the location of soil nails to avoid affecting existing trees)
- Erection of temporary working platform
- Manual delivery of drilling machine to the temporary working platform
- Drilling for soil nails
- Installation of soil nails