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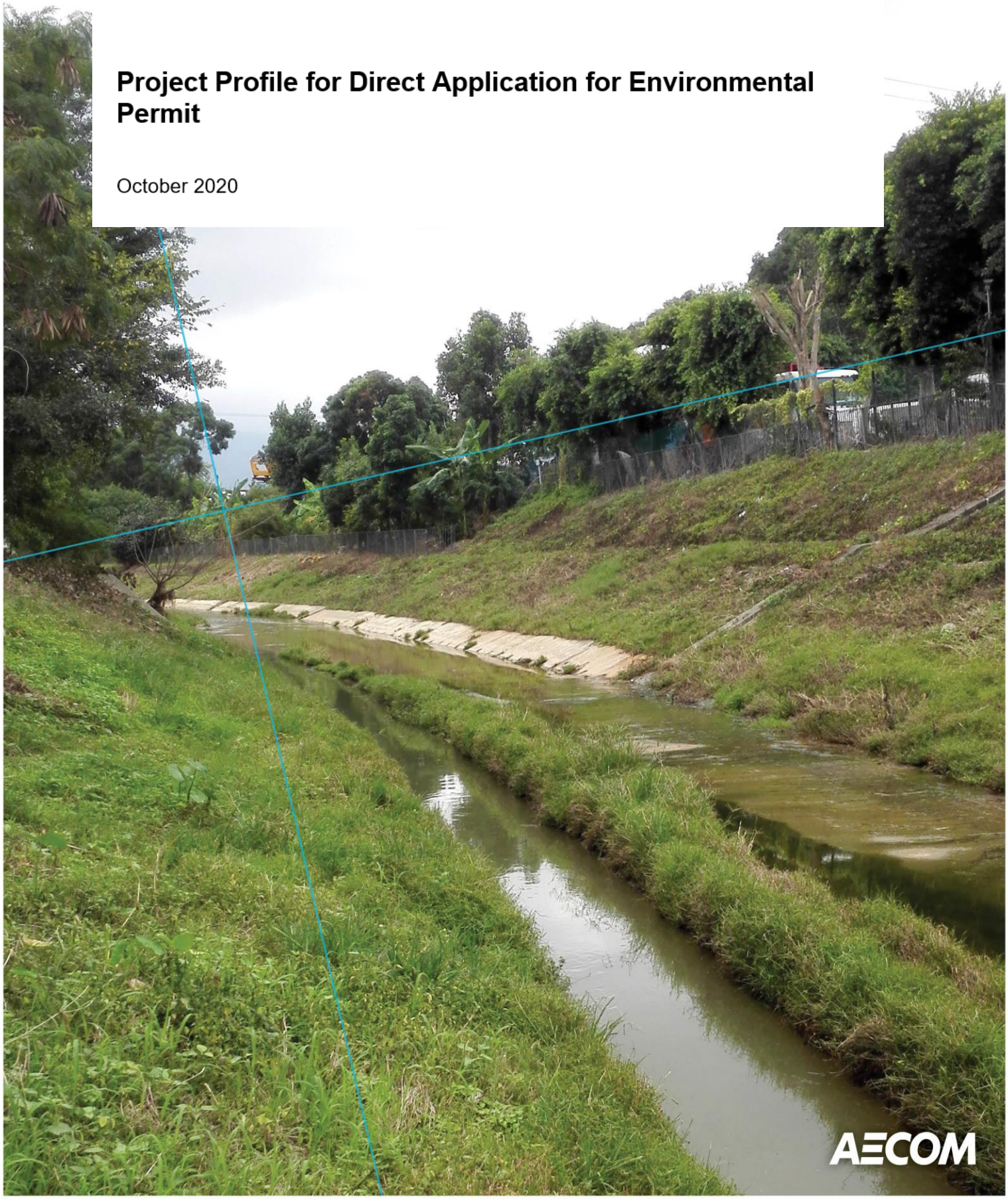
Drainage Services Department

Drainage Improvement Works at Nam Wa Po

Project Profile for Direct Application for Environmental Permit

October 2020



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October 2020

Reviewed by: _____ 27 October 2020
Alex Wu

Approved for Issue: _____ 27 October 2020
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AECOM ASIA CO. LTD.

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1 BASIC INFORMATION

1.1 Project Title

1.1.1.1 Drainage Improvement Works at Nam Wa Po (hereinafter referred to as "the Project").

1.2 Purpose and Nature of the Project

1.2.1.1 The Project is part of the proposed drainage improvement works at North District under the "Review of Drainage Master Plans in Yuen Long and North Districts – Feasibility Study" (the DMP Review Study). In recent years, several flooding incidents occurred in the villages near Nam Wa Po. The purpose of the Project is to improve the stormwater drainage condition in the villages near Nam Wa Po.

1.3 Background Information

1.3.1.1 In 2008, Drainage Services Department (DSD) commissioned the Review of Drainage Master Plans in Yuen Long and North Districts (the DMP Review Study) so that the new development scenarios could be incorporated and the effectiveness of the previously recommended works under the Drainage Master Plan Study for the Northern New Territories (NNTDMP) could also be assessed.

1.3.1.2 The DMP Review Study was completed in end 2011 and identified the drainage condition in the village zone of Nam Wa Po should be improved and therefore a channel to be designed to a flood protection level of 1 in 10 years was proposed to convey the runoff to the upgraded drainage at the downstream.

1.3.1.3 AECOM Asia Company Limited (AECOM) was later appointed by DSD to undertake investigation works under "Agreement No. CE 54/2016(DS) – Drainage Improvement Works at North District – Packages A and C – Investigation" which comprise investigation of drainage improvement works at various locations at North District and Yuen Long, including Nam Wa Po.

1.4 Name of Project Proponent

1.4.1.1 Drainage Services Department (DSD) is the project proponent of the Project.

1.5 Location and Scale of Project and History of Site

1.5.1.1 The Project is to construct an approximately 600 m long 1.5m (W) x 1.5m (D) box culvert and an approximately 60 m long 1.5m (W) x 1.5m (D) rectangular channel upstream to the proposed box culvert to upgrade the existing drainage system at Nam Wa Po. The proposed box culvert aligns mainly along the existing access road running at the west-to-east direction in the vicinity of Tai Hang Village and Blossom Villas. The existing flow in Nam Wa Po is from the catchment of uphill side to Ma Wat River. The proposed drainage improvement work would not change the path of the existing flow. Location of the Project is shown in **Drawing No. 60543869/PP/PH1/101** and typical sections of the proposed works are provided in **Appendix 1.1**.

1.5.1.2 During the preliminary design process, various alternative design options have been reviewed to minimize environmental impacts whilst overcome site constraint and fulfil the operational requirements. In view of the limited works area and scale of works (600 m long 1.5m (W) x 1.5m (D) box culvert and an approximately 60 m long 1.5m (W) x 1.5m (D) rectangular channel), alternative options, such as underground drain system or concrete channel bedding were considered. However, to implement blue-green elements, option of rectangular channel with least concrete structural elements and rip-rap base was adopted that the environmental impacts would be minimised

with ecological enhancement elements incorporated while the operation requirements were not compromised. The selected design option was consulted with public as described in **Section 1.7**.

1.6 Number and Type of Designated Project to be Covered by This Project Profile

1.6.1.1 In accordance with Category I.1(b) of Part I, Schedule 2 of Environmental Impact Assessment Ordinance (EIAO), a drainage channel or river training and diversion works which discharges or discharge into an area which is less than 300m from the nearest boundary of an existing or planned (i) site of special scientific interest (SSSI); (ii) site of cultural heritage; (iii) marine park or marine reserve; (iv) fish culture zone; (v) wild animal protection area; (vi) coastal protection area; or (vii) conservation area, would be classified as a Designated Project (DP). The proposed drainage channels at Nam Wa Po would discharge into Ma Wat River, and then into Ng Tung River and eventually Shenzhen River, which flow along and into areas that are less than 300m from (i) SSSI (Mai Po Marshes SSSI), (ii) site of cultural heritage (Declared Monuments, namely Entrance Tower of Ma Wat Wai, Enclosing Walls and Corner Watch Towers of Kun Lung Wai and Kun Lung Gate Tower), (v) Wild Animal Protection Area in Mai Po Marshes[1], and (vii) Conservation Areas (along Ng Tung River, as well as covering fishponds and wetland along Shenzhen River at Hoo Hok Wai and the rest of Deep Bay area) as illustrated in **Drawing No. 60543869/PP/PH1/102**. As such, it is classified as a DP under the EIAO.

1.6.1.2 This Project Profile has been prepared in accordance with Annex 1 of the *Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)*, and is to seek permission to apply directly for an Environmental Permit for the construction and operation of the Project under Section 5(11) of the EIAO.

1.7 Public Consultation to Date

1.7.1.1 Village representatives of Tai Hang and Nam Wa Po and members of Tai Po Rural Committee (TPRC) have been consulted on 18 December 2019 and 13 January 2020 respectively. The Project was supported by the village representatives and RC members.

1.7.1.2 In the 3rd Meeting of the Planning, Housing and Works Committee of Tai Po District Council (TPDC) held on 11 May 2020, the Project was supported by the DC Members.

1.7.1.3 The Project was consulted with green groups on 2 July 2020. Advice from green groups had been sought and the suggestions such as provision of ecological enhancement elements had been incorporated in the design. No adverse comment on the proposed drainage improvement works was received.

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[1] Restricted Area B designated under the Sixth Schedule to the Wild Animals Protection Ordinance (Cap. 170) covering the Mai Po Marshes, all the mangrove swamps adjoining the Marshes, and the intertidal mud flats and shallow waters of Inner Deep Bay.

1.9 Name and Telephone Number of Contact Person(s)

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2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Planning and Implementation

2.1.1.1 The Project is under PWP Item no. 4165CD – Drainage Improvement Works at North District. The investigation stage was under Agreement No. CE 54/2016 (DS) – "Drainage Improvement Works at North District – Packages A and C – Investigation" which is implemented by AECOM and managed by the DSD.

2.2 Project Time-table

2.2.1.1 The investigation stage of the Project is expected to be completed by 2020, after which the detailed design stage will begin.

2.2.1.2 Construction of the Project is scheduled to commence in year 2022 for completion / commissioning in year 2026 tentatively. The tentative construction programme is presented in **Appendix 2.1**.

2.3 Interactions with Other Projects

2.3.1.1 Based on the available information, no existing/planned existing/ planned projects within 500m from the Project site was identified. No cumulative environmental impact is therefore expected.

3 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

3.1.1 Location of Project

3.1.1.1 The Project is located in areas currently zoned "Agriculture" ("ARG"), "Village Type Development" ("V") and "Green Belt" ("GB") on the approved Kau Lung Hang Outline Zoning Plan (OZP) No. S/NE-KLH/11. The proposed drainage improvement works are mainly aligned along existing access road with its surrounding areas occupied by scattered village houses, temporary structures and open storages.

3.1.1.2 As described in **Section 1.6.1.1**, the Project is a DP by virtue of Category I.1(b) of Part I, Schedule 2 of EIAO that the proposed channels discharge into Ma Wat River, Ng Tung River and eventually Shenzhen River, which flow along and into areas that are less than 300m from (i) SSSI (Mai Po Marshes SSSI), (ii) site of cultural heritage (Declared Monuments namely Entrance Tower of Ma Wat Wai, Enclosing Walls and Corner Watch Towers of Kun Lung Wai and Kun Lung Gate Tower), (v) Wild Animal Protection Area in Mai Po Marshes, and (vii) Conservation Areas (along Ng Tung River, as well as covering fishponds and wetland along Shenzhen River at Hoo Hok Wai and the rest of Deep Bay area). Nevertheless, in view of the nature and limited scale of the Project and the considerable distances between the Project site and these sensitive receivers (over 3.7 km from the closest declared monument, over 4.5km from the closest Conservation Area and over 10km away from Mai Po Marshes SSSI), no environmental impacts from the construction and operation of the Project on these sensitive receivers would be anticipated.

3.1.2 Air Quality

3.1.2.1 No major air pollutant source was identified in the vicinity of the Project site. The closest major source of air pollutants would be the heavy traffic along the existing Fanling Highway, which is located more than 100m from the Project site.

3.1.2.2 The representative air sensitive receivers (ASRs) identified in the vicinity of the Project site are mainly village houses and temporary structures as summarised in **Table 3.1**. Locations of these representative ASRs are illustrated in **Drawing No. 60543869/PP/PH1/301**.

Table 3.1 Representative Air Sensitive Receivers

ID	Location / Description	Nature / Land Use	Number of Floors	Approximate Horizontal Distance from Nearest Project Site Boundary (m)
NWP-A1	Tai Hang Fui Sha Wai	Residential	3	35
NWP-A2	Temporary structure 1 next to the Project	Temporary structure (Residential)	1	5
NWP-A3	Temporary structure in Tai Hang	Temporary structure (Workshop)	1	15
NWP-A4	Temporary structure 2 next to the Project	Temporary structure (Workshop)	1	8
NWP-A5	Temporary structure 3 next to the Project	Temporary structure (Workshop)	1	3
NWP-A6	Temporary structure 4 next to the Project	Temporary structure (Workshop)	1	3
NWP-A7	Temporary structure near Yul Chuen Garden	Temporary structure (Workshop)	1	12
NWP-A8	Yuk Chuen Garden	Residential	3	14
NWP-A9	Squatter structures, south west of Yuk Chuen Garden	Squatter house (Residential)	1	15

ID	Location / Description	Nature / Land Use	Number of Floors	Approximate Horizontal Distance from Nearest Project Site Boundary (m)
NWP-A10	Living Farm	Temporary structure (Workshop)	1	24

3.1.2.3 Tai Po air quality monitoring station (AQMS) is the nearest monitoring station of the Environmental Protection Department (EPD) to the Project site. Air pollutants measured at Tai Po AQMS for the latest five years (2015 – 2019) are summarized in **Table 3.2**. Fugitive dust (RSP and FSP) are the major air pollutants that would be generated during construction phase. It is expected no air pollutant would be generated during operation of the Project. As shown in **Table 3.2**, concentrations of all concerned pollutants including SO_2, NO_2, RSP and FSP in the past five-year were complied with the respective AQOs.

Table 3.2 Air Pollutants at EPD's Tai Po Air Quality Monitoring Station (2015 – 2019)

Pollutant	Parameter	Concentrations (µg/m³)					AQO µg/m³ [1]
		2015	2016	2017	2018	2019	
SO_2	4th highest 10-minutes	56	37	39	24	20	500 (3)
	4th highest 24-hour	13	10	9	8	10	125 (3)
NO_2	19th highest 1-hour	136	112	127	125	142	200 (18)
	Annual	37	33	39	36	36	40
RSP (PM_{10})	10th highest 24-hour	77	74	82	69	65	100 (9)
	Annual	36	29	32	31	31	50
FSP ($PM_{2.5}$)	10th highest 24-hour	57	55	55	47	47	75 (9)
	Annual	23	20	22	19	20	35

Note:
[1] Number of exceedance allowed under the AQO is shown in ( ).

3.1.3 Noise

3.1.3.1 No major noise source was identified in the vicinity of the Project site. The closest noise source would be the heavy traffic along the existing Fanling Highway, which is located more than 100m from the Project site and partly screened by village houses.

3.1.3.2 The representative noise sensitive receivers (NSRs) identified in the vicinity of the Project site were mainly village houses as summarised in **Table 3.3**. Locations of these representative NSRs are illustrated in **Drawing No. 60543869/PP/PH1/302**.

Table 3.3 Representative Noise Sensitive Receivers

ID	Location / Description	Nature / Land Use	Number of Floors	Approximate Horizontal Distance from Nearest Project Site Boundary (m)
NWP1	Tai Hang Fui Sha Wai House 1	Residential	3	35
NWP2	Temporary structure next to the Project	(Temporary Structure) Residential	1	5
NWP3	Tai Hang Fui Sha Wai House 2	Residential	3	36
NWP4	Tai Hang Chung Sum Wai	Residential	3	98
NWP5	Blossom Villas Phase II	Residential	3	20
NWP6	Yuk Chuen Garden	Residential	3	14
NWP7	Squatter structures, south west of Yuk Chuen Garden	Squatter house (Residential)	1	15

3.1.4 Water Quality

3.1.4.1 The Project site is contained within the Water Gathering Grounds that the Project area would be considered as water sensitive receiver. The water sensitive receivers (WSRs) within 500m from the Project site include small hillside natural/semi-natural watercourses, Ma Wat River, other small modified watercourses and ponds as illustrated in **Drawing No. 60543869/PP/PH1/303**.

3.1.5 Ecology

3.1.5.1 The ecological baseline of the Project site was established from literature review and the site surveys (on habitat and vegetation, avifauna, herpetofauna, butterfly and odonate, mammal and aquatic fauna) conducted within 500m from the Project site in June 2018, September 2019, October 2019 and May 2020. The site mainly comprised developed area dominated by common tree and herb species. The Kau Lung Hang Ecologically Important Stream (EIS), from which a freshwater fish species of conservation importance *Acrossocheilus parallens* was previously recorded (DSD, 2013[2]), is located approximately 120m northeast to the Project site. Photos of the habitats and species of conservation importance are shown in **Appendix 3.1**. The flora and fauna list of the study area are presented in **Appendices 3.2** and **3.3**, respectively, while their indicative locations are shown in **Drawing No. 60543869/PP/PH1/303[3]**.

3.1.6 Fisheries

3.1.6.1 Four ponds were recorded within 500m from the Project site, all of which were either Fung Shui Pond or abandoned fishpond with no signs of active fishing activities. The indicative locations of ponds are shown in **Drawing No. 60543869/PP/PH1/303**.

3.1.7 Cultural Heritage

3.1.7.1 No Declared Monuments or Sites of Archaeological Interest (SAI) were identified within 500m from the Project site. The closest SAI to the Project site is Po Leng SAI which is located more than 2.5km from the site. The nearest historic buildings identified, namely Fui Sha Wai Enclosing Walls (Grade 3) and Man Ancestral Hall (Nil Grade), were located at more than 200m from the Project site as shown in **Drawing No. 60543869/PP/PH1/304**.

3.1.8 Land Contamination

3.1.8.1 As reviewed from aerial photographs and site walkover, the past land uses of the location of proposed works were farmlands, semi-natural watercourse, access road, vacant area and vegetated areas. The proposed works area currently falls within the existing semi-natural watercourse, access road, vacant and vegetated land and no major land use changes were observed.

3.1.9 Landscape and Visual

3.1.9.1 A densely vegetated small watercourse (semi-natural watercourse) was identified as one of the key landscape resources (LRs). A total of 17 trees were surveyed within the Project site. A number of LRs were found around the site, including the semi-

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[2] DSD (2013). Protection of Existing Ecological System at Kau Lung Hang. Available at https://www.dsd.gov.hk/Documents/SustainabilityReports/1213/en/managing_the_environment.html
[3] Locations of birds and flying mammals (in flight) are not provided due to their vagile nature and high mobility.

natural watercourse (LR1), hillside woodland (LR2) to the northwest and by small patches of agricultural land (LR3), rural village planting (LR4) and Ma Wat River (LR5) to the east. Locations of these LRs are mapped in **Drawing No. 60543869/PP/PH1/306**. Two numbers of key landscape character areas (LCAs) were identified around the site, including upland and hillside landscape (LCA1) and settled valley landscape (LCA2). The locations of these LCAs are mapped in **Drawing No. 60543869/PP/PH1/307**.

3.1.9.2 In terms of visual impacts, key visually sensitive receivers (VSRs) in the proximity of the Project site include residents in low-rise Blossom Villas Phase 2, Yuk Chuen Garden, Tai Hang Garden and temporary structures in the vicinity of the site (R1). Locations of the key VSRs group are mapped in **Drawing No. 60543869/PP/PH1/306**.

4 POTENTIAL IMPACTS ON THE ENVIRONMENT

4.1 Outline of Process Involved

4.1.1.1 The proposed drainage improvement works would be constructed by traditional open-cut and in-situ concreting method that mainly involve site clearance, soil excavation, sheet-piling, formwork, concreting, backfilling, and reinstatement. To minimise the potential air and noise impacts to the surrounding sensitive receivers, construction of the proposed drainage works would be divided into work sections of 20 m to 100 m depending on site constraints. Work sections would be separated from each other by at least 50m to reduce overlapping of construction activities or concurrent usage of several powered mechanical equipment (PMEs). In each work section, only one construction activity would take place at a time. Each work section of the proposed drainage works would be limited in area and localised. The above construction sequence / programme and division of work sections for construction activities had been reviewed by design engineer and confirmed to be practicable.

4.1.1.2 Maintenance works such as desilting of the proposed box culvert would tentatively be carried out on an annual basis during dry season months when the box culvert is in dry condition to avoid any potential water quality impacts.

4.2 Potential Environmental Impacts during Construction Phase

4.2.1 Air Quality

4.2.1.1 During construction phase, fugitive dust emissions would be generated from construction activities such as excavation works, backfilling, material handling, wind erosion of unpaved areas and stockpiling areas. In view of the nature and small scale of the Project, dust impact would be short-term and localised and could be well controlled through implementing dust suppression measures as described in **Section 5.1.1**. With the implementation of the dust suppression measures, adverse air quality impacts due to the construction of the Project is not anticipated.

4.2.1.2 Likewise, fuel combustion from the use of PMEs during construction works could be a potential source of air pollutants such as PM, NO_2, SO_2 and CO. To improve air quality and protect public health, EPD has introduced the *Air Pollution control (Non-road Mobile Machinery) (Emission) Regulation* since 1 December 2015, only approved or exempted non-road mobile machinery are allowed to be used in construction sites. In addition, all construction plants are required to use ultra-low-sulphur diesel (ULSD) (defined as diesel fuel containing not more than 0.005% sulphur by weight) as stipulated in *Environment, Transport and Works Bureau Technical Circular* (*ETWB-TC(W*)) *No. 19/2005* on *Environmental Management on Construction Sites*. Furthermore, given the localized and small scale of the Project, as well as the small number of PMEs involved, adverse air quality impacts due to emissions from the use of PMEs would be unlikely.

4.2.2 Noise

4.2.2.1 Construction of the proposed drainage improvement works would involve site clearance, soil excavation, sheet-piling, formwork, concreting, backfilling, and reinstatement. Potential noise impacts would arise from the use of PMEs during these construction activities such as excavator, generator, lorry, mobile crane, concrete lorry mixer, poker, etc. No construction activity is expected during restricted hours, i.e. the time between 1900 and 0700 hours on all days, and any time on general holidays, including Sundays. A Construction Noise Permit (CNP) would be required under the *Noise Control Ordinance* (NCO) (Cap. 400) in case the construction works are to be carried out during restricted hours.

4.2.2.2 The proposed PME inventory and their corresponding sound power levels (SWLs) for the construction activities of the Project are given in **Appendix 4.1**. The PME inventory (including % on-time) has been confirmed by design engineer as being reasonable, feasible and practicable in the context of the construction programme. Construction noise levels at the representative NSRs were calculated following the methodology outlined in the *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (GW-TM) issued under the *NCO*. SWLs of the equipment were taken from Table 3 of the *GW-TM*. Where no SWL is provided in the *GW-TM*, reference was made to "SWLs of Other Commonly Used PME" and the "Quality PME" list documented by EPD, or other previous similar studies at other sites in Hong Kong. A positive 3 dB(A) façade correction was added to the predicted noise levels in order to account for the facade effect at each NSR.

4.2.2.3 Results of the construction noise assessment are presented in **Appendix 4.2**. The results show that the unmitigated construction noise levels at all representative NSRs would exceed the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM) noise criteria. As such, noise mitigation measures as described in **Section 5.1.2** are recommended in order to alleviate the potential noise impact to compliance with the noise criterion. With the adoption of recommended noise control measures, the mitigated construction noise levels at all the representative NSRs would comply with the noise criterion of 75 dB(A) during construction of the Project.

4.2.3 Water Quality

4.2.3.1 Potential water quality impacts would arise from uncontrolled surface runoff and erosion of exposed soil, earthworks and stockpiles during rainstorms. Muddy water may also be generated from the construction activities such as dust suppression sprays, dewatering during excavation and washing of construction equipment. Besides, sewage effluent would be produced by on-site workforce. Nevertheless, in view of the limited scale of the Project and with proper implementation of site practices and control measures as presented in **Section 5.1.3**, adverse water quality impact would not be anticipated.

4.2.3.2 During construction of the Project, the proposed rectangular channel and sections of the proposed box culvert would cause direct disturbance to the existing watercourses. In order to minimize the potential water quality impact, before the proposed works at the existing watercourse would be conducted, temporary diversion of existing watercourses by pipelines bypassing the works would be carried out in dry condition to prevent the transportation of suspended sediment to downstream. Considering the limited scale of the proposed works and with the implementation of the temporary arrangement, adverse water quality impact on the downstream water bodies would not be anticipated.

4.2.4 Waste Management

4.2.4.1 The types of waste generated during construction phase of the Project include construction and demolition (C&D) materials, chemical waste, and general refuse.

4.2.4.2 C&D materials would be generated during the construction of the Project. In general, C&D materials would comprise inert and non-inert materials. The inert portion, such as soil, rock and concrete, etc., namely inert C&D materials (or public fills) would be reused on-site as filling materials as far as practicable before disposal at public fill reception facilities (PFRF). The non-inert portion, such as timber, paper etc., namely non-inert C&D materials (or C&D waste) would be reused or recycled on-site as far as possible prior to disposal of at landfill. The estimated volume of different types of C&D materials to be generated from the construction of the Project is summarized in **Table 4.1**. With the implementation of the mitigation measures as presented in

Section 5.1.4 and the proposed waste handling arrangements summarised in **Table 5.1**, adverse environmental impacts arising from the storage, handling, and transportation of C&D materials and waste would not be anticipated.

Table 4.1 Predicted Volume of Different Types of C&D Materials

Type of C&D Materials	Volume (m^3)
All C&D materials	10000
All inert C&D materials (or public fills)	9800
- Inert C&D materials to be reused on-site as backfilling materials	7100
- Inert C&D materials to be disposed of at PFRF	2700
Non-inert C&D materials to be reused, recycled or disposed of at landfill	200(1)

Note:
(1) All C&D waste would be sorted, reused and recycled as far as possible before disposal of at designated landfill.

4.2.4.3 General refuse comprising food scraps, waste paper, empty containers, etc. would be generated from workers; however, the quantities would be insignificant due to the limited number of workers required (less than 15 per day) for such small scale of works and limited space at each workfront. Based on the generation rate of 0.65 kg per worker per day, it is estimated no more than 9.75 kg general refuse per day would be generated from the construction of the Project. With the implementation of the mitigation measures in **Section 5.1.4** and the proposed waste handling arrangements summarised in **Table 5.1**, adverse environmental impacts arising from the storage, handling, and transportation of general refuse would not be anticipated.

4.2.4.4 Small amount of chemical waste would be generated from the maintenance of construction plants /equipment. The amount of chemical waste cannot be accurately predicted at this stage since it largely depends on the Contractor's housekeeping measure. The quantity of chemical waste is anticipated to be very small over the construction period and in the order of a few litres. Any chemical waste generated should be collected by licensed collectors and disposed of at the Chemical Waste Treatment Centre (CWTC) at Tsing Yi. All possible opportunities would be taken to reuse and recycle the materials. Provided the chemical wastes are handled and disposed of in accordance with the mitigation and control requirements in **Section 5.1.4** and the proposed waste handling arrangements summarised in **Table 5.1**, adverse environmental impacts would not be anticipated.

4.2.5 Ecology

4.2.5.1 The proposed box culvert would affect the habitats, comprising developed area, a small patch of plantation and a small section of semi-natural watercourse to the south of Yuk Chuen Garden. No flora or fauna species of conservation importance were recorded within the works area of the proposed box culvert. Overgrown of vegetation were recorded within these affected habitats (e.g. *Mikania micrantha*, *Bidens alba*, *Brachiaria mutica* and *Alocasia macrorrhizos*). The semi-natural watercourse is a small and shallow ditch with seasonal and slow water flow near a greenhouse. It experienced regular human disturbance such as discharge and vegetation trimming. No aquatic fauna species were recorded from this ditch. Given most of the recorded flora were very common species and the impacted habitats only supported very low

fauna diversity and highly disturbed by human activities, only minor ecological impacts would be anticipated from the construction of the proposed box culvert.

4.2.5.2 The proposed rectangular channel would directly affect a short section (approximately 63m long) of small and slow-flowing seasonal semi-natural watercourse adjacent to the hillside secondary woodland west to Ma Wat River. Common or very common vegetation such as *Commelina diffusa*, *Microstegium ciliatum*, *Ipomoea cairica* and *Brachiaria mutica* were recorded within this habitat. No flora species of conservation importance were recorded within the works area of the proposed rectangular channel. Freshwater communities surveys at the semi-natural watercourse to be affected were conducted during wet season months. The results showed that a few aquatic invertebrate species were recorded, but none of them were of conservation importance. During the surveys, a freshwater fish species of conservation importance, Small Snakehead (*Channa asiatica*), was recorded. According to AFCD (2018)[4], Small Snakehead is uncommon in the wild, and there were records from a few watercourses in North District and on Lantau Island. This species was only spotted once during the 4-month ecological site surveys with a scarce abundance (i.e. one individual) with the Project site. To minimise the impact to this freshwater fish species, the potentially impacted semi-natural watercourse within the Project site boundary should be checked by a qualified ecologist and any individuals of Small Snakehead should be captured and relocated upstream or other suitable recipient site prior to the commencement of the works. The design of rectangular channel section replacing the affected semi-natural watercourse should provide a suitable habitat for the existing aquatic communities as far as practicable, taking into account the site constraints and drainage capacity. Given the small scale of proposed works and the implementation of appropriate measures, the impact is considered as minor and acceptable.

4.2.5.3 Temporary diversion by pipelines of the existing seasonal semi-natural watercourse would be carried out before the construction of the box culvert and rectangular channel at these watercourses in order to maintain the flow and minimize the potential water quality impact downstream. As described in **Section 5.1.3.4**, the temporary diversion by pipelines should be carried out in dry condition before the commencement of the proposed works to prevent the transportation of suspended sediment to downstream. Given the diversion by pipelines would be temporary, small in scale and the affected semi-natural watercourse only supported limited aquatic fauna, no significant ecological impact is therefore anticipated during the diversion. With the implementation of the temporary arrangement, indirect ecological impact on the downstream watercourses would be minimized and acceptable.

4.2.5.4 A few fauna species of conservation importance were recorded outside the Project site in Ma Wat River and the hillside secondary woodland to the west of Ma Wat River. A small number of ardeids [Chinese Pond Heron (*Ardeola bacchus*) and Little Egret (*Egretta garzetta*)] were recorded foraging along Ma Wat River, Greater Coucal (*Centropus sinensis*) and Chinese Pond Heron (*Ardeola bacchus*) were recorded from a pond at Nam Wa Po, while Besra (*Accipiter virgatus*) and Rufous-capped Babbler (*Stachyridopsis ruficeps*) were recorded from the secondary woodland near the Project site. Two individuals of Chinese Soft-shelled Turtle (*Pelodiscus sinensis*) were observed in Ma Wat River (near Tai Hang Fui Sha Wai). Although this species is considered to be of conservation importance, the observed individuals are probably released ones of captive origin. The dragonfly Emerald Cascader (*Zygonyx iris insignis*) and the very rare butterfly Broadtail Royal (*Creon cleobis cleobis*) were recorded at the hillside secondary woodland to the west of Ma Wat River. Three flora

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[4] Agriculture, Fisheries and Conservation Department (AFCD) (2018) Hong Kong Biodiversity Database. Available at https://www.afcd.gov.hk/english/conservation/hkbiodiversity/database/search.php [Access on 4 June 2019]

species of conservation importance including Incense Tree (*Aquilaria sinensis*), Silver-back Artocarpus (*Artocarpus hypargyreus*), and Luofushan Joint-fir *(Gnetum luofuense*) were recorded at secondary woodland habitat. A young Incense Tree and the shrub Small Persimmon (*Diospyros vaccinioides*) were observed to be planted at developed area. As both species were artificially introduced to the developed area habitat, they are not considered as flora species of conservation importance. No direct impact on these species would be anticipated.

4.2.5.5 Potential indirect impacts such as disturbance to nearby natural habitats (watercourse, secondary woodland, etc.) and wildlife utilizing these habitats would be caused by increased human activities / noise and dust disturbances during construction phase. Considering the proposed works are localised and in small scale, the indirect impacts would be minor and acceptable with the implementation of good site practices and standard measures as described **Section 5.1**.

4.2.6 Fisheries

4.2.6.1 Given that the ponds identified within the study area were either Fung Shui Pond or abandoned fishpond which showed no signs of active fishing activities, no fisheries impact would be anticipated.

4.2.7 Cultural Heritage

4.2.7.1 No Declared Monuments or SAI are identified within or in the vicinity of the Project site. The nearest identified historic buildings, Fui Sha Wai Enclosing Walls (Grade 3) and Man Ancestral Hall (Nil Grade) are located at 213 m and 216 m from the proposed work areas, respectively. Given the sufficient separation distance between the historic buildings and the Project site, the proposed drainage improvement works would not cause any ground-borne vibration to the historic buildings. No direct or indirect impacts on cultural heritage would be anticipated during the construction of the Project.

4.2.8 Land Contamination

4.2.8.1 Based on the review of available historical aerial photographs from Lands Department, the Project site was situated on farmland from 1963 to 1983, and has been occupied by vegetated / vacant land, semi-natural watercourse and access road from 1993 and onwards. According to findings of the site walkover conducted in November 2019, the Project site was occupied by the existing semi-natural watercourse, an access road, vegetation and vacant land. No potentially contaminating land uses / activities (e.g. vehicle maintenance and open storage), or sources of contamination (e.g. chemical / oil storage) were identified within the proposed works area of the Project site. Therefore, no land contamination impacts are anticipated under the Project. The historical aerial photographs are shown in **Appendix 4.3** and the photographic records for site walkover are shown in **Drawing No. 60543869/PP/PH1/305**.

4.2.9 Landscape and Visual

4.2.9.1 The proposed works include the construction of an approximately 600 m long box culvert with the dimensions of 1.5m x 1.5m, as well as the construction of a 60 m long and 1.5m wide rectangular channel upstream to the proposed box culvert.

4.2.9.2 The location of the proposed works is within the village and basically along the village access. Based on the Tree Survey Report, 17 nos. of existing trees are within the Project site boundary. None of them are Registered Old and Valuable Tree (OVT) or potential OVT. No tree species of conservation importance were recorded within the

works area of the proposed rectangular channel. One of the existing trees *Ficus benjamina* with Diameter Breast Height (DBH) around 1m is identified. In view of its poor structural condition, form and health with many wounded on multi-trunks, severely pruned and dead trunks, the concerned tree is not considered as potential OVT. The existing trees are generally with low amenity value, poor to fair health, and in poor to fair form. Major species found include *Celtis sinensis*, *Dimocarpus longan*, *Leucaena leucocephala*, *Macaranga tanarius* and *Ficus benjamina*. Among the 17 nos. of existing trees within Project site boundary, 17 nos. of trees, including 3 nos. of undesirable trees, would be felled during construction phase. As such, compensatory tree planting will be determined and implemented in accordance with *DEVB TC(W) No. 4/2020 – Tree Preservation*.

4.2.9.3 Beside impact on vegetation, during construction phase, the existing semi-natural watercourse would be temporarily diverted locally to carry out construction works. As the semi-natural watercourse is small and the construction works of the channel would be carried out during dry season, no significant impact on the existing semi-natural watercourse is anticipated.

4.2.9.4 There would be some potential visual obstruction to the hillside woodland for R1 residents from adjacent low-rise housing development and temporary structures due to the construction works such as presence of construction plants/materials entering and leaving the site and the structures being constructed.

4.2.9.5 As the scale of construction of the proposed drainage improvement is small and localized, it is anticipated that the magnitude of impact would be small and could be further mitigated by provision of hoarding along the works area. As such, no adverse landscape impacts and no adverse visual impacts are anticipated.

4.3 Potential Environmental Impacts during Operational Phase

4.3.1 Air Quality

4.3.1.1 The proposed drainage works itself does not constitute any elements that would be an air pollutant emission source. During the operation phase, no other activity would be carried out in the proposed drainage works apart from maintenance works. Therefore, no adverse air quality impact such as dust and odour is expected.

4.3.2 Noise

4.3.2.1 During the operation phase, no activity would be carried out in the proposed drainage works apart from maintenance works such as desilting of the box culvert that would tentatively be carried out annually. It is expected that the maintenance works would be very minor. No adverse noise impact on nearby NSRs would therefore be anticipated.

4.3.3 Water Quality

4.3.3.1 Maintenance works such as desilting of the proposed box culvert would be carried out and is expected to be substantially less intensive than the construction phase excavation works. Furthermore, the maintenance works would be carried out during dry season to avoid any potential water quality impacts.

4.3.4 Waste Management

4.3.4.1 It is anticipated that only limited waste would be generated during maintenance desilting of the proposed box culvert. With the implementation of the mitigation measures and proposed waste handling arrangement as presented in **Section 5.2.4**,

adverse environmental impacts arising from the storage, handling, and transportation of waste to be generated during the operational phase would not be anticipated.

4.3.5 Ecology

4.3.5.1 No ecological impacts are identified during operational phase.

4.3.6 Fisheries

4.3.6.1 No fisheries impacts are anticipated during operational phase.

4.3.7 Cultural Heritage

4.3.7.1 No Declared Monuments and SAI are identified within or in the vicinity of the Project site and the nearest identified historic buildings, Fui Sha Wai Enclosing Walls (Grade 3) and Man Ancestral Hall (Nil Grade) are located at over 213 m and 216 m from the proposed drainage works, respectively. No direct or indirect cultural heritage impacts are identified from the operation of the Project.

4.3.8 Landscape and Visual

4.3.8.1 Concrete rectangular channel with rip-rap base which provides natural substrates is proposed at the upstream rectangular channel. This design makes reference to the constructed drainage works at Kau Lung Hang. These should be properly maintained during operational phase to keep in good condition. No adverse landscape and visual impacts are anticipated during operational phase given the relatively small scale of the project.

5 ENVIRONMENTAL MITIGATION MEASURES TO BE INCORPORATED IN THE CONSTRUCTION AND OPERATION AND ANY FURTHER ENVIRONMENTAL IMPLICATION

5.1 Construction Phase

5.1.1 Air Quality

5.1.1.1 Dust control and suppression measures stipulated in the *Air Pollution Control (Construction Dust) Regulation* will be implemented to control the dust emissions from the site including regular water spraying of exposed surfaces, wheel washing and covering dusty material stockpiles with tarpaulin sheet, screen hoarding and provision of covers for all trucks would minimize dust emissions. Any stockpile of dusty materials should also avoid being placed next to the nearby ASRs to minimise the potential dust impacts as far as possible.

5.1.2 Noise

5.1.2.1 Noise mitigation measures as presented in **Appendix 5.1** including the use of quieter PME, use of movable noise barrier and scheduling of noisy activities are recommended for the construction activities. Movable noise barriers that can be placed close to the construction equipment and moved along with the PME are effective for screening noise from NSRs. A typical design which has been used locally is a wooden framed barrier with a cantilevered upper portion of superficial density no less than 10kg/m² on a skid footing with internal sound absorptive lining. The contractor shall be responsible for the design and actual position of the movable noise barriers with due consideration given to the position and size of the PME, and the requirement of intercepting the line-of-sight from the NSRs to the PME, as well as ensuring that the barriers should have no opening and gap. This measure is particularly effective for low-rise NSRs. It is anticipated that the use of movable noise barrier could provide a 5 dB(A) reduction for movable PME and 10 dB(A) for stationary PME / relatively static plant such as vibratory poker (hand-held electric).

5.1.2.2 With the adoption of recommended noise control measures which have been reviewed and confirmed to be practicable by design engineer, the mitigated noise levels at all the representative NSRs as detailed in **Appendix 5.2**, would comply with the noise criterion of 75 dB(A) during construction of the proposed drainage improvement works.

5.1.2.3 In addition to the abovementioned mitigation measures, noise mitigation measures stipulated in EPD's "*Recommended Pollution Control Clauses for Construction Contracts*" and following good site practices should be implemented during construction phase:

- Only well-maintained plant should be operated on-site and plant should be serviced regularly;
- Silencers or mufflers on construction equipment, if applicable, should be utilized and should be properly maintained;
- Mobile plant such as generator, if any, should be sited as far away from NSRs as possible.
- PME 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 directed away from the nearby NSRs; and
- Material stockpiles and other structures should be effectively utilized, wherever

practicable, for screening noise from on-site construction activities.

5.1.3 Water Quality

5.1.3.1 In order to protect the water quality of the water gathering grounds, all site practices outlined in WSD's *Conditions of Working within Water Gathering Ground* (**Appendix 5.3** refers) should be strictly followed during the construction phase. The Water Quality Objectives (WQOs) and *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* (TM-DSS) stipulated under the *Water Pollution Control Ordinance* (Cap. 358) should also be observed.

5.1.3.2 The site practices outlined in *ProPECC PN 1/94 "Construction Site Drainage"* should be implemented in order to minimize surface runoff and the chance of erosion. The following measures should be implemented to ensure all construction runoff are well controlled, so as to minimize water quality impacts:

Construction Site Runoff and Drainage

- Sand/silt removal facilities such as sand/silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the Technical Memorandum standard under the *Water Pollution Control Ordinance.* Earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities.
- All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit should be regularly removed, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.
- All vehicles and plant should be cleaned before leaving the construction site to ensure no earth, mud, debris and the like is deposited outside the construction works areas.
- Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric during rainstorms.
- Rainwater pumped out from trenches should be treated by silt removal facilities before discharge.
- Good site practices should be implemented to remove rubbish and litter from construction site. It is recommended to clean the construction site on a regular daily basis.

Sewage from Construction Workers

- Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site where necessary to handle sewage from the workers. A licensed contractor would be responsible for the appropriate disposal of sewage and maintenance of these facilities.

5.1.3.3 The practices outlined in *ETWB TC (Works) No. 5/2005 "Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works"* should also be adopted where applicable, including but not limited to the below measures to minimise the water quality impacts upon any natural streams or surface water systems:

- Stockpiling of construction materials and spoil, if any, should be properly covered and located away from any natural stream/river.
- Construction works close to the inland waters should be carried out in dry season as far as practicable where the flow in the surface channel or stream is low.

- Construction debris and spoil should be covered up and/or disposed of as soon as possible to avoid being washed into the nearby water receivers.
- Removal of existing vegetation alongside the riverbanks should be avoided or minimised. When disturbance to vegetation is unavoidable, all disturbed areas should be hydroseeded or planted with suitable vegetation to blend in with the natural environment upon completion of works.

5.1.3.4 Temporary diversion by pipelines is recommended wherever practicable to allow a dry condition for works within the watercourses. The temporary arrangement should be carried out in dry condition before the commencement of the proposed works.

5.1.4 Waste Management

5.1.4.1 The following good waste management plan and practices will be implemented to ensure proper handling and disposal of waste, and to minimize the quantity of waste and C&D materials generated:

- Train site personnel in site cleanliness, proper waste management and chemical handling procedures
- Provide sufficient waste disposal points
- Collect waste regularly
- Adopt a regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors
- Segregate and store different types of wastes in labelled containers or stockpiles to enhance reuse or recycling of materials and their proper disposal
- Plan and stock construction materials carefully to minimise waste generation and avoid unnecessary waste generation
- Adopt proper storage and site practices to minimise the potential for damage or contamination of construction materials.
- Provide workers training about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycle
- Maintain and clean waste storage areas routinely
- Provide covers and, if necessary, water spraying system, to waste storage areas to prevent materials from wind-blown or being washed away
- Cover the wastes while transferring to avoid wind-blown
- Designate different locations within the Project site boundary to stock each material to enhance reuse where applicable

5.1.4.2 All C&D materials generated will be sorted by the contractor into different categories for disposal at PFRF, landfills or recycling as appropriate. Disposal of C&D materials should be managed in accordance with the Development Bureau *Technical Circular (Works) (DEVB TC(W)) No. 6/2010 "Trip Ticket System for Disposal of Construction & Demolition Materials"*.

5.1.4.3 All chemical wastes from equipment maintenance will be handled, stored, and disposed of properly in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

5.1.4.4 General refuse will be stored in enclosed bins or compaction units, separated from C&D materials and chemical wastes. A reputable waste collector should be employed by the contractor to collect and dispose of general refuse, which will be separated from C&D materials and chemical wastes, on a daily or every second day basis to minimize odour, pest and litter impacts.

5.1.4.5 **Table 5.1** provides a summary of the various types of waste likely to be generated during the construction of the Project, together with the recommended handling and disposal methods.

Table 5.1 Summary of Waste Handling Procedures and Disposal Outlets during Construction Phase

Waste Type	Handling	Disposal
C&D Materials	Where possible should be reused on-site. If off-site disposal required, separate into: • C&D waste • Public fill: concrete and rock	 • Strategic Landfill • PFRF
Chemical Wastes	To be collected and disposed of by licensed collector. Stored in compatible containers in designed area on site	CWTC
General Refuse	To be reused and recycled on-site prior to disposal as far as practicable. Provide on-site refuse collection facilities for remaining refuse.	• Refuse station for compaction & containerization and then to Strategic Landfill • A reputable waste collector

5.1.5 Ecology

5.1.5.1 Mitigation measures should be considered according to the principle of avoidance first, then minimisation and compensation. Permanent habitat loss should be avoided during design stage, as far as practicable. Unavoidable habitat loss should be minimised as far as possible.

5.1.5.2 Adoption of Blue-green elements was considered in accordance with DEVB TC(W) No. 9/2020 – Blue-Green Drainage Infrastructure. Taking into account the site constraints and drainage capacity, the existing substrates, i.e. rock and cobbles, would be re-used in the proposed concrete channel as far as possible. Alternatively, DSD Practice Note No. 1/2015, *Guidelines on Environmental and Ecological Considerations for River Channel Design*, has outlined ecologically-friendly elements that could be incorporated into the design of the channel. For example, the channel substrates could be rip-rap with a layer of rubble stones on concrete channel bed, imitating the natural stream habitats of Small Snakehead.

5.1.5.3 The Project site boundary would be clearly defined. All works should take place within the Project site boundary and avoid encroaching into the nearby semi-natural watercourse. Before the commencement of construction works, the semi-natural watercourse within the Project site boundary should be checked by a qualified ecologist to see if there are any individuals of Small Snakehead. Should any individuals of Small Snakehead be found, they should be captured and relocated to upstream areas or other suitable recipient site to avoid direct impact.

5.1.5.4 General good site practices should be adopted to minimize disturbance to habitats and wildlife nearby, and water quality impacts on ecology. These measures include but not limited to:

- Stockpiling of construction materials should be properly covered and located away from natural streams.
- Construction debris and spoil should be covered and properly disposed of as soon as possible to avoid being washed into nearby rivers/ streams by rain.
- Effective site run-off control measures (e.g. provision of surface drainage system, use of sand/silt traps, etc.) should be provided to minimize impacts on adjacent waterbodies. Construction effluent, site run-off and sewage should be collected and treated properly.
- Standard good site practices (e.g. erection of hoardings around work sites and stockpiling at designated areas) should be implemented to minimize potential disturbance impacts.
- Practical dust and noise control measures (e.g. regular watering, the use of quiet mechanical plants, temporary noise barrier, etc.) should be implemented.

5.1.6 Fisheries

5.1.6.1 As no fisheries impacts are anticipated during the construction phase, no mitigation measure is required.

5.1.7 Cultural Heritage

5.1.7.1 As no adverse direct or indirect impacts on cultural heritage would be anticipated during the construction phase, no mitigation measure is required.

5.1.8 Land Contamination

5.1.8.1 As no land contamination impacts are anticipated within the Project site, no mitigation measures is required.

5.1.9 Landscape and Visual

5.1.9.1 Measures to minimise potential construction phase landscape and visual impacts include:

- Minimize disturbance to significant LRs as part of the detailed design;
- Optimization of construction activities, e.g. minimizing extent of temporary works area, installing site hoardings and minimizing illumination on non-target areas; carry out the works in phase to minimize any visual impact due to the construction activities;
- Minimize construction periods where possible for locations with landscape and visual impacts; and
- Any trees to be felled under the Project shall be compensated in accordance with *DEVB TCW No. 4/2020 – Tree Preservation*.

5.1.9.2 No adverse landscape and visual impacts would be anticipated given the relatively small scale of the project, and that the potential landscape and visual impacts identified under **Section 4.2.9** can be further minimized by adopting the recommended list of landscape and visual mitigation measures during the construction phase to be fully implemented.

5.2 Operational Phase

5.2.1 Air Quality

5.2.1.1 As air quality impact would not be anticipated during the operational phase, no mitigation measure is required.

5.2.2 Noise

5.2.2.1 As adverse noise impact would not be anticipated during the operation of drainage channels and associated maintenance works on nearby NSRs, no mitigation measure is required.

5.2.3 Water Quality

5.2.3.1 Mitigation measures as mentioned in **Section 5.1.3** should be followed during maintenance of box culvert.

5.2.4 Waste Management

5.2.4.1 Mitigation measures as mentioned in **Section 5.1.4** should be followed during maintenance of box culvert. Silt and Debris generated from maintenance, if any, should dispose of at strategic landfill.

5.2.5 Ecology

5.2.5.1 As no ecological impacts are anticipated during operational phase, no mitigation measures are required.

5.2.6 Fisheries

5.2.6.1 As no fisheries impacts are anticipated during operational phase, no mitigation measures are required.

5.2.7 Cultural Heritage

5.2.7.1 As no direct or indirect impacts on cultural heritage would be anticipated during operation of the Project, no mitigation measure is required.

5.2.8 Landscape and Visual

5.2.8.1 Measures to minimise potential operational phase landscape and visual impacts include:

- Provision of greening, aesthetic design of aboveground structures to enhance landscape and visual aesthetic of the area in proximity, if any;
- Tree preservation in accordance with *Development Bureau Technical Circular (Works) No. 4/2020 – Tree Preservation*.

5.2.8.2 No adverse landscape and visual impacts would be anticipated given the relatively small scale of the project, and that the potential landscape and visual impacts identified under **Section 4.3.8** can be further minimized by adopting the recommended list of landscape and visual mitigation measures during the operational phase to be fully implemented.

5.3 Environmental Monitoring and Audit

5.3.1.1 With the implementation of recommended mitigation measures, no adverse environmental impacts are anticipated, environmental monitoring is therefore considered not necessary. Environmental audit during the construction phase should be conducted to ensure the recommended mitigation measures be implemented properly.

5.4 Severity, Distribution and Duration of Environmental Effects

5.4.1.1 In view of the nature and small scale of the Project, the associated environmental impacts would be small scale, localised and temporary. With the implementation of the recommended mitigation measures, no adverse impacts would be anticipated from this Project.

6 SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1.1.1 The potential environmental impacts and proposed mitigation measures to be incorporated during construction and operational phases of the Project are summarized in **Table 6.1**, which would be included in the construction contract document. The project proponent would supervise and monitor the implementation of these measures by the Contractor.

Table 6.1 Summary of Potential Environmental Impacts and Mitigation Measures

Potential Environmental Impacts	Mitigation Measures	Implementation Agent	Relevant Section in Project Profile
Construction Phase			
Construction Dust	• Implement standard dust suppression measures as stipulated in *Air Pollution Control (Construction Dust) Regulation* • *Avoid stockpiling of dusty materials next to nearby ASRs*	Contractor	5.1.1
Construction Noise	• Use of quiet PME • Apply temporary / movable noise barrier, etc.	Contractor	5.1.2.1 – 5.1.2.2
	• Adopt noise mitigation measures stipulated in EPD's "*Recommended Pollution Control Clauses for Construction Contracts*" and good site practices		5.1.2.3
Water Quality	• Strictly follow all site practices outlined in WSD's *Conditions of Working within Water Gathering Ground* • Observe relevant requirements (e.g. WQOS, TM-DSS) stipulated under WPQO • Implement site practices outlined in *ProPECC PN 1/94* (e.g. provision of silt removal facilities, good site practices etc.) • Provide temporary sanitary facilities on-site to handle sewage from workers. • Adopt practices outlined in *ETWB TC (Works) No. 5/2005* where applicable (e.g. carry out construction works close to inland waters in dry season as far as practicable) • Temporarily divert flow of watercourses wherever practicable to allow a dry condition for works within the watercourses. • Carry out temporary diversion works by pipelines in dry condition before the commencement of the proposed works.	Contractor	5.1.3.1 – 5.1.3.4
Waste Management	• Conduct good waste management plan and practices on minimizing, handling and disposal of waste • Sort all inert and non-inert C&D materials generated into different categories and reuse	Contractor	5.1.4.1 – 5.1.4.4

Potential Environmental Impacts	Mitigation Measures	Implementation Agent	Relevant Section in Project Profile
	or recycle as far as practicable prior to disposal of at PFRF (inert C&D materials) or landfills (non-recyclable C&D waste) or recycling as appropriate • Proper storage, handling and disposal of chemical waste in accordance with the requirements for *Waste Disposal (Chemical* Waste) (General) Regulation • Store general refuse in enclosed bins or compaction units separate from C&D materials and chemical wastes and reuse/ recycle on-site prior to disposal as far as practicable • Comply with relevant technical circulars and regulations		
Ecology	• Consider the design according to the principle of avoidance first, then minimisation and compensation. • Consider adoption of Blue-green elements in accordance with DEVB TC(W) No. 9/2020 – "Blue-Green Drainage Infrastructure". • Avoid permanent habitat loss during design stage, as far as practicable; minimise unavoidable habitat loss as far as possible.	Design Engineer	5.1.5.1
	• Reuse the existing substrates in the proposed rectangular concrete channel	Contractor	5.1.5.2
	• Capture and relocate the Small Snakehead, if any, to upstream areas or other suitable recipient site if found at the semi-natural watercourse, prior to the commencement of construction works.		5.1.5.3
	• Conduct good site practices to minimize disturbance to habitats and wildlife nearby, and water quality impacts on ecology		5.1.5.4
Landscape and Visual	• Optimization of construction activities, • Minimize construction periods where possible for location with landscape and visual impacts; and carry out the works in phase to minimize any visual impact due to the construction activities. • Carry out the works in phase to minimize any visual impact due to the construction activities.	Contractor	5.1.9.1
	• Any trees to be felled under the Project shall be compensated in accordance with *DEVB TC(W) No. 4/2020 – Tree Preservation*.	Design Engineer / DSD	
	• Minimize disturbance to significant LRs in design	Design Engineer	

Potential Environmental Impacts	Mitigation Measures	Implementation Agent	Relevant Section in Project Profile
Operational Phase			
Water Quality	• Mitigation measures as mentioned under construction phase should be followed during maintenance of box culvert.	DSD	5.2.3.1
Waste Management	• Mitigation measures as mentioned under construction phase should be followed during maintenance of box culvert. • Silt and Debris generated from maintenance should disposal of at strategic landfill	DSD	5.2.4.1
Landscape and Visual	• Provision of greening, aesthetic design of aboveground structures, if any	Contractor	5.2.8.1
	• Tree preservation in accordance with *DEVB TC(W) No. 4/2020*	DSD	

6.1.1.2 In order to help reduce carbon emission and pollution, timely application of temporary electricity and water supply would be made and electric vehicles would be adopted in accordance with *DEVB TC(W) No. 13/2020 – Timely Application of Temporary Electricity and Water Supply for Public Works Contracts and Wider Use of Electric Vehicles in Public Works Contracts* in the Project.

7 USE OF PREVIOUSLY APPROVED ENVIRONMENTAL IMPACT ASSESSMENT REPORTS/ DIRECT EP APPLICATIONS

7.1 Use of Previously Approved Environmental Impact Assessment Reports

7.1.1.1 No previous Environmental Impact Assessment (EIA) Report has been approved or submitted for the Project.

7.2 History of Similar Projects

7.2.1.1 A review has been made to other projects of similar nature whereby permission was granted to apply directly for Environmental Permit as summarized in **Table 7.1**.

Table 7.1 Summary of Previous Projects with Permission Granted to Apply Directly for Environmental Permit

Application No.	Project Profile Title	Description of Works
DIR-278/2020	Drainage Improvement Works at Shek Kiu Tau	The purpose of the Project is to minimize the risk of flooding to the villages in the vicinity of the existing natural stream in Shek Kiu Tau (SKT) to improve to a flood protection level of 1 in 10 years. The Proposed Works include construction of 67m-long Rectangular Channel; upgrading of the existing box culvert across Sha Tau Kok Road; raising for the existing pedestrian crossing and re-provision of existing drainage; and placement of gabion blocks.
DIR-235/2014	Drainage Works at Mai Po	Construction of a new drainage pipe in Mai Po area. The works involve laying about 240m long pipe (pipe diameter varies from 1200mm to 1950mm) with part of the drainage pipe running through the Conservation Area.
DIR-227/2013	Improvement of Yuen Long Town Nullah (Town Centre Section)	Improvement works for the Town Centre Section of the existing Yuen Long Town Nullah.
DIR-204/2010	Drainage Improvement in Big Wave Bay	Construction of new drainage channels with a total length of about 225m. that discharge into an area within 300m from Coastal Protection Area and Declared Monument
DIR-194/2009	Stream Improvement at Ta Kwu Ling associated with the Resite of Chuk Yuen Village	Divert the stream along the southeast boundary of the resite into an open U-shape concrete channel (1 m in width, around 2 m in depth and about 135 m in length), which discharge into Deep Bay near the Mai Po Marshes SSSI and Mai Po Conservation Area.
DIR-192/2009	Desilting Works at Hung Shui Kiu Channel, Tuen Mun	Removal of about 1000m^3/year silting at the channel in the forthcoming ten years, in which part of the desilting works may be implemented in the Conservation Area.
DIR-135/2005	Improvement to the Ngong Ping Stream	Trimming of a short section of stream bed (about 27m in length) at Ngong Ping Stream, which discharges or discharge into an area which is less than 300m from the nearest boundary of an existing Conservation Area, around the previous columbarium bridge and the creation of shallow rock pools at the section to be trimmed.
DIR-127/2005	Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai Drainage Improvement, Stage 1, Phase 2B - Kam Tin Secondary Drainage Channels KT14 & KT15	Channelising an existing stream which discharges or discharge into an area which is less than 300m from the nearest boundary of an existing Conservation Area: KT14 - Three sections with total ~ 958m in length (2.5m W x 2.8m H for 145m long; 2.5m W x 1.6m H for 339m; and

Application No.	Project Profile Title	Description of Works
		2.5m W x 1.6m H for 474m) and 900mm nominal size U-channel along Kam Sheung Road. KT15 - The total length is about 796m including 3 box culverts (3m W x 2m H) and different size of Channel (width 9.9m x depth 1.6m; width 6.7m x depth 1.6m; width 3.5m x depth 1.6m).
DIR-122/2005	Drainage Improvement Works in Upper Tai Po River	Re-profiling of the channel and realignment of the channel at the upstream (which discharge into an area less than 300m from two declared monuments), inclusion of gabions for bank protection whilst providing a natural channel bed (0.6km).
DIR-109/2004	Drainage Diversion Works For the Comprehensive Residential Development At Various Lots In DD227 & DD229, Tai Po Tsai, Sai Kung	The work involves the diversion of about 600m of the existing stream, channel and underground box culvert, which discharges into an area that is less than 300m from the nearest boundary of an existing Conservation Area and Coastal Protection Area.
DIR-085/2003	Tung Chung Cable Car Project - Diversion of the Ngong Ping Stream	Diverted stream at Ngong Ping of about 390m which falls within the Lantau North Country Park and discharges into an area that is less than 300m from the nearest boundary of an existing Conservation Area.
DIR-006/1998	Improvement to the Stream Course at Pui O	Deepening the channel and stabilizing the banks of about 630m.

8 CONCLUSION

8.1.1.1 The predicted environmental impacts from the Project are unlikely to be adverse and the mitigation measures described in this Project Profile meet the requirements of the EIAO-TM.

8.1.1.2 This Project Profile is prepared to seek permission from the Director of Environmental Protection under Section 5(11) of the EIAO to apply directly for an Environmental Permit.

Drawings

ISO A1 594mm x 841mm

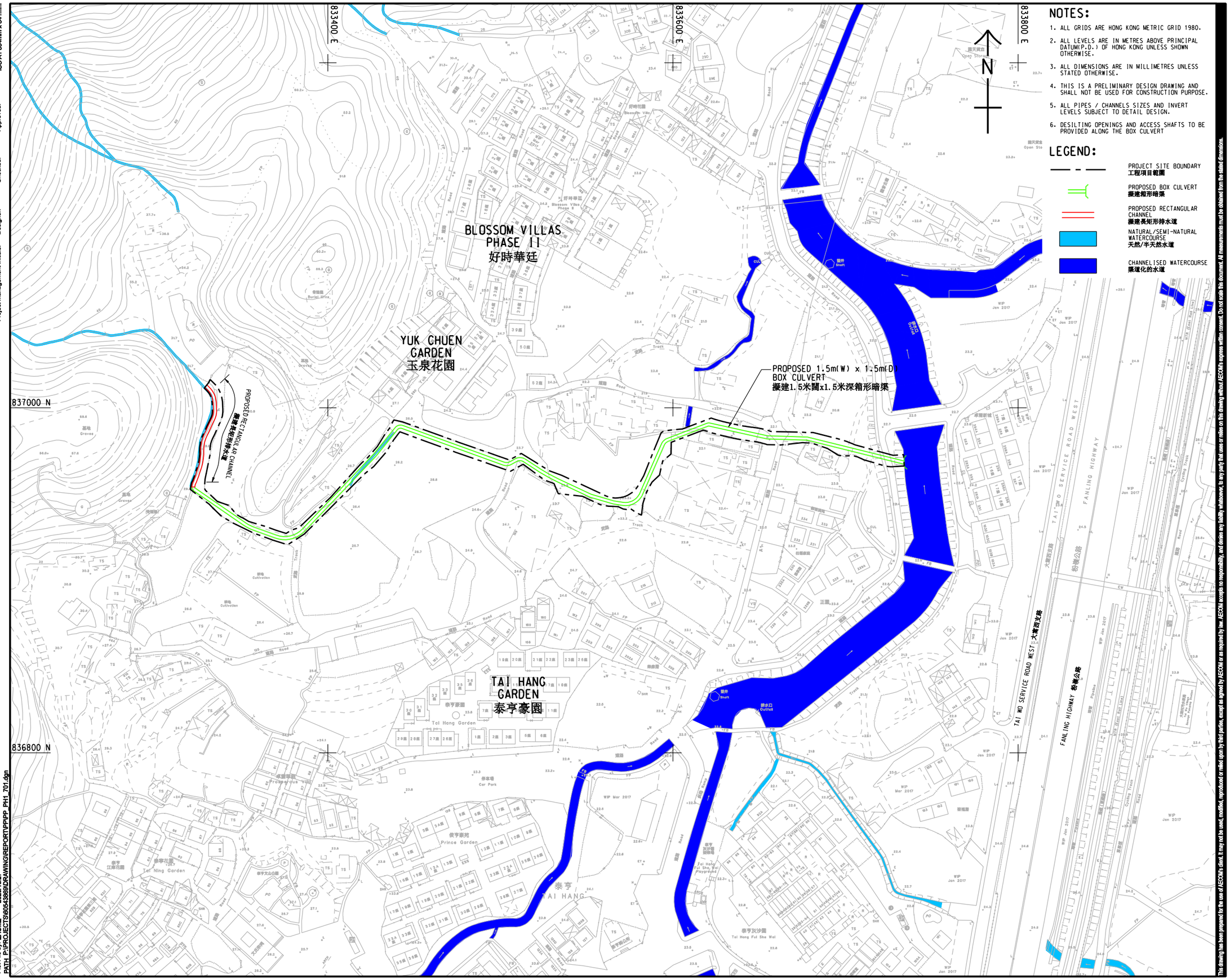
Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: ZHUMZ 2020/10/27
PATH: P:\PROJECTS\60543869\DRAWING\REPORT\PPPP_PH1_701.dgn



NOTES:

1. ALL GRIDS ARE HONG KONG METRIC GRID 1980.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM(P.D.) OF HONG KONG UNLESS SHOWN OTHERWISE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
4. THIS IS A PRELIMINARY DESIGN DRAWING AND SHALL NOT BE USED FOR CONSTRUCTION PURPOSE.
5. ALL PIPES / CHANNELS SIZES AND INVERT LEVELS SUBJECT TO DETAIL DESIGN.
6. DESILTING OPENINGS AND ACCESS SHAFTS TO BE PROVIDED ALONG THE BOX CULVERT

LEGEND:

- PROJECT SITE BOUNDARY 工程項目範圍
- PROPOSED BOX CULVERT 擬建箱形暗渠
- PROPOSED RECTANGULAR CHANNEL 擬建長矩形排水道
- NATURAL/SEMI-NATURAL WATERCOURSE 天然/半天然水道
- CHANNELISED WATERCOURSE 渠道化的水道

AECOM

PROJECT 項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

CLIENT 業主

渠務署 Drainage Services Department

CONSULTANT 工程顧問公司

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ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核實

STATUS 階段

SCALE 比例: A1 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60543869

AGREEMENT NO. 協議編號: CE 54/2016 (DS)

SHEET TITLE 圖紙名稱

PROPOSED DRAINAGE IMPROVEMENT WORKS AT NAM WA PO
擬建南華莆雨水排放系統改善工程

SHEET NUMBER 圖紙編號

60543869/PP/PH1/101

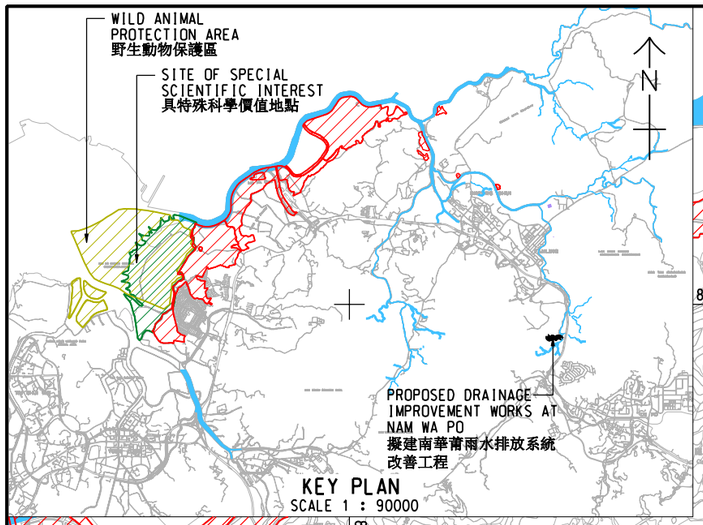
ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:



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AECOM

PROJECT 項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

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STATUS 階段

SCALE 比例
A1 1 : 15000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號
60543869

AGREEMENT NO. 協議編號
CE 54/2016 (DS)

SHEET TITLE 圖紙名稱
SENSITIVE AREAS WITHIN 300m FROM DISCHARGE AREA OF THE PROPOSED DRAINAGE IMPROVEMENT WORKS
擬建雨水排放系統改善工程排水區300米內的敏感地區

SHEET NUMBER 圖紙編號
60543869/PP/PH1/102

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

833400 E

833600 E

833800 E

837000 N

836800 N

NOTES:

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3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
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5. ALL PIPES / CHANNELS SIZES AND INVERT LEVELS SUBJECT TO DETAIL DESIGN.
6. DESILTING OPENINGS AND ACCESS SHAFTS TO BE PROVIDED ALONG THE BOX CULVERT

LEGEND:

- PROJECT SITE BOUNDARY 工程項目範圍
- PROPOSED BOX CULVERT 擬建箱形暗渠
- PROPOSED RECTANGULAR CHANNEL 擬建長矩形排水道
- NWP_A1 REPRESENTATIVE AIR SENSITIVE RECEIVERS 具代表性的空氣敏感受體

BLOSSOM VILLAS PHASE II 好時華廷

YUK CHUEN GARDEN 玉泉花園

TAI HANG GARDEN 泰亨豪園

PROPOSED 1.5m(W) x 1.5m(D) BOX CULVERT 擬建1.5米闊x1.5米深箱形暗渠

PROPOSED RECTANGULAR CHANNEL 擬建長矩形排水道

NWP_A1 NWP_A2 NWP_A3 NWP_A4 NWP_A5 NWP_A6 NWP_A7 NWP_A8 NWP_A9 NWP_A10

TAI WO SERVICE ROAD WEST 大埔西支路

FANLING HIGHWAY 粉嶺公路

Plot File by: ZHUMZ 2020/10/27
PATH: P:\PROJECTS\60543869\DRAWING\REPORT\PPPP_PH1_704.dgn

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PROJECT 項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

CLIENT 業主

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STATUS 階段

SCALE 比例: A1 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60543869

AGREEMENT NO. 協議編號: CE 54/2016 (DS)

SHEET TITLE 圖紙名稱

LOCATIONS OF REPRESENTATIVE AIR SENSITIVE RECEIVERS
具代表性的空氣敏感受體位置

SHEET NUMBER 圖紙編號

60543869/PP/PH1/301

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

833400 E

833600 E

833800 E

837000 N

836800 N

NOTES:

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6. DESILTING OPENINGS AND ACCESS SHAFTS TO BE PROVIDED ALONG THE BOX CULVERT

LEGEND:

PROJECT SITE BOUNDARY
工程項目範圍

PROPOSED BOX CULVERT
擬建箱形暗渠

PROPOSED RECTANGULAR CHANNEL
擬建長矩形排水道

NWP1 REPRESENTATIVE NOISE SENSITIVE RECEIVERS
具代表性的噪音敏感受體

N

BLOSSOM VILLAS PHASE II
好時華廷

YUK CHUEN GARDEN
玉泉花園

TAI HANG GARDEN
泰亨豪園

PROPOSED 1.5m(W) x 1.5m(D) BOX CULVERT
擬建1.5米闊x1.5米深箱形暗渠

PROPOSED RECTANGULAR CHANNEL
擬建長矩形排水渠

NWP1 NWP2 NWP3 NWP4 NWP5 NWP6 NWP7

FANLING HIGHWAY 粉嶺公路

TAI WO SERVICE ROAD WEST 大埔西支路

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PROJECT
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DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

CLIENT
業主

渠務署
Drainage Services Department

CONSULTANT
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I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對

STATUS
階段

SCALE 比例: A1 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60543869

AGREEMENT NO. 協議編號: CE 54/2016 (DS)

SHEET TITLE
圖紙名稱

LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS
具代表性的噪音敏感受體位置

SHEET NUMBER
圖紙編號

60543869/PP/PH1/302

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

833000 E

833500 E

834000 E

837500 N

837000 N

836500 N

N

WO HOP SHEK CEMETERY
和合石墳場

NAM WA PO
南華莆

BLOSSOM VILLAS
PHASE II
好時華廷

YUK CHUEN
GARDEN
玉泉花園

TAI HANG
GARDEN
泰亨豪園

TAI HANG
FUI SHA WAI
泰亨灰沙圍

MA WAT
RIVER
麻笏河

TAI WO SERVICE ROAD WEST 大窩西支路

FANLING HIGHWAY 粉嶺公路

F1

P1 P2 P3 P4

D1

H1

LEGEND:

- PROJECT SITE BOUNDARY 工程項目範圍
- 500m STUDY AREA 500米研究範圍
- WALK TRANSECT 樣線
- FRESHWATER COMMUNITY SAMPLING POINT 淡水生物群落取樣點
- AGRICULTURAL LAND 農地
- POND 池塘
- NATURAL/SEMI-NATURAL WATERCOURSE 天然/半天然的水道
- CHANNELISED WATERCOURSE 渠道化的水道
- GRASSLAND 草地
- GRASSLAND/SHRUBLAND 草地/灌木叢林
- SECONDARY WOODLAND 次生林地
- PLANTATION 植林區
- DEVELOPED AREA 已發展地區
- WASTE GROUND 廢置土地
- ECOLOGICALLY IMPORTANT STREAM 具重要生態價值河溪

SPECIES OF CONSERVATION IMPORTANCE
具存護價值物種

FLORA 植物

- P1 *Artocarpus hypargyreus* 白桂木
- P2 *Aquilaria sinensis* 土沉香
- P3 *Diospyros vaccinioides* 小果柿
- P4 *Gnetum luofuense* 羅浮買麻藤

AQUATIC FAUNA 水生動物

- F1 SMALL SNAKEHEAD 月鱸

DRAGONFLIES 蜻蜓

- D1 EMERALD CASCADER 彩虹蜻

REPTILE 爬蟲類

- H1 CHINESE SOFT-SHELLED TURTLE 鱉

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PROJECT 項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

CLIENT 業主

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STATUS 階段

SCALE 比例
A3 1 : 5000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號
60543869

AGREEMENT NO. 協議編號
CE 54/2016 (DS)

SHEET TITLE 圖紙名稱
HABITAT MAP AND SPECIES OF CONSERVATION IMPORTANCE AT NAM WA PO SITE
南華莆的生境地圖及具存護價值物種

SHEET NUMBER 圖紙編號
60543869/PP/PH1/303

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTES:

1. ALL GRIDS ARE HONG KONG METRIC GRID 1980.
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5. ALL PIPES / CHANNELS SIZES AND INVERT LEVELS SUBJECT TO DETAIL DESIGN.
6. DESILTING OPENINGS AND ACCESS SHAFTS TO BE PROVIDED ALONG THE BOX CULVERT

LEGEND:

- PROJECT SITE BOUNDARY 工程項目範圍
- SITE OF ARCHAEOLOGICAL INTEREST 具考古研究價值的地點
- PROPOSED BOX CULVERT 擬建箱形暗渠
- PROPOSED RECTANGULAR CHANNEL 擬建長矩形排水道
- HISTORIC BUILDING 歷史建築

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PROJECT 項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

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STATUS 階段

SCALE 比例: A1 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60543869

AGREEMENT NO. 協議編號: CE 54/2016 (DS)

SHEET TITLE 圖紙名稱

LOCATIONS OF CULTURAL HERITAGE RESOURCES
文化遺產位置

SHEET NUMBER 圖紙編號

60543869/PP/PH1/304

Plot File by: ZHUMZ 2020/10/27
PATH: P:\PROJECTS\60543869\DRAWING\REPORT\PPPP_PH1_705.dgn

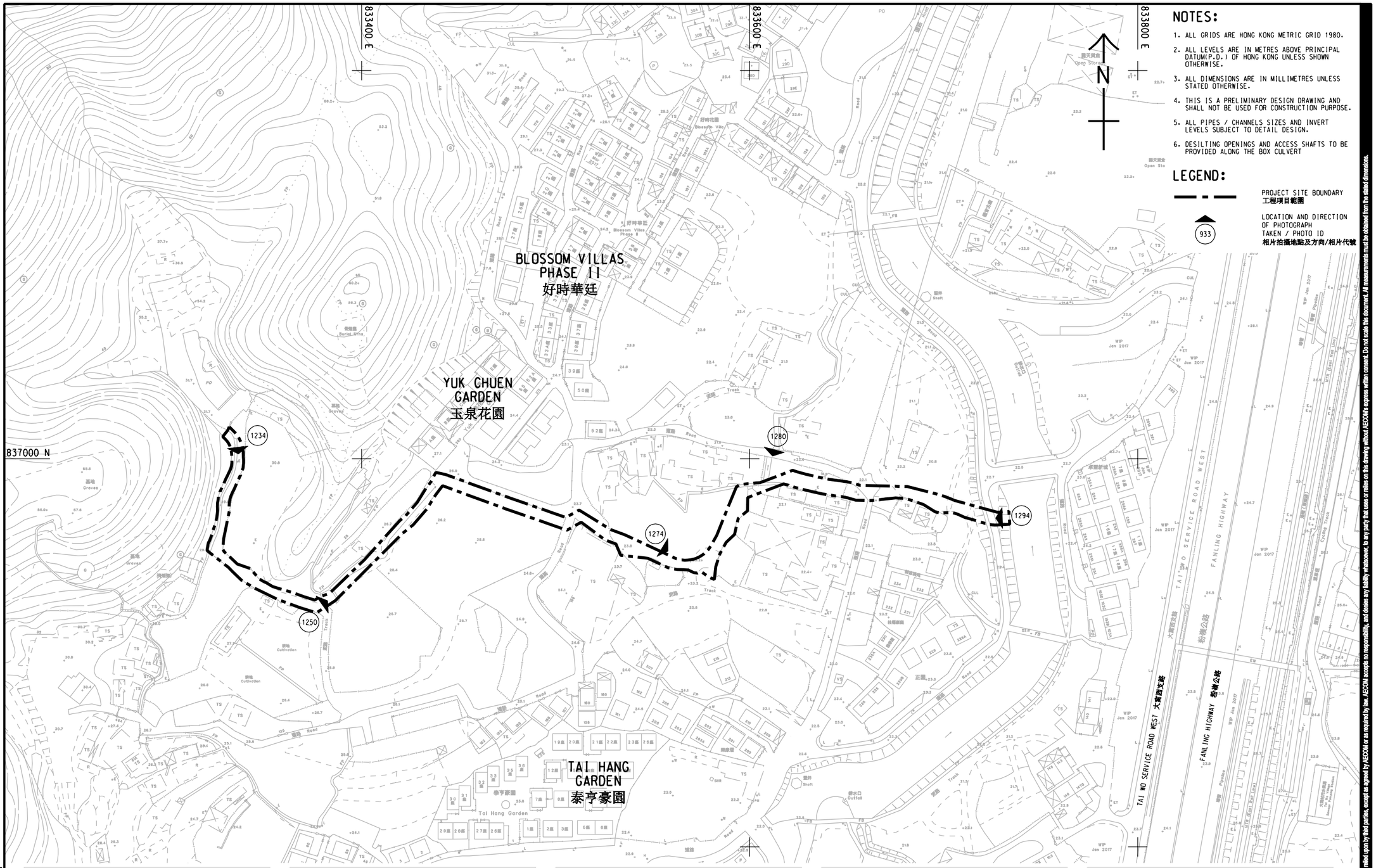
ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:



NOTES:

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6. DESILTING OPENINGS AND ACCESS SHAFTS TO BE PROVIDED ALONG THE BOX CULVERT

LEGEND:

PROJECT SITE BOUNDARY
工程項目範圍

933
LOCATION AND DIRECTION OF PHOTOGRAPH TAKEN / PHOTO ID
相片拍攝地點及方向/相片代號

PHOTO 1234 相片1234
ACCESS ROAD AND EXISTING SEMI-NATURAL WATERCOURSE
道路及現有半天然水道
(DATE TAKEN: 7 NOVEMBER 2019)

PHOTO 1250 相片1250
ACCESS ROAD 道路
(DATE TAKEN: 7 NOVEMBER 2019)

PHOTO 1274 相片1274
VEGETATION / VACANT LAND 植被/空地
(DATE TAKEN: 7 NOVEMBER 2019)

PHOTO 1280 相片1280
VEGETATION 植被
(DATE TAKEN: 7 NOVEMBER 2019)

PHOTO 1294 相片1294
VEGETATION / VACANT LAND 植被/空地
(DATE TAKEN: 7 NOVEMBER 2019)

Plot File by: ZHUMZ 2020/10/27
PATH: P:\PROJECTS\60543869\DRAWING\REPORT\PPPP_PH1_711.dgn

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PROJECT 項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

CLIENT 業主

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STATUS 階段

SCALE 比例: A1 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60543869

AGREEMENT NO. 協議編號: CE 54/2016 (DS)

SHEET TITLE 圖紙名稱

PHOTOGRAPHIC RECORDS FOR SITE WALKOVER AT NAM WA PO
南華莆實地視察的照片記錄

SHEET NUMBER 圖紙編號

60543869/PP/PH1/305

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

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PROJECT 項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

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STATUS 階段

SCALE 比例
A1 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號
60543869

AGREEMENT NO. 協議編號
CE 54/2016 (DS)

SHEET TITLE 圖紙名稱
LANDSCAPE RESOURCES AND VISUALLY SENSITIVE RECEIVERS
景觀資源及視覺敏感受體

SHEET NUMBER 圖紙編號
60543869/PP/PH1/306

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

833400 E

833600 E

833800 E

837000 N

836800 N

NOTES:

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6. DESILTING OPENINGS AND ACCESS SHAFTS TO BE PROVIDED ALONG THE BOX CULVERT

N

LEGEND:

PROJECT SITE BOUNDARY
工程項目範圍

100m ASSESSMENT BOUNDARY
100米研究範圍

LCA1 UPLAND AND HILLSIDE LANDSCAPE
高地及山坡景觀

LCA2 SETTLED VALLEY LANDSCAPE
山谷景觀

BLOSSOM VILLAS PHASE II
好時華廷

YUK CHUEN GARDEN
玉泉花園

TAI HANG GARDEN
泰亨豪園

TAI WO SERVICE ROAD WEST 大老表支路

FANLING HIGHWAY 粉嶺公路

Plot File by: ZHUMZ 2020/10/27
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PROJECT
項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

CLIENT
業主

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STATUS
狀況

SCALE 比例
A1 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60543869

AGREEMENT NO. 協議編號
CE 54/2016 (DS)

SHEET TITLE
圖紙名稱

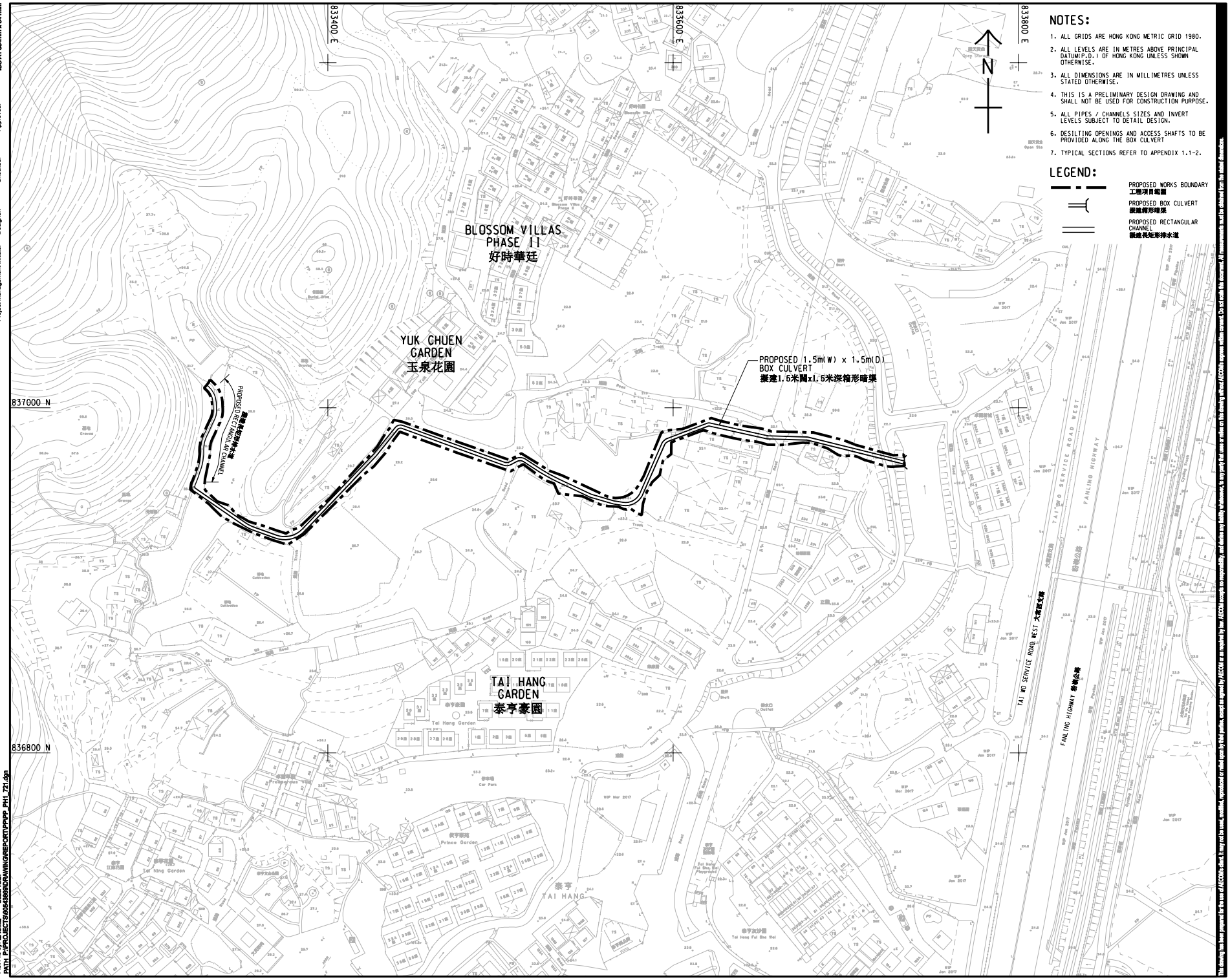
LANDSCAPE CHARACTER AREA
景觀特色區

SHEET NUMBER
圖紙編號

60543869/PP/PH1/307

Appendices

Appendix 1.1 - Preliminary Design of Drainage Improvement Works at Nam Wa Po and Indicative Sections Drawings of the Project



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6. DESILTING OPENINGS AND ACCESS SHAFTS TO BE PROVIDED ALONG THE BOX CULVERT
7. TYPICAL SECTIONS REFER TO APPENDIX 1.1-2.

LEGEND:

PROPOSED WORKS BOUNDARY
工程項目範圍

PROPOSED BOX CULVERT
擬建箱形暗渠

PROPOSED RECTANGULAR CHANNEL
擬建長矩形排水道

AECOM

PROJECT
DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

CLIENT
渠務署
Drainage Services Department

CONSULTANT
AECOM Asia Company Ltd.
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ISSUE/REVISION

MR	DATE	DESCRIPTION	CHK

STATUS

SCALE A1 1 : 1000

DIMENSION UNIT METRES

KEY PLAN

PROJECT NO. 60543869

AGREEMENT NO. CE 54/2016 (DS)

SHEET TITLE
PRELIMINARY DESIGN OF DRAINAGE IMPROVEMENT WORKS AT NAM WA PO
南華甫雨水排放系統改善工程的初步設計

SHEET NUMBER
APPENDIX 1.1-1
附錄 1.1-1

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: ZHUMZ 2020/10/27
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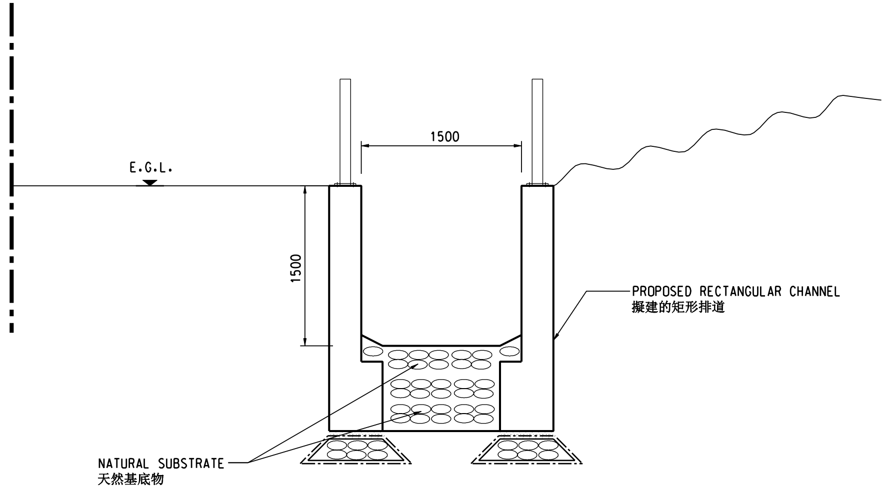
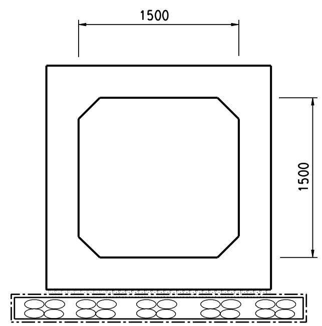


TYPICAL SECTION OF RECTANGULAR CHANNEL
長矩形排水道的典型剖面圖



TYPICAL SECTION OF BOX CULVERT
箱形暗渠的典型剖面圖

AECOM

PROJECT 項目

DRAINAGE IMPROVEMENT WORKS AT NORTH DISTRICT PACKAGES A AND C - INVESTIGATION
北區雨水排放系統改善工程A及C部分-勘查研究

CLIENT 業主

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ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS 階段

SCALE 比例: A1 1 : 25

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60543869

AGREEMENT NO. 協議編號: CE 54/2016 (DS)

SHEET TITLE 圖紙名稱

INDICATIVE SECTIONS DRAWINGS OF THE PROJECT
本項目剖面示意圖

SHEET NUMBER 圖紙編號

APPENDIX 1.1-2
附錄 1.1-2

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

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Appendix 2.1 -
Tentative Construction Programme

Appendix 2.1 Tentative Construction Programme

Act No.	Main Construction Elements	2022				2023				2024				2025				2026			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Site Clearance																				
2	Excavation (Including Pavement Breaking, Sheet Piling, Shoring and Excavation)																				
3	Construction of Box Culvert / Rectangular Channel (Including Rebar Fixing, Formwork Erection, Concreting)																				
4	Backfilling and Road Reinstatement #																				

Note:
- Backfilling and Road Reinstatement works would not be undertanken at the same time within the same work front.

Appendix 3.1 - Representative Photographs of Habitat Types and Species of Conservation Importance Recorded within the Study Area

Plate 1
Agricultural Land

Plate 2
Pond

Plate 3
Natural/Semi-natural Watercourse

Plate 4
Channelised Watercourse

Plate 5
Grassland

Plate 6
Grassland/Shrubland

渠務署 Drainage Services Department	Agreement No. CE54/2016(DS) Drainage Improvement Works at North District – Packages A and C – Investigation	SCALE	N.T.S.	DATE	Jun-19
		CHECK	LAMCCG	DRAWN	YIPKYN
AECOM	**Representative Photographs of Habitat Types and Species of Conservation Importance Recorded within the Study Area**	JOB NO.	60543869	**Appendix No.** App 3.1	**Rev** -

Plate 7
Secondary Woodland

Plate 8
Plantation

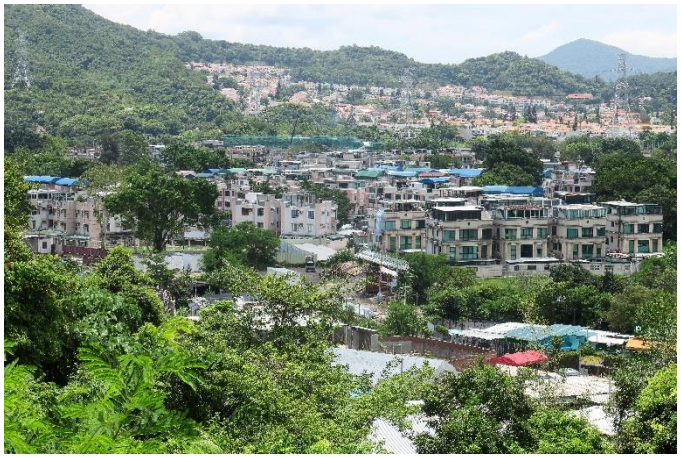


Plate 9
Developed Area

Plate 10
Waste Ground

Plate 11
Aquilaria sinensis

Plate 12
Artocarpus hypargyreus

渠務署 Drainage Services Department	Agreement No. CE54/2016(DS) Drainage Improvement Works at North District – Packages A and C – Investigation	SCALE	N.T.S.	DATE	Jun-19
		CHECK	LAMCCG	DRAWN	YIPKYN
AECOM	**Representative Photographs of Habitat Types and Species of Conservation Importance Recorded within the Study Area**	JOB NO.	60543869	**Appendix No.** App 3.1	**Rev** -

Plate 13
Diospyros vaccinioides

Plate 14
Gnetum luofuense

Plate 15
Black-crowned Night Heron

Plate 16
Chinese Pond Heron

Plate 17
Little Egret

Plate 18
Besra

渠務署 Drainage Services Department	Agreement No. CE54/2016(DS) Drainage Improvement Works at North District – Packages A and C – Investigation	SCALE	N.T.S.	DATE	Jun-19
		CHECK	LAMCCG	DRAWN	YIPKYN
AECOM	**Representative Photographs of Habitat Types and Species of Conservation Importance Recorded within the Study Area**	JOB NO.	60543869	**Appendix No.** App 3.1	**Rev** -

Plate 19
Greater Coucal

Plate 20
Chinese Soft-shelled Turtle

Plate 21
Broadtail Royal

Plate 22
Small Snakehead

N/A

N/A

N/A

N/A

渠務署 Drainage Services Department	Agreement No. CE54/2016(DS) Drainage Improvement Works at North District – Packages A and C – Investigation	SCALE	N.T.S.	DATE	Jun-19
		CHECK	LAMCCG	DRAWN	YIPKYN
AECOM	**Representative Photographs of Habitat Types and Species of Conservation Importance Recorded within the Study Area**	JOB NO.	60543869	**Appendix No.** App 3.1	**Rev** -

Appendix 3.2 - Flora Species Recorded in the Surveys

Appendix 3.2 Flora Species Recorded in the Surveys

Scientific Name	Chinese Name	Origin	Growth Form	Distribution in Hong Kong[1]	Protection Status[2]	PS[4]			SA[4]									
						WC	PL	DA	AG	PO	WC	CW	GL	GS	SW	PL	DA	WG
Acacia auriculiformis	耳果相思	Exotic	Tree	Widely cultivated	-							+						
Acacia confusa	台灣相思	Exotic	Tree	Widely cultivated	-		+								+	+		
Acorus gramineus	石菖蒲	Native	Herb	Very common	-							+						
Agave angustifolia	狹葉龍舌蘭	Exotic	Herb	Cultivated	-												+	
Ageratum conyzoides	藿香薊	Exotic	Herb	Common	-	++					++		++					
Ageratum houstonianum	熊耳草	Exotic	Herb	Common	-				++					++			+	
Alangium chinense	八角楓	Native	Shrub/Tree	Common	-		+								++			
Aleurites moluccana	石栗	Exotic	Tree	Widely cultivated	-											+		
Alisma plantago-aquatica	澤瀉	Native	Herb	Cultivated	-							+						
Alocasia macrorrhizos	海芋	Native	Herb	Very common	-	+		+		+	+	+	+		++			
Alternanthera philoxeroides	空心莧	Exotic	Herb	Common	-							+++						
Alternanthera sessilis	蝦鉗菜	Native	Herb	Common	-	++	+				++							
Amaranthus viridis	野莧	Native	Herb	Very common	-				++			+					+	
Ampelopsis heterophylla var. *kulingensis*	牯嶺蛇葡萄	Native	Climber	Common	-										+			
Antirhea chinensis	毛茶	Native	Shrub	Very common	-										+			
Aporusa dioica	銀柴	Native	Tree	Very common	-										++			
Aquilaria sinensis	**土沉香**	Native	Tree	Common	Protected under Protection of Endangered Species of Animals and Plants Ordinance (Cap.586); Status in China: Near Threatened; Listed in Wild Plants under State Protection: Category II; China Plant Red Data Book: Vulnerable; IUCN Red List: Vulnerable										+		+[3]	
Araucaria heterophylla	異葉南洋杉	Exotic	Tree	Cultivated	IUCN Red List: Vulnerable												+	
Archidendron clypearia	猴耳環	Native	Tree	Common	-										+			
Archontophoenix alexandrae	假檳榔	Exotic	Tree	Commonly cultivated	-											+	+	
Ardisia quinquegona	羅傘樹	Native	Shrub	Very common	-										+			

Scientific Name	Chinese Name	Origin	Growth Form	Distribution in Hong Kong[1]	Protection Status[2]	PS[4]			SA[4]									
						WC	PL	DA	AG	PO	WC	CW	GL	GS	SW	PL	DA	WG
Artocarpus heterophyllus	菠蘿蜜	Exotic	Tree	Cultivated	-	+		+	+	+	+					+	+	
Artocarpus hypargyreus	**白桂木**	Native	Tree	Common	Status in China as Near Threatened; IUCN Red List: Vulnerable										+			
Averrhoa carambola	楊桃	Exotic	Tree	Planted	-				+									
Axonopus compressus	地毯草	Exotic	Herb	Common and naturalized	-									+				+
Bambusa sp.	竹屬	-	Bamboo	-	-		+							+				
Bambusa vulgaris 'Vittata'	黃金間碧竹	Exotic	Bamboo	Widely cultivated	-												+	
Basella alba	潺菜	Exotic	Climber	Restricted, cultivated and naturalized	-			+										
Bauhinia variegata	宮粉羊蹄甲	Exotic	Tree	Cultivated	-												+	
Bauhinia x blakeana	洋紫荊	Native	Tree	Cultivated	-												+	
Berchemia floribunda	勾兒茶	Native	Climber	Common	-										+			
Bidens alba	白花鬼針草	Exotic	Herb	Very common	-	++	++		++	++		+++		+++	+		+	++
Bidens pilosa	鬼針草	Exotic	Herb	Very common	-							+						
Bischofia javanica	秋楓	Native	Tree	Common	-							+						
Bischofia polycarpa	重陽木	Exotic	Tree	Cultivated	-											+		
Blechnum orientale	烏毛蕨	Native	Herb	Very common	-										+			+
Boehmeria nivea	苧麻	Exotic	Shrub	Common	-	++			+		++	+						+
Bombax ceiba	木棉	Exotic	Tree	Cultivated	-			+				+				+		
Bougainvillea spectabilis	勒杜鵑	Exotic	Climber/Shrub	Cultivated	-												+	
Brachiaria mutica	巴拉草	Exotic	Herb	Very common	-	++				++		++		++				
Broussonetia papyrifera	構樹	Native	Tree	Very common	-							+					+	
Callipteris esculenta	菜蕨	Native	Herb	Common	-							++	+	+		+		
Camellia sp.	茶屬	-	Shrub/Tree	Planted	-							+		+				
Carica papaya	番木瓜	Exotic	Tree	Cultivated	-			+	+	+							+	
Carmona microphylla	福建茶	Exotic	Shrub	Cultivated	-												+	
Cassytha filiformis	無根藤	Native	Climber	Very common	-							+			+			

Scientific Name	Chinese Name	Origin	Growth Form	Distribution in Hong Kong[1]	Protection Status[2]	PS[4]			SA[4]									
						WC	PL	DA	AG	PO	WC	CW	GL	GS	SW	PL	DA	WG
Casuarina equisetifolia	木麻黃	Exotic	Tree	Cultivated	-												+	
Cayratia corniculata	角花烏蘞莓	Native	Climber	Very common	-										+			
Celosia argentea	青葙	Native	Herb	Very common	-	+					+							
Celtis sinensis	朴	Native	Tree	Common and widely planted	-		+	+				+			++	++		+
Cinnamomum camphora	樟	Native	Tree	Common, also cultivated	-										+		+	
Citrus reticulata	桔	Exotic	Tree	Cultivated	-												+	
Clausena lansium	黃皮	Exotic	Tree	Cultivated	-					+						+	+	
Cleistocalyx nervosum	水翁	Native	Tree	Common	-												+	
Cocculus orbiculatus	木防己	Native	Climber	Common	-					+							+	
Colocasia esculenta	芋	Native	Herb	Cultivated	-	++				+	++	+		+				
Commelina diffusa	節節草	Native	Herb	Common	-	+++				++	+++	+++	+++	++				
Cordyline fruticosa	朱蕉	Exotic	Shrub	Cultivated	-												+	
Cordyline terminalis 'Rubra'	紅葉鐵	Exotic	Shrub	Cultivated	-			+									+	
Cratoxylum cochinchinense	黃牛木	Native	Shrub/Tree	Very common	-										+			
Crotalaria pallida var. *obovata*	豬屎豆	Exotic	Herb/Shrub	Common	-									+				
Cuphea petiolata	黏毛萼距花	Exotic	Herb	-	-					+								
Cuscuta australis	南方菟絲子	Native	Herb	Common	-							+						
Cyclosorus interruptus	間斷毛蕨	Native	Herb	Common	-							+		+		+		
Cyclosorus parasiticus	華南毛蕨	Native	Herb	Very common	-	++					++	+						
Cynodon dactylon	狗牙根	Native	Herb	Very common	-		+		+	++				+			+	++
Cyperus exaltatus	高稈莎草	Native	Herb	Restricted	-							+						
Cyperus involucratus	風車草	Exotic	Herb	Cultivated or naturalized	-							++						+
Cyperus iria	碎米莎草	Native	Herb	Common	-									+			+	
Dactyloctenium aegyptium	龍爪茅	Native	Herb	Common	-												+	
Dalbergia hancei	藤黃檀	Native	Climber	Common	-										+			
Daphniphyllum calycinum	牛耳楓	Native	Shrub	Common	-										+			
Delonix regia	鳳凰木	Exotic	Tree	Cultivated	-			+								+	+	
Desmodium heterocarpon	假地豆	Native	Shrub	Very common	-										+			
Desmodium tortuosum	南美山螞蝗	Exotic	Herb	Common	-			+	+									
Desmos chinensis	假鷹爪	Native	Climber/Shrub	Common	-										++			
Dicliptera chinensis	狗肝菜	Native	Herb	Restricted	-							+						
Dicranopteris pedata	芒萁	Native	Herb	Very common	-										+			
Digitaria ciliaris	升馬唐	Native	Herb	Very common	-												+	++
Dimocarpus longan	龍眼	Exotic	Tree	Cultivated	IUCN Red List: Lower Risk/ Near Threatened		+		+	+		+				+	+	
Dioscorea bulbifera	黃獨	Native	Climber	Common	-										+			
Diospyros vaccinioides	小果柿	Native	Shrub	very common	Threatened Species List of China's Higher Plants: Endangered; IUCN Red List: Critically Endangered												+[3]	
Dracaena fragrans	巴西鐵樹	Exotic	Shrub	Cultivated	-			+									+	
Duranta erecta	假連翹	Exotic	Climber/Shrub	Cultivated	-												+	

Scientific Name	Chinese Name	Origin	Growth Form	Distribution in Hong Kong[1]	Protection Status[2]	PS[4]			SA[4]									
						WC	PL	DA	AG	PO	WC	CW	GL	GS	SW	PL	DA	WG
Duranta erecta 'variegata'	花葉假連翹	Exotic	Shrub	Cultivated	-												+	
Dypsis lutescens	散尾葵	Exotic	Shrub	Cultivated	IUCN Red List: Near Threatened			+						+				
Echinochloa crusgalli	稗	Native	Herb	Common	-				+			+						
Elephantopus tomentosus	白花地膽草	Native	Herb	Common	-									+				
Eleusine indica	牛筋草	Native	Herb	Very common	-	+					+							
Emilia sonchifolia	一點紅	Native	Herb	Very common	-							+						
Eragrostis atrovirens	鼠婦草	Native	Herb	Common	-							+						
Eriobotrya japonica	枇杷	Exotic	Tree	Cultivated	-												+	
Eucalyptu sp.	桉屬植物	Exotic	Tree	Cultivated	-												+	
Euphorbia hypericifolia	通奶草	Native	Herb	Common	-												+	
Ficus benjamina	垂葉榕	Exotic	Tree	Cultivated	-			+				+				+	+	
Ficus elastica	印度榕	Exotic	Tree	Cultivated	-			+										
Ficus hirta	粗葉榕	Native	Shrub/Tree	Common	-										+			
Ficus hispida	對葉榕	Native	Shrub/Tree	Very common	-		+					+		+	+			
Ficus microcarpa	細葉榕	Native	Tree	Common and widely cultivated	-			+				+					+	
Ficus microcarpa 'Golden Leaf'	黃金榕	Exotic	Shrub	Cultivated	-												+	
Ficus pumila	薜荔	Native	Climber	Very common	-												+	
Ficus subpisocarpa	筆管榕	Native	Tree	Common	-											+		
Ficus virens	大葉榕	Native	Tree	Common	-										+			
Flueggea virosa	白飯樹	Native	Shrub	Common	-			+										
Glochidion lanceolarium	大葉算盤子	Native	Shrub/Tree	Common	-									+				
Gnetum luofuense	**羅浮買麻藤**	Native	Climber	very common	IUCN Red List: Near Threatened										+			
Hedychium coronarium	薑花	Exotic	Herb	Common	-								++	++		+		
Hibiscus mutabilis	木芙蓉	Exotic	Shrub	Extensively cultivated	-			+	+									
Hylocereus undatus	量天尺	Exotic	Herb	Cultivated	-												+	
Ilex asprella	梅葉冬青	Native	Shrub	Very common	-										++			
Ilex pubescens	毛冬青	Native	Shrub	Very common	-										+			
Imperata cylindrica var. *major*	絲茅	Native	Herb	Very common	-				++				++	++				
Ipomoea cairica	五爪金龍	Exotic	Herb	Very common	-	++		++	++	++	++					+	+	++
Ipomoea triloba	三裂葉薯	Exotic	Herb	Common	-				+	++		++		+				
Juniperus chinensis	圓柏	Exotic	Tree	Cultivated	-												+	
Juniperus chinensis 'Kaizuca'	龍柏	Exotic	Tree	Cultivated	-			+									+	
Koelreuteria bipinnata	複羽葉欒樹	Exotic	Tree	Cultivated	-												+	
Kyllinga brevifolia	短葉水蜈蚣	Native	Herb	Common	-	+					+	+						
Kyllinga polyphylla	香根水蜈蚣	Exotic	Herb	Common	-	++					++	+++		++				+
Lactuca sativa	生菜	Exotic	Herb	Cultivated	-				+									
Lagerstroemia indica	紫薇	Exotic	Shrub/Tree	Rare, but commonly planted	Listed under Forests and Countryside Ordinance (Cap. 96)												+	
Lagerstroemia speciosa	大花紫薇	Exotic	Tree	Cultivated	-												+	
Lantana camara	馬纓丹	Exotic	Shrub	Very common	-							++		+	+		+	
Leersia hexandra	李氏禾	Native	Herb	Common	-							++						

Scientific Name	Chinese Name	Origin	Growth Form	Distribution in Hong Kong[1]	Protection Status[2]	PS[4]			SA[4]									
						WC	PL	DA	AG	PO	WC	CW	GL	GS	SW	PL	DA	WG
Leucaena leucocephala	銀合歡	Exotic	Shrub/Tree	Cultivated or naturalized	-		+	++	++	+		++				++	++	
Liquidambar formosana	楓香	Native	Tree	Common, also widely planted	-										+		+	
Liriope spicata	山麥冬	Native	Herb	Very common	-												+	
Litchi chinensis	荔枝	Exotic	Tree	Cultivated	-											+	+	
Litsea cubeba	木薑子	Native	Shrub/Tree	Common	-										+			
Litsea rotundifolia var. *oblongifolia*	豺皮樟	Native	Shrub/Tree	Very common	-										++			
Ludwigia hyssopifolia	草龍	Native	Herb	Restricted	-	+					+							
Ludwigia octovalvis	毛草龍	Native	Herb	Common	-									+				
Ludwigia perennis	細花丁香蓼	Native	Herb	Restricted	-	+								+				
Lycopersicon esculentum	蕃茄	Exotic	Herb	Cultivated	-				+									
Lygodium japonicum	海金沙	Native	Climber/Herb	Very common	-										+			
Macaranga tanarius var. *tomentosa*	血桐	Native	Tree	Common	-		+	++		+		+	+	+	+	++	++	+
Macroptilium atropurpureum	紫花大翼豆	Exotic	Herb	Common	-												+	
Macroptilium lathyroides	大翼豆	Exotic	Herb	Common	-									+				
Mallotus paniculatus	白楸	Native	Shrub/Tree	Very common	-										++			
Malvastrum coromandelianum	賽葵	Native	Herb/Shrub	Common	-				+					+			+	
Malvaviscus penduliflorus	垂花懸鈴花	Exotic	Shrub	Cultivated	-												++	
Mangifera indica	杧果	Exotic	Tree	Cultivated	-			+								+	+	
Manihot esculenta	木薯	Exotic	Shrub	Cultivated	-	+		+	+		+							
Manilkara zapota	人心果	Exotic	Tree	Cultivated	-												+	
Melaleuca bracteata	黃金香柳	Exotic	Tree	Cultivated	-												+	
Melaleuca cajuputi subsp. *cumingiana*	白千層	Exotic	Tree	Cultivated	-												+	
Melastoma malabathricum	野牡丹	Native	Shrub	Common	-									+			+	
Melicope pteleifolia	三椏苦	Native	Shrub/Tree	Common	-										++			
Melinis repens	紅毛草	Exotic	Herb	Very common	-							++					+	+
Michelia x alba	白蘭	Exotic	Tree	Widely cultivated	-												+	
Microcos nervosa	布渣葉	Native	Shrub/Tree	Common	-										++		+	
Microstegium ciliatum	剛莠竹	Native	Herb	Very common	-	+++				+++	++++	+++	+++	+++	++			
Mikania micrantha	薇甘菊	Exotic	Climber/Herb	Very common	-	++	++	++	++		++	++		++		++	++	++
Mimosa pudica	含羞草	Exotic	Herb	Very common	-			+						+				
Mirabilis jalapa	紫茉莉	Exotic	Herb	Cultivated or sometimes escaped from cultivation	-							+						
Miscanthus sinensis	芒	Native	Herb	Very common	-									+		+		
Morus alba	桑	Native	Shrub/Tree	Common and cultivated	-												+	
Musa x paradisiaca	大蕉	Exotic	Herb	Cultivated	-				++							+	+	
Mussaenda pubescens	玉葉金花	Native	Climber/Shrub	Very common	-										+			
Nelumbo nucifera	荷花	Exotic	Herb	Cultivated	-					+								
Nephrolepis auriculata	腎蕨	Native	Herb	Common	-							+						
Neyraudia reynaudiana	類蘆	Native	Herb	Very common	-							+		+				
Oxalis corniculata	酢醬草	Native	Herb	Very common	-				+									++

Scientific Name	Chinese Name	Origin	Growth Form	Distribution in Hong Kong[1]	Protection Status[2]	PS[4]			SA[4]									
						WC	PL	DA	AG	PO	WC	CW	GL	GS	SW	PL	DA	WG
Pachira aquatica	瓜栗	Exotic	Tree	Cultivated	-												+	
Paederia scandens	雞矢藤	Native	Herb	Very common	-							+			+			
Panicum dichotomiflorum	水生黍	Native	Herb	Common	-					++		++						
Panicum maximum	大黍	Exotic	Herb	Very common	-	+		++	++	++		+++	++	++		++	++	++
Paspalum conjugatum	兩耳草	Native	Herb	Common	-									+				++
Paspalum urvillei	絲毛雀稗	Exotic	Herb	Common	-							+						
Passiflora foetida	龍珠果	Exotic	Climber	Very common	-				+									
Pennisetum purpureum	象草	Exotic	Herb	Very common	-					++			++					
Persicaria barbata	毛蓼	Native	Herb	Common	-							+						
Persicaria chinensis	火炭母	Native	Herb	Very common	-							+	+	+				
Persicaria dichotoma	二歧蓼	Native	Herb	Common	-									+				
Persicaria glabra	光蓼	Native	Herb	Restricted	-							+						
Persicaria hydropiper	水蓼	Native	Herb	Common	-							+						
Persicaria lapathifolia	大馬蓼	Native	Herb	Common	-							+						
Persicaria perfoliata	杠板歸	Native	Climber/Herb	Common	-									+				
Phoenix roebelenii	日本葵	Exotic	Tree	Cultivated	-												+	
Phyllanthus emblica	油甘子	Native	Shrub/Tree	Very common	-										+			
Phyllanthus reticulatus	小果葉下珠	Native	Shrub	Common	-							+	+					
Phyllanthus tenellus	纖梗葉下珠	-	Herb	-	-							+			+			
Phyllanthus urinaria	葉下珠	Native	Herb	Common	-									+				
Phytolacca acinosa	商陸	Exotic	Herb	Rare, but often cultivated	-	+					+							
Pilea microphylla	小葉冷水花	Exotic	Herb	Very common	-	+					+							
Platycladus orientalis	側柏	Exotic	Tree	Often cultivated	IUCN Red List: Near Threatened												+	
Plumeria rubra	雞蛋花	Exotic	Tree	Commonly cultivated	-												+	
Podocarpus macrophyllus	羅漢松	Native	Tree	Restricted and often cultivated	-			+									+	
Psidium guajava	番石榴	Exotic	Tree	Common and often cultivated	-												+	
Psychotria asiatica	山大刀	Native	Shrub/Tree	Very common	-										+++			
Pteris semipinnata	半邊旗	Native	Herb	Very common	-										++			

Scientific Name	Chinese Name	Origin	Growth Form	Distribution in Hong Kong[1]	Protection Status[2]	PS[4]			SA[4]									
						WC	PL	DA	AG	PO	WC	CW	GL	GS	SW	PL	DA	WG
Pueraria lobata	野葛	Native	Climber	Very common	-	+		+	++		+	+			+	+	+	
Pycreus flavidus	球穗扁莎	Native	Herb	Common	-									+				
Ravenala madagascariensis	旅人蕉	Exotic	Tree	Cultivated	-												+	
Rhapis excelsa	棕竹	Native	Shrub	Common	-												+	
Rhus succedanea	野漆樹	Native	Shrub/Tree	Common	-										+			
Ruellia coerulea	蘭花草	Exotic	Herb	Cultivated	-	+		+			+	++						
Saccharum officinarum	甘蔗	Exotic	Herb	Cultivated	-				+									
Sapium discolor	山烏桕	Native	Tree	Very common	-										+			
Sapium sebiferum	烏桕	Native	Tree	Common	-									+				
Schefflera arboricola	鵝掌藤	Exotic	Climber/Shrub	Often cultivated	-												+	
Schefflera heptaphylla	鴨腳木	Native	Shrub/Tree	Very common	-										++			
Scleria levis	毛果珍珠茅	Native	Herb	Common	-									+				
Scoparia dulcis	野甘草	Exotic	Herb/Shrub	Common	-				+								+	
Senna tora	決明	Exotic	Herb	Common	-							+						+
Sesbania javanica	沼生田菁	Native	Herb	Common	-			+				++					+	
Sida acuta	黃花稔	Native	Herb	Common	-									+				
Solanum melongena	矮瓜	Exotic	Herb/Shrub	Cultivated	-				+									
Solanum torvum	水茄	Exotic	Shrub	Common	-			+	+					+				
Sonchus oleraceus	苦苣菜	Exotic	Herb	Very common	-							+						
Species from Family Cucurbitaceae	葫蘆科植物	-	Herb	-	-				+			+						
Stephania longa	粪箕薦	Native	Climber	Common	-										+			
Sterculia lanceolata	假蘋婆	Native	Tree	Very common	-										++			
Terminalia mantaly	小葉欖仁	Exotic	Tree	Cultivated	-												+	
Tetracera asiatica	錫葉藤	Native	Climber	Very common	-										+			
Tithonia diversifolia	腫柄菊	Exotic	Herb	Common	-								++					
Tradescantia spathacea	蚌花	Exotic	Herb	Cultivated	-												+	
Trema tomentosa	山黃麻	Native	Shrub/Tree	Common	-										+			
Tridax procumbens	羽芒菊	Exotic	Herb	Very common	-							+					+	
Urena lobata	肖梵天花	Native	Shrub	Common	-									+				
Uvaria macrophylla	紫玉盤	Native	Climber/Shrub	Common	-										++			
Vigna unguiculata subsp. *sesquipedalis*	豆角	Exotic	Herb	Cultivated	-				+									
Vitis bryoniifolia	野葡萄	Native	Climber	Restricted	-										+			

Scientific Name	Chinese Name	Origin	Growth Form	Distribution in Hong Kong[1]	Protection Status[2]	PS[4]			SA[4]									
						WC	PL	DA	AG	PO	WC	CW	GL	GS	SW	PL	DA	WG
Wedelia trilobata	三裂葉蟛蜞菊	Exotic	Herb	Common, also widely cultivated	-	++	+	++	++		++	++						++
Zanthoxylum avicennae	簕欓	Native	Tree	Common	-										+			
Zanthoxylum nitidum	兩面針	Native	Climber/Shrub	Very common	-										++			
Total No. of Species Recorded						**26**	**13**	**31**	**33**	**21**	**22**	**64**	**13**	**45**	**58**	**25**	**83**	**18**

Notes:

1. Distribution in Hong Kong follows:

   Wu, S.H. & Lee, T.C.W. (2000). Pteridophytes of Hong Kong. *Memoirs of the Hong Kong Natural History Society* **23**:5-20

   Xing, F.W., Ng, S.C. & Chau, L.K.C. (2000). Gymnosperms and Angiosperms of Hong Kong. *Memoirs of the Hong Kong Natural History Society* **23**:21-136

   Siu, L.P.G. (2000). Orchidaceae of Hong Kong. *Memoirs of the Hong Kong Natural History Society* **23**:137-148

2. Protection statuses follow:

   Listed under the Forests and Countryside Ordinance (Cap. 96)

   Listed under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)

   AFCD (2018). Rare and Precious Plants of Hong Kong. Agriculture, Fisheries and Conservation Department, HKSAR

   Listed under List of Wild Plants Under Special State Protection.

   Fu, K.L. & Chin, C.M. (1992). China Plant Red Data Book. Vol. 1 - Rare and Endangered Plants. Science Press, Beijing. 736 pages. (In Chinese only)

   Qin, *et al* . (2017). Threatened Species List of China's Higher Plants. *Biodiversity Science* **25**(7):696-747

   IUCN (2020). The IUCN Red List of Threatened Species. Version 2020.1.

   Feng, Z.J., Li, Z.K., Li, B.T., Xue, C.G., Liu, J.B. & He, Y.Q. (2002). Study on Rare and Endangered Plants and National Key Protected Plants in Guangdong. J*ournal of South China Agricultural University* **3**:24-27

3. This individual is artificially introduced/planted to the habitat; thus it is not considered as species of conservation importance.

4. Habitats: PS = Project Site; SA = Study Area; AG = Agricultural Land; WC = Natural/Semi-natural Watercourse; CW = Channelised Watercourse; DA = Developed Area; GR = Grassland; GS = Grassland/Shrubland; PL = Plantation; PO = Pond; SW = Secondary

*** Species considered as of conservation importance in this study are indicated in bold type.**

Code for abundance: ++++ = Abundant, +++ = Frequent, ++ = Occasional, + = Scarce

Appendix 3.3 –
Fauna Species Recorded in the Surveys

Appendix 3.3 Fauna Species Recorded in the Surveys

Table 1 Mammal species recorded in Nam Wa Po in Wet Season

Species	Distrubution in Hong Kong[1]	Conservation and Protection Status	PS[4]	SA[4]
Chinese Noctule *Nyctalus plancyi*	**Common**	**Cap.170[2]; PRC (RC)[3]**		✓
Unidentified Bat sp. 1 (Max frequency: 35kHz)	**-**	**Cap.170[2]**		✓
Unidentified Bat sp. 2 (Max frequency: 40-43kHz)	**-**	**Cap.170[2]**		✓
Unidentified Bat sp. 3 (Max frequency: 44-46kHz)	**-**	**Cap.170[2]**		✓
Unidentified Bat sp. 4 (Max frequency: 47-50kHz)	**-**	**Cap.170[2]**		✓
Unidentified Bat sp. 5 (Max frequency: 51-52kHz)	**-**	**Cap.170[2]**		✓
Unidentified Bat sp. 6 (Max frequency: 54-56kHz)	**-**	**Cap.170[2]**		✓
		Total no. of species recorded	**0**	**7**

Notes:
1. Distrubution in Hong Kong follows AFCD (2019).
2. Listed under Wild Animals Protection Odinance (Cap. 170).
3. Fellowes *et al*. (2002): PRC = Potential Regional Concern; RC = Regional Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
4. Habitats: PS = Project Site; SA = Study Area.

*** Species considered as of conservation importance in this study are indicated in bold type.**

Table 2 Bird species recorded in Nam Wa Po in Wet Season

Species	Principal Status[1]	Conservation and Protection Status[2]	PS[7]	SA[7]						
			DA	CW	DA	GR	GS	PL	PO	SW	IF
Black-crowned Night Heron *Nycticorax nycticorax*	**P**	**(LC)[4]**		**+**							
Chinese Pond Heron *Ardeola bacchus*	**P**	**PRC (RC)[4]**		**+**					**+**		
Little Egret *Egretta garzetta*	**P**	**PRC (RC)[4]**		**+**							
Besra *Accipiter virgatus*	**R**	**Cap. 586[3]; Class II[5]; Appendix II[6]**								**+**	
Black Kite *Milvus migrans*	**W,R**	**Cap. 586[3]; (RC)[4]; Class II[5]; Appendix II[6]**									**+**
White-breasted Waterhen *Amaurornis phoenicurus*	R	-		+	+						
Spotted Dove *Spilopelia chinensis*	R	-			+		+	+			
Greater Coucal *Centropus sinensis*	**R**	**Class II[5]**							**+**		
Cinereous Tit *Parus cinereus*	R	-			+						
Red-whiskered Bulbul *Pycnonotus jocosus*	R	-			+++	+	+			+	
Chinese Bulbul *Pycnonotus sinensis*	R	-			+						
Barn Swallow *Hirundo rustica*	SpM,Su	-		+	+				+		
Yellow-bellied Prinia *Prinia flaviventris*	R	-		+	+						
Plain Prinia *Prinia inornata*	R	-				+	+				
Common Tailorbird *Orthotomus sutorius*	R	-			+						
Rufous-capped Babbler *Stachyridopsis ruficeps*	**R**	**LC[4]**								**+**	
Masked Laughingthrush *Garrulax perspicillatus*	R	-	+		+			+			

Appendix 3.3 Fauna Species Recorded in the Surveys

Species	Principal Status[1]	Conservation and Protection Status[2]	PS[7]	SA[7]							
			DA	CW	DA	GR	GS	PL	PO	SW	IF
Japanese White-eye *Zosterops japonicus*	R,?W	-		+	+					+	
Crested Myna *Acridotheres cristatellus*	R	-			++						
Common Myna *Acridotheres tristis*	R	-			+						
Black-collared Starling *Gracupica nigricollis*	R	-		+	+						
Oriental Magpie Robin *Copsychus saularis*	R	-			+						
Eurasian Tree Sparrow *Passer montanus*	R	-	+	+	+						
Scaly-breasted Munia *Lonchura punctulata*	R	-			+						
White Wagtail *Motacilla alba*	W,R	-		+							
Total no. of species recorded			**2**	**10**	**16**	**2**	**3**	**2**	**3**	**4**	**1**

Notes:
1. Principal status refers to Carey *et al.* (2001): R = Resident; W = Winter Visitor; Su = Summer Visitor; M = Migrant; A = Autumn; Sp = Spring; P = Present all year, exact compostion unknown; ?W = extent of migration in winter is unclear. A hyphen indicates that the species has been recorded too infrequently to allow an assessment of its status to be made.
2. All wild birds in Hong Kong are protected under Wild Animals Protection Odinance (Cap. 170).
3. Listed under Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).
4. Fellowes *et al*. (2002): LC = Local Concern; PRC = Potential Regional Concern; RC = Regional Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
5. Protected by List of Wild Animals Under Special State Protection.
6. CITES (2018).
7. Habitats: PS = Project Site; SA = Study Area; CW = Channelised Watercourse; DA = Developed Area; GR = Grassland; GS = Grassland/Shrubland; PL = Plantation; PO = Pond; SW = Secondary Woodland; IF = In Flight.

*** Species considered as of conservation importance in this study are indicated in bold type.**
Code of Abundance: +=Scarce; ++=Occasional; +++=Frequent; ++++=Abundant; +++++=Dominant

Appendix 3.3 Fauna Species Recorded in the Surveys

Table 3 Amphibian species recorded in Nam Wa Po in Wet Season

Species	Distrubution in Hong Kong[1]	Conservation and Protection	PS[2]	SA[2]
			-	DA
Günther's Frog *Hylarana guentheri*	Widely distributed throughout Hong Kong.	-		+
		Total no. of species recorded	**0**	**1**

Notes:
1. Distrubution in Hong Kong follows AFCD (2019).
2. Habitats: PS = Project Site; SA = Study Area; DA = Developed Area.

Code of Abundance: +=Scarce; ++=Occasional; +++=Frequent; ++++=Abundant; +++++=Dominant

Table 4 Reptile species recorded in Nam Wa Po in Wet Season

Species	Conservation and Protection Status	Distrubution in Hong Kong	PS[3]	SA[3]		
			-	CW	DA	PO
Red-eared Slider *Trachemys scripta*	-	Widely distributed and commonly found in reservoirs or ponds in urban parks.		+		+
Chinese Soft-shelled turtle *Pelodiscus sinensis*	**GC; RLCV(EN); IUCN(VU); Cap.170**	**Locally found in reservoirs and fishponds in Deep Bay area.**		**+**		
Changeable Lizard *Calotes versicolor*	-	Widely distributed throughout Hong Kong.			+	
		Total no. of species recorded	**0**	**2**	**1**	**1**

*** Species considered as of conservation importance in this study are indicated in bold type.**

Code of Abundance: +=Scarce; ++=Occasional; +++=Frequent; ++++=Abundant; +++++=Dominant

Notes:
1. Conservation and protection status refer to Fellowes *et al*. (2002), Red List of China's Vertebrates (Jiang *et al.*, 2016), IUCN (2020), China State Major Protection Status, CITES (2018), Cap. 170 and Cap. 586.
   a. Conservation status by Fellowes *et al*. (2002): LC = Local Concern; PRC = Potential Regional Concern; RC = Regional Concern; PGC = Potential Global Concern; GC = Global Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
   b. Conservation status by Red List of China's Vertebrates (RLCV) (Jiang *et al*., 2016): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
   c. Conservation status by IUCN (2020): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
   d. Protection status by China State Major Protection Status (CSMPS): I = Class I Protected Species in China; II = Class II Protected Species in China.
   e. Protection status by CITES (2018): I = Listed in CITES Appendix I; II = Listed in CITES Appendix II; III = Listed in CITES Appendix III.
   f. Cap. 170 = Wild Animals Protection Odinance (Cap. 170). All wild birds in Hong Kong are protected under this Ordinance.
   g. Cap. 586 = Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).
2. Status in Hong Kong follows AFCD (2019).
3. Habitats: PS = Project Site; SA = Study Area; AG = Agricultural Land; CW = Channelised Watercourse; DA = Developed Area; GR = Grassland; GS = Grassland/Shrubland; IF = In Flight; PL = Plantation; PO = Pond; SW = Secondary Woodland; WC = Natural/Semi-natural Watercourse, WG = Waste Ground.

Table 5 Butterfly species recorded in Nam Wa Po in Wet Season

Species	Conservation and Protection Status[1]	Distrubution in Hong Kong[2]	PS[3]	SA[3]				
			DA	AG	CW	DA	GR	SW
Contiguous Swift *Polytremis lubricans*	-	Common			+		+	
Chinese Dart *Potanthus confucius*	-	Uncommon			+			
Long-tailed Blue *Lampides boeticus*	-	Common				+		
Pale Grass Blue *Pseudozizeeria maha*	-	Very Common				+		
Broadtail Royal *Creon cleobis*	**LC**	**Very Rare**						**+**
Angled Castor *Ariadne ariadne*	-	Common		+			+	+
Red-ring Skirt *Hestina assimilis*	-	Common		+				+
Common Sailer *Neptis hylas*	-	Very Common						+
Five-dot Sergeant *Parathyma sulpitia*	-	Common				+		+
Common Mime *Chilasa clytia*	-	Common				+		
Tailed Jay *Graphium agamemnon*	-	Common			+			
Common Jay *Graphium doson*	-	Common				+		
Common Bluebottle *Graphium sarpedon*	-	Very Common			+	+		+
Great Mormon *Papilio memnon*	-	Very Common			+			
Paris Peacock *Papilio paris*	-	Very Common					+	+
Common Mormon *Papilio polytes*	-	Very Common	+	+		+	+	+
Spangle *Papilio protenor*	-	Very Common						+
Lemon Emigrant *Catopsilia pomona*	-	Common	+	+	+		+	+
Common Grass Yellow *Eurema hecabe*	-	Very Common	+	+	+	+	+	+
Indian Cabbage White *Pieris canidia*	-	Very Common			+		+	+
Dark Brand Bush Brown *Mycalesis mineus*	-	Very Common			+			
Great Egg-fly *Hypolimnas bolina*	-	Common			+			
Short-banded Sailer *Phaedyma columella*	-	Common			+			
Total no. of species recorded			**3**	**5**	**11**	**8**	**7**	**12**

*** Species considered as of conservation importance in this study are indicated in bold type.**
Code of Abundance: +=Scarce; ++=Occasional; +++=Frequent; ++++=Abundant; +++++=Dominant

Notes:
1. Conservation and protection status refer to Fellowes *et al*. (2002), Red List of China's Vertebrates (Jiang *et al.*, 2016), IUCN (2020), China State Major Protection Status, CITES (2018), Cap. 170 and Cap. 586.
   a. Conservation status by Fellowes *et al*. (2002): LC = Local Concern; PRC = Potential Regional Concern; RC = Regional Concern; PGC = Potential Global Concern; GC = Global Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
   b. Conservation status by Red List of China's Vertebrates (RLCV) (Jiang *et al*., 2016): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.

c. Conservation status by IUCN (2020): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
d. Protection status by China State Major Protection Status (CSMPS): I = Class I Protected Species in China; II = Class II Protected Species in China.
e. Protection status by CITES (2018): I = Listed in CITES Appendix I; II = Listed in CITES Appendix II; III = Listed in CITES Appendix III.
f. Cap. 170 = Wild Animals Protection Odinance (Cap. 170). All wild birds in Hong Kong are protected under this Ordinance.
g. Cap. 586 = Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

2. Distrubution in Hong Kong follows AFCD (2019).
3. Habitats: PS = Project Site; SA = Study Area; AG = Agricultural Land; CW = Channelised Watercourse; DA = Developed Area; GR = Grassland; GS = Grassland/Shrubland; IF = In Flight; PL = Plantation; PO = Pond; SW = Secondary Woodland; WC = Natural/Semi-natural Watercourse, WG = Waste Ground.

Table 6 Odonate species recorded in Nam Wa Po in Wet Season

Species	Conservation and Protection Status[1]	Distrubution in Hong Kong[2]	PS[3]	SA[3]			
			WC	CW	DA	PO	SW
Orange-tailed Sprite *Ceriagrion auranticum*	-	Abundant	+	+			
Yellow Featherlegs *Copera marginipes*	-	Abundant		+			
Common Blue Jewel *Heliocypha perforate*	-	Abundant		+			
Black Threadtail *Prodasineura autumnalis*	-	Abundant		+			
Common Flangetail *Ictinogomphus pertinax*	-	Common		+		+	
Blue Dasher *Brachydiplax chalybea*	-	Common				+	
Asian Amberwing *Brachythemis contaminata*	-	Abundant		+			
Blue Percher *Diplacodes trivialis*	-	Abundant				+	
Russet Percher *Neurothemis fulvia*	-	Common		+			
Red-faced Skimmer *Orthetrum chrysis*	-	Abundant		+			
Common Blue Skimmer *Orthetrum glaucum*	-	Abundant	+		+		
Marsh Skimmer *Orthetrum luzonicum*	-	Abundant	+				
Common Red Skimmer *Orthetrum pruinosum*	-	Abundant	+	++	+		
Green Skimmer *Orthetrum sabina*	-	Abundant					+
Wandering Glider *Pantala flavescens*	-	Abundant			+		
Pied Skimmer *Pseudothemis zonata*	-	Common		+		+	
Crimson Dropwing *Trithemis aurora*	-	Abundant	+	+			
Indigo Dropwing *Trithemis festiva*	-	Abundant	+				
Emerald Cascader *Zygonyx iris*	**PGC**	**Abundant**					**+**
Total no. of species recorded			**6**	**11**	**3**	**4**	**2**

*** Species considered as of conservation importance in this study are indicated in bold type.**
Code of Abundance: +=Scarce; ++=Occasional; +++=Frequent; ++++=Abundant; +++++=Dominant

Notes:
1. Conservation and protection status refer to Fellowes *et al*. (2002), Red List of China's Vertebrates (Jiang *et al.*, 2016), IUCN (2020), China State Major Protection Status, CITES (2018), Cap. 170 and Cap. 586.

a. Conservation status by Fellowes *et al*. (2002): LC = Local Concern; PRC = Potential Regional Concern; RC = Regional Concern; PGC = Potential Global Concern; GC = Global Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
b. Conservation status by Red List of China's Vertebrates (RLCV) (Jiang *et al*., 2016): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
c. Conservation status by IUCN (2020): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
d. Protection status by China State Major Protection Status (CSMPS): I = Class I Protected Species in China; II = Class II Protected Species in China.
e. Protection status by CITES (2018): I = Listed in CITES Appendix I; II = Listed in CITES Appendix II; III = Listed in CITES Appendix III.
f. Cap. 170 = Wild Animals Protection Odinance (Cap. 170). All wild birds in Hong Kong are protected under this Ordinance.
g. Cap. 586 = Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

2. Distrubution in Hong Kong follows AFCD (2019).
3. Habitats: PS = Project Site; SA = Study Area; AG = Agricultural Land; CW = Channelised Watercourse; DA = Developed Area; GR = Grassland; GS = Grassland/Shrubland; IF = In Flight; PL = Plantation; PO = Pond; SW = Secondary Woodland; WC = Natural/Semi-natural Watercourse, WG = Waste Ground.

Table 7 Fish species recorded in Nam Wa Po in Wet Season

Species	Conservation and Protection Status[1]	Distrubution in Hong Kong[2]	PS[3]	SA[3]	
			WC	CW	PO
Common Carp *Cyprinus carpio*	IUCN(VU)#	-			+
Wild Carp *Hemiculter leucisculus*	-	Uncommon		++	
Chinese Barb *Puntius semifasciolatus*	-	Common	+		
North African Catfish *Clarias gariepinus*	-	-		++	
Mosquito Fish *Gambusia affinis*	-	Common	++		
Nile Tilapia *Oreochromis niloticus*	-	Common		+++	++
Small Snakehead *Channa asiatica*	**LC**	**Uncommon**	+		
Total no. of species recorded			**3**	**3**	**2**

*** Species considered as of conservation importance in this study are indicated in bold type.**
# The recorded species was cultivated and hence not considered as of species of conservation importance.
Code of Abundance: +=Scarce; ++=Occasional; +++=Frequent; ++++=Abundant; +++++=Dominant

Notes:
1. Conservation and protection status refer to Fellowes *et al*. (2002), Red List of China's Vertebrates (Jiang *et al.*, 2016), IUCN (2020), China State Major Protection Status, CITES (2018), Cap. 170 and Cap. 586.
   a. Conservation status by Fellowes *et al*. (2002): LC = Local Concern; PRC = Potential Regional Concern; RC = Regional Concern; PGC = Potential Global Concern; GC = Global Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
   b. Conservation status by Red List of China's Vertebrates (RLCV) (Jiang *et al*., 2016): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
   c. Conservation status by IUCN (2020): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
   d. Protection status by China State Major Protection Status (CSMPS): I = Class I Protected Species in China; II = Class II Protected Species in China.
   e. Protection status by CITES (2018): I = Listed in CITES Appendix I; II = Listed in CITES Appendix II; III = Listed in CITES Appendix III.
   f. Cap. 170 = Wild Animals Protection Odinance (Cap 170). All wild birds in Hong Kong are protected under this Ordinance.
   g. Cap. 586 = Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).
2. Distrubution in Hong Kong follows AFCD (2019).
3. Habitats: PS = Project Site; SA = Study Area; AG = Agricultural Land; CW = Channelised Watercourse; DA = Developed Area; GR = Grassland; GS = Grassland/Shrubland; IF = In Flight; PL = Plantation; PO = Pond; SW = Secondary Woodland; WC = Natural/Semi-natural Watercourse, WG = Waste Ground.

Table 8 Aquatic Invertebrate species recorded in Nam Wa Po in Wet Season

Species	Conservation and Protection Status[1]	Distrubution in Hong Kong[2]	PS[3]	SA[3]
			WC	CW
Blood Worm Chironomidae sp.	-	-	+	++
Waterskater/water strider Metrocoris sp.	-	-		+
Flatworm Platyhelminthes sp.	-	-	+	
Mayfly Baetidae sp.	-	-	++	
Mayfly Caenidae sp.	-	-	+	
Caddisfly Calamoceratidae sp.	-	-	+	
Freshwater Snail *Angulyagra polyzonata*	-	-		++
Apple Snail *Pomacea canaliculata*	-	-		++
Freshwater Snail *Melanoides tuberculata*	-	-		++
Atyid Shrimps *Caridina cantonensis*	-	-	++	
Total no. of species recorded			**6**	**5**

*** Species considered as of conservation importance in this study are indicated in bold type.**
Code of Abundance: +=Scarce; ++=Occasional; +++=Frequent; ++++=Abundant; +++++=Dominant

Notes:
1. Conservation and protection status refer to Fellowes *et al*. (2002), Red List of China's Vertebrates (Jiang *et al.*, 2016), IUCN (2020), China State Major Protection Status, CITES (2018), Cap. 170 and Cap. 586.
   a. Conservation status by Fellowes *et al*. (2002): LC = Local Concern; PRC = Potential Regional Concern; RC = Regional Concern; PGC = Potential Global Concern; GC = Global Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
   b. Conservation status by Red List of China's Vertebrates (RLCV) (Jiang *et al*., 2016): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
   c. Conservation status by IUCN (2020): NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered.
   d. Protection status by China State Major Protection Status (CSMPS): I = Class I Protected Species in China; II = Class II Protected Species in China.
   e. Protection status by CITES (2018): I = Listed in CITES Appendix I; II = Listed in CITES Appendix II; III = Listed in CITES Appendix III.
   f. Cap. 170 = Wild Animals Protection Odinance (Cap. 170). All wild birds in Hong Kong are protected under this Ordinance.
   g. Cap. 586 = Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).
2. Distrubution in Hong Kong follows AFCD (2019).
3. Habitats: PS = Project Site; SA = Study Area; AG = Agricultural Land; CW = Channelised Watercourse; DA = Developed Area; GR = Grassland; GS = Grassland/Shrubland; IF = In Flight; PL = Plantation; PO = Pond; SW = Secondary Woodland; WC = Natural/Semi-natural Watercourse, WG = Waste Ground.

Appendix 4.1 - Construction Plant Inventory under Unmitigated Scenario

Appendix 4.1 Construction Plant Inventory under Unmitigated Scenario

1. Earthworks

Pavement Breaking

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)
Breaker, Excavator Mounted (Hydraulic)		CNP028	1	122	100%	0	122
						Total, dB(A)	**122**

Sheet Piles Driving

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)
Giken Piler and Power-pack	[1]	Manufacture Catalog	1	94	100%	0	94
Excavator, mini-robot mounted	[2]	OCNP	1	94	100%	0	94
						Total, dB(A)	**97**

Trench Excavation

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)
Excavator, mini-robot mounted	[2]	OCNP	1	94	100%	0	94
						Total, dB(A)	**94**

Trench Shoring

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)
Air Blower (Electric)	[2]	OCNP	1	95	100%	0	95
Generator, Standard		CNP101	1	108	100%	0	108
						Total, dB(A)	**108**

2. Construction of the Box Culvert / Rectangular Channel

Building Concrete Laying

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)		
							Group 1	Group 2	Group 3
Concrete Lorry Mixer		CNP044	1	109	50%	0	106	-	-
Vibratory Poker		CNP170	1	113	100%	0	-	113	-
Water Pump (Petrol)		CNP282	2	103	100%	0	-	106	-
Bar Bender / Cutter		CNP021	1	90	100%	0	-	90	-
Crane		CNP048	1	112	100%	0	-	-	112
						Total, dB(A)	**106**	**114**	**112**
						Maximum SWL, dB(A) [3]	**114**		

3. Backfilling

Backfilling / Sheet Piles Extraction & Shoring Removal

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)	
							Group 1	Group 2
Loader / Excavator		CNP081	1	112	100%	0	112	-
Vibratory Roller		CNP186	1	108	100%	0	108	-
Dump Truck		CNP067	1	117	30%	0	-	112
						Total, dB(A)	**113**	**112**
						Maximum SWL, dB(A) [3]	**113**	

4. Reinstatement

Surface Reinstatement

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)	
							Group 1	Group 2
Concrete Lorry Mixer		CNP044	1	109	50%	0	106	-
Vibratory Poker		CNP170	1	113	100%	0	-	113
Dump Truck		CNP067	1	117	30%	0	-	112
						Total, dB(A)	**106**	**115**
						Maximum SWL, dB(A) [3]	**115**	

Note:

[1] Referring to AEIAR-127/2008 "*EIA Report of Tsim Sha Tsui Station Northern Subway*" and EPD website below that the noise level at 7m is 69dB(A) for this PME. https://www.epd.gov.hk/epd/misc/construction_noise/contents/index.php/en/home2/quieter-construction-equipment/item/27-press-in-method.html

[2] "Sound Power Levels of Other Commonly used PME" on EPD's website (Link: https://www.epd.gov.hk/epd/sites/default/files/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf)

[3] PME in different sub-groups under the same construction activities will not be in use concurrently. The group with higher SWL has been adopted as the worst-case scenario of that construction activity.

Appendix 4.2 - Predicted Construction Noise Level under Unmitigated Scenario

Appendix 4.2 Predicted Construction Noise Level under Unmitigated Scenario

Act No.	Main Construction Elements [1]	SWL, dB(A)	Notional Distance to the NSRs, m							Predicted Noise Level, $L_{eq\ (30\text{-}min)}$ dB(A) [2] [3] [4]						
			NWP1	NWP2	NWP3	NWP4	NWP5	NWP6	NWP7	NWP1	NWP2	NWP3	NWP4	NWP5	NWP6	NWP7
1	Earthworks															
	- Pavement Breaking	122	37	7	41	100	22	16	17	86	100	85	77	90	93	93
	- Sheet Piles Driving	97	37	7	41	100	22	16	17	61	75	60	52	65	68	68
	- Trench Excavation	94	37	7	41	100	22	16	17	58	72	57	49	62	65	65
	- Trench Shoring	108	37	7	41	100	22	16	17	72	86	71	63	77	79	79
2	Construction of Box Culvert / Rectangular Channel (Building Concrete Laying)	114	37	7	41	100	22	16	17	78	92	77	69	82	85	84
3	Backfilling (Backfilling / Sheet Piles Extraction & Shoring Removal)	113	37	7	41	100	22	16	17	77	92	76	68	82	85	84
4	Reinstatement (Surface Reinstatement)	115	37	7	41	100	22	16	17	79	94	78	70	84	87	86

Remark:

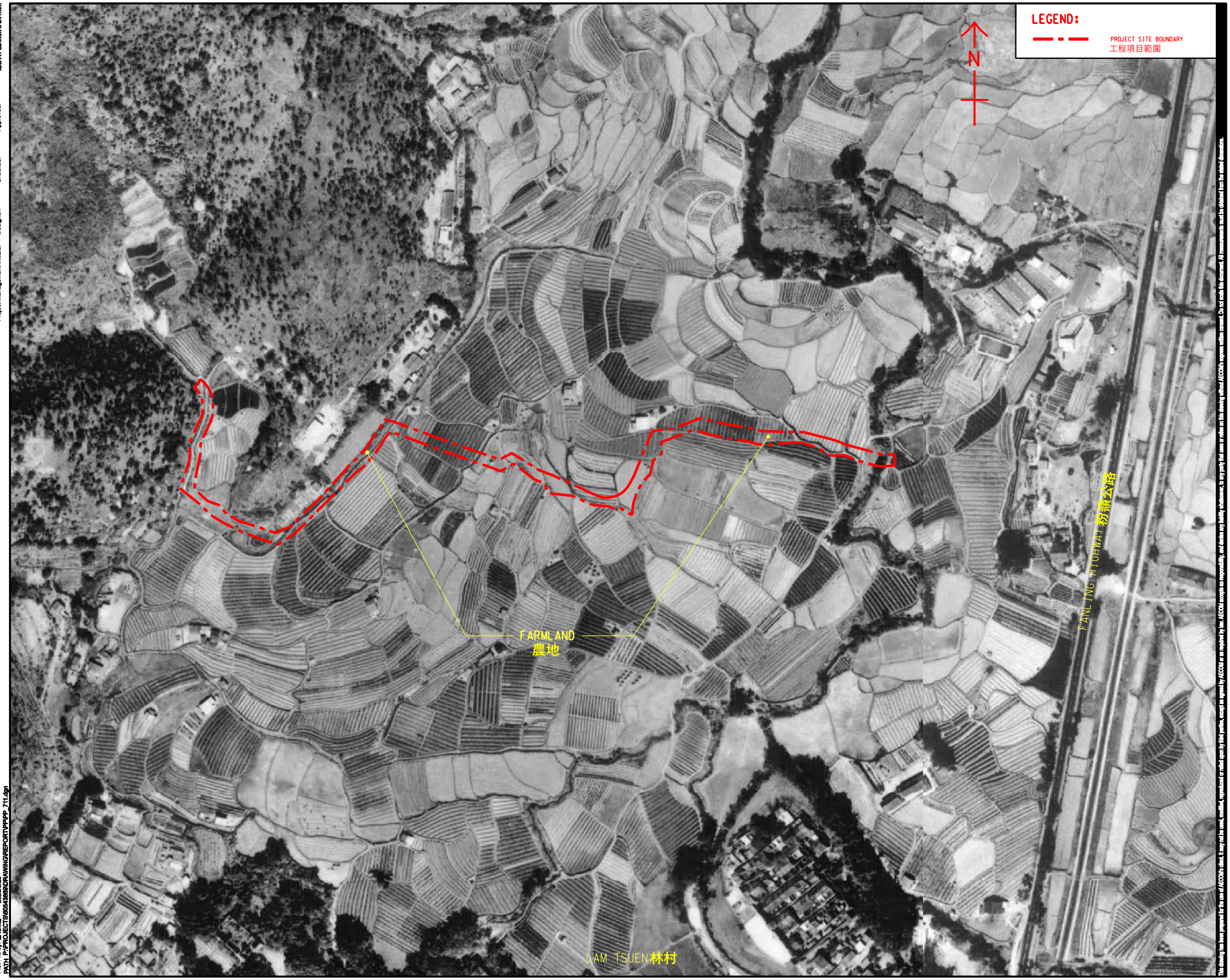
[1] Amongst construction activities no.1 - 4, only one construction activity will be carried out at any time. For construction activity no.1, only one type of earthworks would be carried out at any time.

[2] Distance Correction, dB(A) = 20 x log(D) + 8, where D is the notional distance between notional source and NSR.

[3] +3 dB(A) façade correction has been included.

[4] Noise level in boldface indicates an exceedance of the noise criteria.

Appendix 4.3 - Aerial Photographs



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: ZHUMZ 2020/5/25
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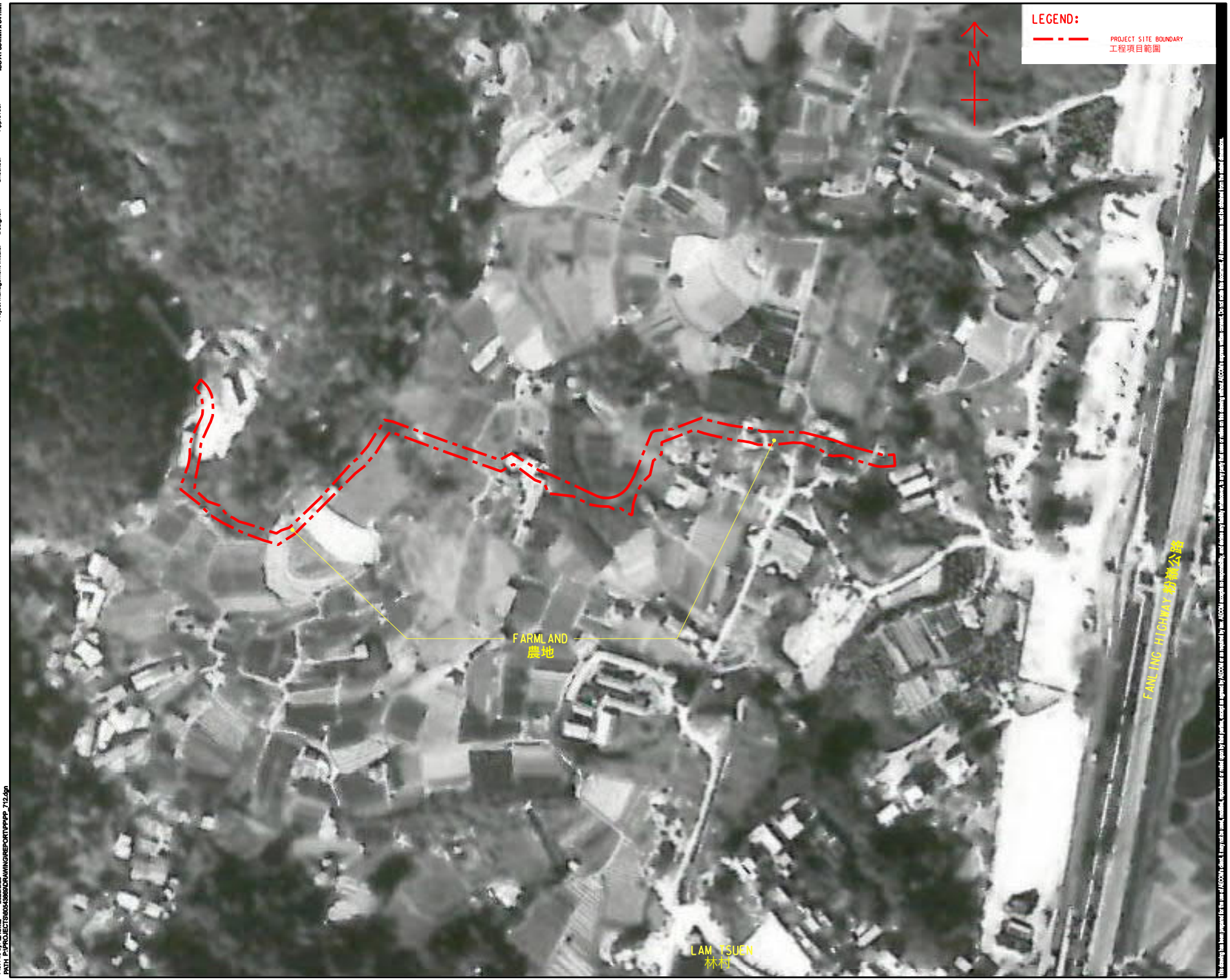
AGREEMENT NO. CE 54/2016 (DS)

SHEET TITLE
AERIAL PHOTOGRAPH 1963
NAM WA PO SITE
1963年航空照片 - 南華甫

SHEET NUMBER
APPENDIX 4.3 - 1
附錄4.3 - 1



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AGREEMENT NO.
CE 54/2016 (DS)

SHEET TITLE
AERIAL PHOTOGRAPH 1983
NAM WA PO SITE
1983年航空照片 - 南華甫

SHEET NUMBER
APPENDIX 4.3 - 2
附錄4.3 - 2

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SHEET TITLE
AERIAL PHOTOGRAPH 1993
NAM WA PO SITE
1993年航空照片 - 南華甫

SHEET NUMBER
APPENDIX 4.3 - 3
附錄4.3 - 3

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PROJECT NO. 60543869
AGREEMENT NO. CE 54/2016 (DS)

SHEET TITLE
AERIAL PHOTOGRAPH 2001
NAM WA PO SITE
2001年航空照片 - 南華甫

SHEET NUMBER
APPENDIX 4.3 - 4
附錄4.3 - 4

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SCALE A1 1 : 1000
DIMENSION UNIT METRES

KEY PLAN

PROJECT NO. 60543869
AGREEMENT NO. CE 54/2016 (DS)

SHEET TITLE
AERIAL PHOTOGRAPH 2010
NAM WA PO SITE
2010年航空照片 - 南華甫

SHEET NUMBER
APPENDIX 4.3 - 5
附錄4.3 - 5

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METRES

KEY PLAN

PROJECT NO.
60543869

AGREEMENT NO.
CE 54/2016 (DS)

SHEET TITLE
AERIAL PHOTOGRAPH 2018
NAM WA PO SITE
2018年航空照片 - 南華甫

SHEET NUMBER
APPENDIX 4.3 - 6
附錄4.3 - 6

Appendix 5.1 - Construction Plant Inventory under Mitigated Scenario

Appendix 5.1 Construction Plant Inventory under Mitigated Scenario

1. Earthworks

Pavement Breaking

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)	Remark
Hand-held Percussive Breaker		QPME EPD-08314 or equivalent	1	103	100%	-10	93	movable noise barrier
Generator, super silenced, 70dB(A) at 7m		CNP103	1	95	100%	-10	85	movable noise barrier
						Total, dB(A)	94	

Sheet Piles Driving

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)	Remark
Giken Piler and Power-pack	[1]	Manufacture Catalog	1	94	100%	0	94	
Excavator, mini-robot mounted	[2]	OCNP	1	94	100%	-5	89	movable noise barrier
						Total, dB(A)	**95**	

Trench Excavation

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)	Remark
Excavator, mini-robot mounted	[2]	OCNP	1	94	100%	-5	89	movable noise barrier
						Total, dB(A)	**89**	

Trench Shoring

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)	Remark
Air Blower (Electric)	[2]	OCNP	1	95	100%	0	95	
Generator, super silenced, 70dB(A) at 7m		CNP103	1	95	100%	-10	85	movable noise barrier
						Total, dB(A)	**95**	

2. Construction of the Box Culvert / Rectangular Channel

Building Concrete Laying

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)			Remark
							Group 1	Group 2	Group 3	
Concrete Lorry Mixer		CNP 044	1	109	50%	-10	96	-	-	movable noise barrier
Vibratory Poker, hand-held (electric)	[2]	OCNP	1	102	100%	-10	-	92	-	movable noise barrier
Water Pump (Electric)		CNP281	2	88	100%	-10	-	81	-	movable noise barrier
Bar Bender / Cutter		CNP021	1	90	100%	-10	-	80	-	movable noise barrier
Generator, super silenced, 70dB(A) at 7m		CNP103	1	95	100%	-10	-	85	-	movable noise barrier
Crane, mobile		QPME EPD-08249 or equivalent	1	101	100%	-5	-	-	96	movable noise barrier
						Total, dB(A)	**96**	**93**	**96**	
						Maximum SWL, dB(A) [3]	**96**			

3. Backfilling

Backfilling / Sheet Piles Extraction & Shoring Removal

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)		Remark
							Group 1	Group 2	
Loader / Excavator, wheeled/tracked		QPME EPD-09457 or equivalent	1	95	100%	-5	90	-	movable noise barrier
Vibratory Roller		QPME EPD-06997 or equivalent	1	94	100%	-5	89	-	movable noise barrier
Dump Truck with grab, 5.5 tonne < gross vehicle weight ≦ 38 tonne	[2]	OCNP	1	105	30%	-5	-	95	movable noise barrier
						Total, dB(A)	**93**	**95**	
						Maximum SWL, dB(A) [3]	**95**		

4. Reinstatement

Surface Reinstatement

Powered Mechanical Equipment (PME)		TM Ref./ other Ref.	No.of Items	SWL/Item dB(A)	On-time %	Barrier Corr. dB(A)	Sub-total SWL, dB(A)		Remark
							Group 1	Group 2	
Concrete Lorry Mixer		CNP 044	1	109	50%	-10	96	-	movable noise barrier
Vibratory Poker, hand-held (electric)	[2]	OCNP	1	102	100%	-10	-	92	movable noise barrier
Dump Truck with grab, 5.5 tonne < gross vehicle weight ≦ 38 tonne	[2]	OCNP	1	105	30%	-5	-	95	movable noise barrier
Generator, super silenced, 70dB(A) at 7m		CNP103	1	95	100%	-10	-	85	movable noise barrier
						Total, dB(A)	96	97	
						Maximum SWL, dB(A) [3]	**97**		

Note:

[1] Referring to AEIAR-127/2008 "*EIA Report of Tsim Sha Tsui Station Northern Subway*" and EPD website below that the noise level at 7m is 69dB(A) for this PME.
https://www.epd.gov.hk/epd/misc/construction_noise/contents/index.php/en/home2/quieter-construction-equipment/item/27-press-in-method.html

[2] "Sound Power Levels of Other Commonly used PME" on EPD's website
(Link: https://www.epd.gov.hk/epd/sites/default/files/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf)

[3] PME in different sub-groups under the same construction activities will not be in use concurrently. The group with higher SWL has been adopted as the worst-case scenario of that construction activity.

Appendix 5.2 - Predicted Construction Noise Level under Mitigated Scenario

Appendix 5.2 Predicted Construction Noise Level under Mitigated Scenario

Act No.	Main Construction Elements [1]	SWL, dB(A)	Notional Distance to the NSRs, m							Predicted Noise Level, $L_{eq\ (30\text{-}min)}$ dB(A) [2] [3]						
			NWP1	NWP2	NWP3	NWP4	NWP5	NWP6	NWP7	NWP1	NWP2	NWP3	NWP4	NWP5	NWP6	NWP7
1	Earthworks															
	- Pavement Breaking	94	37	7	41	100	22	16	17	57	72	56	49	62	65	64
	- Sheet Piles Driving	95	37	7	41	100	22	16	17	59	73	58	50	64	66	66
	- Trench Excavation	89	37	7	41	100	22	16	17	53	67	52	44	57	60	60
	- Trench Shoring	95	37	7	41	100	22	16	17	59	74	58	50	64	67	66
2	Construction of Box Culvert / Rectangular Channel (Building Concrete Laying)	96	37	7	41	100	22	16	17	60	74	59	51	64	67	67
3	Backfilling (Backfilling / Sheet Piles Extraction & Shoring Removal)	96	37	7	41	100	22	16	17	60	74	59	51	64	67	67
4	Reinstatement (Surface Reinstatement)	97	37	7	41	100	22	16	17	61	75	60	52	65	68	68

Remark:

[1] Amongst construction activities no.1 - 4, only one construction activity will be carried out at any time. For construction activity no.1, only one type of earthworks would be carried out at any time.

[2] Distance Correction, dB(A) = 20 x log(D) + 8, where D is the notional distance between notional source and NSR.

[3] +3 dB(A) façade correction has been included.

Appendix 5.3 - Conditions of Working within Water Gathering Ground

Conditions of Working within Water Gathering Ground

(a) Adequate measures shall be taken to ensure that no pollution or siltation occurs to the catchwater and catchments.

(b) No earth, building materials, fuel oil or toxic materials and other materials which may cause contamination to the water gathering grounds are allowed to be stocked or stored on site.

(c) All surplus spoil shall be removed from water gathering ground as soon as possible.

(d) Temporary drains with silt traps shall be constructed at the boundary of the site prior to the commencement of any earthwork.

(e) Regular cleaning of the silt traps shall be carried out to ensure that they function properly at all time.

(f) All excavated or filled surfaces which have the risk of erosion shall be protected from erosion at all time.

(g) Facilities for washing the wheels of vehicles before leaving the site shall be provided.

(h) Any construction plant which causes pollution to catchwater or catchment due to leakage of oil or fuel shall be removed off site immediately.

(i) Any soil contamination with fuel leaked from plant shall be removed off site and the voids arising from removal of contaminated soil shall be replaced by suitable material to the approval of the Director of Water Supplies.

(j) Provision of temporary toilet facilities is to be subject to the approval of the Director of Water Supplies.

(k) All waterworks access roads must be maintained unobstructed at all time.

(l) Site formation plans shall be submitted to W.S.D. for approval prior to commencement of work.

(m) No structure or temporary works shall be erected in the catchwaters without prior approval of W.S.D.

(n) The Contractor shall be responsible for cleaning frequently any waterworks roads and associated drainage works of mud and debris.

(o) The Contractor shall limit the gross weight of the vehicles imposed on the waterworks access along catchwaters to 5 tonnes and the axle load to 3 tonnes. He shall apply to W.S.D.with details of his vehicles for using the access.

(p) The approval for using the access may be withdrawn on written notice to the Contractor by W.S.D. at their absolute discretion.

(q) The Contractor shall recover immediately his vehicle which fill into the catchwater or stream bed or pay to Government on demand the cost of recovery that may be necessary through the occurrence of any incident cause by the Contractor.

(r) The Contractor shall carry out repair or reinstatement works to the satisfaction of W.S.D. or pay to Government on demand the cost of repair and reinstatement to any waterworks installations that shall or may be necessary at any time as a result of damage caused by the Contractor or others under his charge.

(s) No chemicals including fertilizers shall be used without the prior approval form W.S.D.

(t) Use of pesticides is not allowed within the water gathering grounds. The storage and discharge of pesticide or toxicant, flammable or toxic solvents, petroleum oil or tar and other toxic substances are strictly prohibited within the water gathering ground.