



Project Profile for Stream Improvement at Ta Kwu Ling Associated with the Resite of Chuk Yuen Village

(Report No. 255228/06.119/D)

November 2009
Civil Engineering and Development Department

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Civil Engineering Office
Boundary Control Point Division

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Executive Summary

E.1 Project Title

Stream Improvement at Ta Kwu Ling Associated with the Resite of Chuk Yuen Village.

E.2 Background and Purpose of Project

The “Preliminary Planning Study on Developing Liantang/Heung Yuen Wai Control Point” commissioned by the Hong Kong SAR Government and Shenzhen Municipal People’s Government in December 2006 confirmed the need for a new Boundary Control Point (BCP) at Liantang/Heung Yuen Wai (LT/HYW). It was identified that implementation of the BCP would require resumption and resite of Chuk Yuen Village at Ta Kwu Ling.

After due considerations of various environmental factors and consultation with villagers of Chuk Yuen, a resettlement area (named as “Site J”) has been selected and confirmed. However, it is found that there is an existing stream section traversing the resettlement area. This stream section is of low ecological values and yet could cause flooding of the resettlement site during wet seasons or heavy rainfall events. It is therefore proposed to improve the existing stream section by diverting it to the southeast boundary of the resettlement area through establishing an open channel with increased water conveyance capacity and suitable greening measures. This proposed improvement work will not only safeguard the resettlement area against the potential risk of flooding, but will also strengthen the landscape resources of the area.

E.3 Scale of the Project

The scope of this Project comprises improvement of the existing stream section of approximately 133 m in length and 1 m in width by diverting it to the southeast boundary of the resettlement area through construction of an open channel and the associated maintenance access as a result of the resite of Chuk Yuen Village.

E.4 Planning and Implementation Programme

It is anticipated that construction of the stream improvement works will commence in September 2010 and will last for about 2 months for stream diversion and 3 months for landscaping works.

E.5 Conclusions of the Assessments

Assessment has been undertaken to identify and assess all key environmental impacts that may arise from the construction and operation of the proposed stream improvement works.

The key environmental issues reviewed include air quality, noise, water quality, waste management implications and ecology, as well as landscape and visual impacts. No adverse environmental impacts are likely to occur during construction and operation of the proposed Project. Where likely impacts were identified, mitigation measures have been identified and recommended for incorporation into the detailed design and tender documents of the stream improvement works.

With implementation of the proposed mitigation measures, the residual environmental impacts will be of low significance.

1. Basic Information

1.1 Project Title

1.1.1 Stream Improvement at Ta Kwu Ling Associated with the Resite of Chuk Yuen Village

1.2 Purpose and Nature of the Project

1.2.1 The "Preliminary Planning Study on Developing Liantang/Heung Yuen Wai Control Point" commissioned by the Hong Kong SAR Government and Shenzhen Municipal People's Government in December 2006 confirmed the need for a new Boundary Control Point (BCP) at Liantang/Heung Yuen Wai (LT/HYW). It was identified that implementation of the BCP would require resumption and resite of Chuk Yuen Village at Ta Kwu Ling.

1.2.2 A resettlement site (named "Site J") has been carefully selected and designed to avoid locations with high ecological values; to minimize the site footprint as far as practicable and to meet the expectation of relocated villagers. However, it is found that there is an existing stream section of approximately 133 m in length and around 1m in width traversing the resettlement area. The existing stream section has been assessed to be of low ecological values (see Section 3.6 for details), and yet it has a potential of flooding in the proposed resettlement area. As a result, retaining the stream section will have no ecological significance but will inevitably require extra space to allow for flood prevention and protection works, which would result in enlarging the resettlement site footprint and causing more habitat loss. As such, this Project is proposed to divert the stream section to the southeast boundary of the resettlement site and to improve its water conveyance capacity. It is considered that the proposed Project is essential to safeguard the resettlement area against the risk of flooding as well as to minimize the habitat to be affected. In addition, greening measures are proposed to improve the landscape and visual appearance of the diverted stream section, which will in turn strengthen the landscape resources of the site.

1.2.3 The proposed Project involves improvement of the stream section of approximately 133 m in length and around 1m in width at Ta Kwu Ling through diverting it to an open channel with the associated maintenance access and greening measures. The channel will receive surface runoff from the Chuk Yuen resettlement area and the surrounding area of the same catchment, and will alleviate the flooding risk of the proposed resettlement by enhancing the capacity of water conveyance to downstream, which eventually discharges to the Shenzhen River at around 800 m from the Project area.

1.3 Name of Project Proponent

1.3.1 Civil Engineering Office, Civil Engineering and Development Department (CEDD)

1.4 Contact Persons

Project Proponent – CEDD

Contact Person : Mr. Kelvin W.W. Cho (Tel: 2762 5468; Fax: 2714 0103)

Environmental Consultant – Mott MacDonald Hong Kong Limited

Contact Person : Mr. Eric Ching (Tel: 2828 5757; Fax: 2827 1823)

1.5 Location of the Project

1.5.1 The proposed stream improvement is located around 300m to the east of Lin Ma Hang Road and at more than 650m to the east of the site is the North East New Territories (NENT) landfill. The existing streams and land uses in the vicinity of the Site are shown on **Figure 1.1** and the tentative layout plan of the proposed stream improvement and associated works are shown on **Figure 1.2** and **Figure 1.3**.

1.6 Scale of the Project

1.6.1 As explained in Section 1.2, the existing stream section of approximately 133 m in length and 1 m in width traversing the proposed village resite has to be improved through diversion for preventing flooding of the resettlement. It is proposed to divert the stream along the southeast boundary of the resite into an open U-shape concrete channel provided with greening measures to facilitate the water conveyance during wet seasons. The proposed Project area is around 0.3 ha.

1.6.2 The proposed U-shape channel will be about 1 m in width, around 2 m in depth and about 135 m in length. A maintenance access with grasscrete lining of width around 0.75 m along the open channel to enhance the visual appearance and landscape resource will be provided as the associated works. The adjacent slope work will be enhanced by hydroseeding and shrubs will be planted to increase the microhabitat at the riparian zone (**Figures 1.2** and **1.3** refer).

1.6.3 The proposed resettlement area is to accommodate the resite of Chuk Yuen Village which comprises village houses and improvement of the existing access road, as well as other supporting facilities of an area about 2.3 ha. Surface runoff generated from the resite and nearby catchments is conveyed by the proposed internal drains within the resite and the proposed stream improvement channel to the existing downstream watercourses and finally discharges to the Shenzhen River.

1.7 Site History and Existing Condition

Surrounding Environment

1.7.1 The stream within the resettlement area is low-lying, running between active and abandoned agricultural lands. It is a modified watercourse for the purpose of irrigation. Some irrigation devices were observed on-site. The lower watercourse has intermittent flow during dry seasons and leading to Shenzhen River at Ta Kwu Ling (**Figure 1.1**).

1.7.2 According to the historical aerial photographs (**Appendix A**), the surrounding area of the stream has been used for traditional agriculture and some of the lots have now become abandoned. The current land uses within the resettlement area comprise of active and abandoned agricultural land, grassland and an abandoned fish pond at the northern side of the resettlement area. Except for a

few simple erected structures to support the existing agricultural activities, no other buildings were observed within the Project area.

Water Quality and Flooding

- 1.7.3 The existing stream at Ta Kwu Ling is a modified watercourse with intermittent flow at the lower stream section during dry seasons and appeared turbid with unpleasant smell as a result of surface runoff from adjacent agricultural lands. The stream and the adjacent agricultural lands may flood during wet seasons and in heavy rainfall occasions. In order to mitigate the flooding hazard to the future resite of Chuk Yuen Village, it is proposed to improve the stream conveyance by diverting a section to the southeast boundary of the resite to form an open channel.

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

- 1.8.1 The proposed stream improvement works involve drainage channel diversion which discharges into Shenzhen River at Ta Kwu Ling. The latter then discharges into Deep Bay near the Mai Po Marshes Site of Special Scientific Interest (SSSI) and Mai Po Conservation Area. It is a designated project under Item I.1(b) (i) and (vii) of Schedule 2, Part I of the EIA Ordinance (Cap. 499), by virtue:

“A drainage channel diversion works which discharges into an area which is less than 300m from the nearest boundary of an existing or planned site of special scientific interest or conservation area” require an environmental permit for the construction and operation of the Project.

2. Outline of Planning and Implementation Programme

2.1 Planning and Implementation Programme

2.1.1 The stream improvement works and associated construction are proposed to commence in September 2010 for a construction period of about 2 months for stream diversion works.

2.1.2 For information, the site formation works of the resettlement area at the southern portion will be commenced concurrently for a period of 4 months with one month overlapping with the stream improvement works. The landscaping works will last for 3 months after the site formation works for the southern portion of Chuk Yuen resite. The tentative works programme is shown on **Appendix B**.

3. Major Elements of the Surrounding Environment

3.1 Introduction

3.1.1 The potential impacts associated with the stream improvement and associated works of the Project as well as its future operation are assessed according to the criteria listed in Annexes of the Technical Memorandum on Environmental Impact Assessment. Potential environmental issues during the construction and operational phases including air quality, noise, water quality, waste management, ecology and landscaping and visual outlook were assessed and described as follows.

3.2 Air Quality

Background Air Quality

3.2.1 The Environmental Protection Department (EPD) is operating a fixed air quality monitoring station in Tai Po, which is the station situated nearest to the Project Site. The 5-year average concentrations of air pollutants were calculated from the annual average pollutant concentrations published in EPD's Air Quality in Hong Kong 2003, and 2005 to 2008 at the Tai Po air monitoring station. This is presented in **Table 3-1**.

3.2.2 The monitoring results in 2004 were not used in the calculation because as reported in Air Quality in Hong Kong 2003, sufficient monitoring data was not obtained at the station to allow calculation of the annual average pollutant concentrations in that year.

Table 3-1 5-year average pollutant concentrations monitored at Tai Po air quality monitoring station

Pollutants	Annual Average ($\mu\text{g}/\text{m}^3$)	HKAQO Annual ($\mu\text{g}/\text{m}^3$)
SO ₂	17	80
NO ₂	53	80
TSP	69	80
RSP	52	55

Air Sensitive Receivers

3.2.3 There are no recognised villages in the proximity of the stream section to be diverted but a number of isolated village houses/structures were identified within the Project area. These Air Sensitive Receivers (ASRs) would be subject to air quality impact arising from construction activities of the stream improvement works. The worst-affected ASRs are those situated closest to the stream section to be diverted. These representative ASRs are tabulated in **Table 3-2** and their locations are shown in **Figure 3.1**.

Table 3-2 Representative ASRs during Construction Phase

ASRs	Description	Type of Use	Distance between ASR and stream (m)
A1	Village House	Residential	135
A2	Village House	Residential	150
A3	Village House	Residential	85

3.3 Noise

Noise Sensitive Receivers

- 3.3.1 There are no recognised villages in the proximity of the stream section to be diverted though a number of isolated village houses/structures were identified within the Project area. These Noise Sensitive Receivers (NSRs) would be subject to noise impact arising from construction activities of the stream improvement works.
- 3.3.2 For purpose of this assessment, representative NSRs situated closest to the stream section to be diverted have been identified and selected for prediction of the worst-case levels of noise impact. These representative NSRs are described in **Table 3-3** and their locations are shown in **Figure 3.2**. Such NSRs are the same village houses identified as ASRs in Section 3.2 above.

Table 3-3 Representative Noise Sensitive Receivers during Construction Phase

NSRs	Description	Type of Use	Distance between NSR and stream (m)
N1	Village House	Residential	135
N2	Village House	Residential	150
N3	Village House	Residential	85

3.4 Water

Existing Environment

- 3.4.1 The existing stream which traverses the southeast corner of the proposed resite of Chuk Yuen Village is a modified low-lying stream. It is moderately polluted with turbid water, conveys surface runoff from the adjacent agricultural lands downstream to the west. The lower stream course section has intermittent flow during dry seasons, discharging to the Shenzhen River and flowing downstream to the Deep Bay Region, which is more than 12km from the proposed stream improvement works.

Water Sensitive Receivers

- 3.4.2 Water sensitive receivers include the existing stream to the west of the resettlement site and Shenzhen River that is the receiving body of the stream as shown in **Figure 3.3**. The stream is leading to the Deep Bay Region via the Shenzhen River.

3.5 Waste

- 3.5.1 The habitats that would be affected by the stream improvement works comprise active and abandoned agricultural lands, low-lying grassland and the existing stream. Historical aerial photographs (**Appendix A**) reviewed that no potential sources of land contamination such as open storage or workshops were identified.

- 3.5.2 The proposed stream improvement works would generate a variety of wastes that can be divided into distinct categories based on their composition and ultimate method of disposal. The identified waste types include:
- Construction and demolition (C&D) material, including excavated material;
 - General refuse from construction activities;
 - Chemical waste from construction machinery; and
 - Sediment arising from maintenance of the channel.
- 3.5.3 Each type of waste arising is described in Section 4.5, together with an evaluation of the potential environmental impacts associated with generation, handling, storage and transport of waste.

3.6 Ecology

Ecological Baseline Conditions

- 3.6.1 The proposed stream section to be diverted is situated in private agricultural land between Lin Ma Hang Road and Tung Lo Hang Shan. The stream drains away intermittently in dry season at the lower course during site observation in November 2009 and is trained at lower course with box culvert. It flows downstream to the west leading to the Shenzhen River and further downstream to the Deep Bay Region, which is around 12km from the proposed works area.
- 3.6.2 Offsite habitats in the vicinity include woodland, shrubland, plantation, active agricultural land, abandoned agricultural land / low-lying grassland, hillside grassland, marsh, abandoned pond, open field and developed area. The distribution of each habitat is shown on the Habitat Map in **Figure 3.4**.
- 3.6.3 The Mai Po Inner Deep Bay Ramsar Site covers the Mai Po Marshes SSSI, the Inner Deep Bay area and the inter-tidal mudflats with 1,500 hectares of wetlands are sites of conservation concern in this study. These habitats are around 12km offsite from the proposed water course diversion works. The Ramsar Site was designated “Wetland of International Importance” under the Ramsar Convention on 4 September 1995. This Site is a natural shallow estuarine area, with extensive inter-tidal mudflats, dwarf mangroves, gei wai and fishponds. These wetlands provide a wide range of habitats to support a high diversity of fauna (Tsim and Lock, 2002), particularly important for waterbirds, including a number of globally threatened species and provide roosting ground for the global or biogeographical wintering or passage populations and species that are of regional or local conservation concern (Binnie, 2000).

Habitat Characteristics and Wildlife Recorded

- 3.6.4 The detail checklists for flora and fauna recorded in the Project area and its vicinity during the survey period (May to August 2009) are presented in **Tables E-1 – E-4** in **Appendix E**. The recent ecological field surveys conducted for this study recorded 99 plant species, 35 bird species, 27 butterfly species, 13 dragonfly species, 3 amphibian species and 2 reptile species. No sign or direct observation of mammals was recorded during the study period. The baseline conditions of each habitat in the Project Area and vicinity are shown in **Table 3-4** below.

Table 3-4 Baseline Conditions of Each Habitat in the Project Area and Vicinity

Habitat Type	Location	Existing Conditions and Habitat Value
Woodland	Woodland edge located next to the middle section of the access road (Plate F1 in Appendix F)	The study area covers a narrow fringe of roadside trees along the existing vehicular access road. Dominant tree species include <i>Celtis sinensis</i> , <i>Macaranga tanarius</i> , <i>Microcos paniculata</i> which are typical self-seeded native species in rural village areas. Branch trimming was carried out from time to time for road traffic safety and access to graves during worship of ancestors. Moderate-low value.
Active Agricultural Land	Predominant habitat at the north of the stream and the area adjoining the access road (Plate F2).	The dominant species include <i>Ipomoea aquatica</i> , <i>Allium tuberosum</i> and <i>Ipomoea batatas</i> which are crop species commonly cultivated in local farmland. Native herbaceous plants were also recorded but they are usually regarded as weeds and regularly removed by farmers. Chinese Pond Heron, White-breasted Waterhen, Greater Coucal and Lesser Coucal were recorded at the active agricultural land. Commonly found bird species in the Site included Common Koel, Barn Swallow, White Wagtail, Yellow-bellied Prinia, White-rumped Munia, Eurasian Tree Sparrow and Black-collared Starling. Four butterfly species and two dragonfly species, which are all common and abundant, were observed in the habitat (Tables E-3 and E-4 in Appendix E). Frog calling from species of Asian Common Toad <i>Bufo melanostictus</i> and Asiatic Painted Frog <i>Kaloula pulchra pulchra</i> were recorded after rain during field survey on 9 June, 2009. A common reptile species, Checkered Keelback <i>Xenochrophis piscator</i> was also recorded during the study. Moderate-low value.
Abandoned Agricultural Land / Low-lying Grassland	Abandoned agricultural land and low-lying grassland (Plate F3) were recorded along the stream surrounding the active agricultural land mentioned above.	The dominant flora species recorded are <i>Mikania micrantha</i> , <i>Paspalum conjugatum</i> and <i>Panicum maximum</i> . These species usually colonized the agricultural land rapidly after abandonment. Cattle Egret was sighted foraging and Chinese Pond Heron was sighted flying above the habitat. Other birds including Chinese Bulbul, Yellow-bellied Prinia, White-rumped Munia, Scaly-breasted Munia, Eurasian Tree Sparrow, Black-collared Starling and Crested Myna were recorded in small shrubs or perching on the overhead wire. One butterfly species and one dragonfly species, both are very common and abundant, were also recorded in this habitat (Tables E-3 and E-4 in Appendix E). Low value.
Abandoned Fish Pond	Abandoned fish pond was recorded at the north of the stream separated by the active agricultural land (Plate F4).	The abandoned fish pond is dominated by <i>Cyclosorus interruptus</i> , <i>Panicum maximum</i> and <i>Phragmites australis</i> , which are commonly found in similar habitats. One young individual of <i>Aquilaria sinensis</i> (a tree species listed under Protection of Endangered Species of Animals and Plants Ordinance Cap. 586) was recorded at the edge of the abandoned pond, which is considered as a species of conservation interest. Uncommon butterfly species, Bush Hopper <i>Ampittia dioscorides etura</i> and common butterfly species, Common Grass Yellow <i>Eurema hecabe hecabe</i> were recorded at the abandoned fish pond. Moderate-low value.
Watercourse	The watercourse entered the Project area from its southeast boundary, running along the southern side of the Project area (Plate F5).	The watercourse is situated beside the active agricultural land and abandoned agricultural land / low-lying grassland. It is modified and overgrew with <i>Panicum maximum</i> and <i>Cyperus</i> spp. along the riparian zone (Plate F5). The watercourse is shallow with medium to slow flow and high turbidity. A few species of dragonfly species were recorded inhabiting at the riparian zone. A total of two Chinese Pond Herons, one White-breasted Waterhen and one Asiatic Painted Frog <i>Kaloula pulchra pulchra</i> were found associated with the watercourse. (Appendix E). Low value.

Habitat Type	Location	Existing Conditions and Habitat Value
Developed Area	The area of the current concrete paved access road connecting the Lin Ma Hang Road to the proposed Chuk Yuen resettlement area and the scattered village (Plate F6)	Anthropogenic habitat associated with higher level of human activities compared to the above habitats and of limited ecological value. <i>Eleusine indica</i> , <i>Panicum maximum</i> , <i>Dicliptera chinensis</i> and widespread flora species are commonly found at the roadside area. Very low value.

3.6.5 The stream is situated besides the active agricultural land and abandoned agricultural land / low-lying grassland. It is modified and overgrew with *Panicum maximum* and *Cyperus* spp. along the riparian zone (**Plate F5**). The stream is shallow with medium to slow flow and high turbidity but may flood during heavy rainfall event. Neither fish nor ripple on water surface in response to baiting was observed during the field survey. Only a few common dragonfly species were recorded inhabiting at the riparian zone. A total of two Chinese Pond Herons, one White-breasted Waterhen and one Asiatic Painted Frog *Kaloula pulchra pulchra* were found associated with the watercourse. The ecological value of this stream section is considered to be low due to the low species diversity and abundance with low quality of water and modified watercourse nature with intermittent flow seasonally.

3.6.6 Apart from the Project area and the habitats in vicinity, information on ecological resources at the adjacent area with potential ecological value was also collected. From a mammal camera trap survey conducted by AFCD in 2002-2006, 10 mammal species were recorded in Chuk Yuen woodland, the habitat at approximately 400m to the northwest of the stream improvement area. Mammal species recorded in the woodland included four species of conservation concern, namely East Asian Porcupine *Hystrix brachyura*, Masked Palm Civet *Paguma larvata*, Leopard Cat *Prionailurus bengalensis* and Red Muntjac *Muntiacus muntjac*. Other species such as Small Indian Civet *Viverricula indica*, Small-toothed Ferret Badger *Melogale meschata*, Small Asian Mongoose *Herpestes javanicus*, Domestic Dog *Canis lupus familiaris*, Domestic Cat *Felis catus* and Eurasian Wild Pig *Sus scrofa* were also recorded (Shek *et al.* 2007). The range of occurrence index (number of photographs taken divided by the total amount of trapping effort in 100 camera working days within each 1 km² grid) of East Asian Porcupine, Masked Palm Civet, Leopard Cat and Red Muntjac are 5.01 – 15.00, 0.01 – 1.00, 2.01- 4.00 and 0.01 – 1.00 respectively, which are comparatively low for the very common status of East Asian Porcupine, the Red Muntjac, the uncommon Masked Palm Civet and the Leopard Cat. All four species are protected under the Wild Animals Protection Ordinance (Cap. 170), while the Leopard Cat is also protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586), listed under the CITES and as Vulnerable species in the China Red Data Book.

3.7 Landscape and Visual

Baseline Landscape Conditions

3.7.1 The location of the stream improvement works and the adjacent area is comprised of agricultural land, with scattered villages and low rise agricultural structures. There are also pockets of vegetation dispersed across the open fields. The area can be categorised as follows:

3.7.2 LR 1 - Abandoned Agricultural Land / Low Lying Grassland. This Landscape Resource (LR) contains flat to gently undulating fields no longer used for crop cultivation now dominated by short

to tall grassland vegetation. They contain a mix of native and exotic species. This LR is of medium quality and landscape amenity and is considered to have a medium sensitivity to change.

- 3.7.3 LR 2 – Active Agricultural Land. This LR contains flat to gently undulating fields used for crop cultivation. This LR is of medium quality and landscape amenity and is considered to have a medium sensitivity to change.
- 3.7.4 LR 3 – Stream. This LR is a small watercourse that traverses the southern portion of the resite of Chuk Yuen Village proposed to be diverted in this Project. Whilst it has a generally organic alignment, the agricultural practices in the area have affected the stream and the banks are generally lacking in vegetation. It is generally of medium quality and landscape amenity and is considered have a medium sensitivity.
- 3.7.5 The locations of the LRs are shown in **Figure 3.5**.

Baseline Visual Conditions

- 3.7.6 The proposed stream improvement works is to be located in a closed border area with relatively few residents and potential Visual Sensitive Receivers (VSRs). In addition the existing vegetation and undulating topography will screen the Project from much of the surrounding areas.
- 3.7.7 VSR 1 Farmers. These VSRs are employees engaged in farming the areas around the Project site. They are relatively few in number and are considered to have a low sensitivity.
- 3.7.8 The location of VSR1 is shown in **Figure 3.6**.

4. Potential Environmental Impacts

4.1 Introduction

4.1.1 The potential impacts associated with the proposed stream improvement and associated works for Ta Kwu Ling Stream are shown in **Table 4.1**.

Table 4.1 Potential Impacts during Construction and Operation Associated with the Proposed Stream Improvement works

Potential Impacts	Phase		
	Construction	Operation	
Air Quality	Dust emissions	√	X
Noise	Noise from operation of machinery/site activities	√	X
Water Quality	Site runoff and drainage	√	√
	General construction activities	√	X
	Effluents	√	X
Waste generation	Disposal of excavated materials	√	X
	Handling or disposal of chemical waste	√	X
	Handling or disposal of general refuse	√	X
	Sediment arising from channel maintenance	X	√
Ecology	Habitat Loss	√	√
	Direct disturbance to wildlife	√	X
	Indirect disturbance	√	X
Landscape and Visual	Unightly visual appearance	√	√
	Loss of landscape resource	√	√

Notes: √ = Possible ; X = Not anticipated

4.2 Air Quality

Construction Phase

- 4.2.1 Fugitive dust emissions will be generated from construction activities for the stream improvement such as site clearance, filling, excavation and temporary stockpiling of dusty materials.
- 4.2.2 During the construction phase, the Project will start with site clearance which is classified as a regulatory work under the *Air Pollution Control (Construction Dust) Regulation*. Implementation of the standard dust suppression measures required under the schedule shall control dust emissions to an acceptable level.
- 4.2.3 Dust emissions from excavation or earth moving operation shall be controlled by spraying with water or a dust suppression chemical immediately before, during and after the operation so as to maintain the surface wet.

Operational Phase

4.2.4 No operational phase air quality impact of the proposed stream improvement is anticipated.

4.3 Noise

Construction Phase

4.3.1 Noise impact due to the stream improvement works has been assessed. The type and number of PMEs, and the corresponding SWLs are given in **Appendix C**.

Unmitigated Impact

4.3.2 It is envisaged that construction activities will last for approximately 2 months for the stream improvement as shown in **Appendix B**. The predicted construction noise impact for the unmitigated scenario is summarised in **Table 4-2**. Calculation worksheet is presented in **Appendix D**.

Table 4-2 Unmitigated Construction Noise Impact, dB(A)

NSRs	Description	Type of Use	Predicted Construction Noise Level, dB(A)	Construction Noise Criteria, dB(A) ⁽¹⁾
N1	Village House	Residential	68	75
N2	Village House	Residential	67	75
N3	Village House	Residential	72	75

Note(1): Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), Annex 5, Table 1B - Noise Standards for Daytime construction Activities

4.3.3 No exceedances of the daytime noise criteria are predicted at these representative NSRs, and hence no noise mitigation measures is required for the stream improvement works. And there will be no construction activities during the restricted hours.

Cumulative Impact

4.3.4 It is envisaged that there will be concurrent site formation works at the southern portion of the Chuk Yuen resite with one month overlapping period. Nevertheless, it is confirmed with the Project Proponent that noise mitigation measures including use of quiet plant and/ or movable noise barrier will be implemented to alleviate the construction noise impact due to the adjacent site formation work to acceptable levels. Therefore, no adverse cumulative noise impact is anticipated.

Operational Phase

4.3.5 No operational phase noise impact of the proposed stream improvement is anticipated.

4.4 Water

Construction Phase

General

- 4.4.1 Potential sources of water quality impact associated with the construction of the stream improvement and associated works have been identified as follows:
- Construction site runoff and drainage;
 - General construction activities; and
 - Sewage effluent from construction workforce.

Construction Site Runoff and Drainage

- 4.4.2 Runoff from the construction works areas may contain suspended solids, contaminants and increased loads of sediments. Potential sources of pollution from site drainage include:
- Runoff and erosion from site surfaces, drainage channels, earth working areas and stockpiles;
 - Release of grouting and cement materials with stormwater;
 - Wash water from dust suppression sprays and wheel wash facilities; and
 - Fuel, oil, solvents and lubricants from maintenance of construction vehicles and mechanical equipment.
- 4.4.3 Sediment laden runoff during the construction works for the stream improvement works, if uncontrolled, may carry pollutants (adsorbed onto the particle surfaces) into the receiving waters. Therefore, good site practices should be implemented to control construction site runoff and drainage from the works areas, and to prevent runoff and drainage water with high levels of suspended solids from entering the public drainage system and the downstream of the proposed stream improvement works before and after the stream improvement. With the implementation of adequate construction site drainage and provision of silt removal facilities, unacceptable water quality impacts are not anticipated.

General Construction Activities

- 4.4.4 On-site construction activities may result in water pollution from the following:
- Uncontrolled discharge of debris and rubbish such as packaging, construction materials and refuse; and
 - Spillages of liquids stored on-site, such as oil, diesel and solvents.
- 4.4.5 Good construction and site management practices should be observed to ensure that litter, fuels and solvents do not enter the public drainage system and the existing stream.

Sewage Effluent

- 4.4.6 Sewage would be generated from the workforce during the construction phase. However, this temporary sewage could be adequately collected by temporary facilities (e.g. portable chemical toilets) which could be installed within the construction site. Therefore, it is unlikely that sewage generated from the site would result in any significant water quality impact.

Operational Phase

- 4.4.7 Minor maintenance activities at the open channel would be carried out during the operational phase to clear the excessive sediment runoff from upstream. Therefore, water pollution to the stream section and downstream due to these activities is likely to be of low significance.
- 4.4.8 The potential for offsite water quality impacts during the operational phase would be discharges of surface runoff from the resettlement area during rainy seasons and sewage generated from the resettlement area. The surface runoff may contain oil, grease and grit, though in small quantities, that may cause water quality impacts to the downstream of the improvement works, if uncontrolled. Surface runoff onto the houses within the resettlement area would be collected by downpipes into the local stormwater drainage system underneath the internal roads within the resettlement area. Surface runoffs onto the internal roads and the paved areas would be collected by road gullies and internal surface drainage systems respectively. The surface runoff collected would be discharged into local stormwater drainage system.
- 4.4.9 Sewage generated from the villagers at the resite, if uncontrolled, would be another source of potential water quality impact.

4.5 Waste

Construction Phase

Land Contamination

- 4.5.1 No sources of land contamination were identified in this study as a result of the historical and recent land uses. Thus, no contaminated soil will be generated due to excavation for the stream improvement works.

Construction and Demolition Materials

- 4.5.2 A small quantity of excavated sediment would be generated from the stream improvement work. Approximately 900m³ of excavated soil is expected to be removed for the proposed stream improvement and associated works. The excavated material will be transported off-site to a public fill facility.

General Refuse

- 4.5.3 The construction workforce would generate refuse comprising food scraps, waste paper, empty containers, etc. Release of general refuse into the surface channel should not be permitted as introduction of these wastes is likely to have detrimental effects on water quality in the area. Such refuse should be properly managed so that intentional or accidental release to the surrounding

environment does not occur. Disposal of refuse at sites other than approved waste transfer or disposal facilities should be prohibited. Effective collection of site wastes would be required to prevent waste materials from being blown around by wind, flushed or leached into the water environment, or creating an odour nuisance or pest and vermin problem. Waste storage areas should be well maintained and cleaned regularly. With the implementation of good waste management practices at the site, adverse environmental impacts are not expected to arise from the storage, handling and transportation of wastes from construction workforce.

Chemical Waste

- 4.5.4 The maintenance and servicing of construction plant and equipment might generate some chemical wastes such as cleaning fluids, solvents, lubrication oil and fuel. Maintenance of vehicles may also involve the use of a variety of chemicals, oil and lubricants including heavy duty cleaners, organic solvents, degreasers, brake fluids, battery acid and soldering fluids. It is difficult to quantify the amount of chemical waste that would arise from the construction activities since it would be dependent on the Contractor's on-site maintenance requirements and the amount of plant utilised. However, it is anticipated that the quantity of chemical waste, such as lubricating oil and solvent produced from plant maintenance, would be small and in the order of a few cubic metres per month.
- 4.5.5 Chemical wastes arising during the construction phase might pose environmental, health and safety hazards if not stored and disposed of in an appropriate manner as stipulated in the Waste Disposal (Chemical Waste) (General) Regulations. The potential hazards include:
- Toxic effects to workers;
 - Impacts on water quality from spills; and
 - Fire hazards.
- 4.5.6 Materials classified as chemical wastes will require special handling and storage arrangements before removal for appropriate treatment at the licensed Chemical Waste Treatment Facility. Wherever possible opportunities should be taken to reuse and recycle materials. Provided that the handling, storage and disposal of chemical wastes are in accordance with these requirements, adverse environmental impacts are not expected.

Operational Phase

- 4.5.7 Waste generation during the operational phase will mainly be the sediment arising from maintenance of the open channel. It is likely to be in low quantity. No adverse impact is anticipated and no mitigation measure is required during the operational phase.

4.6 Ecology

- 4.6.1 The potential ecological impacts arising from the Project generally include direct impacts due to habitat loss and indirect impacts due to sediment discharge (if uncontrolled), site run-off and possible nuisance during construction.
- 4.6.2 There was no rare or protected plant recorded within the stream section. The riparian vegetations along the stream are all common species in Hong Kong. Only two species of birds and 5 species of dragonfly were recorded utilizing the stream during the ecological field surveys. The low abundance and diversity of fauna species recorded in the stream indicate that it is not an

important habitat for maintaining high biological diversity, which is probably due to pollution from various human activities such as agricultural activities.

Construction Phase Impacts

- 4.6.3 The proposed stream improvement would involve diverting the section of stream within the subject site into an open channel, the construction of maintenance access with grasscrete lining and associated landscaping works. An area of 0.22 ha of abandoned agricultural land/ low-lying grassland and 0.04 ha of active agricultural land will be lost due to the proposed stream improvement and associated works. A short section of about 133 m of the existing stream will be backfilled for site formation works for the Chuk Yuen resite and the sloping surface facing the diverted stream will be enhanced by hydroseeding. An area of around 0.04 ha within the site boundary will be enhanced by shrub plant. The fauna species potentially to be affected by the stream improvement works are common species and would be re-colonized at the channel after completion of the stream improvement work.
- 4.6.4 During construction phase, sediment or accidental spill from construction material would cause pollution of the stream. Uncontrolled runoff laden with suspended solids and accidental spillage of chemicals from machinery would cause impact to the aquatic fauna at the downstream of the watercourse which lead to the Shenzhen River and eventually to the Deep Bay Region.
- 4.6.5 During the proposed stream improvement work, the water flow at the existing stream section within the resite of Chuk Yuen Village shall be maintained until the construction of the new drainage channel is completed and ready for diversion. Therefore, the proposed stream diversion would not introduce significant changes in hydrological characteristic in upper and lower stream course during both construction and operational phases. The potential sediment impact during the construction phase would be temporal for a short duration (around 2 months for stream diversion, and 4 months for concurrent project at Chuk Yuen resite with one month overlapping period) and could be minimised when good site practices are adopted at the construction site.
- 4.6.6 The indirect disturbance impact on the sites of conservation concern including the Mai Po and Inner Deep Bay Ramsar Site, Mai Po Marshes SSSI and Mai Po Nature Reserve in the Deep Bay Region would be insignificant, because the proposed stream improvement works will be at more than 12km offsite from sites of conservation concern and the intermittent flow of downstream section connecting to Shenzhen River.
- 4.6.7 The indirect disturbance impacts due to nuisance arising from construction on flora and fauna associated in adjacent habitats would be of low significance because of the short duration (about 2 months stream diversion works with 3 months landscaping activities) and the small area (around 0.3 ha) for the proposed works.

Operational Phase Impacts

- 4.6.8 Minor maintenance activities at the open channel would be carried out during the operational phase to clear the excessive sediment runoff from upstream. Therefore, ecological impact to the stream section and downstream aquatic environment due to these activities is likely to be of low significance.

- 4.6.9 There is a potential for offsite disturbance during the operational phase as a result of the uncontrolled surface run-off, direct discharge of untreated or partially treated domestic effluent from the future Chuk Yuen resite on the aquatic environment. It is suggested that a proper sewage and drainage collection system will be provided by the Chuk Yuen resite, thus the potential offsite pollution to the stream due to sewage or contaminated surface runoff will be avoided. Therefore, the potential impact to the wildlife utilizing the stream and its lower course during operational phase of the Chuk Yuen resite would be insignificant.

4.7 Landscape and Visual

Construction and Operational Phases

Landscape Impact Assessment

- 4.7.1 The magnitude of change of the proposed stream improvement and associated works will have on LR3 is expected to be intermediate within the study area due to the medium quality and landscape amenity with medium sensitivity to change. This is likely to result in no significant threshold of impacts on a portion of LR1 and LR2, and medium significance on the remaining portion of LR1 where the stream improvement works will be carried out.
- 4.7.2 Grasscrete lining for the maintenance access, hydroseeding on slope and shrubs planting at riparian zone will be included to enhance the landscape resource for the stream improvement works during the operational phase. Therefore, no further impacts are expected during the operational stage of the stream improvement work.

Visual Impact Assessment

- 4.7.3 The magnitude of change to the visual environment due to the proposed stream improvement work is considered to be low due to the few numbers of VSRs that would be affected, small scale of the proposed work and short duration of the construction.
- 4.7.4 The expected visual impacts on VSR 1 farmers are expected to be low during both construction and operation.

5. Environmental Protection Measures and Any Further Environmental Implications

5.1 Air Quality

Construction Phase

5.1.1 Dust mitigation measures should be adopted as required under the *Air Pollution Control (Construction Dust) Regulation*. A control programme can be instigated to monitor the construction process in order to enforce dust controls and modify methods of works to reduce dust emissions down to acceptable levels. The following dust control measures as stipulated in the *Air Pollution Control (Construction Dust) Regulation* should be implemented throughout the construction period.

Site Clearance

- the working area for the uprooting of trees, shrubs, or vegetation or the removal of boulders, pole, pillars should be sprayed with water immediately before, during and immediately after the operation so as to maintain the entire surface wet.
- all demolished items shall be covered by impervious sheeting or placed in area sheltered on the top and three sides within a day of demolition.

Excavated Materials

- any stockpile of dusty material shall be either: (a) covered entirely by impervious sheeting; (b) placed in an area sheltered on the top and the three sides; or (c) sprayed with water or dust suppression chemicals so as to maintain the entire surface wet.

Exposed Earth

- exposed earth should be properly treated by compaction, hydroseeding, vegetation planting or seating with latex, vinyl, bitumen within six months after the last construction activity on the site or part of the site where the exposed earth lies.

Loading, Unloading or Transfer of Dusty Materials

- all dusty materials should be sprayed with water immediately prior to any loading or transfer operation so as to keep the dusty material wet.

Debris Handling

- any debris should be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the three sides.
- before debris is dumped into a chute, water should be sprayed so that it remains wet when it is dumped.

Transport of Dusty Materials

- vehicle used for transporting dusty materials/ spoils should be covered with tarpaulin or similar material. The cover should extend over the edges of the sides and tailboards.

Access Haul Roads

- each and every main haul road shall be paved with concrete, bituminous hardcore materials or metal plates and kept clear of dusty materials; or

- the unpaved haul roads shall be sprayed with water or a dust suppression chemical so as to keep the entire road surface wet.

Site Boundary and Entrance

- vehicle washing facilities including a high pressure water jet shall be provided at every discernible or designated vehicle exit point; and
- the area at which vehicle washing takes place and the section of the road between the washing facilities and the exit point shall be paved with concrete, bituminous or hardcore materials.

- 5.1.2 Good site management is important to help reduce potential air quality impact down to an acceptable level. As a general guidance, the Contractor shall maintain high standard of housekeeping to prevent emissions of fugitive dust. Loading, unloading, handling and storage of raw materials, wastes or by-products should be carried out in a manner so as to minimize the release of visible dust. Any piles of materials accumulated on or around the work areas shall be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas shall be carried out in a manner without generating fugitive dust emissions. The material shall be handled properly to prevent fugitive dust emissions before cleaning.

Operational Phase

- 5.1.3 No mitigation measure is required.

5.2 Noise

Construction Phase

- 5.2.1 No exceedance of noise criteria is predicted for the construction of stream improvement work, however, it is recommended that the Contractor should adopt good working practices in order to minimise construction noise as far as practicable.

Good Site Practices and Noise Management

- 5.2.2 Good site practices measures may include the following:
- the Contractor shall adopt the Code of Practice on Good Management Practice to Prevent Violation of the Noise Control Ordinance (Chapter 400) (for Construction Industry) published by EPD;
 - the Contractor shall observe and comply with the statutory and non-statutory requirements and guidelines;
 - before commencing any work, the Contractor shall submit to the Engineer's Representative for approval the method of working, equipment and noise mitigation measures intended to be used at the site;
 - the Contractor shall devise and execute working methods to minimise the noise impact on the surrounding sensitive uses, and provide experienced personnel with suitable training to ensure that those methods are implemented;
 - noisy equipment and noisy activities should be located as far away from the NSRs as practical;

- unused equipment should be turned off; number of operating PME should be kept to a minimum and the parallel use of noisy equipment / machinery should be avoided as far as practicable;
- regular maintenance of all plant and equipment; and
- material stockpiles and other structures may be effectively utilised as noise barriers, where practicable.

Operational Phase

5.2.3 No mitigation measure is required.

5.3 Water

Construction Phase

Construction Site Runoff and Drainage

5.3.1 Adequate construction site drainage management measures shall be implemented and maintained by the Contractor to control site runoff and drainage and thereby prevent high sediment loadings from reaching the downstream section of the existing stream.

5.3.2 The site practices outlined in ProPECC PN 1/94 Construction Site Drainage should be followed as far as practicable during construction of the stream improvement works to minimise surface runoff, control erosion, and to retain and reduce any suspended solids prior to discharge. Where appropriate, these practices include the following items and should be properly implemented to control site discharges so as to avoid water quality impacts during the construction phase:

- Surface runoff from construction sites should be discharged into storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels or earth bunds or sandbag barriers should be provided on site to properly direct stormwater to such silt removal facilities;
- Perimeter channels at site boundaries should be provided where necessary to intercept storm run-off from outside the site so that it will not wash across the site. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks;
- Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly;
- Soil excavation works should be minimized on rainy days to reduce potential for soil erosion and contamination of runoff;
- During rainstorms, temporary exposed slope surfaces should be covered e.g., by tarpaulin, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds. Intercepting channels should be provided (e.g. along the crest/edge of excavation) to prevent storm runoff from washing across exposed soil surfaces;
- Earthwork final surfaces should be well compacted and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms;
- Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
- Open stockpiles of construction materials on site should be covered with tarpaulin or similar fabric during rainstorms;

- Manholes should always be adequately covered and temporarily sealed to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers.

General Construction Activities

- 5.3.3 Construction waste, debris and refuse generated on site should be collected, handled and disposed of properly to avoid entering the existing stream before and after its diversion. Stockpiles of cement and other construction materials should be kept covered when not being used.
- 5.3.4 Fuel, oil, solvents and lubricants should only be used and stored in designated areas which have pollution prevention facilities. To prevent spillage of fuel, oil, solvents and lubricants to nearby water bodies, all fuel tanks and storage areas should be provided with locks and be sited on sealed areas within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund should be drained of rainwater after a rain event.

Sewage Effluents

- 5.3.5 Temporary sanitary facilities, such as portable chemical toilets, should be provided on site to handle sewage from the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.

Operational Phase

- 5.3.6 No mitigation measure is required for the operation of the stream improvement.
- 5.3.7 For the potential offsite disturbance, with the provision of an adequately designed drainage system to prevent uncontrolled discharges, adverse water quality impact from discharge of surface runoff is not anticipated.
- 5.3.8 All the sewage generated from the resettlement area would be collected by a sewerage network provided inside the Chuk Yuen resite. With the provision of facilities for proper treatment and disposal of sewage generated from the resite, the offsite water quality impact from sewage generation from the adjacent resettlement area during the operational phase is not a concern.

5.4 Waste

Construction Phase

Good Site Practices

- 5.4.1 Adverse impacts related to waste management are not expected to arise, provided that good site practices are strictly followed. Recommendations for good site practices during the construction activities include:
- Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site;

- Training of site personnel in proper waste management and chemical handling procedures;
- Provision of sufficient waste disposal points and regular collection of waste;
- Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers; and
- Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors.

Waste Reduction Measures

- 5.4.2 Good management and control could prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:
- Sort C&D material from demolition and decommissioning of the existing facilities to recover recyclable portions such as metals;
 - Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;
 - Encourage collection of aluminium cans by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the workforce;
 - Proper storage and site practices to minimise the potential for damage or contamination of construction materials; and
 - Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.
- 5.4.3 In addition to the above measures, specific mitigation measures are recommended below for the identified waste arising to minimise environmental impacts during handling, transportation and disposal of these wastes.

Construction and Demolition Materials

- 5.4.4 In order to minimise impacts resulting from collection and transportation of C&D material for off-site disposal, the excavated materials should be reused on-site as backfilling material and for landscaping works as far as practicable. When disposing C&D material at a public fill reception facility, it should be noted that the material should only consist of earth, building debris and broken rock and concrete. Other mitigation requirements are listed below:
- A Waste Management Plan should be prepared;
 - A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed; and
- 5.4.5 In order to monitor the disposal of C&D material and solid wastes at public fill reception facilities and landfills, and to control fly-tipping, a trip-ticket system (e.g. ETWB TCW No. 31/2004) should be included.

Excavated Sediment

- 5.4.6 The quality of the sediment has yet to be characterised from planned site investigation. However, regardless of the quality of the sediment determined, in accordance with the guidelines set out in ETWB TCW No. 34/2002, generation of dredged/excavated sediment for disposal shall be avoided or minimised as far as practicable. This will be achieved through maximising the possible re-use of the dredged/excavated sediment on site.

General Refuse

- 5.4.7 General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material.

Chemical Waste

- 5.4.8 If chemical wastes are produced at the construction site, the Contractor would be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor should use a licensed collector to transport and dispose of the chemical wastes, to either the approved Chemical Waste Treatment Centre, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.

Operational Phase

- 5.4.9 Waste generation during the operational phase will mainly be the sediment arising from channel maintenance, which is likely to be of low quantity. No adverse impact is anticipated and no mitigation measure is required during the operational phase.

5.5 Ecology

Construction Phase

- 5.5.1 No specific mitigation measure for ecological impact is required as the potential impact is expected to be insignificant. General good construction practices and management to keep the works area clean and tidy would minimize construction site runoff and the chance of accidental spillage of chemicals to the surrounding water bodies. Refuse and wastes generated during construction should be disposed of properly. Disturbance to off-site habitats and associated wildlife should be avoided by clearly defining the works boundary.

Operational Phase

- 5.5.2 With the proper collection and treatment of surface run-off and domestic sewage from the Chuk Yuen Resite, no ecological mitigation measures will be required in the operational phase.

5.6 Landscape and Visual

Construction and Operational Phases

Landscape Mitigation Measures

- 5.6.1 Moderate landscape impacts have been identified for the LRs. Recommended landscape mitigation measures to be further investigated as part of the detailed design are proposed to reduce these impacts and improve the overall amenity of the development and they include:
- Greening measures including hydro seeding and edge plantings for the proposed fill slopes that enclose the development and embankment of the open channel.
 - The proposed maintenance access will be paved with a soft paving technique 'Grasscrete' to increase the overall greening of the development and reduce stormwater run-off.
- 5.6.2 The residual impacts for the LRs are expected to reduce to slight following the adoption of the landscape mitigation measures.

Visual Mitigation Measures

- 5.6.3 Slight impacts have been identified on the VSR1 adjacent to the Project site. Visual enhancement measures are proposed to improve the overall amenity of the development. These include:
- Selection of colours, material and finishes that complement the surrounding rural environment.
 - Greening measures as recommended for the landscape mitigation measures would further reduce the visual impact on the VSRs
- 5.6.4 The adoption of these visual mitigation measures will reduce the impacts for VSR 1 to negligible for both construction and operation phases of the Project.

6. Previously Approved EIA Reports

- 6.1.1 No relevant EIA report with similar study area and nature to the proposed Project was made reference in this Project Profile.

7. Conclusions

7.1 Air Quality

Construction Phase

- 7.1.1 During the construction phase, dust will be generated from the stream improvement work. With the implementation of the dust control measures required under the Air Pollution Control (Construction Dust) Regulation, the potential dust impact can be alleviated to an acceptable level.

Operational Phase

- 7.1.2 No operational phase air quality impact of the proposed stream improvement works is anticipated and hence no mitigation measure is required.

7.2 Noise

Construction Phase

- 7.2.1 The potential noise impact that could arise from daytime construction activities for the stream improvement work has been evaluated (there will be no construction activities during the restricted hours). Whilst the Contractor may prefer to use different construction methods and different types and numbers of PME, the tentative construction schedule and plant inventory assumed are considered representative and should reveal a conservative noise impact scenario.

- 7.2.2 No exceedance of noise criteria for the construction activities for stream improvement work is anticipated, and hence no specific noise mitigation measure is required. However, it is recommended that the Contractor should adopt good working practices in order to minimise construction noise as far as practicable.

Operational Phase

- 7.2.3 No operational phase noise impact of the proposed stream improvement works is anticipated and hence no mitigation measure is required.

7.3 Water

- 7.3.1 The potential water quality impacts resulting from the implementation of stream improvement and associated works and cumulative impacts from the Chuk Yuen resite were identified. These comprised surface runoff and drainage, debris, refuse and liquid spillages from general construction activities and sewage effluents from the construction workforce during construction phase; and discharges of surface runoff during rainy seasons and sewage generated from the future Chuk Yuen resite during operational phase.

Construction Phase

- 7.3.2 During the construction phase, minimisation of water quality deterioration could be achieved through implementing adequate good site practices such as control measures on the runoff and

drainage from the works areas. Proper site management and good housekeeping practices would also be required to ensure that construction wastes and materials would not enter the existing stream that runs downstream to the stream improvement works and leading to the Shenzhen River. Sewage effluent arising from the construction workforce would also require appropriate treatment through provision of portable toilets.

Operational Phase

7.3.3 Appropriate drainage system will be constructed to prevent uncontrolled discharges of runoff and sewage generated from the resettlement area. Those effluents will be discharged to the drainage and sewer system during the operational phase.

7.3.4 With implementation of the effluent collection and treatment measures to be provided for the Chuk Yuen resite, it is anticipated that no adverse water quality impact on the open channel and downstream aquatic environment would be resulted from the resite of Chuk Yuen Village.

7.4 Waste

Construction Phase

7.4.1 Wastes generated by the construction activities are likely to include C&D materials from the construction works, general refuse from the workforce and chemical waste from any maintenance of construction plant and equipment. Provided that these identified waste arising are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts are not anticipated during construction of the stream improvement works.

7.4.2 Waste management would be the contractor's responsibility to ensure that all wastes produced during the construction of the proposed stream improvement works are handled, stored and disposed of in accordance with good waste management practices and EPD's regulations and requirements. The recommended mitigation measures should form the basis of the site Waste Management Plan to be developed by the Contractor at commencement of construction phase of the proposed stream improvement works.

Operational Phase

7.4.3 Waste generation during the operational phase will mainly be the sediment arising from maintenance of the open channel, which is likely to be of low quantity. Hence, no mitigation measure is required during the operational phase.

7.5 Ecology

Construction Phase

- 7.5.1 The habitats that would be affected by the proposed stream improvement works comprise an area of 0.22 ha of abandoned agricultural land/ low-lying grassland, 0.04 ha of active agricultural land and approximately 133 m (in length) of an existing stream section at Ta Kwu Ling. The ecological value of the existing stream is low due to the continuous disturbance by adjacent agricultural activities and the associated discharges or surface runoff. The flora and fauna species recorded utilizing the stream habitat is in low diversity and abundance and mostly common and widespread in Hong Kong.
- 7.5.2 No specific mitigation measure for ecological impacts is required, as the potential impacts are expected to be low. With the implementation of good construction site practices and management and the construction of open channel for operation prior to the site formation works adjacent to or filling of the watercourse, the off-site disturbances to lower course of the stream would be kept in acceptable levels. The potential offsite disturbance to the Mai Po and Inner Deep Bay Ramsar Site, Mai Po Marshes SSSI and Mai Po Nature Reserve is anticipated to be insignificant due to the long distance (around 12km) from the proposed works and the implementation of water quality control measures.

Operational Phase

- 7.5.3 The possible ecological impacts that may arise during the operational phase would be surface run-off and sewage discharge from the Chuk Yuen resite. Given the proper drainage and sewage treatment to be provided for the resettlement area, the impacts are anticipated to be insignificant.

7.6 Landscape and Visual

- 7.6.1 A preliminary Landscape Visual Impact Assessment (LVIA) has been undertaken to assess the potential landscape and visual impacts that may arise from the construction and operation of the proposed stream improvement works.

Construction and Operational Phases

Landscape Impact

- 7.6.2 Three LRs have been identified, namely, LR 1 Abandoned Agricultural Land / Low Lying Grassland, LR 2 Active Agricultural Land and LR 3 Stream. With the recommended landscape mitigation measures, the residual impacts during both construction and operation are considered to be slight for all three LRs.

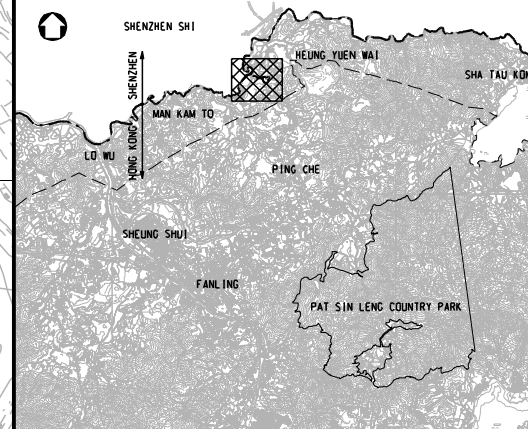
Visual Impact

- 7.6.3 The farmers working adjacent to the proposed stream improvement works have been identified as the visual sensitive receiver. Following the adoption of the recommended visual mitigation measures, including the landscape enhancement measures such as grasscrete lining of the maintenance access, hydroseeding of slope and shrubs planting at riparian zone, the residual impact for VSR 1 would be slight during both construction and operation.

7.7 Summary






- 7.7.1 Assessment has been undertaken to identify and assess all key environmental impacts that may arise from the construction and operation of the proposed stream improvement works.
- 7.7.2 The key environmental issues reviewed include air quality, noise, water quality, waste management implications and ecology, as well as landscape and visual impacts. No adverse environmental impacts are likely to occur during construction and operation of the proposed Project. Where likely impacts were identified, mitigation measures have been identified and recommended for incorporation into the detailed design and tender documents of the stream improvement works.
- 7.7.3 With the implementation of these proposed mitigation measures, the residual environmental impacts will be of low significance.

Figures



KEY PLAN
SCALE 1:100 000

LEGEND:


-  SITE BOUNDARY OF VILLAGE DEVELOPMENT
-  INDICATIVE STREAM IMPROVEMENT WORKS BOUNDARY
-  SHENZHEN RIVER
-  EXISTING WATERCOURSE
-  PROPOSED STREAM IMPROVEMENT WORKS

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Client



**CIVIL ENGINEERING
AND DEVELOPMENT
DEPARTMENT**

Project

**STREAM IMPROVEMENT AT TA KWU LING
ASSOCIATED WITH THE RESITE OF
CHUK YUEN VILLAGE**

Title

**PROPOSED STREAM IMPROVEMENT LOCATION
AND SURROUNDING ENVIRONMENT**

Designed	JC	Eng.Chk.	DW
Drawn	MING	Coordination	DW
Dwg.Chk.	JC	Approved	HTC
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Drawing No		Status	PRE
		Rev	P1

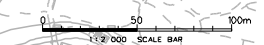
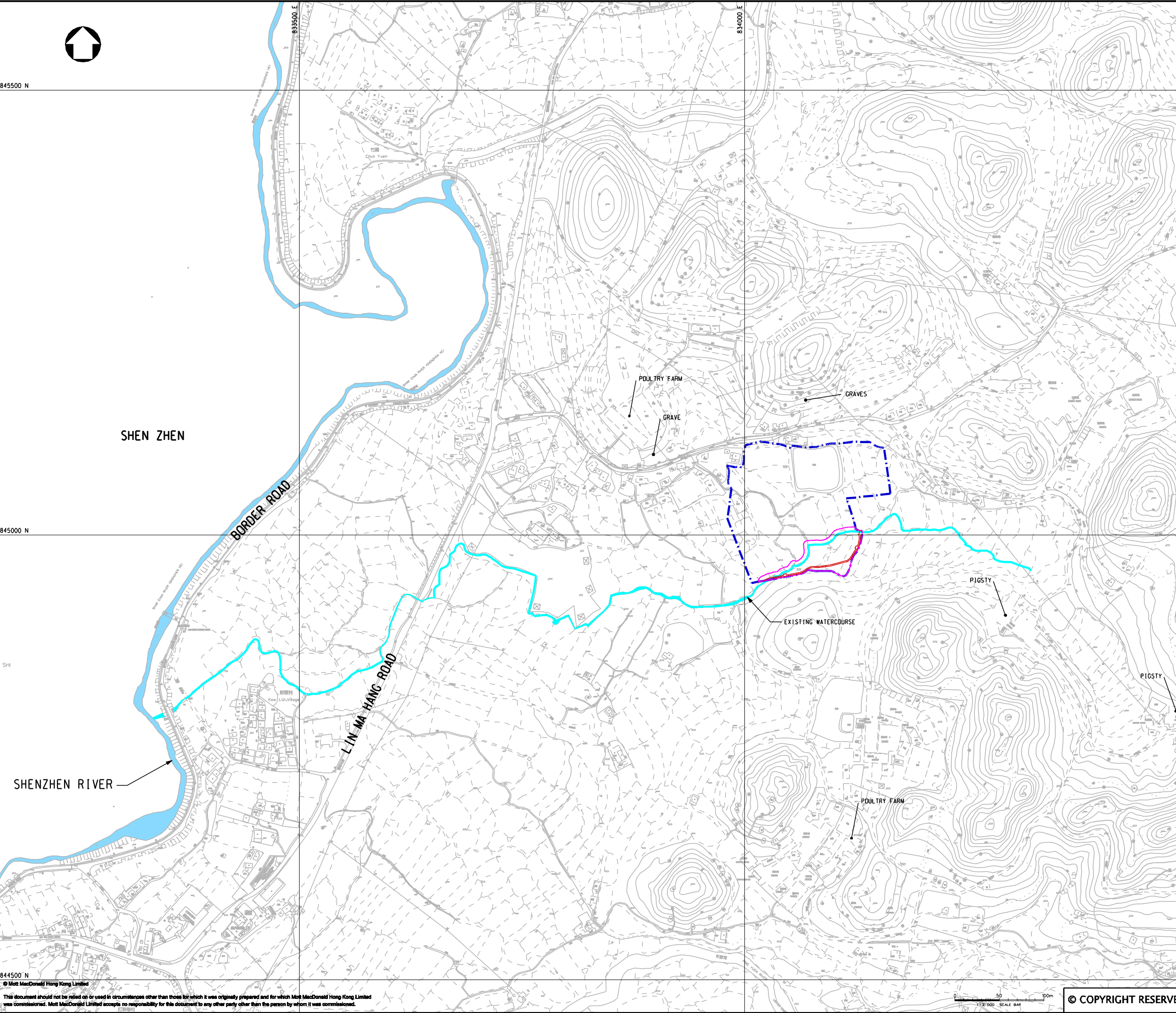
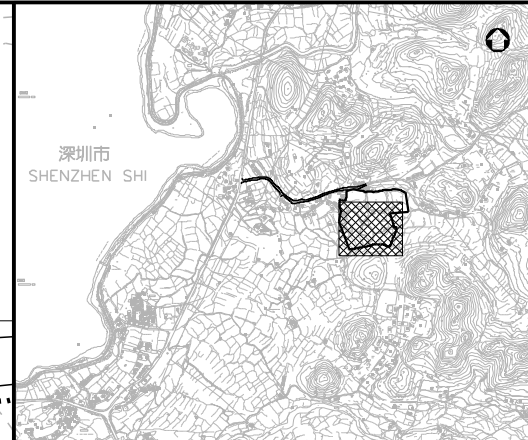


FIGURE 1.1



KEY PLAN

SCALE 1:10 000


- LEGEND:**
- - - - PROPOSED AREA FOR CHUK YUEN RESITE
 - - - - INDICATIVE STREAM IMPROVEMENT WORKS BOUNDARY
 - EXISTING WATERCOURSE

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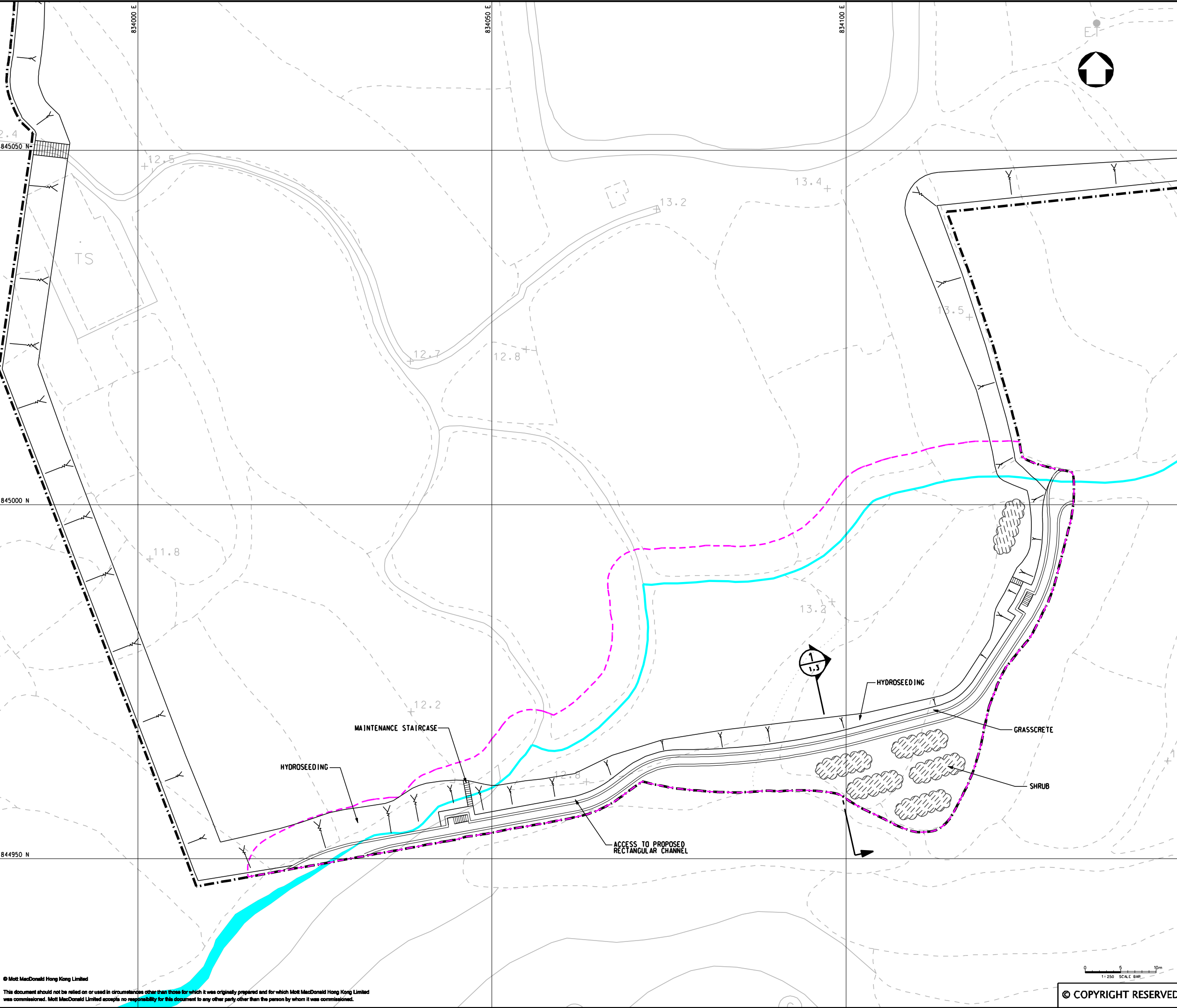


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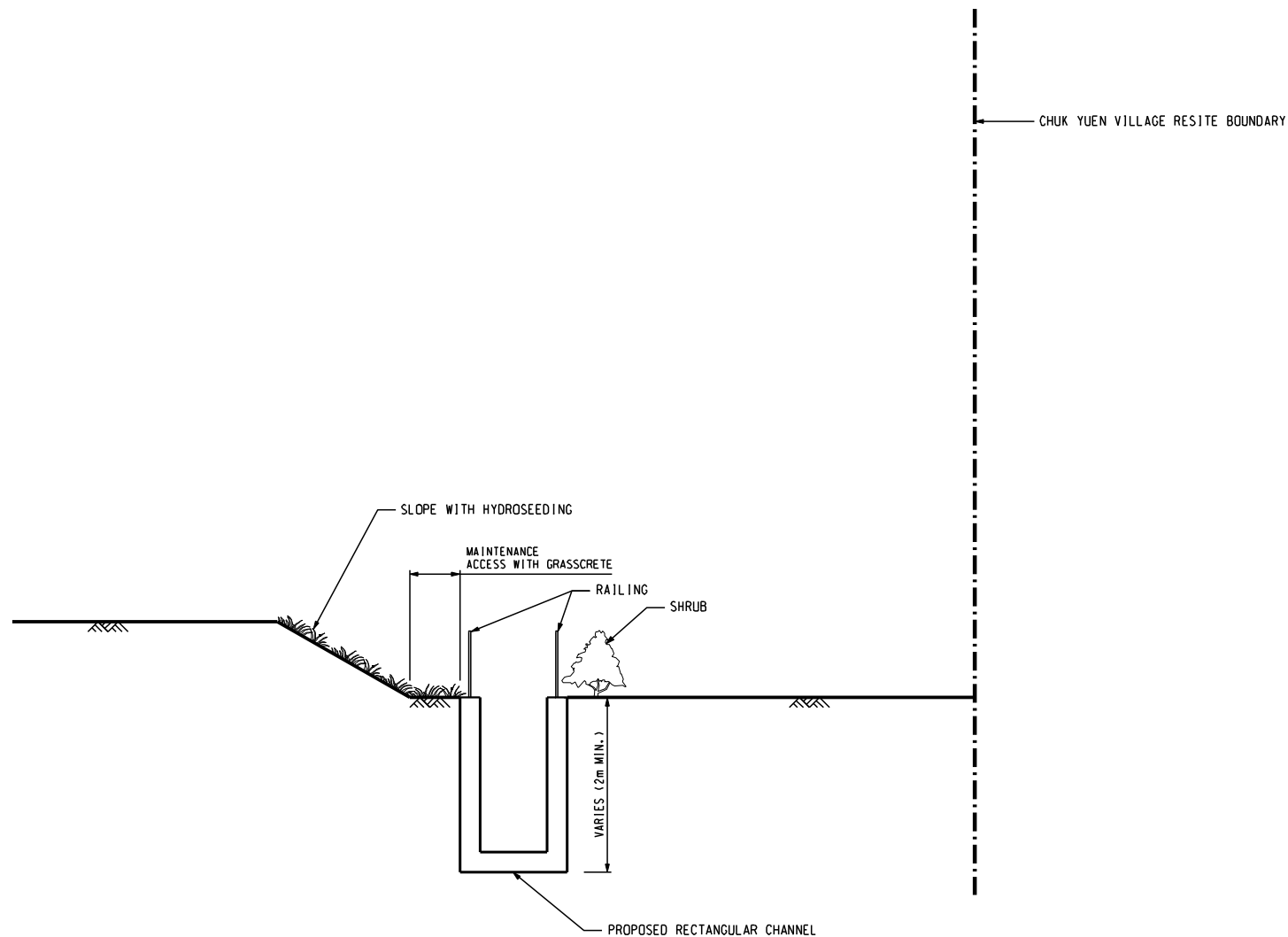
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PROPOSED STREAM IMPROVEMENT WORKS

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Dwg.Chk.	JC	Approved	HT	
Scale at A1	1:250@A1	Project	255228	Status
		CAD file	4\255228\REPORT\ENVP\PP\09\24\FIG 1-2.dgn	PRE
Drawing No	FIGURE 1.2			Rev
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SECTION 1
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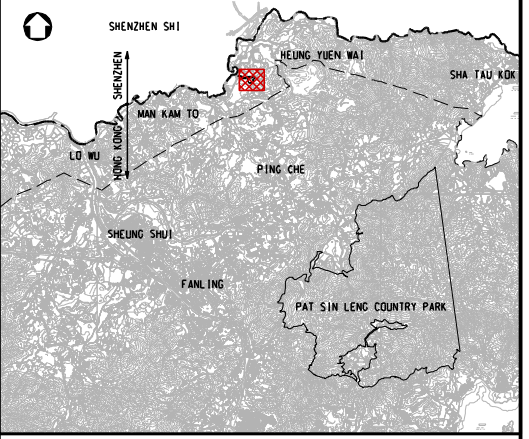
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ASSOCIATED WITH THE RESITE OF
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Title
CROSS SECTIONS FOR THE PROPOSED
STREAM IMPROVEMENT

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Drawn	LC	Coordination	DW
Dwg.Chk.	JC	Approved	HT
Scale at A1	1:50@A1	Project	255228
		CAD file	4\255228\REPORT\ENVP\PP\09\24\FIG 1-3.dgn
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SCALE 1:100000

- LEGEND:**
- - - - PROPOSED AREA FOR CHUK YUEN RESITE
 - - - - INDICATIVE STREAM IMPROVEMENT WORKS BOUNDARY
 - - - - STREAM IMPROVEMENT WORKS
 - A1** LOCATIONS OF REPRESENTATIVE AIR SENSITIVE RECEIVERS

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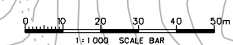
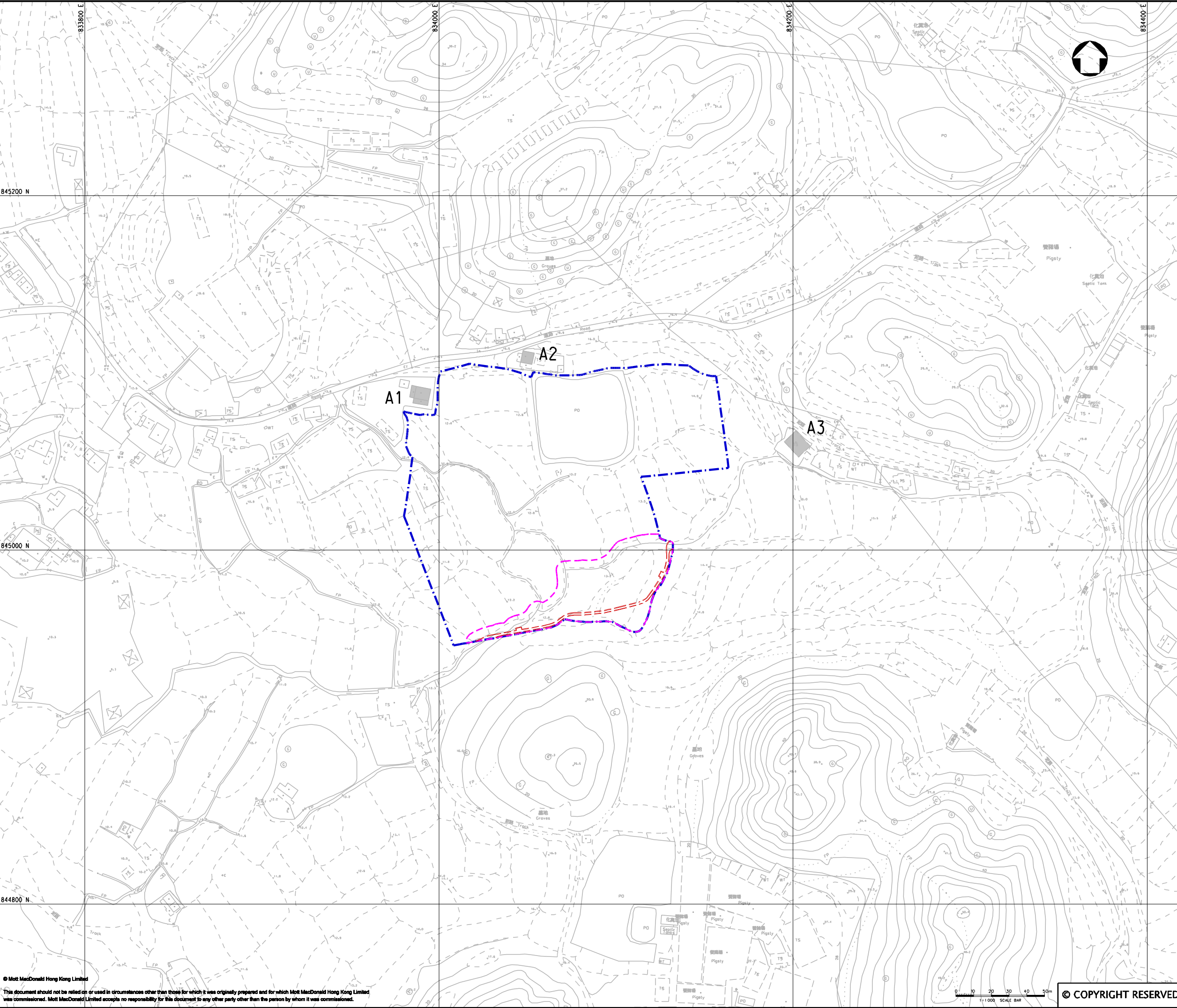
Project

STREAM IMPROVEMENT AT TA KWU LING ASSOCIATED WITH THE RESITE OF CHUK YUEN VILLAGE

Title

LOCATIONS OF REPRESENTATIVE AIR SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

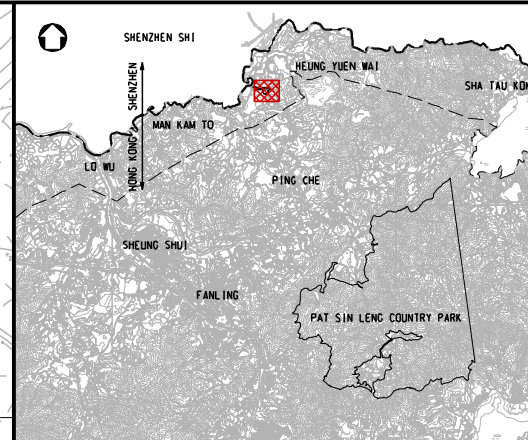
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Dwg.Chk.	CWK	Approved	HT
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Scale at A1	1:1000@A1	CAD file	4\255228\REPORT\ENV\PP\09\24\FIG 3-1.dgn
Drawing No		Status	PRE
		Rev	P1



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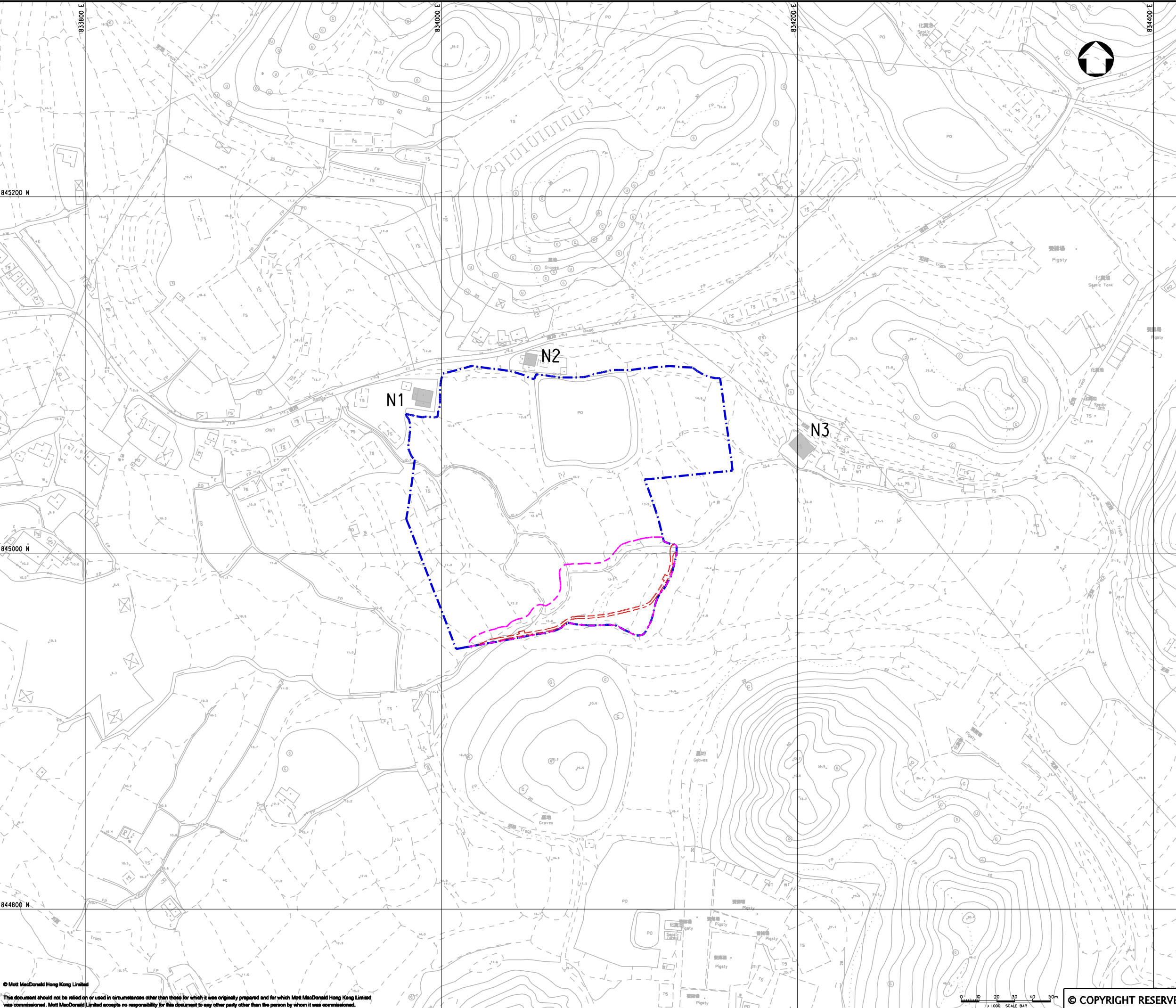
FIGURE 3.1

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KEY PLAN
SCALE 1:100000

- LEGEND:**
- — — PROPOSED AREA FOR CHUK YUEN RESITE
 - - - INDICATIVE STREAM IMPROVEMENT WORKS BOUNDARY
 - - - STREAM IMPROVEMENT WORKS
 - N1** LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS



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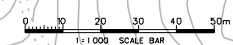
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**STREAM IMPROVEMENT AT TA KWU LING
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CHUK YUEN VILLAGE**

Title
**LOCATIONS OF REPRESENTATIVE
NOISE SENSITIVE RECEIVERS
DURING CONSTRUCTION PHASE**

Designed	CWK	Eng.Chk.	DW
Drawn	MING	Coordination	HT
Dwg.Chk.	CWK	Approved	DW
Scale at A1	1:1000@A1	Project	255228
		CAD file	4\255228\REPORT\ENV\PP\09\24\FIG 3-2.dgn
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FIGURE 3.2



LEGEND:


- · - · - SITE BOUNDARY OF VILLAGE DEVELOPMENT
- INDICATIVE STREAM IMPROVEMENT WORKS BOUNDARY
- EXISTING WATERCOURSE
- PROPOSED STREAM IMPROVEMENT WORKS

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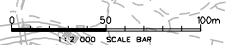
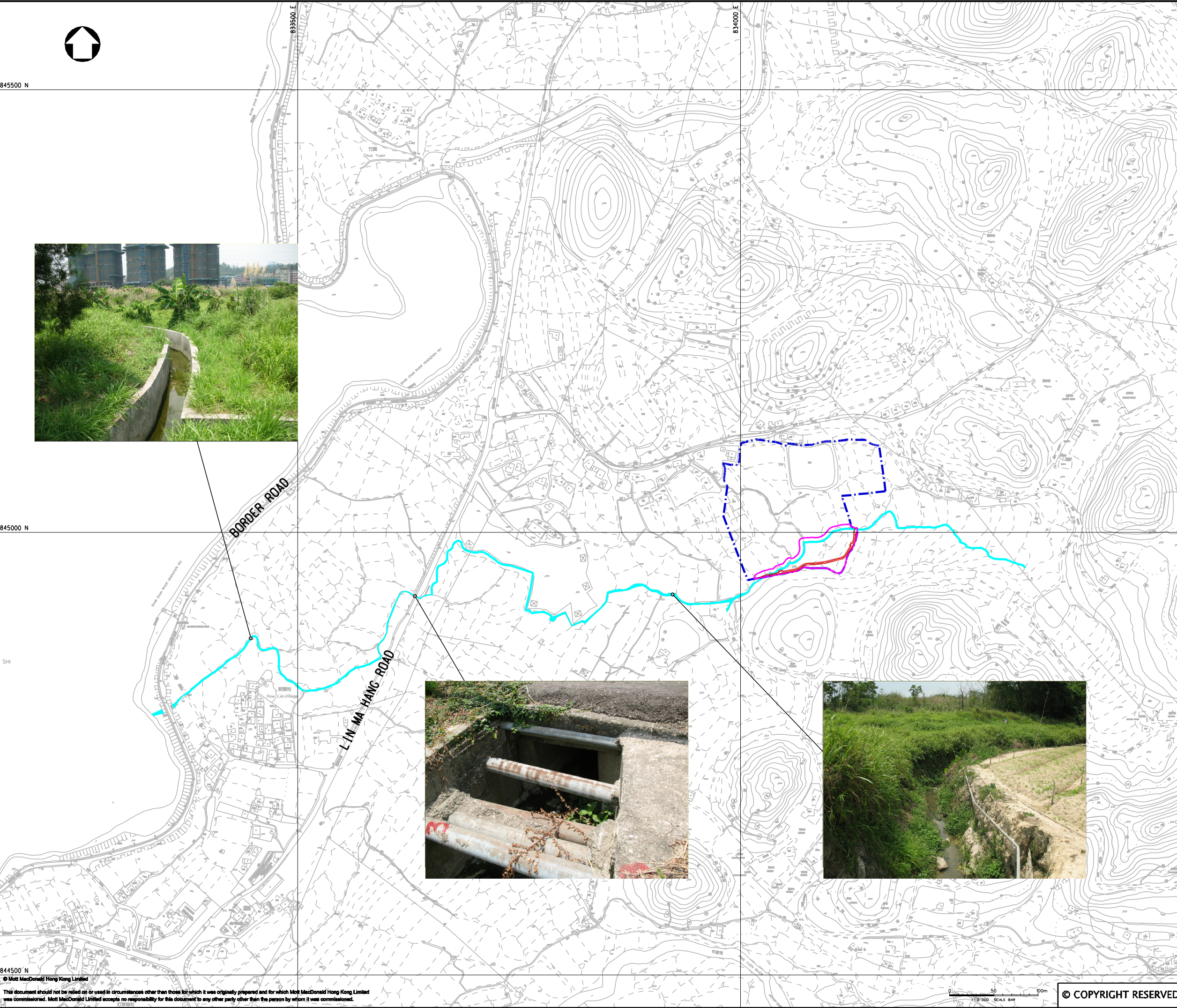
Project

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Title

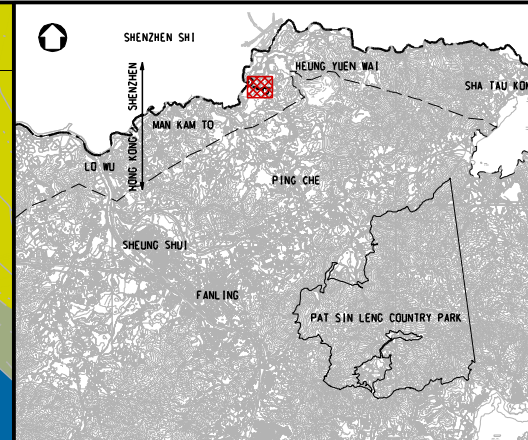
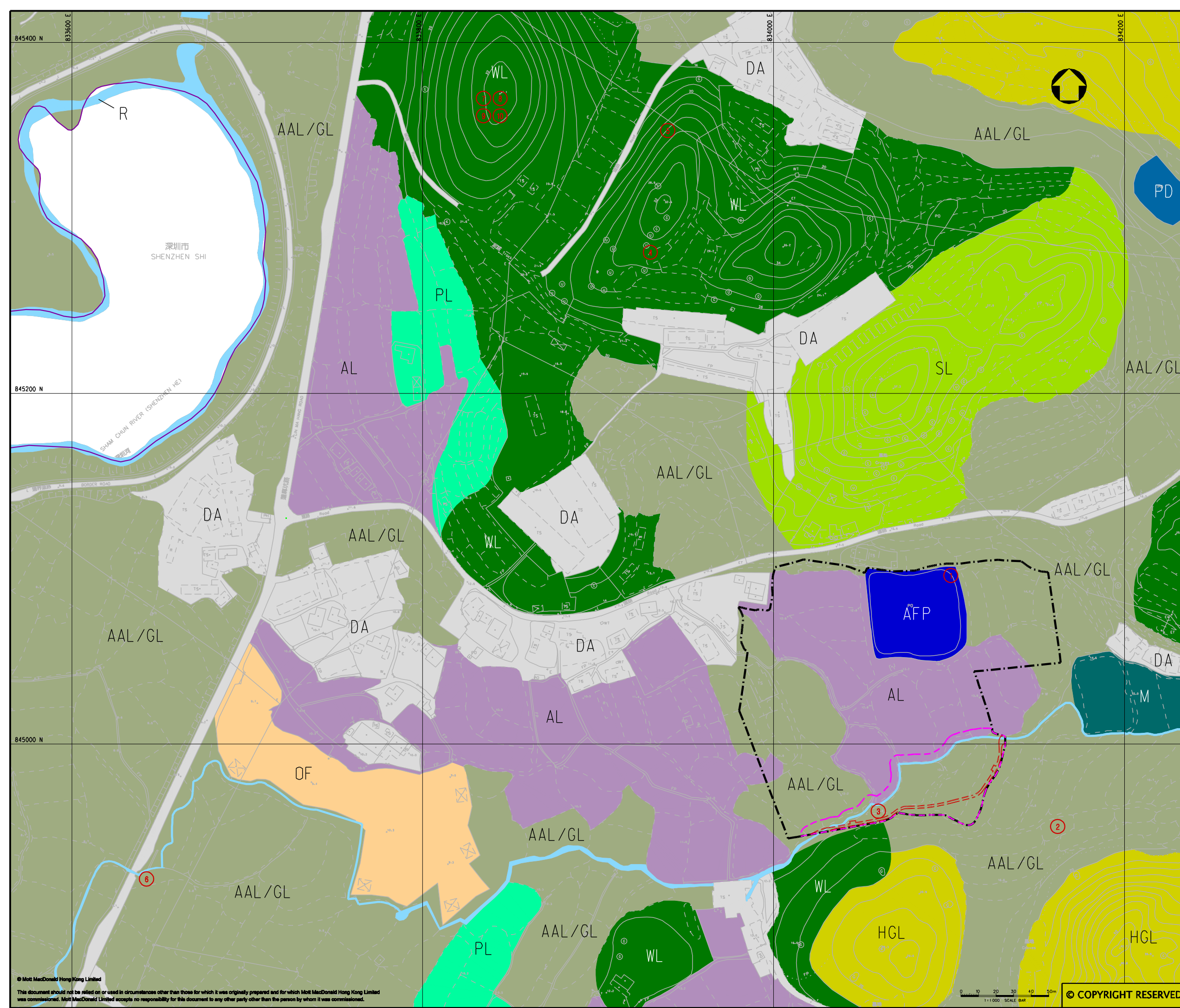
LOCATIONS OF WATER SENSITIVE RECEIVERS

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Dwg.Chk.	CWK	Approved	HT	
Scale at A1	1:2000@A1	Project	255228	Status
		CAD file	\\V255228\REPORT\ENVP\PP\09\24\FIG 3-3.dgn	PRE
Drawing No				Rev
				P1



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FIGURE 3.3



KEY PLAN
SCALE 1:100000

LEGEND:

- BOUNDARY OF HKSAR
- PROPOSED AREA FOR CHUK YUEN RESITE
- INDICATIVE STREAM IMPROVEMENT WORKS BOUNDARY
- STREAM IMPROVEMENT WORKS

WL	WOODLAND	AL	ACTIVE AGRICULTURAL LAND
SL	SHRUBLAND	HGL	HILLSIDE GRASSLAND
PL	PLANTATION	PD	POND
M	MARSH	R	WATERCOURSE
AFP	ABANDONED FISH POND	OF	OPEN FIELD
AAL/GL	ABANDONED AGRICULTURAL LAND / LOW-LYING GRASSLAND	DA	DEVELOPED AREA

SPECIES OF CONSERVATION CONCERN:

1	AQUILARIA SINENSIS	6	WHITE-SHOULDERED STARLING
2	CATTLE EGRET	7	EAST ASIAN PORCUPINE (INDICATIVE)
3	CHINESE POND HERON	8	MASKED PALM CIVET (INDICATIVE)
4	BLACK KITE	9	LEOPARD CAT (INDICATIVE)
5	CRESTED SERPENT EAGLE	10	RED MUNTJAC (INDICATIVE)

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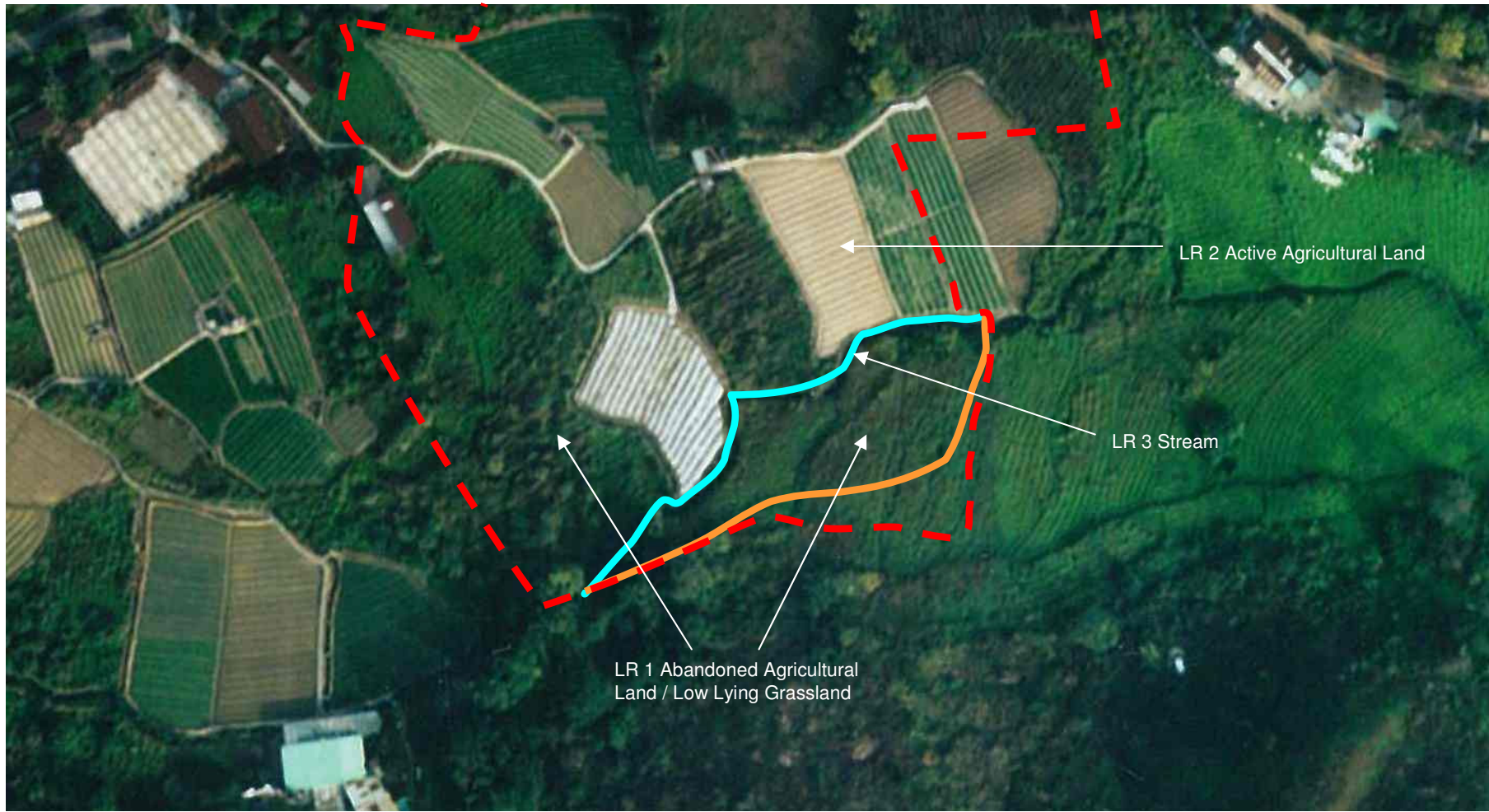
Project
STREAM IMPROVEMENT AT TA KWU LING ASSOCIATED WITH THE RESITE OF CHUK YUEN VILLAGE

Title
HABITAT MAP AND SPECIES OF CONSERVATION CONCERN

Designed	PW	Eng.Chk.	DW	
Drawn	MING	Coordination	DW	
Dwg.Chk.	PW	Approved	HT	
Scale at A1	1:1000@A1	Project	255228	Status
		CAD file	4\255228\REPORT\ENV\PP\09\24\FIG 3-4.dgn	PRE
Drawing No				Rev
				P1

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FIGURE 3.4




- Legend**
- - - Proposed Area for Chuk Yuen Resite
 - Proposed Stream Diversion Location
 - Existing Stream

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Ling associated with the Resite of
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Title:
Existing Landscape Resources



LR 1 Abandoned Agricultural
Land / Low Lying
Grassland



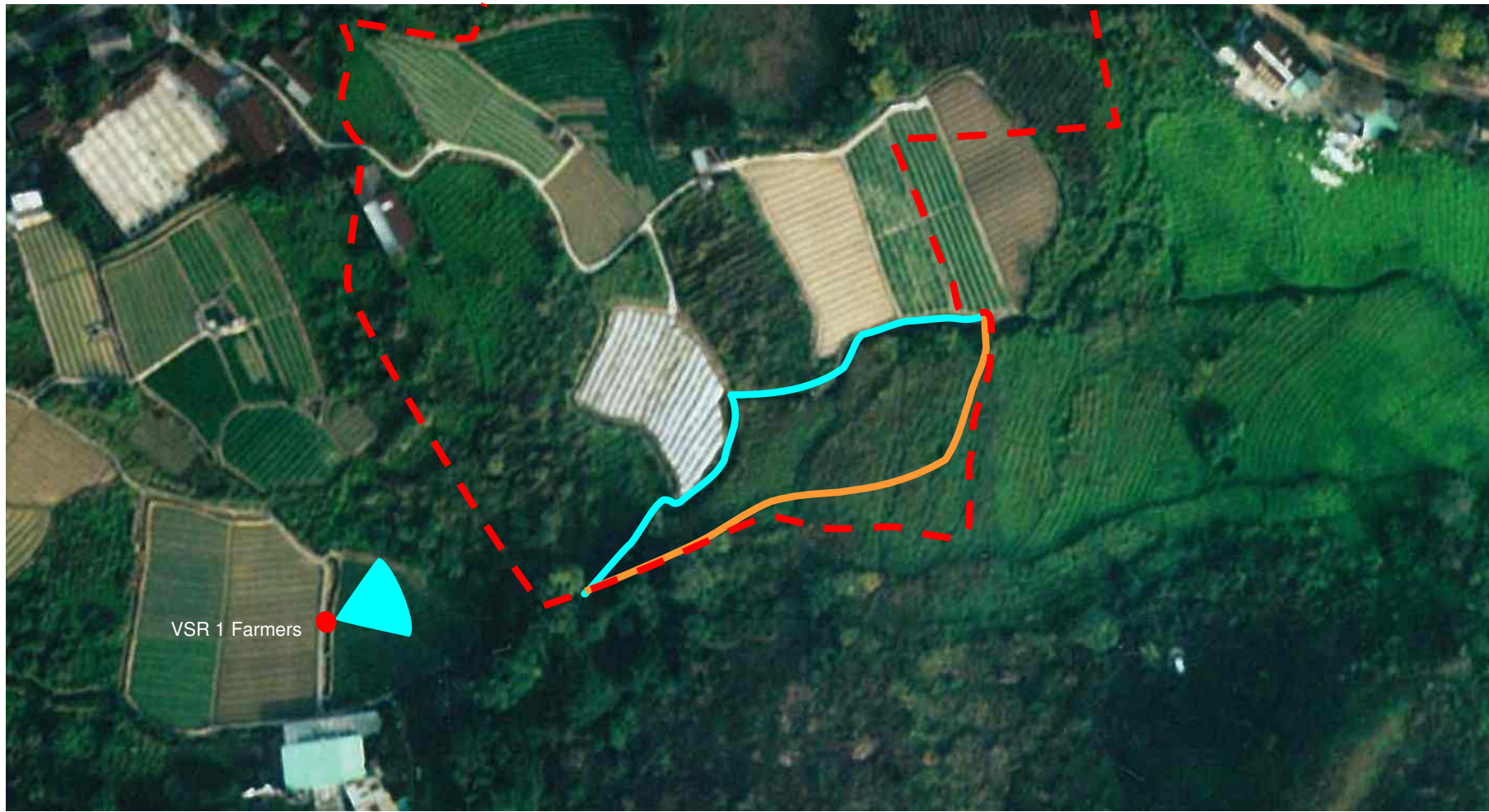
LR 2 Active Agricultural Land



LR 3 Stream

Designed	SL	Eng. Chk.	EC
Drawn	SL	Coordination	-
Dwg. Chk.	-	Approved	HT
Scale: as 1	Project: 255228	Status:	-
Drawing No	Figure 3.5		Rev B

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- Legend**
- - - Proposed Area for Chuk Yuen Resite
 - ▲ Visual Sensitive Receivers
 - Proposed Stream Diversion Location
 - Existing Stream

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Ling associated with the Resite of
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Title
Existing Visual Sensitive
Receivers



Designed	SL	Eng. Chk.	EC
Drawn	SL	Coordination	-
Dwg. Chk.	-	Approved	HT

Scale at A1: Project 255228 Status -
CAD file: J:\255228\PROJECT\DRAWING\99073\MMH-255228-P-01_118-A.dgn

Drawing No: Figure 3.6 Rev: B

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Appendices

-  Proposed Area for Stream Improvement
-  Proposed Area for Chuk Yuen Resite




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Title
HISTORICAL AERIAL PHOTOS
OF SITE J - 1945

Designed	HC	Eng.Chk.	JC	
Drawn	MING	Coordination	JC	
Dwg.Chk.	HC	Approved	AK	
Scale at A1	-	Project	255226	Status
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- - - - Proposed Area for Stream Improvement
- Proposed Area for Chuk Yuen Resite

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Title
HISTORICAL AERIAL PHOTOS OF SITE J - 1954

Designed	HC	Eng.Chk.	JC	
Drawn	MING	Coordination	JC	
Dwg.Chk.	HC	Approved	AK	
Scale at A1	-	Project	255226	Status
		CAD file	J:\255226\CAD\ADMIN\MH\255226-P\A1.TLB-1954.dwg	PRE

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- - - - - Proposed Area for Stream Improvement
- Proposed Area for Chuk Yuen Resite

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Title
HISTORICAL AERIAL PHOTOS OF SITE J - 1975

Designed	HC	Eng.Chk.	JC	
Drawn	MING	Coordination	JC	
Dwg.Chk.	HC	Approved	AK	
Scale at A1	-	Project	255226	Status
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- - - - Proposed Area for Stream Improvement
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Title
HISTORICAL AERIAL PHOTOS OF SITE J - 1986

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Drawn	MING	Coordination	JC
Dwg.Chk.	HC	Approved	AK
Scale at A1	-	Project	255226
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		Status	PRE

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Project Profile for Stream Improvement at
Ta Kwu Ling Associated
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PME List

Appendix C

PME	TM or other reference	No. of PME	SWL, dB(A)/ unit	% on time	Total SWL, dB(A)
Activity 1 Stream Improvement Works					
Crane, mobile/ barge mounted (diesel)	CNP 048	1	112	50%	109
Concrete lorry mixer	CNP 044	1	109	100%	109
Poker, vibratory, hand-held	CNP 170	1	113	50%	110
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	50%	109
				Total	115

Project Profile for Stream Improvement at
Ta Kwu Ling Associated
with Chuk Yuen Resite

Construction Noise Impact

Appendix D

Construction Noise Impact on N1											
Noise Criterion, Leq (30 min) = 75 dB(A)											
PME	TM or other reference	No. of PME	SWL, dB(A)/unit	Screening Effect, dB(A)	% on time	Total SWL, dB(A)	Slant dist. From NSR, m	Dist. Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)	
Cumulative Impact											
Activity 1 Stream Improvement Works (Unmitigated)											
Crane, mobile/ barge mounted (diesel)	CNP 048	1	112	0	50%	109	135.0	-50.6	3.0	61.4	
Concrete lorry mixer	CNP 044	1	109	0	100%	109	135.0	-50.6	3.0	61.4	
Poker, vibratory, hand-held	CNP 170	1	113	0	50%	110	135.0	-50.6	3.0	62.4	
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	0	50%	109	135.0	-50.6	3.0	61.4	
									Total	68	
Activity 2 Adjacent Site Formation and Excavation (Mitigated)											
Group 1 Excavation											
Excavator (45kW)	BS 5228 Table C.3/35	3	106	0	100%	111	51.0	-42.1	3.0	71.6	
									Total	72	
Group 2 Tipping fill											
Dump truck (50t)	BS 5228 Table C.9/39	4	103	0	50%	106	51.0	-42.1	3.0	66.9	
									Total	67	
Group 3 Spreading fill											
Roller, vibratory	CNP 186	1	108	0	100%	108	51.0	-42.1	3.0	68.9	
Bulldozer (200kW)	BS 5228 Table C.3/62	2	109	-5	100%	107	51.0	-42.1	3.0	67.9	
									Total	71	
									Maximum	72	
										Cumulative Impact	73

Project Profile for Stream Improvement at
Ta Kwu Ling Associated
with Chuk Yuen Resite

Construction Noise Impact

Appendix D

Construction Noise Impact on N2											
Noise Criterion, Leq (30 min) = 75 dB(A)											
PME	TM or other reference	No. of PME	SWL, dB(A)/unit	Screening Effect, dB(A)	% on time	Total SWL, dB(A)	Slant dist. From NSR, m	Dist. Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)	
Cumulative Impact											
Activity 1 Stream Improvement Works (Unmitigated)											
Crane, mobile/ barge mounted (diesel)	CNP 048	1	112	0	50%	109	150.0	-51.5	3.0	60.5	
Concrete lorry mixer	CNP 044	1	109	0	100%	109	150.0	-51.5	3.0	60.5	
Poker, vibratory, hand-held	CNP 170	1	113	0	50%	110	150.0	-51.5	3.0	61.5	
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	0	50%	109	150.0	-51.5	3.0	60.5	
										Total	67
Activity 2 Adjacent Site Formation and Excavation (Mitigated)											
Group 1 Excavation											
Excavator (45kW)	BS 5228 Table C.3/35	3	106	0	100%	111	41.0	-40.2	3.0	73.5	
										Total	74
Group 2 Tipping fill											
Dump truck (50t)	BS 5228 Table C.9/39	4	103	0	50%	106	41.0	-40.2	3.0	68.8	
										Total	69
Group 3 Spreading fill											
Roller, vibratory	CNP 186	1	108	0	100%	108	41.0	-40.2	3.0	70.8	
Bulldozer (200kW)	BS 5228 Table C.3/62	2	109	-5	100%	107	41.0	-40.2	3.0	69.8	
										Total	73
										Maximum	74
										Cumulative Impact	74

Project Profile for Stream Improvement at
Ta Kwu Ling Associated
with Chuk Yuen Resite

Construction Noise Impact

Appendix D

Construction Noise Impact on N3											
Noise Criterion, Leq (30 min) = 75 dB(A)											
PME	TM or other reference	No. of PME	SWL, dB(A)/unit	Screening Effect, dB(A)	% on time	Total SWL, dB(A)	Slant dist. From NSR, m	Dist. Corr., dB(A)	Façade Corr., dB(A)	CNL, dB(A)	
Cumulative Impact											
Activity 1 Stream Improvement Works (Unmitigated)											
Crane, mobile/ barge mounted (diesel)	CNP 048	1	112	0	50%	109	85.0	-46.6	3.0	65.4	
Concrete lorry mixer	CNP 044	1	109	0	100%	109	85.0	-46.6	3.0	65.4	
Poker, vibratory, hand-held	CNP 170	1	113	0	50%	110	85.0	-46.6	3.0	66.4	
Excavator/ loader, wheeled/ tracked	CNP 081	1	112	0	50%	109	85.0	-46.6	3.0	65.4	
										Total	72
Activity 2 Adjacent Site Formation and Excavation (Mitigated)											
Group 1 Excavation											
Excavator (45kW)	BS 5228 Table C.3/35	3	106	0	100%	111	89.0	-47.0	3.0	66.8	
										Total	67
Group 2 Tipping fill											
Dump truck (50t)	BS 5228 Table C.9/39	4	103	0	50%	106	89.0	-47.0	3.0	62.0	
										Total	62
Group 3 Spreading fill											
Roller, vibratory	CNP 186	1	108	0	100%	108	89.0	-47.0	3.0	64.0	
Bulldozer (200kW)	BS 5228 Table C.3/62	2	109	-5	100%	107	89.0	-47.0	3.0	63.0	
										Total	67
										Maximum	67
										Cumulative Impact	73

Appendix E Checklists of flora and fauna recorded during study period

Table E-1 Flora species recorded within the Project Area and the vicinity

Scientific Name	Common Name	Native to HK	Habit	Abundance
<i>Ageratum conyzoides</i>	勝紅薊	No	Herb	+
<i>Allium tuberosum</i>	韭菜	No	Herb	+
<i>Alocasia odora</i>	海芋	Yes	Herb	+++
<i>Alternanthera sessilis</i>	蓮子草	Yes	Herb	+
<i>Amaranthus spinosus</i>	刺莧	No	Herb	+
<i>Amaranthus viridis</i>	野莧	Yes	Herb	+
<i>Annona squamosa</i>	番荔枝	No	Tree	+
<i>Antidesma bunius</i>	五月茶	Yes	Tree	+
<i>Aquilaria sinensis</i>	土沉香	Yes	Tree	+
<i>Artemisia indica</i>	五月艾	Yes	Herb	+
<i>Benincasa hispida</i>	節瓜	No	Climber	+
<i>Brachiaria mutica</i>	巴拉草	No	Herb	+
<i>Breynia fruticosa</i>	黑面神	Yes	Shrub	+
<i>Bridelia tomentosa</i>	土蜜樹	Yes	Shrub / Tree	+
<i>Canarium album</i>	橄欖	No	Tree	+
<i>Capsella bursa</i>	薺菜	Yes	Herb	+
<i>Carica papaya</i>	番木瓜	No	Tree	+
<i>Celtis sinensis</i>	朴樹	Yes	Tree	+++
<i>Celtis tetrandra</i>	葉下珠	Yes	Herb	+
<i>Chloris barbata</i>	孟仁草	Yes	Herb	+
<i>Cinnamomum camphora</i>	樟	Yes	Tree	+
<i>Clausena lansium</i>	黃皮	No	Tree	+
<i>Coccinia grandis</i>	紅瓜	Yes	Herb	+
<i>Colocasia esculenta</i>	芋	Yes	Herb	+
<i>Commelina communis</i>	鴨跖草	Yes	Herb	+
<i>Conyza bonariensis</i>	香絲草	No	Herb	+
<i>Cyclosorus interruptus</i>	間斷毛蕨	Yes	Herb	+++
<i>Cyperus difformis</i>	異型莎草	Yes	Herb	+
<i>Cyrtococcum patens</i>	弓果黍	Yes	Herb	+
<i>Dicliptera chinensis</i>	狗肝菜	Yes	Herb	++
<i>Dimocarpus longan</i>	龍眼	No	Tree	+
<i>Dioscorea alata</i>	大薯	No	Climber	+
<i>Echinochloa crusgalli</i>	稗	Yes	Herb	+
<i>Eclipta prostrata</i>	白花蟛蜞菊	Yes	Herb	+
<i>Eleusine indica</i>	牛筋草	Yes	Herb	+++
<i>Emilia sonchifolia</i>	一點紅	Yes	Herb	+
<i>Euphorbia hirta</i>	飛揚草	No	Herb	+
<i>Euphorbia hypericifolia</i>	通奶草	Yes	Herb	+
<i>Ficus hispida</i>	對葉榕	Yes	Shrub / Tree	++
<i>Ficus microcarpa</i>	細葉榕	Yes	Tree	+
<i>Ficus pumila</i>	薜荔	Yes	Climber	+
<i>Ficus variegata</i>	青果榕	Yes	Shrub / Tree	+
<i>Fimbristylis miliacea</i>	日照飄拂草	Yes	Herb	+
<i>Flueggea virosa</i>	白飯樹	Yes	Shrub	+
<i>Gladiolus x gandavensis</i>	劍蘭	No	Herb	+
<i>Glycosmis parviflora</i>	山小橘	Yes	Shrub/ Tree	+

Appendix E Checklists of flora and fauna recorded during study period

Scientific Name	Common Name	Native to HK	Habit	Abundance
<i>Hedyotis corymbosa</i>	繖房花耳草	Yes	Herb	++
<i>Heterosmilax japonica</i>	肖菝葜	Yes	Climber	+
<i>Ipomoea aquatica</i>	甕菜	No	Herb	++
<i>Ipomoea batatas</i>	番薯	No	Herb	++
<i>Ipomoea cairica</i>	五爪金龍	No	Climber	+
<i>Ipomoea triloba</i>	三裂葉牽牛	Yes	Herb	+
<i>Kyllinga brevifolia</i>	短葉水蜈蚣	Yes	Herb	+
<i>Lantana camara</i>	馬纓丹	No	Shrub	+++
<i>Leptochloa chinensis</i>	千金子	Yes	Herb	+
<i>Leucaena leucocephala</i>	銀合歡	No	Shrub	+
<i>Ligustrum sinense</i>	山指甲	Yes	Shrub / Tree	+
<i>Lindernia anagallis</i>	長蒴母草	Yes	Herb	+
<i>Lindernia crustacea</i>	母草	Yes	Herb	+
<i>Lindernia procumbens</i>	陌上菜	Yes	Herb	+
<i>Litchi chinensis</i>	荔枝	No	Tree	+
<i>Litsea glutinosa</i>	潺槁樹	Yes	Tree	+
<i>Ludwigia perennis</i>	細花丁香蓼	Yes	Herb	+
<i>Lygodium japonicum</i>	海金沙	Yes	Herb	+
<i>Macaranga tanarius</i>	血桐	Yes	Tree	++
<i>Mallotus apelta</i>	白桐	Yes	Shrub / Tree	+
<i>Melia azedarach</i>	苦楝	No	Tree	++
<i>Microcos paniculata</i>	布渣葉	Yes	Shrub / Tree	+
<i>Microstegium ciliatum</i>	剛莠竹	Yes	Herb	+
<i>Mikania micrantha</i>	薇甘菊	No	Climber	++++
<i>Miscanthus floridulus</i>	五節芒	Yes	Herb	+
<i>Morinda parvifolia</i>	雞眼藤	Yes	Shrub / Climber	+
<i>Musa balbisiana</i>	野蕉	Yes	Herb	+
<i>Oxalis corniculata</i>	酢漿草	Yes	Herb	+
<i>Oxalis corymbosa</i>	紅花酢漿草	No	Herb	+
<i>Paederia scandens</i>	雞矢藤	Yes	Climber	+
<i>Panicum maximum</i>	大黍	No	Herb	++++
<i>Paspalum conjugatum</i>	兩耳草	No	Herb	+++
<i>Peperomia pellucida</i>	草胡椒	No	Herb	+
<i>Phragmites australis</i>	蘆葦	Yes	Herb	++
<i>Phyllanthus reticulatus</i>	小果葉下珠	Yes	Shrub	+
<i>Polygonum chinense</i>	火炭母	Yes	Herb	+
<i>Polygonum perfoliatum</i>	杠板歸	Yes	Herb	+
<i>Portulaca oleracea</i>	瓜子菜	Yes	Herb	+
<i>Pouzolzia zeylanica</i>	霧水葛	Yes	Herb	+
<i>Psychotria asiatica</i>	山大刀	Yes	Shrub / Tree	+
<i>Sageretia thea</i>	雀梅藤	Yes	Shrub	+
<i>Sapium sebiferum</i>	烏柏	Yes	Tree	+
<i>Solanum nigrum</i>	龍葵	Yes	Herb	+
<i>Sonchus oleraceus</i>	苦苣菜	No	Herb	+
<i>Sporobolus fertilis</i>	鼠尾粟	Yes	Herb	+
<i>Stephania longa</i>	千金藤	Yes	Climber	+
<i>Telosma cordata</i>	夜香花	No	Climber	+
<i>Tinospora sinensis</i>	寬筋藤	Yes	Climber	+

Appendix E Checklists of flora and fauna recorded during study period

Scientific Name	Common Name	Native to HK	Habit	Abundance
<i>Trema tomentosa</i>	山黃麻	Yes	Shrub / Tree	+
<i>Tridax procumbens</i>	羽芒菊	No	Herb	+
<i>Triumfetta rhomboidea</i>	刺蒴麻	Yes	Shrub	+
<i>Vernonia cinerea</i>	夜香牛	Yes	Herb	+
<i>Vitis vinifera</i>	葡萄	No	Climber	+

* Rank of Abundance: + = uncommon; ++ = fairly common; +++ = very common; ++++ = dominant

Appendix E Checklists of flora and fauna recorded during study period

Table E-2 Bird species recorded in the Project Area and the vicinity

Common Name	Scientific Name	Habitat							Level of Concern
		AAL/GL	AL	DA	OF	SL	WL	R	
Cattle Egret	<i>Bubulcus ibis</i>	1							(LC)
Chinese Pond Heron	<i>Ardeola bacchus</i>	1	4					3	PRC(RC)
Black Kite	<i>Milvus migrans</i>						1		(RC)
Crested Serpent Eagle	<i>Spilornis cheela</i>						1		(LC)
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>		1					6	
Spotted Dove	<i>Streptopelia chinensis</i>	3		3			3		
Chestnut-winged Cuckoo	<i>Clamator coromandus</i>						1		
Large Hawk Cuckoo	<i>Hierococyx sparverioides</i>						1		
Indian Cuckoo	<i>Cuculus micropterus</i>						1		
Common Koel	<i>Eudynamis scolopacea</i>		1				1		
Greater Coucal	<i>Centropus sinensis</i>	1	1				4		
Lesser Coucal	<i>Centropus bengalensis</i>	1	2			1			
Little Swift	<i>Apus affinis</i>	6							
Barn Swallow	<i>Hirundo rustica</i>	7	6	2	5				
White Wagtail	<i>Motacilla alba</i>		2	1					
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	3				4	11		
Chinese Bulbul	<i>Pycnonotus sinensis</i>	1					11		
Long-tailed Shrike	<i>Lanius schach</i>	1	1						
Oriental Magpie Robin	<i>Copsychus saularis</i>						3		
Masked Laughingthrush	<i>Garrulax perspicillatus</i>					2	2		
Hwamei	<i>Garrulax canorus</i>						1		
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	3	1				1		
Common Tailorbird	<i>Orthotomus sutorius</i>					1	3		
Great Tit	<i>Parus major</i>						1		
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>						1		
Japanese White-eye	<i>Zosterops japonicus</i>					4	37		
White-rumped Munia	<i>Lonchura striata</i>	5	2			1			
Scaly-breasted Munia	<i>Lonchura punctulata</i>	3	2						
Eurasian Tree Sparrow	<i>Passer montanus</i>	6	4	7					
Black-collared Starling	<i>Sturnus nigricollis</i>	6	1	1					
White-shouldered Starling	<i>Sturnus sinensis</i>	15							(LC)
Crested Myna	<i>Acridotheres cristatellus</i>	17				1			
Black Drongo	<i>Dicrurus macrocercus</i>	2				1	2		
Hair-crested Drongo	<i>Dicrurus hottentottus</i>						2		
Large-billed Crow	<i>Corvus macrorhynchos</i>						4		
Total no. of species recorded:		18	13	5	1	8	21	2	
Total no. of individuals recorded:		82	28	14	5	15	92	9	

Habitat: AAL/GL = Abandoned Agricultural Land/Low-lying Grassland, AL = Agricultural Land, DA = Developed Area, OF = Open Field, SL = Shrubland, WL = Woodland, R = Watercourse

Level of Concern: LC = Local Concern, RC = Regional Concern, PRC = Potential Regional Concern. (Fellowes et al. 2002)

Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.

Appendix E Checklists of flora and fauna recorded during study period

Table E-3 Butterfly species recorded in the Project Area and the vicinity

Common Name	Scientific Name	Habitat							Commonness
		AAL/GL	AL	DA	AFP	SL	WL	R	
Common Bluebottle	<i>Graphium sarpedon sarpedon</i>						1		VC
Great Mormon	<i>Papilio memnon agenor</i>			1			2		VC
Common Mormon	<i>Papilio polytes polytes</i>	4	3			2	5	1	VC
Spangle	<i>Papilio protenor protenor</i>						3		VC
Lemon Emigrant	<i>Catopsilia pomona pomona</i>		1						C
Common Grass Yellow	<i>Eurema hecabe hecabe</i>	1			1	1	3		VC
Indian Cabbage White	<i>Pieris canidia canidia</i>	2	5	3			1		VC
Blue-spotted Crow	<i>Euploea midamus midamus</i>					1			VC
Ceylon Blue Glassy Tiger	<i>Ideopsis similis similis</i>						8		VC
Common Duffer	<i>Discophora sondaica tulliana</i>					1	1		C
Banded Tree Brown	<i>Lethe confusa confusa</i>					1			VC
Dark-brand Bush Brown	<i>Mycalesis mineus mineus</i>						4		VC
Common Five-ring	<i>Ypthima baldus baldus</i>						2		VC
Tawny Rajah	<i>Charaxes bernardus bernardus</i>					1			C
Red Ring Skirt	<i>Hestina assimilis assimilis</i>	1							C
Great Egg-fly	<i>Hypolimnas bolina kezia</i>	2				1	7		VC
Grey Pansy	<i>Junonia atlites atlites</i>	1	1					2	C
Five-dot Sergeant	<i>Parathyma sulphitia sulphitia</i>						2		C
Black Prince	<i>Rohana parisatis staurakius</i>					1	1		C
Lime Blue	<i>Chilades lajus leucofasciatus</i>					5	1		VC
Pale Grass Blue	<i>Zizeeria maha serica</i>	6				1	2		VC
Bush Hopper	<i>Ampittia dioscorides etura</i>				1				UC
Large Faun	<i>Faunis eumeus eumeus</i>						2		C
Glassy Tiger	<i>Parantica aglea melanoides</i>	1					2		VC
Yellow Orange Tip	<i>Ixias pyrene pyrene</i>						1		UC
Dark Evening Brown	<i>Melanitis phedima muskata</i>			1					C
Peacock Pansy	<i>Junonia almana almana</i>		1						C
Total no. of species recorded:		8	5	3	2	10	18	2	
Total no. of individuals recorded:		18	11	5	2	15	48	3	

Habitat: AAL/GL = Abandoned Agricultural Land/Low-lying Grassland, AL = Agricultural Land, DA = Developed Area, AFP = Abandoned Fish Pond, SL = Shrubland, WL = Woodland, R = Watercourse

Commonness: VC = Very Common, C = Common, UC = Uncommon (Yiu and Young, 2002)

Appendix E Checklists of flora and fauna recorded during study period







Table E-4 Dragonfly species recorded in the Project Area and the vicinity

Common Name	Scientific Name	Habitat						Commonness
		AAL/GL	AL	DA	SL	WL	R	
Common Bluetail	<i>Ischnura senegalensis</i>	1					3	A
Orange-faced Sprite	<i>Pseudagrion rebriceps rubriceps</i>						2	C
Yellow Featherlegs	<i>Copera marginipes</i>						2	A
Common Flangetail	<i>Ictinogomphus pertinax</i>						6	A
Asian Amberwing	<i>Brachythemis contaminata</i>		2			2		A
Forest Chaser	<i>Lyriothemis elegantissima</i>					1		C
Pied Percher	<i>Neurothemis tullia tullia</i>						1	C
Common Red Skimmer	<i>Orthetrum pruinosum neglectum</i>	5	2		2		4	A
Green Skimmer	<i>Orthetrum sabina sabina</i>	1			1			C
Wandering Glider	<i>Pantala flavescens</i>	10	70		1			A
Crimson Dropwing	<i>Trithemis aurora</i>					2	4	A
Common Blue Skimmer	<i>Orthetrum glaucum</i>			1				A
Marsh Skimmer	<i>Orthetrum luzonicum</i>	1						A
Total no. of species recorded:		5	3	1	3	3	7	
Total no. of individuals recorded:		18	74	1	4	5	22	

Habitat: AAL/GL = Abandoned Agricultural Land/Low-lying Grassland , AL = Agricultural Land, DA = Developed Area, SL = Shrubland, WL = Woodland, R = Watercourse

Commonness: A = Abundant, C = Common (Wilson *et al.* 2004)

Appendix F - Plates (Ecology)

	
<p>Plate F1 Woodland</p>	<p>Plate F2 Agricultural Land</p>
	
<p>Plate F3 Abandoned Agricultural Land / Low Lying Grassland</p>	<p>Plate F4 Abandoned Fish Pond</p>
	
<p>Plate F5 Stream</p>	<p>Plate F6 Developed Area</p>