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Civil Engineering and Development Department

Agreement No. CE 19/2008 (GE)

Landslip Prevention and Mitigation Programme, 2008, Package D
Landslip Preventive Works on Government Slopes and Retaining Walls in Sha Tin, Tai Po and Tsuen Wan – Investigation, Design and Construction

Project Profile for Landslip Preventive Works at
Feature No. 7NE-C/C310 along
Tai Po Road – Tai Po Kau

July 2011

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1 BASIC INFORMATION

1.1 Project Title

1.1.1 Landslip Preventive Works at Feature No. 7NE-C/C310 along Tai Po Road – Tai Po Kau (hereinafter referred to "the Project") is under Agreement No. CE19/2008 (GE): Landslip Prevention and Mitigation Programme, 2008, Package D, Landslip Preventive Works on Government Slopes and Retaining Walls in Sha Tin, Tai Po and Tsuen Wan - Investigation, Design and Construction.

1.2 Purpose and Nature of Project

1.2.1 The objectives of Agreement No. CE19/2008 (GE) are to collect data for 70 assigned features and about 30 related features, to carry out detailed studies on about 5 private features or private portions of mixed government/private maintenance responsibility and to upgrade 35 government features in Sha Tin, Tai Po and Tsuen Wan in the Landslip Prevention and Mitigation Programme.

1.2.2 The feature no. 7NE-C/C310 (hereinafter referred to "the Feature") is a soil cut slope located at Tai Po Road-Tai Po Kau. It was formed to its present profile between 1945 and 1963 in association with the modification of Tai Po Road. The Feature was selected for inclusion in the Landslip Prevention and Mitigation Programme by the Geotechnical Engineering Office (GEO), Civil Engineering and Development Department (CEDD) under Agreement No. CE19/2008 (GE).

1.2.3 Geotechnical investigations including desk studies and ground investigation have been completed in January 2009 and geotechnical assessment has been carried out for the Feature. Investigations reveal that the stability of the Features is of inadequate factor of safety and could not meet the current geotechnical standards. Therefore, landslip prevention and mitigation works are proposed to upgrade the Feature. The maintenance responsibility of the Feature belongs to Highways Department (HyD). The landslip prevention works to be involved for the Feature include minor earthworks, soil nailing, drainage improvements and landscaping works.

1.3 Name of Project Proponent

1.3.1 The Project Proponent is Landslip Preventive Measures Division 3 of the GEO, CEDD, Government of the Hong Kong Special Administrative Region (HKSAR).

1.4 Location and Scale of Project

1.4.1 The proposed works at the Feature, which is located at Tai Po Road-Tai Po Kau, partly falls within the Conservation Area (CA). The location of the Feature and the CA are presented in **Figure 1**.

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

1.5.1 In accordance with Category Q.1 of Part 1, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO), the Project is classified as a Designated Project. Therefore, an Environmental Permit shall be obtained prior to the commencement of the Project under the EIAO.

1.6 Name and Telephone Number of Contact Person

1.6.1 All queries regarding the Project can be addressed to:

Mr. K W Law Engineer

Geotechnical Engineering Office
Civil Engineering and Development Department
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Fax : 2712 6357
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2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Outline of Planning

2.1.1 The Project is under the scope of Agreement No. CE 19/2008 (GE) which was awarded by the CEDD to AECOM Asia Company Limited (AACL) to undertake the ground investigation, design and construction assignment of landslip preventive works on the CEDD slopes. The proposed upgrading works of the Project will be undertaken in the Works Contract No. GE/2009/21.

2.1.2 The Project involves an area of approximately 5,000m^2. The main scope of works under the Works Contract No. GE/2009/21 comprises the following:

- Installation of soil nails on soil slope profile (about 4,200m^2);
- Installation of rock dowels on rock slope portion (about 600m^2);
- Rock slope stabilization work such as removal of loose rock fragments, construction of buttress wall and installation of wire mesh where necessary at rock slope portion (about 200m^2);
- Installation of prescriptive raking drains;
- Construction of surface channels and catchpit to collect the surface runoff; and
- Provision of hydroseeding with erosion control mat and wire mesh to the completed soil slope portion (about 3,800m^2).

2.2 Tentative Project Programme

2.2.1 The Project is proposed to commence in June 2011. The tentative construction programme is shown in **Appendix A**. Details of the major activities to be carried out under the Project are summarised in **Table 2.1**.

Table 2.1 Details of Major Construction Activities

Major Construction Activities	Main Works Involved	Anticipated Duration/ Months
Minor earthworks	• Removal of hard surfacing and slope debris materials • Disposal of the debris materials	1
Installation of soil nails	• Drilling holes into slope for installation of steel bars and grouting up the holes as soil nails	5
Installation of raking drains	• Drilling holes into slope for installation of geotextile pipes as raking drains	1
Installation of rock dowels	• Drilling holes into rock slope portion for installation of steel bars and grouting up the holes as rock dowels	4
Drainage improvement works	• Construction of concrete surface drainage channels to control surface runoff	3
Maintenance access	• Construction of 600mm width concrete maintenance access with installation hand railing along the slope crest for safety issue	5

2.3 Interactions with Other Projects

2.3.1 There are landslip prevention works at two features, namely Feature Nos. 7NE-C/C285 and 7NE-C/C236 under Contract No. GE/2009/21, located at 200m and 240m away from the works boundary of the Project respectively. The construction works at Features Nos. 7NE-C/C285 and 7NE-C/C236 have already commenced and are scheduled to be completed in April and November 2011 respectively.

2.3.2 Similar to the works nature of the Project, installation of soil nails and raking drains, construction of surface drainage, rock slope remedial works and installation of erosion control

mat and wire mesh on slope surface would be carried out at both features. With anticipated localized and minor environmental impact from the landslip preventive works of the both features, no significant cumulative impact from the Project is anticipated.

3 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

3.1 General

3.1.1 The Project site adjoining Tai Po Road-Tai Po Kau to the west is a rural area. Low density residential development, Dragon Fountain, is located to the east of the site, with a small slope separating the residential development and the Project site. Village type residential developments are situated downhill at further east of the site.

3.2 Air Quality

Air Sensitive Receivers

3.2.1 Representative air sensitive receivers (ASRs) identified in the vicinity of the proposed Project site are listed in **Table 3.1** and presented in **Figure 2**.

Table 3.1 Representative Air Sensitive Receivers (ASRs)

ASR ID	Description	Landuse	No. of Floors	Closest Distance from Project Site (m)
DF1	Block A, Dragon Fountain	Residential	3	54
DF2	Block D, Dragon Fountain	Residential	3	82

3.2.2 Traffic emissions from Tai Po Road - Tai Po Tau is the major existing air emission source.

3.2.3 In the absence of nearby air quality monitoring data in the vicinity of Tai Po Kau, the annual average concentrations of total suspended particulates (TSP) monitored at the nearest EPD air quality monitoring station (Tai Po), which is located about 4.5 km away from the Project, would be used as a reference to provide information on the background air pollutant levels.

3.2.4 The latest 5-year average TSP data (2005 - 2009) of Tai Po air quality monitoring station is 67$\mu g/m^3$, which complies with the annual TSP Air Quality Objectives of 80$\mu g/m^3$.

3.3 Noise

Noise Sensitive Receivers

3.3.1 Representative noise sensitive receivers (NSRs) identified in the vicinity of the proposed Project site are listed in **Table 3.2** and presented in **Figure 2**.

Table 3.2 Representative Noise Sensitive Receivers (NSRs)

NSR ID	Description	Land Use	No. of Floors	Closest Distance from Project Site (m)
DF1	Block A, Dragon Fountain	Residential	3	54
DF2	Block D, Dragon Fountain	Residential	3	82

3.4 Water Quality

3.4.1 Drainage culverts lie at the northern and southern ends and also as the eastern side of the works area of the Project. No other water quality sensitive receivers have been identified in the vicinity of the site.

3.5 Ecology

3.5.1 Ecological surveys were conducted within and adjacent to the proposed works area in June 2009; additional surveys were conducted in March 2011 to update the existing ecological condition of the Feature. The surveys consisted of the following aspects:

- Habitat and Vegetation Surveys: Dominant and notable plant species, relative abundance and growth forms were recorded. Identification of species and distribution status in Hong

Kong were made with reference to Corlett *et al*. (2000)[1] and Hong Kong Herbarium (2004)[2].

- Wildlife Survey: Wildlife including avifauna, herpetofauna, mammal and terrestrial insect (Odonate and Lepidoptera) was surveyed by direct sighting and hearing of animal calls. Active search of potential herpetofauna/mammal habitats was undertaken. Signs of terrestrial mammals (i.e. dropping, footprints and burrows) were searched for.

Areas of Conservation Interest

3.5.2 As discussed in **Section 1**, the Feature is located along Tai Po Road – Tai Po Kau and is partially located within Conservation Area (CA), which is zoned under the Tai Po Outline Zoning Plan (OZP No. S/TP/22), as presented in **Figure 1**. The CA is a highly diverse woodland habitat with mature and rich lowland forest. This zoning is intended to protect and retain the existing natural landscape, ecological or topographical features of the area and to separate sensitive natural environment such as Site of Special Scientific Interest or Country Park from the adverse effects of development.

Habitat and Vegetation

3.5.3 The Feature is approximately 200 m in length. Five habitat types were found within and adjacent to the Feature, including woodland, shrubland, plantation, grassland and developed area. The Feature is mainly composed of woodland at the upper slope, developed area at the lower slope, plantation between the woodland and the developed area, shrubland at the southern part of the Feature, and grassland at the northern and southern end of the Feature.

3.5.4 A habitat map showing the distribution of these five habitats is presented in **Figure 3**. Representative photographs of the habitats observed within and adjacent to the Feature are given in **Appendix B**.

3.5.5 The woodland habitat located at the upper part of the slope was largely covered with a canopy of mature trees such as *Ficus hispida*, *Schefflera heptaphylla*, *Macaranga tanarius*, *Bischofia javanica*, *Cinnamomum camphora* and *Machilus* spp*.* Other species such as climber species *Mikania micrantha* and *Pueraria* spp.; shrub species *Lantana camara* and *Psychotria asiatica*; and herb species *Lophatherum gracile* and *Neyraudia reynaudiana* were also recorded within the woodland habitat.

3.5.6 Within the shrubland habitat located at the southern part of the Feature, dominant species recorded include *Lantana camara*, *Macaranga tanarius*, *Mikania micrantha* and *Pueraria* spp. Plant species that were also commonly recorded within shrubland habitat include shrub species *Alangium chinense, Ardisia crenata, Ilex asprella, Melastoma sanguineum* and *Melicope pteleifolia*; and herb species *Adiantum capillus-veneris* and *Blechnum orientale*.

3.5.7 At the plantation habitat located at the middle part of the Feature, *Acacia confusa* was the dominant species recorded. Other species recorded within plantation habitat include *Ficus hispida, F. virens, Alangium chinense* and *Bauhinia championi.*

3.5.8 Within the grassland habitat recorded at the northern and southern end of the Feature, herb species was observed to be dominant in this habitat. Herb species recorded include *Alocasia odora, A. cucullata, Borreria* spp.*, Centella asiatica, Polygonum chinense, Wedelia trilobata,* and *Youngia japonica*.

3.5.9 Developed area, which was mostly covered with concrete surface, was recorded at the lower part of the Feature. Plant coverage was low in this habitat; some of the species recorded include *Wedelia trilobata, Amaranthus viridis,* and *Trema tomentosa*.

3.5.10 Ten individuals of Incense Tree (*Aquilaria sinensis*) were found at the woodland, plantation, and developed habitats within and adjacent to the Feature. One individual was in a tree form

[1] Corlett, R.T., Xing, F.W., Ng, S.C., Chau, L.K.C., Wong, L.M.Y. (2000): Hong Kong Vascular Plants: Distribution and Status. *Memoirs of the Hong Kong Natural History Society* 23: 1-148.

[2] Hong Kong Herbarium (2004): *Check List of Hong Kong Plants 2004.* Agriculture, Fisheries and Conservation Department (AFCD), Hong Kong.

(height: 5m, trunk diameter: 150 mm), four were young trees (height: 1-1.5m) and the remaining five individuals were in a whip form (height: ~0.5 m). Owing to the intensive use of this species for commercial purpose, wild populations of *Aquilaria sinensis* outside Hong Kong have become rare; large individuals of Incense Trees are particularly uncommon. Within Hong Kong, Incense Tree is common in lowland areas; this species is scheduled under Cap. 586 (i.e. *the Protection of Endangered Species of Animals and Plants Ordinance*). All Incense Tree individuals were recorded within the Feature boundary except one of them lied just beyond the boundary.

3.5.11 Two tree species with restricted distribution in Hong Kong, Philippine's Hackberry (*Celtis timorensis*) and Persimmon-leaved Litsea (*Litsea monopetala*), were recorded within the developed and shrubland habitats respectively. The individual of Philippine's Hackberry was in a whip form (height: 0.3 m), and the individual of Persimmon-leaved Litsea was in a tree form (height: ~4m, trunk diameter: ~200 mm). Both species were recorded within the Feature boundary.

3.5.12 Five seedlings of Ailanthus (*Ailanthus fordii*) were recorded within the Feature boundary. Three individuals were in young trees (height: 1-1.5m) and the other two individuals were in a whip form (height: ~0.5 m). It is a rare tree species distributed in lowland evergreen forests in Hong Kong and it is currently under the protection in Hong Kong legislation (Cap. 96) and its status in China is classified as “Near Threatened (NT)” .

3.5.13 One individual of Lamb of Tartary (*Cibotium barometz*) was found on the edge of the woodland within the Feature boundary. It is a large, tree-like fern species which is scheduled under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586). The recorded individual has a height of about 1m. Serious decline in population size and number of individuals outside Hong Kong due to extensive collection for herbal medical uses, and hence this vulnerable species was also listed as a wild plant under Category II state protection in China.

3.5.14 One individual of Hong Kong Pavetta (*Pavette hongkongensis*) was recorded within the woodland in the Feature boundary, of which with a height of 2.2m. It is a common shrub or small tree species listed under Forests and Countryside Ordinance (Cap. 96) in Hong Kong.

3.5.15 *Rhododendron* spp. was also recorded at the northern end of the slope within the works area. It was observably cultivated within the plantation habitat.

3.5.16 A full list of flora recorded within and adjacent to the Feature is given in **Appendix C**. Location of flora species of conservation interest recorded within the Feature is presented in **Figure 3**. Representative photographs of the flora species of conservation interest recorded are shown in **Appendix E**.

Wildlife

3.5.17 A total of 13 species of birds were recorded at the Feature and adjacent habitats during the surveys. Red-whiskered Bulbul (*Pycnonotus jocosus*) and Chinese Bulbul (*Pycnonotus sinensis*) were the most commonly recorded. All recorded species are common and widespread in Hong Kong. One individual of Black Kite (*Milvus migrans*), a species of conservation interest, was observed at flight over the shrubland habitat. No nesting ground of birds was found within or adjacent to the Feature.

3.5.18 A total of 14 species of butterfly were recorded during the surveys. Most of them are common in Hong Kong, except one uncommon species, Common Jay (*Graphium doson axion*), recorded within shrubland habitat adjacent to the Feature. Common Jay is often found in forests and occurs from February to November (Lo, 2005)[3].

[3] Lo, P.Y.F. (2005): *Hong Kong Butterflies*, 2nd edition. Agriculture, Fisheries and Conservation Department (AFCD), Hong Kong.

3.5.19 Two species of dragonfly, Wandering Glider (*Pantala flavescens*) and Indigo Dropwing (*Trithemis festiva*), were recorded during the surveys. Both species are abundant and widespread in Hong Kong.

3.5.20 No direct or indirect observations of herpetofauna and mammal were made during the surveys.

3.5.21 A full list of fauna recorded within and adjacent to the Feature is given in **Appendix D**. The location of the uncommon butterfly species, Common Jay, recorded within the works area is shown in **Figure 3**. Representative photograph of this species of conservation interest is shown in **Appendix E**.

3.6 Landscape and Visual

3.6.1 The Project is visually sensitive as it is located along Tai Po Road – Tai Po Kau. The existing slope surface of the Project is mainly covered by sprayed concrete and is partly vegetated. Behind the slope crest, there is a natural hillside. Slopes adjacent to the Project are either vegetated, concrete sprayed, or covered with stone pitching surfacing. The potential visual impacts associated with the Project and the mitigation measures are discussed in **Sections 4** and **5**.

3.7 Cultural Heritage

3.7.1 No declared monuments, proposed monuments, graded historic sites/buildings, heritage resources and Sites of Archaeological Interest are located within the Project site.

4 POSSIBLE IMPACT ON THE ENVIRONMENT

4.1 General

4.1.1 Based on the nature and location of the Project, potential environmental impacts associated with the Project are assessed as presented below.

4.2 Potential Environmental Impacts during Construction Phase

Air Quality

4.2.1 Potential air quality impacts may arise from fugitive dust emissions generated from minor earthworks for the removal of existing hard surfacing, soil nailing works and handling and transportation of construction and demolition (C&D) materials. Mitigation measures have been recommended to minimize the potential dust associated with these construction activities. Details of dust suppression measures have been discussed in **Section 5**.

4.2.2 In view of the nature and small scale of works which involve limited number of plants (**Appendix F**), in addition to the implementation of dust suppression measures, no adverse dust impact is anticipated. Besides, taken into account of considerable separation distance between the localized construction works and the ASRs, as well as only limited number of vehicles and plants employed for the proposed works, exhaust emission from the limited construction plant is anticipated to be insignificant.

Noise

4.2.3 The major source of construction noise impact would be the operation of powered mechanical equipments (PMEs) for carrying out the landslip preventive works. The activities would be conducted during non-restricted hours i.e. daytime (7am to 7pm), Monday to Saturday except Sundays and public holidays. No construction activities would be carried out during the restricted hours (7 pm to 7 am on weekdays and anytime on Sundays and public holidays).

4.2.4 The proposed plant inventory for the construction activities and the predicted noise levels at representative NSRs are presented in **Appendix F**. The PMEs to be employed were grouped under each construction activity for evaluation of noise to be generated. Sound power level (SWL) of the PME is taken from the Table 3 of *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (GW-TM).

4.2.5 A summary of the noise prediction, following the assessment methodology outlined in GW-TM, at representative NSRs is given in **Table 4.1** below. The predicted noise levels at the NSRs ranged from 64 – 75 dB(A), complying with the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM) criteria of 75dB(A). Based on the noise prediction results, it is thus concluded that no adverse impact is anticipated from the construction activities of the Project.

Table 4.1 Predicted Noise Levels Associated with the Landslip Preventive Works

NSR ID	Description	Predicted Construction Noise Levels, dB(A)	EIAO-TM Noise Criteria, dB(A)
DF1	Block A, Dragon Fountain	66 – 75	75
DF2	Block D, Dragon Fountain	64 – 73	75

Water Quality

4.2.6 During the construction phase, runoff and drainage from construction site would be the main sources of potential water quality impacts. Appropriate measures would be implemented as far as practicable in accordance with the guidelines stipulated in EPD's Practice Note for Professional Persons on Construction Site Drainage ProPECC PN1/94 to minimize potential water quality impacts. Runoff and drainage from the Project site will be properly collected and treated 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 anticipated with the provision of proper site drainage system and implementation of the mitigation measures recommended in **Section 5**.

Ecology

4.2.7 The construction phase of the Project would require removal of loose rock fragment on the slope surface, vegetation clearance within the works area of approximately 5,000 m^2. Although all the existing trees would be retained on site, the installation of slope stabilisation facilities such as soil nails, rock dowel, rock mesh, u-channel and maintenance stairway would have potential direct impacts to the understorey vegetation including the six plant species of conservation interest recorded within the works area if no mitigation measures are implemented, including Incense Tree (*Aquilaria sinensis*), Philippine's Hackberry (*Celtis timorensis*), Ailanthus (*Ailanthus fordii*), Hong Kong Pavetta (*Pavetta hongkongensis*), Lamb to Tartary (*Cibotium barometz*) and Persimmon-leaved Litsea (*Litsea monopetala*). Other potential indirect impacts to the works area and adjacent habitats/wildlife would be resulted from construction phase activities and increased human activity, such as trampling of habitats/vegetation, littering, and waste generated from workforce. Such impacts would be temporary in nature and would only affect low value ecological habitats. With the implementation of the mitigation measures proposed in **Section 5**, indirect ecological impacts are expected to be minimal.

Landscape and Visual

4.2.8 There are approximately 140 trees located within the Project area. During the construction phase, temporary scaffolding and working platforms would be erected on the slope face to install soil nails and carry out landscaping works. All the existing trees will be retained on site. With the implementation of tree protective measures, the impact on landscape resources would be insignificant.

4.2.9 Given that the nature of the proposed construction works is small in scale, localized and temporary and all the existing trees will be retained, it is considered that the visual impact due to the construction works of the Project is slight and temporary.

Cultural Heritage

4.2.10 No declared monuments, proposed monuments, graded historic sites/buildings, heritage resources and Sites of Archaeological Interest are located within 50m from the proposed works site boundary and thus no declared monuments, proposed monuments, graded historic sites/buildings, heritage resources and Sites of Archaeological Interest would be affected by the proposed landslip preventive works.

Waste Management

4.2.11 The C&D materials including artificial hard material (AHM), soil/rock and non-inert materials would be generated from site clearance, removal of existing slope surfacing and surface channel materials and during drilling of soil nails, raking drains and rock dowels etc.

4.2.12 Inert C&D materials will be taken to the Public Fill Facility at Tuen Mun Area 38 Fill Bank managed by the CEDD, while non-inert materials and general refuse will be disposed of at NENT Landfill managed by EPD. Permissions have been granted from EPD and CEDD for waste disposal to these designated facilities. Estimated volumes of the wastes are summarized in **Table 4.2** below. Only minimal amount of general refuse, chemical wastes and sewage would be produced from general site works and workforce. No other waste types would be generated from the proposed construction activities.

Table 4.2 Estimated Quantities of Waste Materials Generated from the Project

Type of Waste	Source	Estimated Volume/ m^3	Designated Waste Handling Facilities

Type of Waste	Source	Estimated Volume/ m^3	Designated Waste Handling Facilities
Artificial hard material	Existing hard surfacing removal	100	Tuen Mun Area 38 Fill Bank managed by the CEDD
	Existing channel surface removal	60	
Soil /rock	Soil nails, raking drains and rock dowel drilling	150	
	Soil nail head excavation	80	
Non-inert materials, such as timber, debris etc.	Site Clearance	100	NENT Landfill managed by EPD
	Total	490	

4.2.13 Provided that the good site practices recommended in **Section 5** will be strictly followed during handling and transportation of construction wastes generated from the Project, no adverse environmental impacts are anticipated during the construction phase.

4.3 Potential Environmental Impacts during Operation Phase

4.3.1 No adverse impact would be expected during the operation phase of the proposed landslip preventive works with regard to the environmental issues of air quality, noise, water quality, ecology, cultural heritage and waste management.

4.3.2 With the landscape proposal presented in **Figures 4A** and **B**, it is expected that the proposed landscaping works such as hydroseeding and woodland mix planting would match with the existing surroundings, resulting in slight positive impact in terms of landscape resources in long term. The landscape proposal is discussed in **Section 5** in detail.

5 ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND FURTHER ENVIRONMENTAL IMPLICATIONS

5.1 Construction Phase / Operation Phase

Air Quality

5.1.1 To minimise the potential construction dust impact to the surrounding sensitive receivers, good site practices should be employed on site to minimize dust emission. The following dust suppression measures should be carried out to minimize construction dust impact:

- Use of regular watering/ tarpaulin, with complete coverage, to reduce dust emissions from exposed site surfaces, particularly during dry weather.
- Use of frequent watering for particularly dusty static construction areas.
- Tarpaulin covering of all dusty vehicle loads transported to and from the site.
- Water construction vehicles' wheels and body before exiting the site.
- Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.

Noise

5.1.2 To minimize the noise impact to the surrounding environment, the following recommended good site practices should be adopted:

- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program.
- Silencers or mufflers on construction equipment should be utilized as far as practicable and should be properly maintained during the construction program.
- Mobile plant, if any, should be sited as far from NSRs as possible.
- Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum.
- Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs.
- Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities.

Water Quality

5.1.3 The site practices outlined in EPD's Practice Note for Professional Persons on Construction Site Drainage ProPECC PN1/94 should be followed to minimize surface runoff. The water quality of the treated surface runoff should comply with the statutory requirement under the *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* of the *Water Pollution Control Ordinance*. Recommended mitigation measures for minimizing potential water quality impact listed below should be followed throughout the construction phase:

Surface run-off

- Surface run-off from construction site should be discharged into storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sedimentation basins.
- Open stockpiles of construction materials on sites should be covered with tarpaulin or similar fabric as necessary during rainstorms.
- Good site practices should be adopted to remove rubbish and litter from construction site so as to prevent the rubbish and litter from spreading from the site area. It is recommended to clean the construction sites on a regular basis.

Sewage from Workforce

- Sufficient chemical toilets should be provided in the works areas and a licensed waste collector should be deployed to clean the chemical toilets on a regular basis.
- Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment.

Ecology

5.1.4 Major ecological impact identified would be the potential loss of the six plant species of conservation interest recorded within the works area. To avoid the loss, detailed design of the construction works would take into account their locations, and retain the individuals in-situ. Prior to the commencement of construction works, the exact locations of the individuals would be identified, and be tagged with eye catching tapes or surrounded by barricades to avoid any damage that may be caused during construction phase. The minor excavation that might be required during soil nailing and formation of u-channel and stairway should avoid any damage to the root system of the plants located on the slope. The extent of excavation on the slope should also be kept to a bare minimum.

5.1.5 To compensate for the loss of vegetation during site clearance, upon completion of works, compensatory landscape planting would be provided to compensate for the loss. A planting schedule is presented in **Figure 4B**.

5.1.6 All trees should be retained in-situ and no tree felling would be required. Temporary protective hessian armouring around the tree trucks would be provided by the Contractor to protect the existing trees prior to the commencement of site clearance, demolition and construction of the slope works.

5.1.7 As the health of the single individual of *Litsea monopetala* recorded within work area was unsatisfactory, a review on the tree condition is recommended prior the construction work. And extra care (e.g. protection of root system, regular watering, etc.) should be taken to avoid posing any further stresses on the tree due to the construction activities..

5.1.8 Standard good site practice should be implemented to avoid and minimise potential disturbance to the surrounding habitats, including:

- Placement of equipment or stockpile in designated works areas, and select access routes within existing disturbed land, or at the locations most convenient to access to the slope area;
- Construction activities should be restricted to works areas that would be clearly demarcated;
- Works areas should be reinstated immediately after completion of works;
- Provision of sufficient waste disposal facilities to collect construction wastes and general refuse. The wastes should be disposed of timely and properly off-site;
- Open burning on works sites is illegal, and should be strictly prohibited;
- Fire fighting equipment should be provided in the works areas before the commencement of works;
- The resident site staff should monitor the proper implementation of the above mitigation measures.

Landscape and Visual

5.1.9 Temporary hoarding would be erected along the boundary of the works site to provide some screening effect to the surrounding sensitive receivers. An outline of the landscape mitigation proposal is presented in **Figures 4A** and **4B**. Part of the current vegetation cover on the northern slope surface of the Project would be removed and replaced by sprayed concrete with colour paints and planter holes and rock mesh to reduce visual impacts.

5.1.10 In addition, hydroseeding with woodland mix planting at the southern portion slope crest are proposed to compensate the vegetation clearance. Seedlings include *Litsea glutinosa*, *Macarange tanarius*, *Machilus thunbergii* and *Schima superba* and large shrubs include *Ligustrum sinense* and *Melastoma candidum* would be introduced to the southern portion of the slope crest by hydroseeding. No tree felling, particularly no removal of the plant species of conservation interest, would also be required. The protective measures for the existing trees and the plants are recommended in **Sections 5.1.4** to **5.1.8** above. The visual impact of the maintenance staircases would be minimized by providing colour paints to blend into the surrounding environments.

Cultural Heritage

5.1.11 With no cultural heritage impact anticipated, mitigation measures would not be required.

Waste Management

5.1.12 Although only minimal amount of waste would be generated from the construction activities, mitigation measures are recommended as follow to reduce impacts arising from the Project.

Good Site Practices and Waste Reduction Measures

- Training of site personnel in site cleanliness, proper waste management and chemical handling procedures.
- Provision of sufficient waste disposal points and regular collection of waste.
- Appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.
- Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors.
- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.
- Encourage collection of aluminium cans by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the workforce.
- Proper storage and site practices to minimize the potential for damage or contamination of construction materials.
- Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary generation of waste.
- Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycle.

Storage, Collection and Transportation of Waste

- Waste should be handled and stored well to ensure secure containment, thus minimising the potential of pollution.
- Maintain and clean storage areas routinely.
- Storage area should be provided with covers and, if necessary, water spraying system to prevent materials from wind-blown or being washed away.
- Different locations should be designated to stock each material to enhance reuse where applicable.
- Water trucks' wheels and body before leaving the works area. This can reduce the introduction of dust to the public road network.

- The construction waste generated on-site would be transported to the designated disposal facilities managed by EPD or CEDD. Monitoring of the Contractor's compliance with the requirements of the trip ticket system would be carried out to ensure that the waste actually reaches the intended disposal facility and the correct procedures are being followed at all times.

5.2 Severity, Distribution and Duration of Environmental Effects

5.2.1 No adverse residual environmental impacts are anticipated with the implementation of the recommended mitigation measures.

5.3 Further Implications

5.3.1 No further environmental impacts are anticipated with the implementation of the recommended mitigation measures.

6 CONCLUSION

6.1.1 The potential environmental impacts arising from the Project have been assessed, including air quality, noise, water quality, ecology, landscape and visual, cultural heritage and waste management aspects.

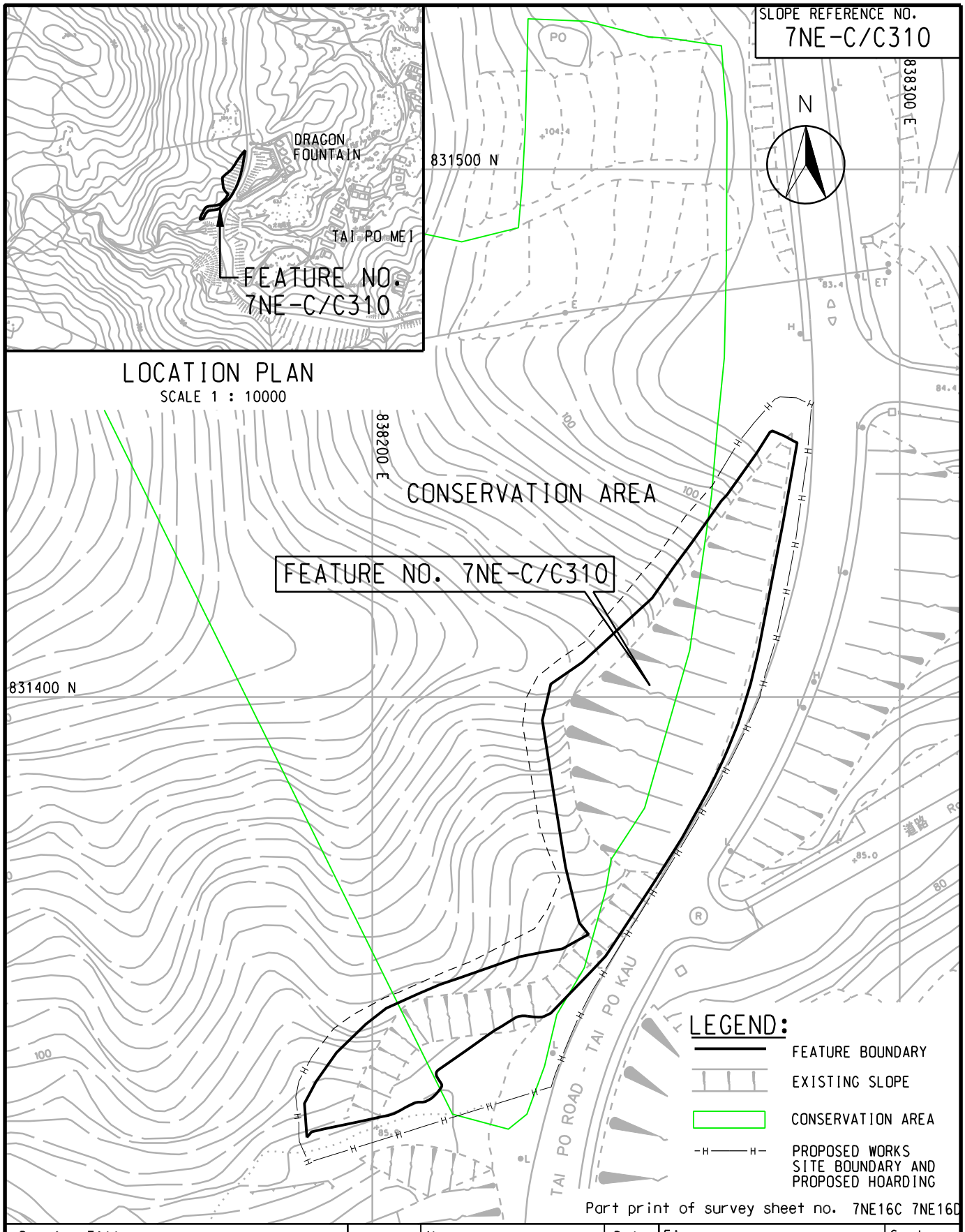
6.1.2 Based on the findings of the assessed aspects, with proper implementation of the recommended mitigation measures given in **Section 5**, no adverse environmental impact is anticipated during the construction and operation phases of the Project. During operation phase of the Project, with implementation of the landscape proposal, slight positive impact in terms of landscape resources is predicted in the long term.

7 USE OF PREVIOUSLY APPROVED EIA REPORTS

7.1.1 Relevant project profiles submitted for application for permission to apply directly for an Environmental Permit (EP) are listed below:

- Agreement No. CE 11/2004 (GE) 10-year Extended LPM Project, Phase 5, Package E – Tai Po Landslip Preventive Works on Government Slopes and Related Studies – Investigation, Design and Construction: Landslip Preventive Works at Feature No. 3SE-B/C156, Along Bride's Pool Road, Near Chung Mei Plover Cove Reservoir, Tai Po (Submitted in December 2007 and EP was granted in February 2008 with EP no. EP-304/2008).

Figures



Part print of survey sheet no. 7NE16C 7NE16D

Drawing Title		Name	Date	Figure	Scale
PROJECT LOCATION PLAN	Designed	TWC	03/11	FIGURE 1	1:1000
	Drawn	SZS	03/11	GEOTECHNICAL ENGINEERING OFFICE	
AECOM	Checked	WWL	03/11	CEDD Civil Engineering and Development Department Geotechnical Engineering Office	
	Approved	AKLN	03/11		

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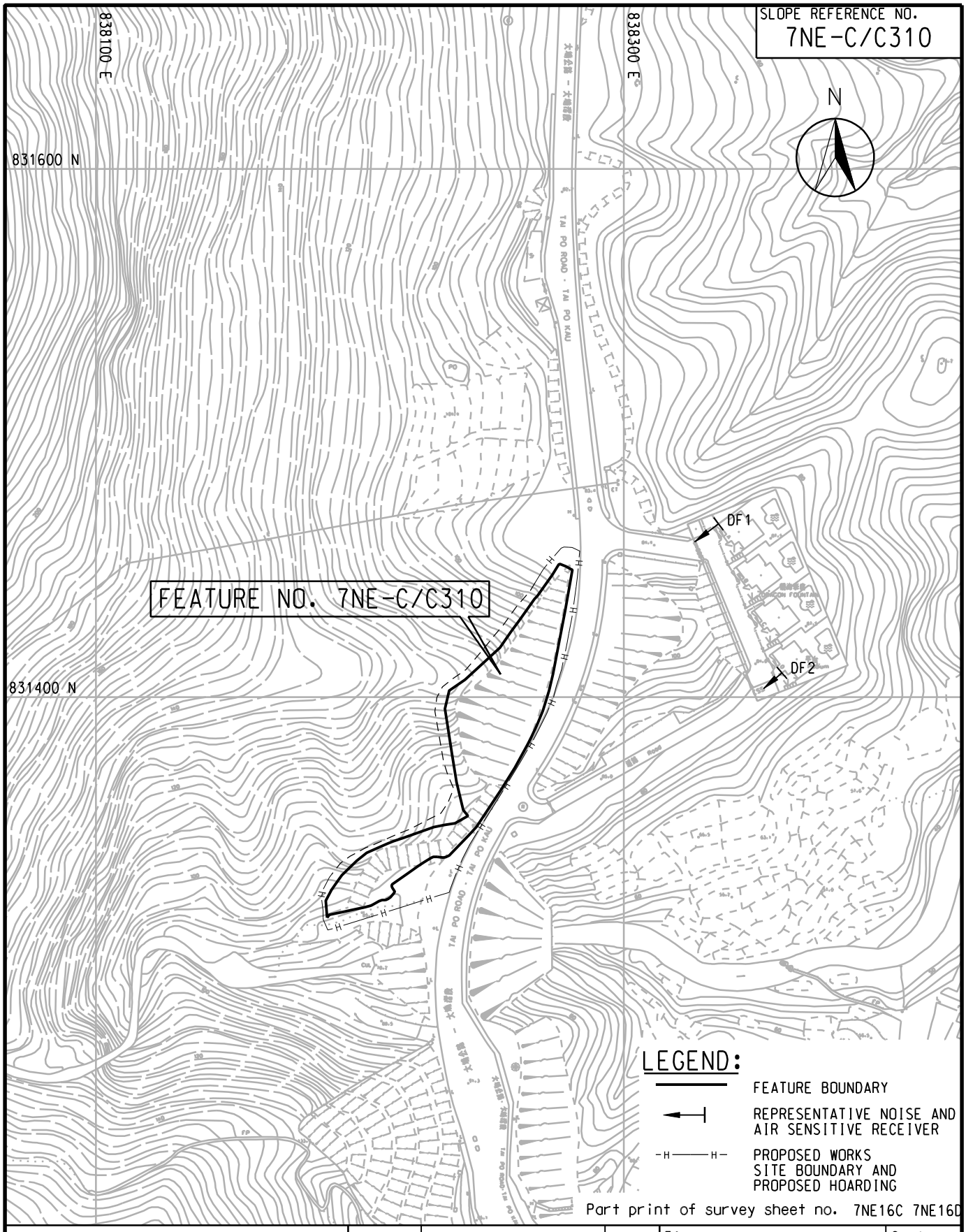
p:\projects\60048431\DRAWING\FIG\FIG 1.dgn

SLOPE REFERENCE NO.
7NE-C/C310



Part print of survey sheet no. 7NE16C 7NE16D

Drawing Title		Name	Date	Figure	Scale
LOCATION OF REPRESENTATIVE SENSITIVE RECEIVERS	Designed	TWC	03/11	FIGURE 2	1:2000
	Drawn	SZS	03/11	GEOTECHNICAL ENGINEERING OFFICE	
AECOM	Checked	WWL	03/11	CEDD Civil Engineering and Development Department Geotechnical Engineering Office	
	Approved	AKLN	03/11		

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p:\projects\60048431\DRAWING\FIG\FIG 2.dgn

831350 N

831400 N

831450 N

N

838190 E

838240 E

FEATURE NO. 7NE-C/C310

TAI PO ROAD

TAI PO KAU

LEGEND:

- FEATURE BOUNDARY
- PROPOSED WORKS SITE BOUNDARY AND PROPOSED HOARDING
- WOODLAND
- SHRUBLAND
- PLANTATION
- GRASSLAND
- DEVELOPED AREA
- CELTIS TIMORENSIS
- LITSEA MONOPETALA
- GRAPHIUM DOSON AXION
- AQUILARIA SINENSIS
- AREA WITH AQUILARIA SINENSIS
- AREA WITH AILANTHUS FORDII
- PAVETTA HONGKONGENSIS
- CIBOTIUM BAROMETZ

CEDD Civil Engineering and Development Department
Geotechnical Engineering Office

PROJECT :
CONTRACT NO. GE/2009/21
LANDSLIP PREVENTION AND MITIGATION PROGRAMME, 2008, PACKAGE D LANDSLIP PREVENTIVE WORKS ON GOVERNMENT SLOPES AND RETAINING WALLS SHA TIN, TAI PO AND TSUEN WAN-INVESTIGATION, DESIGN AND CONSTRUCTION

TITLE : HABITAT MAP

LOCATION:Tai Po Road - Tai Po Kau

DRAWN :	DESIGNED :	DATE :	DRG. NO.:	REV.:
CHW	CKL1	03/11	FIGURE 3	

AECOM

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P:\PROJECTS\60048431\DRAWING\FIG\FIG 3.dgn

838220 E

838250 E

838280 E

831430 N

831400 N

100

N

CP

TO EXISTING DRAINAGE SYSTEM

PROPOSED ROCK MESH

EXISTING CONCRETE SURFACE

PROPOSED SHOTCRETE SURFACE WITH COLOUR PAINT AND WIRE MESH

FEATURE NO. 7NE-C/C310

CUT LINE

SCALE 1 : 300

LEGEND:

- FEATURE BOUNDARY
- EXISTING FEATURE BOUNDARY
- PROPOSED 600mm WIDTH CONCRETE MAINTENANCE STAIRWAY WITH HANDRAILING
- PROPOSED LOCKABLE GATE FOR MAINTENANCE STAIRWAY
- EXISTING CONCRETE PAVING WITH HANDRAILING
- EXISTING TREE
- PROPOSED TREE RING
- PROPOSED CATCHPIT WITH CONCRETE COVER
- EXISTING CATCHPIT WITH PROPOSED CONCRETE COVER
- PROPOSED U-CHANNEL
- PROPOSED STEPPED CHANNEL
- EXISTING U-CHANNEL
- EXISTING STEPPED CHANNEL
- PROPOSED HYDROSEEDING AND WOODLAND MIX PLANTING
- PROPOSED ROCK MESH
- PROPOSED CONCRETE PAVING WITH HANDRAILING
- PROPOSED WORKS SITE BOUNDARY AND PROPOSED HOARDING
- PROPOSED SOIL NAIL
- PROPOSED ROCK DOWELS
- PROPOSED PULL-OUT TEST SOIL NAILS
- PROPOSED RAKING DRAINS

No.	Date	Description	Initial
A	01/10	MINOR AMENDMENT	TWC

REVISION

	Name	Date
Designed	TWC	03/11
Drawn	WY	03/11
Checked	WWL	03/11
Approved	AKLN	03/11
Contract No.	GE/2008/08	-
Drawing No.	FIGURE 4A	03/11

Drawing Title

Feature No. 7NE-C/C310
Tai Po Road - Tai Po Kau

LANDSCAPE PROPOSAL

SHEET 1 OF 2

GEOTECHNICAL ENGINEERING OFFICE

CEDD Civil Engineering and Development Department

AECOM

PART PRINT OF SURVEY SHEET NO. : 7NE16D, 7NE16C

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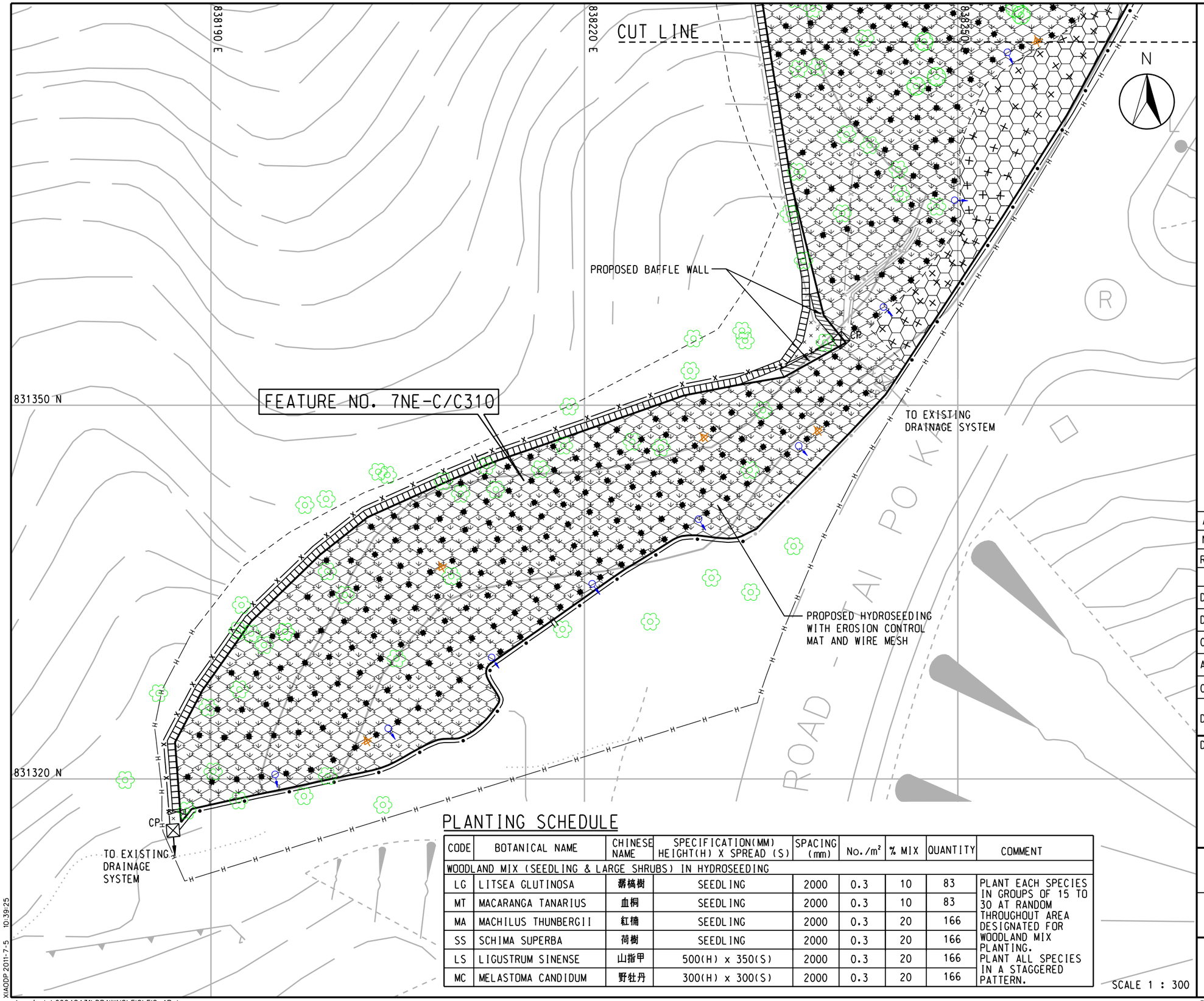
p:\projects\60048431\DRAWING\FIG\FIG 4A.dgn



LEGEND:

- FEATURE BOUNDARY
- EXISTING FEATURE BOUNDARY
- PROPOSED 600mm WIDTH CONCRETE MAINTENANCE STAIRWAY WITH HANDRAILING
- PROPOSED LOCKABLE GATE FOR MAINTENANCE STAIRWAY
- PROPOSED BAFFLE WALL
- EXISTING CONCRETE PAVING WITH HANDRAILING
- EXISTING TREE
- PROPOSED TREE RING
- PROPOSED CATCHPIT WITH CONCRETE COVER
- EXISTING CATCHPIT WITH PROPOSED CONCRETE COVER
- PROPOSED U-CHANNEL
- PROPOSED STEPPED CHANNEL
- EXISTING U-CHANNEL
- EXISTING STEPPED CHANNEL
- PROPOSED HYDROSEEDING AND WOODLAND MIX PLANTING
- PROPOSED ROCK MESH
- PROPOSED CONCRETE PAVING WITH HANDRAILING
- PROPOSED WORKS SITE BOUNDARY AND PROPOSED HOARDING
- PROPOSED SOIL NAIL
- PROPOSED ROCK DOWELS
- PROPOSED PULL-OUT TEST SOIL NAILS
- PROPOSED RAKING DRAINS

PLANTING SCHEDULE

CODE	BOTANICAL NAME	CHINESE NAME	SPECIFICATION(MM) HEIGHT(H) X SPREAD (S)	SPACING (mm)	No./m²	% MIX	QUANTITY	COMMENT
WOODLAND MIX (SEEDLING & LARGE SHRUBS) IN HYDROSEEDING								
LG	LITSEA GLUTINOSA	潺槁樹	SEEDLING	2000	0.3	10	83	PLANT EACH SPECIES IN GROUPS OF 15 TO 30 AT RANDOM THROUGHOUT AREA DESIGNATED FOR WOODLAND MIX PLANTING. PLANT ALL SPECIES IN A STAGGERED PATTERN.
MT	MACARANGA TANARIUS	血桐	SEEDLING	2000	0.3	10	83	
MA	MACHILUS THUNBERGII	紅楠	SEEDLING	2000	0.3	20	166	
SS	SCHIMA SUPERBA	荷樹	SEEDLING	2000	0.3	20	166	
LS	LIGUSTRUM SINENSE	山指甲	500(H) x 350(S)	2000	0.3	20	166	
MC	MELASTOMA CANDIDUM	野牡丹	300(H) x 300(S)	2000	0.3	20	166	

SCALE 1 : 300

No.	Date	Description	Initial
A	01/10	MINOR AMENDMENT	TWC

REVISION

	Name	Date
Designed	TWC	03/11
Drawn	WY	03/11
Checked	WWL	03/11
Approved	AKLN	03/11
Contract No.	GE/2008/08	-
Drawing No.	FIGURE 4B	03/11

Drawing Title

Feature No. 7NE-C/C310
Tai Po Road - Tai Po Kau

LANDSCAPE PROPOSAL

SHEET 2 OF 2

GEOTECHNICAL ENGINEERING OFFICE

CEDD Civil Engineering and Development Department

AECOM

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PART PRINT OF SURVEY SHEET NO. :7NE16D,7NE16C

APPENDIX A

Tentative Construction Programme

Appendix A Tentative Construction Programme

Act No.	Main Construction Elements	2011					2012			
		Aug 1	Sep 2	Oct 3	Nov 4	Dec 5	Jan 6	Feb 7	Mar 8	Apr 9
1	Site Pocession and Preparation									
2	Installation of soil nails									
3	Installation of raking drains									
4	Removal of hard surfacing (Soil slope portion)									
5	Removal of hard surfacing (Rock slope portion)									
6	Installation of rock dowels									
7	Drainage improvement works and Construction of maintenance access									
8	Construction of berm and handrailing along maintenance access									
9	Soft landscaping works and Site Clearance									

APPENDIX B

Representative Photographs of Habitats Recorded Within or Adjacent to the Feature

Woodland

Shrubland

Plantation

AECOM	Agreement No. CE 19/2008 (GE) Ecological Survey for Feature No. 7NE-C/C310 **Representative Photographs of Habitats Recorded Within or Adjacent to the Feature**	SCALE	N.T.S.	DATE	Mar 11
		CHECK	GCCL	DRAWN	KCYJ
		JOB NO.	60187161	**DRAWING No.** Appendix B	**Rev** -

Grassland

Developed Area

AECOM	Agreement No. CE 19/2008 (GE) Ecological Survey for Feature No. 7NE-C/C310 **Representative Photographs of Habitats Recorded Within or Adjacent to the Feature**	SCALE	N.T.S.	DATE	Mar 11
		CHECK	GCCL	DRAWN	KCYJ
		JOB NO.	60187161	**DRAWING No.** Appendix B	**Rev** -

APPENDIX C

Floral Species Recorded Within or Adjacent to the Feature

Appendix C Floral Species Recorded Within or Adjacent to the Feature
(Code for Abundance: xxxx=abundant; xxx=frequent; xx=occasional; x=scarce)

Plant Species	Growth Form	Status in HK	Woodland	Shrubland	Plantation	Grassland	Developed Area	Adjacent
Acacia confusa	tree	exotic, common	x	x	xxxx		x	x
Adiantum capillus-veneris	herb	common		xx			x	
Ageratum conyzoides	herb	exotic, common	x	x				x
Ailanthus fordii	small tree	rare, listed under Cap. 96 sub. leg.	xx					
Alangium chinense	shrub	common	x	xx	xx		x	
Aleurites moluccana	tree	common					x	
Alocasia odora	perennial herb	common	xxx	xxx		x	x	
Alocasia cucullata	perennial herb	common		x		x		x
Amaranthus viridis	herb	common	x	x			xx	
Aporusa dioca	tree	common	x	x	x			
Aquilaria sinensis	tree	common, wild plant under State protection (category II); recorded in China Plant Red Data Book and Illustration of Rare & endangered plant in Guangdong Province	xx	x	x		x	
Archidendron clypearia	tree	common		x				
Arachis hypogaea	Herb	common				xxx	x	xx
Ardisia crenata	shrub	common		xx				
Ardisia lindleyana	herb	common	x	x				
Bauhinia blakeana	tree	common		x				
Bauhinia championi	woody climber	common	xxx	xxx	xx			
Bauhinia glauca	climber	common		xx				
Bauhinia variegans	tree	common	x	x	x	xx		x
Berchemia racemosa (Berchemia floribunda)	climbing shrub	common	x					
Bidens alba	herb	exotic, very common	xxx	xxx			x	
Bischofia javanica	tree	common	x	xxx			x	
Blechnum orientale	herb	very common	xx	xx				
Borreria spp.	herb	common		x		x	x	x
Breynia fruticosa	shrub	very common	x		x			
Bridelia tomentosa	tree	common		x	x		x	
Byttneria aspera	woody climber	very common	xx	x		x		
Cassytha filiformis	climber	very common	x	xx				
Celtis sinensis	tree	very common		xx		x		
Celtis timorensis	tree	restricted					x	
Centella asiatica	herb	very common				x	x	x
Centotheca lappacea	perennial herb	common		x				
Chloris barbata	herb	common	xx	xx				
Cibotium barometz	tree-like fern	common (Wild Plant under State protection: Category II; listed under Protection of Endangered Species of Animals and Plants Ordinance Cap. 586)	x					
Cinnamomum camphora	tree	very common	x	x			x	
Colocasia esculenta	herb	common		x				
Cratoxylum cochinchinense	shrub	very common	x					
Desmos chinensis	woody climber	common		x				
Dichroa febrifuga	shrub	common	x		x			
Dicliptera chinensis	herb	common	x			x		
Dioscorea bulbifera	climber	common		xx				

Plant Species	Growth Form	Status in HK	Woodland	Shrubland	Plantation	Grassland	Developed Area	Adjacent
Diploclisia glaucescens	woody vine	common		xx				
Elaeocarpus hainanensis	Small Tree	common						x
Eleutherococcus trifoliatus	scandent shrub	common		x				
Emilia sonchifolia	herb	exotic, common		x			x	x
Erechtites hieracifolia	herb	exotic, common		x				
Erythrina variegata L.	tree	common					x	
Ficus hirta	shrub	common			x			
Ficus hispida	tree	common	x	xx	xx		x	x
Ficus virens	tree	common	x		xx		x	
Glochidion eriocarpum	shrub	common		x				
Glochidion lanceolarium	shrub	common		x				
Hedyotis hedyotidea	climbing subshrub	very common		x				
Homalium cochinchinensis	tree	common	x				x	
Ilex asprella	shrub	very common		xx				
Lagerstroemia speciosa	shrub	exotic						x
Lantana camara	shrub	exotic, common	xx	xxx	x	xx		x
Ligustrum sinense	tree	common		x		x		x
Litsea cubeba	tree	common	x	xx	x			
Litsea glutinosa	shrub	very common	x	x				
Litsea monopetala	tree	restricted		x				
Litsea rotundifolia	shrub	very common	x	x				
Lophatherum gracile	herb	common	xx	xx				
Lygodium japonicum	climber	very common	x	xx			x	
Macaranga tanarius	tree	very common	xx	xxx		x		x
Machilus breviflora	tree	very common	x	x				
Machilus chekiangensis	tree	common		x				
Machilus pauhoi	tree	common	x					
Maesa perlarius	climber: vine	common		x		x		xx
Malvastrum coromandelianum	subshrub	common		x			x	
Melastoma dodecandrum	herb	common			x			
Melastoma sanguineum	shrub	common	x	xx				
Melicope pteleifolia	shrub	common		xx				
Microcos paniculatus	tree	common		x				
Microstegium ciliatum	perennial procumbent herb	common		x	x	xx	x	x
Mikania micrantha	climber	exotic, common	xx	xxx				
Mimosa pudica	herb	exotic, common		xx				x
Murraya paniculata	shrub	exotic, common		x				
Neyraudia reynaudiana	herb	common	xx	xx				
Oxalis corniculata	perennial herb	common		xx		xx	xx	x
Oxalis corymbosa	perennial herb	common				xx	xx	x
Paraixeris denticulata	biennial herb	common			x		x	
Pavetta hongkongensis	tree or shrub	common, listed under Cap. 96 sub. leg.	x					
Pinus elliottii	tree	exotic			x			
Polygonum chinense	herb	very common		xx		x		
Psychotria asiatica	shrub	common	xx	xx	x			
Psychotria serpens	semi-woody climber	very common	x			x		
Pteris semipinnata	herb	very common	x	xx				
Pteris vittata	herb	very common	x		x		x	
Pueraria spp.	climber		xxx	xxx				
Pyrrosia adnascens	herb	common	x	x	x			
Rhododendron pulchrum var. *phoeniceum*	shrub	n/a			x			
Rhus chinensis	shrub	common			x			
Rhus succedanea	tree	very common	x		x			
Rhynchosia volubilis	climber	restricted		x				
Rosa laevigata	climbing shrub	common		xx				
Rubus parvifolius	shrub	common		x			x	x
Rubus reflexus	climber	very common	x	xx			x	x
Sapium discolor	tree	very common	x					
Sarcandra glabra	shrub	very common		x	x			
Schefflera heptaphylla (Schefflera octophylla)	tree	very common	xxx	xx	x			x
Scolopia saeva	tree	common	x					
Smilax glabra	climbing shrub	very common	x	x				
Solanum torvum	shrub	common		x				
Spathodea campanulata	tree	exotic			x		x	x

Plant Species	Growth Form	Status in HK	Woodland	Shrubland	Plantation	Grassland	Developed Area	Adjacent
Sterculia lanceolata	shrub	very common		x				
Synedrella nodiflora	herb	very common	x	x				
Tetracera asiatica	climber	very common	x	x				
Thunbergia grandiflora	herbaceous vine	common, cultivated or naturalised		x				
Trema tomentosa	shrub	common		x			xx	x
Tridax procumbens	perennial herb	very common				x		
Tylophora ovata	woody vine	common				x		x
Urena lobata	shrub	exotic, common	x	x				
Vernicia montana	tree	exotic		x				
Viburnum odoratissimum	shrub or small tree	very common		x				
Wedelia trilobata	herb	introduced, common		xx	x	x	xxx	x
Youngia japonica	herb	very common				x	x	
Zanthoxylum avicennae	shrub	common		x		x		
Zanthoxylum nitidum	shrub	very common		xx				

APPENDIX D

Fauna Species Recorded Within or Adjacent to the Feature

Appendix D Fauna Species Recorded Within or Adjacent to the Feature
(Code for Abundance: xxxx=abundant; xxx=frequent; xx=occasional; x=scarce)

Bird Species

Common Name [(1)]	Scientific Name	Distribution in Hong Kong	Level of Concern [(2)]	Protection Status in China [(3)]	Abundance
Black Kite[#]	*Milvus migrans*	Common	(RC)	Category II	x
Barn Swallow	*Hirundo rustica*	Common	-	-	x
Scarlet Minivet	*Pericrocotus flammeus*	Common	-	-	x
Red-whiskered Bulbul	*Pycnonotus jocosus*	Abundant	-	-	xxx
Chinese Bulbul	*Pycnonotus sinensis*	Abundant	-	-	xxx
Oriental Magpie Robin	*Copsychus saularis*	Abundant	-	-	xx
Yellow-bellied Prinia	*Prinia flaviventris*	Common	-	-	xx
Plain Prinia	*Prinia inornata*	Common	-	-	x
Common Tailorbird	*Orthotomus sutorius*	Common	-	-	xx
Great Tit	*Parus major*	Common	-	-	x
Scarlet-backed Flowerpecker	*Dicaeum cruentatum*	Common	-	-	xx
Japanese White-eye	*Zosterops japonica*	Abundant	-	-	xx
Blue Magpie	*Urocissa erythrorhyncha*	Common	-	-	x

Butterfly Speices

Common Name	Scientific name	Status in Hong Kong	Level of Concern [(2)]	Protection Status in China [(3)]	Abundance
Papilionidae					
Common Jay	*Graphium doson axion*	Uncommon	-	-	x
Red Helen	*Papilio helenus helenus*	Common	-	-	x
Common Mormon	*Papilio polytes polytes*	Common	-	-	xx
Great Mormon	*Papilio memnon agenor*	Common	-	-	xx
Spangle	*Papilio protenor protenor*	Common	-	-	xx
Paris Peacock	*Papilio paris paris*	Common	-	-	x
Pieridae					
Great Orange Tip	*Hebomoia glaucippe glaucippe*	Common	-	-	x
Lemon Emigrant	*Catopsilia pomona pomona*	Common	-	-	x
Common Grass Yellow	*Eurema hecabe hecabe*	Common	-	-	x
Lycaenidae					
Pale Grass Blue	*Zizeeria maha serica*	Common	-	-	x
Satyridae					
Common Five-ring	*Ypthima baldus baldus*	Common	-	-	x
Nymphalidae					
Rustic	*Cupha erymanthis erymanthis*	Common	-	-	xxx
Common Sailer	*Neptis hylas hylas*	Common	-	-	x
Colour Sergeant	*Athyma nefte seitzi*	Common	-	-	x

Odonate Species

Common Name	Scientific name	Status in Hong Kong	Level of Concern [(2)]	Protection Status in China [(3)]	Abundance
Dragonfly					
Wandering Glider	*Pantala flavescens*	Abundant	-	-	x
Indigo Dropwing	*Trithemis festiva*	Abundant	-	-	x

Note:
(1) All wild birds are protected under the Wild Animals Protection Ordinance (Cap. 170).
(2) Fellowes, J.R., Lau, M.W.N., Dudgeon, D., Reels, G.T., Ades, G.W.J., Carey, G.J., Chan, B.P.L., Kendrick, R.C., Lee, K.S., Leven, M.R., Wilson, K.D.P. and Yu, Y.T. 2002. Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong. *Memoirs of the Hong Kong Natural History Society* No. 25, 123-160.
(3) List of Wild Animals Under State Protection (promulgated by State Forestry Administration and Ministry of Agriculture on 14 January, 1989).
[國家重點保護野生動物名錄(1989年1月14日林業局及農業部發佈施行)]
Species recorded flying overhead but not recorded utilizing the habitat; species of conservation interest at flight were not shown in habitat maps.

APPENDIX E

Representative Photographs of Species of Conservation Interest Recorded Within or Adjacent to the Feature

Common Jay (*Graphium doson axion*)

Incense Tree (*Aquilaria sinensis*)

Ailanthus (*Ailanthus fordii*)

AECOM	Agreement No. CE 19/2008 (GE) Ecological Survey for Feature No. 7NE-C/C310 **Representative Photographs of Species of Conservation Interest Recorded Within or Adjacent to the Feature**	SCALE	N.T.S.	DATE	June 11
		CHECK	GCCL	DRAWN	CPYY
		JOB NO.	60187161	DRAWING No.	Appendix E
				Rev	-

Lamb of Tartary (*Cibotium barometz*)

Philippine's Hackberry (*Celtis timorensis*)

AECOM	Agreement No.CE 28/2007 (GE) Ecological Survey for Feature No. 7NE-C/C310 **Representative Photographs of Species of Conservation Interest Recorded Within or Adjacent to the Feature**	SCALE	N.T.S.	DATE	June 11
		CHECK	GCCL	DRAWN	CPYY
		JOB NO.	60187161	**DRAWING No.** Appendix E	**Rev** -

Hong Kong Pavetta (*Pavetta hongkongensis*)

Persimmon-leaved Litsea (*Litsea monopetala*)

AECOM	Agreement No.CE 28/2007 (GE) Ecological Survey for Feature No. 7NE-C/C310 **Representative Photographs of Species of Conservation Interest Recorded Within or Adjacent to the Feature**	SCALE	N.T.S.	DATE	June 2011
		CHECK	GCCL	DRAWN	CPYY
		JOB NO.	60187161	**DRAWING No.** Appendix E	**Rev** -

APPENDIX F

Proposed Construction Plant Inventory and Construction Noise Impact Assessment

Powered Mechanical Equipment (PME) for Different Construction Tasks during Normal Daytime Working Hours (Unmitigated Scenario)

1 Site Pocession and Preparation

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100
Lorry, with crane, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 022	1	105	80%	104
Dump truck, with grab, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 011	1	105	80%	104
Concrete lorry mixer	CNP 044	1	109	80%	108
Welding Set	EIA ref. 1	2	78	100%	81
				Total	**111**

2 Installation of soil nails

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100	100
Lorry, with crane, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 022	1	105	80%	104	
Dump truck, with grab, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 011	1	105	80%	104	
Air Compressor, air flow > 10m3/min and < 30m3/min	CNP 002	1	102	100%	102	
Drill rig, rotary type (diesel)	OCNP 014	2	110	80%	112	
Concrete lorry mixer	CNP 044	1	109	80%		108
Grout mixer	OCNP 016	2	90	80%		92
Grout pump	OCNP 017	2	105	80%		107
				Total	**114**	**111**
				Max	**114**	

3 Installation of raking drains

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100
Air Compressor, air flow > 10m3/min and < 30m3/min	CNP 002	1	102	100%	102
Drill rig, rotary type (diesel)	OCNP 014	1	110	80%	109
				Total	**110**

4 Removal of hard surfacing (Soil slope portion)

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100	
Dump truck, with grab, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 011	1	105	80%		104
Air Compressor, air flow > 10m3/min and < 30m3/min	CNP 002	1	102	100%	102	
Rock drill, hand-held (pneumatic)	CNP 183	1	116	80%	115	
				Total	**115**	**104**
				Max	**115**	

Powered Mechanical Equipment (PME) for Different Construction Tasks during Normal Daytime Working Hours (Unmitigated Scenario)

5 Removal of hard surfacing (Rock slope portion)

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100
Dump truck, with grab, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 011	1	105	80%	104
Air Compressor, air flow > 10m3/min and < 30m3/min	CNP 002	1	102	100%	102
Rock drill, hand-held (pneumatic)	CNP 183	2	116	80%	118
Excavator/loader, wheeled/tracked	CNP 081	1	112	80%	111
				Total	**119**

6 Installation of rock dowels

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100	100
Lorry, with crane, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 022	1	105	80%		104
Air Compressor, air flow > 10m3/min and < 30m3/min	CNP 002	1	102	100%	102	
Drill rig, rotary type (diesel)	OCNP 014	1	110	80%	109	
Grout mixer	OCNP 016	1	90	80%	89	
Grout pump	OCNP 017	1	105	80%	104	
				Total	**111**	**105**
				Max	**111**	

7 Drainage improvement works and Construction of maintenance access

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100	100
Dump truck, with grab, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 011	1	105	80%	104	
Air Compressor, air flow > 10m3/min and < 30m3/min	CNP 002	1	102	100%	102	
Rock drill, hand-held (pneumatic)	CNP 183	2	116	60%	117	
Cutter, circular, steel (electric)	OCNP 009	2	112	80%		114
Excavator/loader, wheeled/tracked	CNP 081	1	112	80%		111
Concrete lorry mixer	CNP 044	1	109	80%		108
Grout mixer	OCNP 016	1	90	80%		89
Grout pump	OCNP 017	1	105	80%		104
Saw, circular, wood	CNP 201	1	108	80%	107	
				Total	**118**	**117**
				Max	**118**	

8 Construction of berm and handrailing along maintenance access

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100	100
Concrete lorry mixer	CNP 044	1	109	80%		108
Air Compressor, air flow > 10m3/min and < 30m3/min	CNP 002	1	102	80%	101	
Rock drill, hand-held (pneumatic)	CNP 183	2	116	70%	117	
Grout mixer	OCNP 016	1	90	80%		89
Grout pump	OCNP 017	1	105	80%		104
Welding Set	EIA ref. 1	1	78	100%		78
Saw, circular, wood	CNP 201	1	108	80%		107
				Total	**118**	**112**
				Max	**118**	

Powered Mechanical Equipment (PME) for Different
Construction Tasks during Normal Daytime Working Hours
(Unmitigated Scenario)

9 Soft landscaping works and Site Clearance

Powered Mechanical Equipment (PME)	TM Ref.	No. of Items	SWL/Item dB(A)	On-time %	Total SWL dB(A)
Generator, silenced, 75dB(A) at 7m	CNP 102	1	100	100%	100
Lorry, with crane, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 022	1	105	80%	104
Dump truck, with grab, 5.5 tonne < gross vehicle weight < 38 tonne	OCNP 011	1	105	80%	104
Welding Set	EIA ref. 1	2	78	100%	81
				Total	**108**

Remark:

1. EIA Ref. 1 - SWL of Welding Plant refer to the approved EIA Report of Sheung Shui to Lok Ma Chau Spur Line (AEIAR-052/2002).
2. OCNP - SWL refer to the other PME documented by the Noise Control Authority (http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf)

Construction Noise Calculation

NSR: DF1 - Block A Dragon Fountain

Act No.	Construction Element	SWL	Dist	SPL[1]	2011					2012			
					Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
					1	2	3	4	5	6	7	8	9
1	Site Pocession and Preparation	111	96	66	66								
2	Installation of soil nails	114	96	69		69	69	69	69	69			
3	Installation of raking drains	110	96	66							66		
4	Removal of hard surfacing (Soil slope portion)	115	96	71								71	
5	Removal of hard surfacing (Rock slope portion)	119	96	74			74						
6	Installation of rock dowels	111	96	67				67	67	67	67		
7	Drainage improvement works and Construction of maintenance access	118	96	73					73	73	73		
8	Construction of berm and handrailing along maintenance access	118	96	73								73	73
9	Soft landscaping works and Site Clearance	108	96	63									63
			Total SPL, dB(A)		66	69	75	71	75	75	75	75	73
			Exceedance		-	-	-	-	-	-	-	-	-

NSR: DF2 - Block D Dragon Fountain

Act No.	Construction Element	SWL	Dist	SPL[1]	2011					2012			
					Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
					1	2	3	4	5	6	7	8	9
1	Site Pocession and Preparation	111	126	64	64								
2	Installation of soil nails	114	126	67		67	67	67	67	67			
3	Installation of raking drains	110	126	63							63		
4	Removal of hard surfacing (Soil slope portion)	115	126	68								68	
5	Removal of hard surfacing (Rock slope portion)	119	126	72			72						
6	Installation of rock dowels	111	126	64				64	64	64	64		
7	Drainage improvement works and Construction of maintenance access	118	126	71					71	71	71		
8	Construction of berm and handrailing along maintenance access	118	126	71								71	71
9	Soft landscaping works and Site Clearance	108	126	61									61
			Total SPL, dB(A)		64	67	73	69	73	73	72	73	71
			Exceedance		-	-	-	-	-	-	-	-	-

Remarks:

1. For the calculation of sound pressure levels (SPL), the PMEs are assumed to be placed at the notional source position according to the "Technical Memorandum on Noise from Construction Work other than Percussive Piling" by EPD

Noise Exceedance