香港青年協會
the hongkong federation of youth groups

Phase III Redevelopment of The Hong Kong Federation of Youth Groups Jockey Club Sai Kung Outdoor Training Camp

Project Profile

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1. BASIC INFORMATION

1.1 Project Title

1.1.1 Phase III Redevelopment of The Hong Kong Federation of Youth Groups Jockey Club Sai Kung Outdoor Training Camp (hereinafter referred to as the "Project").

1.2 Purpose and Nature of the Project

1.2.1 The Hong Kong Federation of Youth Groups Jockey Club Sai Kung Outdoor Training Camp was first constructed in 1965, before the designation of Sai Kung West Country Park in 1978, to provide the general public, particularly young people, with social, recreation, educational, nature conservation, sports and leisure activities. To meet the public demand, Phase 1 redevelopment was completed in 1993 while Phase II redevelopment was completed in 2001 to expand its capacity to 236 bed spaces.

1.2.2 According to the LCSD's statistics, the Camp's utilization was the highest among all campsites in Hong Kong in 2007/08 and 2008/09, when total attendance exceeded 90,000 each year. Yet, due to limited capacity, about 500 applications with more than 45000 potential attendance have been rejected in 2008/9 and 2009/2010. To meet the increasing demand from the public, a Phase III redevelopment has been proposed. Support letters from government departments including The Home Affairs Bureau and the Leisure and Cultural Services Department were received in 2007.

1.2.3 As the camp site was first constructed before the designation of Sai Kung West Country Park, the camp was embraced by the Country Park boundary, and redevelopment of the camp (Phase II and the current Project) would involve construction within the Country Park. Since the Project is sited partly within the Sai Kung West Country Park boundary, the Country and Marine Parks Board (CMPB) was first consulted in December 2006 and then in January 2010 after approval of funding from the Jockey Club to undertake the Project. CMPB had no objection on the proposal in principle. The Board advised HKFYG to submit a more comprehensive environmental impact assessment in accordance with the Environmental Impact Assessment Ordinance to the Board for further deliberation.

1.2.4 Under the Tai Mong Tsai & Tsam Chuk Wan OZP S/SK-TMT/4, the existing camp site falls partly in Recreation (R) zone and partly in Country Park (CP) zone, and the Project will also involve areas under these two zonings. According to the OZP Explanatory Notes, Holiday Camp on area zoned for "Recreation" is always permitted. After the proposed redevelopment, the camp would continue to provide the aforementioned services to the general public, which is in line with the functions of the Country Parks, which are "designated for the purposes of nature conservation, countryside recreation and outdoor education" (AFCD 2010). Therefore, no rezoning will be proposed under the Project; and there would not be reduction in the extent of Sai Kung West Country Park boundary. Within the Country Park boundaries, "all uses and developments require the consent of Country and Marine Parks Authority, and approval from Town Planning Board is not required" (TPB 2010).

1.3 Name of the Project Proponent

1.3.1 The Hong Kong Federation of Youth Groups (HKFYG)

1.4 Location and Scale of Project

1.4.1 The Project Site is located partly within the existing camp site and partly on a natural slope downhill of Tai Mong Tsai Road to the southeast of the camp site. The Project Site location is shown in **Figure 1.1**.

1.4.2 The Project has three major components: 1) one new canteen block at the center of the existing camp site; 2) eight no. of two to three storey dormitories and adventure facilities on the hillside to the southeast of the existing camp site, and 3) two platform decks near the existing slipway to provide ground level open area for outdoor activities. To minimise earthwork and footprint, all new buildings would be built on minipiles. The capacity of the camp site would be increased to about 460 bed spaces and canteen services expanded to serve 400 people. A wastewater treatment plant would also be set up for re-use of wastewater generated from new canteen kitchen for irrigation and toilet flushing. The total footprint of Phase III redevelopment is about 0.65 ha. The Master Layout Plan is shown in **Figure 1.2**.

1.4.3 In terms of zoning, the Project area is covered by the Outline Zoning Plan S/SK-TMT/4 - Tai Mong Tsai & Tsam Chuk Wan. Zonings within the Project Site include Recreation and Country Park. Part of the Project would be confined to the existing camp site (Recreation Zone) while the rest within Country Park Zone. The Coastal Protection Area is located further upstream of the Project Site and is avoided (see **Figure 3** of **Appendix B**).

Dormitory

1.4.4 Eight no. of houses comprising of a total of 19 units will be built on the lower portion of slope west of existing houses. The eight semi-detached houses with a mixed combination of 2-sotreys and 3-storeys are arranged in a single row to fit in the site context and to minimise the footprint and hence the environmental impact. The proposed variation of building height will also break visual monotony so as to provide a more interesting view to the viewer. The total site coverage area is 718 s.m. In a similar fashion as phase II, the new houses will serve to accommodate group clients. To minimise visual impacts, the height of all houses will also be below the level of Tai Mong Tsai Road. On façade arrangement, sun shading features and green features will be incorporated into the environmental sensitive design together with tree planting. A cross-section of a 3-storey dormitory house is shown in **Figure 1.3a.** The front view of the houses showing their height in relation to Tai Mong Tsai Road is shown in **Figure 1.3b**. To minimise noise impact, all new dormitory houses will also be installed with air-conditioners so that the houses do not rely on openable windows for ventilation. They will be aligned more than 40m away from Tai Mong Tsai Road. The additional traffic due to the proposed development is minimal and will occur at daytime when the dormitory houses are not occupied. The noisy equipment (air blower and pump) of the new wastewater treatment system will be installed in a plant room next to the lift shaft under the existing assembly hall. It is over 190m away from the nearest proposed dormitories and will be shielded by existing building. Therefore operational noise impact to the proposed dormitories would be minimal.

Canteen Block

1.4.5 To cater for the needs of new visitors, the new canteen block will be located in the heart of the camp with outdoor accesses connecting new and existing portions of the site. The canteen block will comprise of a dining hall (capacity 350), a cafeteria, activity rooms, a drop off point at Tai Mong Tsai Road for arrival of visitors. The footprint is approx. 1,785 s.m. With respect to existing slope profile and a sensitive approach to minimize visual impact from Tai Mong Tsai Road, the building structure is extended down slope from Tai Mong Tsai Road to existing swimming pool deck. Environmental sensitive design including are incorporated, including sun shading screens facing west façade, minimized openings on loading wall structures on west/ north sides, green roof and timber deck landscape features on roof deck. Mini-pile foundation and no slope cutting are adopted to minimize the impact of existing earth conditions. A cross-section and front view of the canteen block is shown in **Figure 1.3c** and **Figure 1.3d** respectively.

Platform Decks

1.4.6 The proposed extension of ground level open area consists of two parts, i.e. Area A and Area B, both in the form of decking on minipiles (**Figure 1.4**). Area A is located at the waterfront between the BBQ site and the existing slipway, of 210 m^2 in area. Area B is the area adjacent to the existing slipway, currently separated from the stream channel by the slipway. It will be of 370 m^2 in area. Both platform decks are located outside the Coastal Protection Area. It is estimated that a total of 60 nos. of minipiles of 273mm diameter would be required to support the two platform decks.

Sewage and Wastewater Treatment

1.4.7 Locations of the existing sewage treatment plant and new wastewater treatment plant are shown in **Figure 1.2** & **1.5a**.

1.4.8 The existing sewage treatment plant (STP) collects sewage from Phase I and II including backwash wastewater from swimming pool, cleaning wastewater and toilet flushing. The existing plant is using a multi-stages Rotating Biological Contactor (RBC) for organic degradation. The existing STP average discharge flow for Phase I and II is 35 m^3/day while the proposed future discharge flow for Phase III is about 121 m^3/day. To cater for relocation of the canteen and increased sewer generated by additional visitors and to promote water conservation, a new wastewater reuse system is proposed to treat a portion of the canteen wastewater in the site for irrigation and flushing purpose. The wastewater reuse system will share the loading of the existing STP and also to reduce the fresh water consumption within the camp site. The wastewater reuse system will operate in parallel with the STP and will employ membrane bioreactor (MBR) for the core treatment process.

1.4.9 To share the loading of the existing STP and to increase the safety factor for sewage treatment, the design flow capacity for the new wastewater treatment plant is 60 m^3/day (generated from canteen kitchen), of which 15m^3/day of effluent will be reused within the facility. **Figure 1.5b** shows the flow diagram of the proposed sewage treatment process. Wastewater generated from canteen kitchen will be first collected in a holding tank. A grease interceptor will be provided to remove oil from the wastewater. Portion of the canteen wastewater (60 m^3/day) will be transferred to a new MBR wastewater reuse

system for treatment and reuse purposes. The remaining canteen wastewater (28 m^3/day) will be drained to the existing STP and be treated with other sewage generated from the site by RBC system. Wastewater after being treated by MBR in the wastewater reuse system will meet the USEPA standard for wastewater reuse. The polished treated effluent will be divided into 2 streams, one for irrigation and the other for flushing.

1.4.10 For the irrigation system, wastewater after treated by the MBR will be stored in "Treated Effluent Storage Tank" No. 1 and it will pass through a booster set and an UV sterilizer for disinfection before use. For the flushing water system, treated effluent after the MBR treatment will be stored in "Treated Effluent Chlorination & Storage Tank" No. 2. Sodium hypochlorite will be fed into the tank for disinfection and chlorinated effluent will be pumped to flushing water storage tank on demand.

1.4.11 Where necessary, redundant treated effluent from the wastewater reuse system will be piped to discharge via the existing sewage treatment plant effluent outfall. The grease separated from kitchen wastewater will be removed from site by tankering services. Wet sludge collected from the MBR system will be discharged to the aerated sludge holding tank of the STP by pump. Sludge may either disposed as solid waste after sludge dewatering or disposed as wet sludge by tankering service to Government Sewage Treatment Plant.

1.4.12 The new MBR system has a dimension of 5 m (L) x 2.2 m (W) x 3.5 m (H) and will be installed at an open space on the hallway outside the existing Assembly Hall. The new MBR system would be shielded by vegetation along the waterfront and the existing building at the rear to minimise any potential visual and odour impacts. The equipment with higher noise level, including the blower and the permeate pump would be installed in a plant room next to the lift shaft under the existing Assembly Hall. It is over 90m away from the nearest the existing dormitories and over 190m from the proposed dormitories and will be shielded by building to minimise noise impact.

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

1.5.1 Two elements of the Project are identified as Designated Projects (DP) and covered in the current Project Profile.

1.5.2 The Project involves earthworks partly within the Sai Kung West Country Park boundary and therefore is classified as a Designated Project (DP) under Schedule 2 Part I – Category Q.1 of the Environmental Impact Assessment Ordinance (EIAO) Cap. 499. An Environmental Permit under the EIA Ordinance must be obtained prior to the commencement of construction of the Project.

1.5.3 The Project involves the reuse of treated wastewater from a treatment plant and therefore is classified as a Designated Project (DP) under Schedule 2 Part I – Category F.4 of the Environmental Impact Assessment Ordinance (EIAO) Cap. 499. An Environmental Permit under the EIA Ordinance is required during construction and operation of the Project.

1.6 Name and Telephone Number of Contact Person

The contact person for this Project is shown below:

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2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Outline of Planning

2.1.1 The Hong Kong Federation of Youth Groups is the Project Proponent. The project team consists of the following consultants while the proposed works will be implemented by the contractor(s) to be appointed by the Project Proponent at a later stage.

Table 2.1 Project Team

Company	Role
Atelier VIII Architects Ltd.	Project Architect
Stephen Cheng Consulting Engineering Ltd.	Structural and Geotechnical Engineering Consultant
GHD Ltd.	E&M and Sewage Consultant
Rider Levett Bucknall Ltd.	Quantity Surveyor
Ecosystems Ltd.	Environmental Consultant
Kenneth Ng and Associate Ltd.	Landscape Consultant
LLA Consultancy Ltd.	Traffic Consultant

2.2 Project Implementation and Timetable

The construction works are proposed to commence in November 2010 and to be completed in 15 months by February 2012. The proposed construction programme is shown in **Figure 2.1**.

2.3 Interactions with Other Projects

2.3.1 There is no planning project near the Project Site. As such, cumulative environmental impacts are not anticipated.

3. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

3.1 Major Elements of the Surrounding Environment

3.1.1 The Project is located at the south of Tai Mong Tsai at the foothill of Cheung Shan. Oriented in a northwest-southeast direction, access to this narrow and elongated site is via Tai Mong Tsai Road. The site is sandwiched and bounded between the wooded hill slopes of Cheung Shan and Tai Mong Tsai Road along the northeast and the water channel with a wooded hill slope at the opposite of study area to the southwest. The water channel is the estuary of Tai Mong Tsai Stream, which flows to Inner Port Shelter. The Project Site is currently occupied by existing camp facilities/buildings, landscape amenity areas and vegetated slopes. Tai Mong Tsai village is located more than 270m to its north from the site formation boundary.

3.2 Existing Sensitive Receivers and Sensitive Parts of the Natural Environment

Air and Noise

3.2.1 All dormitory houses of the project proponent are installed with air-conditioners and do not rely on openable window for ventilation. A nearest village house at Tai Mong Tsai Village (ASR-V, NSR-V) from the site is identified as representative air and noise sensitive receiver during the construction stage (**Figure 3.1a**).

Water

3.2.2 Sai Kung Inner Port Shelter (WSR-I) and Tai Mong Tsai Stream (WSR-S) are identified as the sensitive receiver during the construction stage (**Figure 3.1a**).

Ecology

3.2.3 Sai Kung West Country Park, Coastal Protection Area/Tai Mong Tsai Stream are identified as the sensitive receivers during the construction stage.

3.2.4 Ecological resources within 500m from the Project Site included mixed woodland, plantation, tall shrubland, low shrubland, stream, mangrove/sandflat, abandoned agricultural land, urbanised/disturbed, intertidal and subtidal habitats and their associated flora and fauna. Total number of terrestrial flora and fauna species recorded within the 500m Study Area included 301 plant species, 68 bird species, 43 butterfly species, 14 dragonfly species, 7 reptile species, 3 amphibian species, and 3 mammal species. Aquatic, intertidal and subtidal fauna recorded included 35 fish species, 16 crab species, 12 coral species, and other invertebrates.

3.2.5 Species of conservation interest recorded included 5 plant species, 10 bird species, 2 mammal (bat) species, 2 fish species, 1 crab species and hard corals. Their location, distribution, protection status and rarity are summarised in **Table 3.1** below. Habitat map and location of species of conservation interest are shown in **Figure 3.2**. Detailed baseline and assessment are described in **Appendix A**.

Table 3.1 Species of conservation interest recorded in the 500m Study Area

Common Name	Scientific Name	Locations	Protection Status	Distribution	Rarity
Flora					
Incense Tree	*Aquilaria sinensis*	Mixed Woodland; Tall Shrubland; Plantation	Protected by Protection of Endangered Species of Animals and Plants Ordinance, Cap. 586. Category II nationally protected species in China and is listed as vulnerable in the China Plant Red Data Book and by IUCN (2002).	Lowland forests and fung shui woods	Locally common
Rhodoleia	*Rhodoleia championii*	Tall Shrubland	Protected by Forestry Regulations (Cap. 96)	Forest	Very rare naturally, but also widely planted
Lam of Tartary	*Cibotium barometz*	Mixed Woodland, Tall shrubland	Protected by Protection of Endangered Species of Animals and Plants Ordinance, Cap. 586. Category II nationally protected species in China and is listed as vulnerable in the China Plant Red Data Book	Shade and moist places in ravines and under forests	Locally common
Pavetta	*Pavetta hongkongensis*	Mixed Woodland; Plantation	Protected by Forestry Regulations (Cap. 96)	thickets or forests	Locally common
Cycad-fern	*Brainea insignis*	Tall shrubland	Vulnerable (VU). Wild plant under State protection (category II).	open hillsides, margin of forests and sometimes in secondary forests	Locally common
Fauna					
Short-nosed Fruit Bat	*Cynopterus sphinx*	Flying and roosting in the Training Camp	Wild Animals Protection Ordinance (Cap 170)	Widely distributed in Hong Kong, occurs in many types of habitats.	Common in Hong Kong
Japanese Pipistrelle	*Pipistrellus abramus*	Flying in urbanized/disturbed within the Study Area	Wild Animals Protection Ordinance (Cap 170)	Widely distributed in Hong Kong, occurs in many types of habitats.	Common in Hong Kong
Black Kite	*Milvus lineatus*	Soaring above the Training Camp and	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected	Widely distributed in Hong Kong, occurs in many types of habitats	Common in Hong Kong

Common Name	Scientific Name	Locations	Protection Status	Distribution	Rarity
		coastal area	Animal of PRC; Appendix 2 of CITES		
Crested Serpent Eagle	*Spilornis cheela*	Soaring above the plantation near Tai Mong Tsai village	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES	Found in large woodland	Rare in Hong Kong
Greater Coucal	*Centropus sinensis*	Tall shrubland and abandoned agriculture within the Study Area	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC	Widely distributed in Hong Kong, occurs in many types of habitats	Common in Hong Kong
Black-winged Cuckoo-shrike	*Coracina melaschistos*	Mixed woodland near Outward Bound School	Wild Animals Protection Ordinance (Cap 170);	Found in woodland edge areas. Mainly recorded from Tai Po Kau Nature Reserve	Rare in Hong Kong
Orange-bellied Leafbird	*Chloropsis hardwickii*	Mixed woodland in upstream of Tai Mong Tsai Stream	Wild Animals Protection Ordinance (Cap 170);	Found in woodland. Mainly recorded from Tai Po Kau Nature Reserve	Rare in Hong Kong
Brown Fish Owl	*Ketupa zeylonensis*	Estuary of Tai Mong Tsai Stream	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES	Recorded in a few localities in Hong Kong, favours sparse woodland patches close to stream, reservoir or estuarine water	Very rare in Hong Kong
Collared Scops Owl	*Otus lettia*	Tall shrubland near the Training Camp	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES	Widely distributed in woodland in Hong Kong	Common in Hong Kong
Rufous-capped Babbler	*Stachyris ruficeps*	Tall shrubland near the Monument	Wild Animals Protection Ordinance (Cap 170);	Mainly confined to woodlands	Rare in Hong Kong
Hwamei	*Garrulax canorus*	Tall shrubland within the Study Area, urbanized/disturbed in Outward Bound School	Wild Animals Protection Ordinance (Cap 170); Appendix 2 of CITES	Widely distributed in hillsides covered by thick shrublands	Common in Hong Kong
Greater Necklaced Laughingthrush	*Garrulax pectoralis*	Mixed woodland within the Study Area	Wild Animals Protection Ordinance (Cap 170)	Mainly confined to woodlands	Rare in Hong Kong

Common Name	Scientific Name	Locations	Protection Status	Distribution	Rarity
Goby fish	*Psammogobius biocellatus*	Recorded in the estuary	This species is NOT protected in Hong Kong,	Recorded from streams in Sai Kung and northeast New Territories	Lower Risk/near threatened in IUCN Redlist
Goby fish	*Favonigobius reichei*	Recorded in the estuary	This species is NOT protected in Hong Kong,	Common and widespread in Hong Kong	Lower Risk/near threatened in IUCN Redlist
Seasarma crab	*Pseudosesarma pakshuni*	Recorded on the stream banks upstream to the site formation boundary.	This species is NOT protected in Hong Kong,	Widely distributed in Hong Kong	Uncommon
Hard Corals	-	Recorded outside the embaymen t, to the east of the embaymen t opening.	All hard corals are protected in Hong Kong under Cap. 586.	Widely distributed in Hong Kong	Small coverage (5-10%) and mostly common, abundant, and dominant species. Only two species are considered uncommon in Hong Kong, i.e. *Favites flexuosa* and *Goniastrea favulus*.

Landscape and Visual

3.2.6 A total of 4 Landscape Character Units (LCUs) and 8 Landscape Elements (LEs) have been identified within 500 m from the site boundary. Baseline data and detailed assessment are included in **Appendix B**.

3.2.7 A tree survey has been carried out and the extent of existing trees in conflict with the improvement works was assessed in the Tree Survey Report. A total of 724 trees are found within the site boundary. For the proposed development, 354 existing trees including 22 dead trees were surveyed within the proposed works area. There are in total 45 tree species found within the captioned location, most of these trees are native pioneer species. Majority of the existing tree are found to be poor to fair in terms of tree form and health condition. None of trees within the lot is identified as rare, endangered or protected flora species in Hong Kong except 8 no. of *Aquilaria sinensis* found within the site which is protected. No trees in the Study Area are registered as Old and Valuable Trees (OVTs) under ETWB TC(W) No. 29/2004 or are considered potentially registrable as OVTs.

3.2.8 A visual envelope has been mapped to determine Visually Sensitive Receivers (VSRs). A total of 6 VSRs within the visual envelope were identified and grouped into types (**Figure 3.2**) where photos of key views from and towards

the proposed Project are taken. .

Table 3.2 Visual Sensitive Receivers (VSRs)

VSRs	Location
VSR1	Travellers
	VPT1.1 Passengers along Tai Mong Tsai Road
VSR2	Residential
	VPT2.1 Tai Mong Tsai Village
VSR3	Recreational
	VPT3.1 Hiker to the south of Cheung Shan
	VPT3.2 & 3.3 Hiker to the hillside trail west of site
	VPT3.4 Visitors to the water channel between subject site and Yim Tin Tsai

3.3 Planned Sensitive Receivers and Sensitive Parts of the Natural Environment

Air and Noise

3.3.1 The existing dormitory (ASR-E, NSR-E) and proposed new dormitory is identified as sensitive receiver (ASR-D, NSR-D) during the operation stage (**Figure 3.1b**).

Water

3.3.2 Sai Kung Inner Port Shelter (WSR-I) and Tai Mong Tsai Stream (WSR-S) are identified as the sensitive receivers during the operation stage (**Figure 3.1b**).

Ecology

3.3.3 Coastal Protection Area/Tai Mong Tsai Stream is identified as the sensitive receivers during the operation stage.

Landscape and Visual

3.3.4 Visual sensitive receivers during operation stage are same as during the construction stage (see 3.2.8).

4. POSSIBLE IMPACTS ON THE ENVIRONMENT

4.1 Possible Environmental Impacts during Construction Phase

Air Quality

4.1.1 Dust may be generated during site formation which may have potential impact to the nearby air sensitive receiver (ASR-V, ASR-E) (see **Figure 3.1a**), in particular during excavation or handling and transportation of construction and demolition (C&D) materials.

4.1.2 The amount of C&D materials to be excavated for the Project is about 2,000 m^3. The excavation period will last for about 7 months. It is expected that 90% of excavated material will be generated during the first 3 months. The estimated excavated material volume per month is 600 m^3. Assuming 20 working days per month and the average hauling volume of the truck is 6 m^3 per trip, only 5 trips per days would be required for handling the excavated materials.

4.1.3 All the trucks will be properly covered. The Project site will be regularly sprayed with water four times per construction day and dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation will be applied. No adverse dust impact is expected at nearby ASRs due to construction of the Project.

4.1.4 Any cumulative dust impact can be minimized by good site practices and management, by regular water spraying, and implementation of dust suppression measures. No adverse cumulative construction dust impact is expected.

Water Quality

4.1.5 Potential water quality concerns during construction phase are site runoff and sewage generated from construction workforce. There is no dredging or marine works at the seafront area. The proposed platform deck will be a elevated reinforced concrete structure supported by min-pile foundation. The proposed mini-pile is a circular pile with a diameter of 273mm and is therefore a small diameter pile foundation. The piles would be installed by drilling method and no dredging is required during construction of foundation and reinforced concrete deck works. Sand bags will be placed in the peripheral of piling works area to prevent the displaced soil from flowing into sea. The proposed canteen block and dormitory will also be supported by minipiles to minimise earthwork and hence minimise polluted site runoff. With the implementation of good site practices and recommended mitigation measures, adverse water quality impact during the construction phase due to the Project is not anticipated.

4.1.6 Any cumulative water quality impact arising from the construction can be effectively controlled through the implementation of good site practices and management. No adverse cumulative water quality impact is expected.

Noise

4.1.7 Noise impact during the construction phase may result from the construction activities with the use of powered mechanical equipment. The existing noise sensitive receiver identified is Tai Mong Tsai Village (NSR-V) which is more than 270m from the Project Site. No adverse noise impact during construction of the Project is expected. The Construction Plant Schedule and noise impact

calculation for NSR-V is attached in **Appendix C.** Combinations (Com1 to Com5) of Powered Mechanical Equipment (PME) during construction, i.e., different scenarios where the combination of machinery would be operated simultaneously in actual situation are shown, and the worst case scenario is selected for calculation. As the identified NSR-V is located far away from the proposed project site, the predicted noise level without mitigation measure, ranging from 61 dB(A) to 70 dB(A), complies with the day-time noise criteria 75dB(A).

Waste Management

4.1.8 C&D materials and waste such as excavated spoil (soil and rock), unusable concrete and grout, wood, metal scraps, equipment parts and packaging materials will be generated. Small amount of chemical wastes from the maintenance of plant/powered mechanical equipment are also expected. With the implementation of good construction site management practice, environmental impact due to waste generated from the Project would be insignificant.

4.1.9 About 2,000 m^3 of C&D materials will be generated during construction of the Project. The amount of excavated materials for these works is about 1,900 m^3 soil materials and 100 m^3 concrete. About 200 m^3 excavated soils will be reused onsite and the remaining C&D materials will be delivered to Public Filling Reception Facilities for reuse. The estimated volume of C&D materials to be disposed at landfill is about 700 m^3. Provided that the chemical waste is handled and disposed of in accordance with the Waste Disposal (Chemical Waste) (General) Regulation, adverse environmental impacts is not anticipated. The amount of general refuse that will be generated from construction workforces is insignificant in view of limited construction activities.

4.1.10 With the implementation of waste management measures and good site practices in waste handling, disposal and transportation, no adverse cumulative environmental impact is expected.

Ecology

4.1.11 Loss of habitats and associated vegetation due to site formation will constitute direct ecological impacts of the project. Estimated habitat loss includes 0.18 ha of urbanised/disturbed (existing camp site), 0.16 ha of plantation and 0.31 ha of mixed woodland. In terms of zoning, about half of the new development would be confined to the existing camp site (Recreation Zone) while the rest in the Country Park boundary. The Coastal Protection Area (CPA) will be avoided.

4.1.12 Potential impacts due to losses of mixed woodland habitat and its associated flora and fauna are considered minor to moderate due to the young age, simple structure, commonness of the habitats in local context and low fauna and medium flora diversity. Plant species to be affected by the development mainly consist of exotic plantation trees and common pioneer native species. A few individuals of *Aquilaria sinensis* would be encroached by the development, while other individuals recorded during the current survey would be avoided. The other recorded plant species of conservation interest were located outside the development footprint and therefore would not be affected. Mitigation is recommended to compensate the loss of native tree and shrub species due to their potential ecological values to wildlife.

4.1.13 Indirect construction impacts include disturbance of vegetation and wildlife due to road access, human traffic, dust and soil erosion generated during construction. Due to the temporary and localized nature of the impacts, potential impacts to flora and fauna are ranked as minor. Dispersion of dust and noise and silted runoff generated during construction can be minimized by good site practice.

4.1.14 Direct impacts to aquatic/marine habitats include a minute loss of about 3.5m^2 of intertidal habitats at hard substrate intertidal zone by construction of Area A and muddy substrate under Area B. The hard substrate intertidal zone only supported common species such as rock oyster. The muddy area in Area B is currently colonized by a number of small seedlings of common mangrove species (*Kandelia obovata*). About 0.01 ha of mangrove will be encroached. The direct loss impact is minor. Mitigation measures including compensatory mangrove planting is proposed.

4.1.15 Indirect Impacts to aquatic fauna and marine communities are largely avoided by the construction method and the planning of construction works. The supporting pile for the platform deck would be constructed using mini bore piling method. No dredging is required. Sandbags or equivalent will be used to enclose the works area, while piling works should be scheduled to be conducted during low tide as much as possible to minimise water quality impact during construction. Therefore indirect impacts to aquatic habitats and marine communities would be insignificant.

Landscape and Visual

4.1.16 The proposed project would cause a loss of woodland (including plantation) (LE1) and existing camp site (LE3), which would result in substantial and slight impacts to the corresponding LEs respectively. Impacts other LEs are negligible.

4.1.17 The potential impacts to VSR1 (passengers along Tai Mong Tsai Road), VSR3.1 (Hiker to the south of Cheung Shan), VSR3.4 (Visitors to the water channel between subject site and Yim Tin Tsai), VPT3.5 (Visitors at barbecue area 12) and VSR3.6 (Visitors at barbecue area 13) are substantial to moderate because these VSRs are located within close distant to the site and would have open to partial views of the constriction works. The other VSRs will have no direct view of the site and the potential impacts are considered as slight to negligible.

4.1.18 Mitigation measures for landscape and visual impacts are proposed to reduce the impacts (see 5.2.11). With implementation of the mitigation measures, the impacts are reduced from substantial and moderate to moderate and slight and are considered acceptable.

4.1.19 Within the site formation boundary, 238 trees surveyed within lot were in conflict with proposed development and recommended to be felled due to low survival rate after transplant, low amenity value, poor health, poor form and located on steep slope with no proper transportation access for transplanting. 90 trees within the site formation boundary and 370 outside the works area will be retained. Of the 8 no. of species of conservation interest (*Aquilaria sinensis*) recorded within the site formation boundary, 3 will be retained, 4 will be transplanted and 1 will be fell.

4.1.20 To mitigate the loss of 238 trees, 150 nos. of standard size trees and 125 nos. of tree whip trees shall be planted within site. Loss of tree will be compensated with a ratio of more than 1:1 in terms of numbers on site. In addition, 4000 nos. of whip of 10mm trunk diameter shall be planted off site within nearby Sai Kung West Country Park area. The proposed trees will consist mostly of native species. The total aggregated girth size of compensatory trees of 48.74m is more than the felled 47.49m. Therefore, overall loss of tree will be compensated with a ratio of more than 1:1 in terms of numbers and aggregated girth size.

4.2 Possible Environmental Impacts during Operation Phase

Air Quality

4.2.1 Air quality impact arising during operation stage is the potential odour nuisance from the Project. The treated effluent will be pumped to the filtration system which comprises of sand filter, micron filter and activated carbon filer for removal for solid and odour. Adverse odour impact on the air sensitive receivers during the operation stage of the Project is not expected.

Water Quality

4.2.2 The existing sewage treatment plant (STP) will collect all wastewater from Phase I and II and a portion of wastewater from Phase III. The future STP effluent flow will increase to 96 m^3/day. As the existing STP has sufficient capacity to cater the future additional Phase III sewage flow, no modification on the treatment tasks and process or upgrading is required. The discharge quality from the STP is summarized in **Table 4.1**.

Table 4.1 Discharge Quality from Sewage Treatment Plant

Water Quality Parameter	Unit	Design Target
pH	-	6-9
Biochemical Oxygen Demand (BOD_5)	mg/L	< 20
Total Suspended Solids (TSS)	mg/L	< 30
Total Nitrogen	mg/L	< 20
E. Coli	cfu/100mL	< 1,000

4.2.3 The proposed wastewater treatment facility which collects wastewater generated from Phase III canteen kitchen. The estimate inflow will be 60 m^3/day, of which 15m^3 of treated effluent will be reused for toilet flushing (10m^3/day by chlorinated disinfection) and landscaping (5m^3/day by UV sterilization). Remaining 45 m^3 effluent will be discharged back to sea.

4.2.4 **Figure 1.5** shows the schematic flow diagram of the treatment process for the existing STP and new wastewater facility.

4.2.5 During the operation stage, portion of the treated wastewater from the MBR treatment will be reclaimed for reuse while the rest of the treated wastewater will be discharged via the existing effluent outlet point. The reclaimed water will be separated into two streams: one for irrigation and one for toilet flushing. For the irrigation system, treated effluent will be stored in “Treated Effluent Storage Tank” No. 1 and it will pass through a booster set and an UV sterilizer for disinfection before use. For the flushing water system, treated effluent after the MBR treatment will be stored in “Treated Effluent Chlorination & Storage Tank”

No. 2. Sodium hypochlorite will be fed into the tank for disinfection and chlorinated effluent will be pumped to flushing water storage tank on demand. The amount of chlorine dosing will be regulated automatically according to water chlorine level in the Tank and the chlorine level is designed to be kept between 1 mg/L and 2 mg/L which is compatible to the standard of drinking water. The chlorinated effluent will be generated on demand, and no surplus chlorinated effluent will be discharged directly into the sea. The sewage generated by toilet flushing will be treated by the existing STP before discharge. Since only 10m³/day of treated water would be chlorinated for flushing, the residue chlorine level is expected to be much lower in the combined effluent discharge (156m³/day) due to dilution and therefore potential water quality impacts due to presence of chlorine is not anticipated.

4.2.6 The quality of the reclaimed water is summarized in **Table 4.2**.

Table 4.2 Reclaimed Water Quality from Wastewater Reuse Facility

Water Quality Parameter	Unit	USEPA Criteria*		Reclaimed Water Quality of this Project	
		Toilet Flushing	Irrigation	Toilet Flushing	Irrigation
pH	-	6-9	6-9	6-9	6-9
Turbidity	NTU	$\leq$ 2	$\leq$ 2	$\leq$ 2	$\leq$ 2
Biochemical Oxygen Demand (BOD_5)	mg/L	$\leq$ 10	$\leq$ 10	$\leq$ 10	$\leq$ 10
Total Suspended Solids (TSS)	mg/L	N.S.	N.S.	$\leq$ 10	$\leq$ 10
E. Coli	cfu/100mL	undetectable	undetectable	undetectable	undetectable
Total Residual Chlorine (TRC)	mg/L	$\geq$ 1	$\leq$ 1	$\geq$ 1	$\leq$ 1

Remarks:
* From USEPA (2004) Guidelines for Water Reuse
N.S. – Not Specified

Noise

4.2.7 During operation phase, the noisy equipment of the new wastewater treatment system (air blower and pump) will be the source of noise. The new wastewater treatment system would be installed more than 65m away from the nearest existing dormitory house. The noisy equipment (air blower and pump) will be installed in a plant room next the lift shaft under the existing Assembly Hall. It is over 90m away from the nearest existing dormitory and over 190m from the proposed dormitory. It will also be shielded by the existing building. Therefore operational noise impacts would be minimal.

4.2.8 The transportation of visitors in-and-out of the camp site will generate additional traffic in Tai Mong Tsai Road. Based on the traffic impact assessment report, existing traffic flow is ranging from 140 veh/hr to 280 veh/hr while the redevelopment traffic flow is ranging from 11 veh/hr to 27 veh/hr (increase 7%-9%). The present camp provides two car parking spaces and two loading/unloading spaces for coaches. In future, two additional loading/unloading spaces for coaches will be provided. Routine peak check-in/check-out hours for the camp sites are mainly around from 2pm to 4pm. The additional traffic due to the proposed development is minimal and will occur at daytime when the dormitory houses are not occupied. In addition, both the existing dormitory houses (NSR-E) are and new dormitory houses (NSR-D) will be installed with air-conditioners so that the houses do not rely on openable windows for ventilation. Therefore with the small increase of traffic flow during

day time and short peak time frame, operation noise impact to the existing and proposed dormitories would be minimal.

Waste Management

4.2.9 Screening and sludge will follow the existing disposal regime. The screening and sludge will be transported and properly disposed at landfills. The silt will be contained inside sealed bags to prevent leakage of foul water during transportation. With these measures and practices properly implemented, the cumulative environmental impact during operation stage would be negligible.

Ecology

4.2.10 Potential operational impacts would include noise from increased visitors and traffic, sewage discharge, surface runoff and artificial lightings. The nature of the activities in the extension will be similar with those in the current camp site. With well organised field trips and observation of codes, potential impacts to terrestrial and intertidal fauna from this source are thus ranked as minor and mitigation will not be required.

4.2.11 Similar to the existing camp site, the sewage generated by the proposed development will be collected and treated on-site before discharged to the sea. To cater for relocation of the canteen and increased sewer generated by additional visitors, a new on-site wastewater treatment plant would be constructed to treat wastewater which would be reused for irrigation and toilet flushing. The design of both the existing and the new wastewater treatment plants, including recommended flow rate and SS and BOD loadings followed EPD's guidelines and USEPA guidelines respectively. Potential impacts are ranked as insignificant.

4.2.12 Similar to the existing camp site, the surface run-off of the proposed development will be collected through the surface drainage system and discharged directly into the sea via sand trap. Due to the limited footprint and nature of landuse, additional surface runoff generated from concrete surface would not have significant impacts on hydrology or water quality of the surrounding area.

4.2.13 Operational impacts to fauna species of conservation interest is considered insignificant. Apart from Brown Fish Owl and Short-nosed Fruit Bat, all the terrestrial fauna of conservation interest were recorded at localities away from the camp site. It is anticipated that the impact of human disturbance will be confined to the camp site and adjacent habitats and of similar nature. Short-nosed Fruit Bat would likely to continue to roost in Chinese Fan Palm in the Training Camp. Impact to Brown Fish Owl during operation phase is anticipated to be insignificant. Brown fish Owl is predominate a nocturnal raptor. Most activities in the Training Camp will be carried out in daytime and therefore the use of foraging habitats near the camp by this species will not be affected.

Landscape and Visual

4.2.14 Passengers and pedestrian along Tai Mong Tsai will have direct view of the new canteen block. However, the time pass though this section of road is short. The waterborne recreational visitors to the water channel between subject site and Yin Tin Tsai will have direct view of the new canteen block and dormitory. With landscape treatment including green roof and tree screen planting, the

residual impacts are considered slight and acceptable.

4.2.15 No visual impact from nighttime glare is expected during the operational stage.

4.2.16 In terms of landscape impact, it is anticipated that the magnitude of change from the baseline condition will be vary from small to large during operational stage. Due to the disturbance to the vegetated hill slopes and portion of the existing campsite facilities, the potential landscape impact is predicted to be substantial to LE1 (Woodland) and LCU3 (Settled Valley Landscape), slightly adverse to LE3 (Existing Camp Site) and moderate adverse to LCU1 (Strait Landscape), with residual landscape impact of moderate adverse to LE1 (Woodland) and slightly adverse to LCU3 (Settled Valley Landscape), LE3 (Existing Camp Site) and LCU1 (Strait Landscape). Mitigation measures including tree planting are proposed to mitigate the impact. No change is predicted to the other LCUs and LEs.

Health and Hygiene

4.2.17 Toilet flushing and landscape irrigation by reclaimed water are non-potable uses. The reclaimed water from the wastewater reuse facility will have a separate distribution system and treated with chlorination or UV prior to use or for storage. Direct contact by human being is not expected. For landscape irrigation applications, operators will be required to wear personal protective gears, including hand gloves and face masks, to minimize contact with the reclaimed water whilst carrying out the irrigation work. Also, it will not be allowed to use high pressure jet to avoid any atomized water. The impact on human health and hygiene is therefore insignificant.

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

5.1 During Construction Stage of the Project

Air Quality

5.1.1 The air quality impact due to dust generated from the construction works would be insignificant with the mitigation measures as stipulated in the Air Pollution Control (Construction Dust) Regulation implemented. The impacts will be minimized by adoption of proper working methods such as regular water spraying, four times per construction day. Relevant specifications will be incorporated into the works contract.

Water Quality

5.1.2 During construction stage of the Project, the practices outlined in "ProPECC PN1/94 Construction Site Drainage" as well as other good site management practices to avoid site runoff and minimize the potential water pollution will be implemented. All site construction runoff will be controlled and silt removal facilities will be provided to prevent high levels of suspended solids from entering the drainage network. Open stockpiles should be covered with tarpaulin or similar materials during rainstorm event. Silt removal facilities, channels and manholes will be properly maintained and the deposited silt and grit will be removed regularly, at the onset of and after each rainstorm events. Earthworks final surfaces will be well compacted and the subsequent permanent works or surface protection measures will be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate drainage like intercepting channels will be provided (e.g. along the crest / edge of excavation) where necessary. The contractor will be required under the contract specification to ensure that the site is properly managed and deposition of any solid materials, litter or wastes will not occur in drainage channels or surface waters.

5.1.3 Any debris or rubbish generated on-site will be collected, handled and disposed of properly to avoid entering nearby stormwater drains or open drainage channels. All chemical tanks and storage areas will be located as far as possible from existing water ways and placed on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. Open stormwater drains and culvert near the works area shall be covered to block the entrance of large debris and refuse.

Noise

5.1.4 The construction activities of the Project will include excavation, piling and decking works mainly. The potential noise impact to NSR-V (Tai Mong Tsai Village) is minor. During construction period, camp users will be engaged in various activities which take place outside the campsite. All dormitory houses are installed with air-conditioners to minimise the impacts. Implementation of good site practices during the construction stage are recommended to minimize the potential noise impacts.

Waste Management

5.1.5 The Contractor will be required to sort all C&D materials and waste into

different categories for recycling or disposal at public filling area and landfill as appropriate. To minimize generation of waste and C&D materials, proper waste management measures and good site practices in waste handling, disposal and transportation will be implemented. Disposal of C&D materials will be monitored through the trip-ticket system as stipulated in ETWB TCW No. 31/2004. All chemical wastes due to maintenance of equipment will be handled, stored and disposed of properly in accordance with the requirements of the Waste Disposal (Chemical Waste) Regulation. General refuse will be stored and disposed of separately from general construction waste and chemical waste. The storage bins for general refuse will be provided with lids, which should be kept closed to avoid odour nuisance and wind blown litter. The general refuse will be removed regularly and disposed of to licensed landfills, no adverse waste management implication related to handling and disposal of general refuse is expected.

Ecology

5.1.6 The current layout and design has minimised the footprint and earthwork and thus the impacts on both terrestrial and aquatic habitats. Woodland loss is minimised by construction of some 3-storey dormitory houses. Decking rather than reclamation is proposed to minimise the loss and disturbance of seabed. The supporting pile for the platform deck would be constructed using mini bore piling method, to avoid the need of dredging.

5.1.7 Potential disturbance to the surrounding environment will be further minimised through good site practice and precautionary measures for air and water quality and noise impacts.

5.1.8 Within the site formation boundary, the layout of the dormitory has been adjusted such that three individual tree of *Aquilaria sinensis* will be retained on site, and four will be transplanted to nearby landscape area within the Project Site. One individual would be encroached by the dormitories and impacts are unavoidable. This tree grew on sloping ground and therefore had deformed root ball. Survival rate after transplantation would be very low and therefore felling is recommended. *Aquilaria sinensis* are commercially available and will also be included in the compensatory planting list. Chinese Fan-palm, which provides roosting habitats for Short-nosed Fruit Bats, can be included in the planting list.

5.1.9 Loss of 0.31 ha of woodland and 0.18 ha of plantation as well as the associated vegetation will be mitigated by compensatory woodland planting. The plant list will include mainly native tree and shrub species which are present in the existing habitats and are valuable to wildlife, e.g. providing food source for birds, bats and butterflies. Species selected would include *Schefflera heptaphylla, Machilus spp., Sapium discolor, Sapium sebiferum* and *Gordonia axillaris*. Due to limited space within the project site, only about 0.03 ha of temporary works area would be replanted with native trees. A landscape proposal has also been made for the Project Site. Liaison has been made with AFCD to identify a site of 0.8 ha for compensatory planting in the vicinity of the site (Lui Ta Shek) within Sai Kung West Country Park. About 4000 no. trees will be planted at 1m to 1.5m spacing on the site. Species to be planted should include native species found in the area and pioneer species which has higher survival rate. Locations of the woodland compensatory planting area are shown in **Figure 5.1**.

5.1.10 Loss of the small mangrove area (0.01 ha) under Platform Deck at Area B would be mitigated by planting mangrove droppers on the sandflat near existing established mangrove stands (**Figure 5.1**). Mangrove planting has been one of the activities organised by the camp and the compensatory mangrove planting can also be participated by campers. A total area of 160m2 at the intertidal zone was planted with Kandelia droppers during conservation education activities by campers between Mar-Apr 2010 when droppers were ripen. This can be considered as advanced implementation of mangrove compensation. Survival and growth of these mangrove stands should be monitored quantitatively.

Landscape and Visual

5.1.11 The landscape and visual mitigation measures recommended during construction stage are summarised below:

- Minimizing construction area and contractor's temporary works area to avoid unnecessary impacts to landscape resources and minimize visual intrusion
- Sensitively designed site hoarding in both color and form to screen view to the construction works
- Preservation of existing tree to be retain on area not affected by the proposed development
- Demarcation of the tree protection zone for retain trees
- Operational time restrictions to limit after dark welding and lighting

5.2 During Operation Stage of the Project

Noise

5.2.1 The air blowers and pumps of the proposed wastewater treatment facility will be installed in a plant room to reduce the noise emissions during operation. Silencers at the air intakes and discharge openings of the wastewater treatment facility will also be employed to further reduce the noise impact. With these mitigation measures in place, adverse noise impact is not anticipated during the operation stage of the Project.

Water

5.2.2 To minimize the chance of wastewater bypass from the existing STP and wastewater treatment facility, standby pump and coarse screen will be provided to cater for breakdown and maintenance of the pump and screen. In order to minimise the chance of power failure, backup power supply in the form of dual power supply or automatic operated emergency generator will be provided. Furthermore, a valid discharge license for the STP under the WPCO will be obtained from EPD. The license will stipulate the effluent quality that must be achieved before discharge. The license will also stipulated any other conditions that must be met including regular monitoring of the effluent water quality.

5.2.3 The operation of the wastewater reuse system will be under continuous monitoring in order to ensure the quality of treated wastewater meet the required standard. The UV sterilizer will be monitored by an UV monitor, and signal will be sent to the supervising centre to notify the operator to clean or replace the UV lamps. For the chlorination system, the residual chlorine concentration in the treated storage tank is controlled by residual chlorine monitor. Besides, quality of the treated wastewater will be monitored by taking sample to laboratory for testing in order to ensure good quality of wastewater to

be kept. Spare parts for the system will be kept in stock in order to minimize risk caused by down time of the system.

5.2.4 Apart from the online monitoring and control system for the sewage quality as mentioned, regular sampling programme will be devised to further safeguard and ensure the quality of the treated effluent is suitable for reuse. Should the treated effluent not meet the required standards for irrigation and flushing, the water reuse subsystem will be shut down. All treated water from the MBR system will be piped to discharge via the existing sewage treatment plant effluent outfall rather than undergoing auxiliary treatment for reuse. The treated water for direct discharge will not undergo any chlorination process. During this period, both irrigation system and flushing system will use the fresh water from city main as water source. The water reuse plant would be fully inspected for problem fixing.

5.2.5 The discharge point of the treated effluent is located at a stream estuary which is also an intertidal zone where water is brackish. Change of salinity of marine water is therefore not anticipated. The marine organisms including mangroves found in the intertidal zones nearby also adapt to change of salinity during high tide and low tide period, and therefore adverse impacts on marine organisms are not expected.

Waste Management

5.2.6 A small quantity of screenings will be generated from the existing STP. The screenings of sewage from STP will be properly stored in covered containers, packed in plastic bags and handled within the pumping station structure to avoid odour nuisance. It will then be transported to designated landfills for disposal as soon as possible.

5.2.7 Sludge generated during the treatment process will be properly stored in covered containers within the existing STP structure and wastewater treatment facility to avoid odour nuisance. The sludge will be regularly collected by licensed contractor and transported to sewage treatment works for treatment and disposal.

Health and Hygiene

5.2.8 Potential health and hygiene concerns may exist if there is incorrect connection of the potable and reclaimed water pipes. The reclaimed water will be installed as a separate system and will not be connected with the potable water supply system. To avoid cross-connection of the reclaimed water supply to the potable water supply, the pipes for the reclaimed water will be specially arranged to differentiate them from that of the potable water pipes, e.g. clearly labeled with warning signs and notices, colour-coded, and/or using different pipe size, so that physical connection of the reclaimed water pipes with the potable water fittings would not be possible.

5.2.9 For the health and safety reasons, supply from the wastewater reuse system to irrigation or flushing systems will be shut off if there is an outbreak of disease. Redundant treated effluent will be discharged directly in lieu of reuse. At this moment, both irrigation system and flushing system will use the fresh water from city main as water source.

Hazard

5.2.10 Small amounts of sodium hypochlorite solution will be stored on-site for disinfection of toilet flushing reclaimed water. Fire Services Department's requirements for storage would be properly observed. The sodium hypochlorite solution will be kept in storage designated areas and below the exempted quantity under the Dangerous Goods Ordinance (Cap. 295) and its subsidiary Regulations. Also, the use of this chemical within the camp site for reclaimed water disinfection would not constitute a potentially hazardous installation in accordance with EPD's ProPECC PN 2/94 Potentially Hazardous Installation. In light of the small quantities of chemicals stored, no significant hazard impact is anticipated.

Landscape & Visual

5.2.11 The landscape and visual mitigation measures recommended during the design stage and hence implemented during operational stage are summarised below:

- Selection of fast growing native trees and shrubs mix at in compensation for the removal / disturbance area
- Landscape treatment such as green roof and screen planting including climber plants to screen and soften surface of built structures and mitigate the landscape and visual impact.
- Staggered built form with variation of building height to complement the sloping landform and to enhance visual quality
- Sensitive treatment and design including use of earth tone non-reflective external finishes of the built structure to ensure element with colour, texture and tonal quality being compatible to the existing landscape context.
- Maintenance of planting works upon completion.

5.2.12 The proposed development has been designed in consideration with the existing topography and in harmony with the natural setting of the surrounding areas. The proposed development will provide visual relief for the visual receptors. The adverse impact on the vegetated hill slopes will be mitigated by the compensation-replanting scheme. A preliminary landscape plan is included in **Figure 5.2** & **5.3**. The proposed development is predicted to be acceptable with landscape and visual mitigation measure implemented.

5.2.13 The potential environmental impacts and proposed mitigation measures to be incorporated into the design and construction of the Project are summarized in **Table 5.1**

Implementation of Mitigation Measures

5.2.14 During the construction phase, monthly environmental audit will be undertaken by qualified professionals (e.g. environmental consultant to be appointed by the project proponent) to ensure the implementation of the above recommended mitigation measures. The qualified professional will confirm to EPD implementation of the recommended mitigation measures, including compensatory planting and tree transplantation, and other environmental audit findings in the monthly audit report.

5.2.15 During the operational phase, monitoring of sewage effluent quality would be conducted monthly following the existing practice. The compensatory woodland planting and landscape planting would be maintained for 2 years under the

landscape contract. Monitoring of mangrove will be conducted by qualified environmental consultant for 2 years after planting. Results of monitoring will be documented and submitted to EPD. Unusual incidence/non-compliance such as breakdown of sewage treatment plants or poor survival of plantings should be reported to the camp operator immediately. Meetings with relevant authorities should be called when appropriate for working out remedial actions.

Table 5.1 Summary of Mitigation Measures

Stage & Location	**Items**	**Mitigation Measures**	**Implement -ation Agent**	**Relevant Section in the Project Profile**
Construction Stage / Construction Site	Dust	(1) Adopt dust control and suppression measures as stipulated in the Air Pollution Control (Construction Dust) Regulation. (2) Water spraying on exposed area and during excavation. (3) Provide wheel-washing facilities.	Contractor	5.1.1
	Water	(1) Control construction surface run-off according to ProPECC PN1/94, EPD's Practice Note for Professional Persons, Construction Site Drainage. (2) All chemical tanks and storage areas will be provided with locks and placed on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank.	Contractor	5.1.2 – 5.1.3
	Noise	(1) Implementation of good site practices, such as but not limited to, regular maintenance of powered mechanical equipment, use of silent equipment and use of temporary noise barrier as the proper noise control measures.	Contractor	5.1.4

Stage & Location	Items	Mitigation Measures	Implement-ation Agent	Relevant Section in the Project Profile
	Waste	(1) Standard waste management measures and good site practices in waste handling, disposal and transportation will be implemented. (2) The contractor will be required to sort all C&D materials and waste into different categories for reuse on site, recycling and disposal at designated public fill reception facilities or landfills. Disposal of C&D materials will be managed through the trip-ticket system as stipulated in ETWB TCW No. 31/2004. (3) All chemical wastes due to maintenance of equipment will be handled, stored and disposed of in accordance with the requirements of the Waste Disposal (Chemical Waste) Regulation. (4) General refuse will be stored and disposed of separately from general construction waste and chemical waste. The storage bins for general refuse will be provided with lids, which should be kept closed to avoid odour nuisance and wind blown litter. General refuse will be removed regularly and disposed of to landfills.	Contractor	5.1.5
	Ecology	(1) Preserve five no. and transplant two no. of species of conservation interest (*Aquilaria sinensis*) (2) Compensatory woodland planting (0.03 ha within Project Site and 0.8 ha in Sai Kung West Country Park) (3) Compensatory mangrove planting (0.01 ha) (4) Good site practices	Contractor	5.1.7-5.1.10
	Landscape and Visual	(1) Minimizing construction area (2) Sensitive design of site hoarding (3) Preservation of existing tree to be retained (4) Demarcation of tree protection zone (5) Operational time restriction	Contractor	5.1.11
Operation Stage	Noise impact	(1) Pump sets and air blowers will be installed inside plant room.	Project Proponent	5.2.1
	Water quality	(1) Standby pumps and coarse screen shall be provided. (2) Backup power supply in the form of dual power supply or automatic operated emergency generator will be provided. (3) Valid discharge license for the STP under the WPCO shall be obtained from EPD. (4) Regular sampling programme will be devised for monitoring the quality of the treated effluent from the wastewater recycling system.	Project Proponent	5.2.2-5.2.4

Stage & Location	**Items**	**Mitigation Measures**	**Implement -ation Agent**	**Relevant Section in the Project Profile**
	Waste generation	(1) The screenings of sewage from STP will be properly stored in covered containers, packed in plastic bags and handled within the pumping station structure to avoid odour nuisance and properly disposed. (2) Sludge generated will be regularly collected by licensed contractor.	Project Proponent	5.2.6-5.2.7
	Health and Hygiene	(1) The water pipes for the reclaimed water facility will be specially arranged to differentiate them from that of the potable water pipes to avoid contamination of potable water supply system. (2) Supply from the wastewater reuse system to irrigation or flushing systems will be shut off if there is an outbreak of disease.	Project Proponent	5.2.8-5.2.9
	Hazard	Fire Services Department's requirements for bulk storage of sodium hypochlorite will be properly observed and comply with the Dangerous Goods Ordinance (Cap. 295) and its subsidiary Regulations.	Project Proponent	5.2.10
	Landscape and Visual	(1) Selection of fast growing native tree and shrub mixes (2) Landscape treatment to the built element (3) Staggered built form with variation of building height to complement the sloping landform and to enhance visual quality (4) Sensitive treatment and design to the external finish of built element (5) Tree compensation proposal and maintenance of planting works	Project Proponent / Contractor	5.2.11-5.2.12

6. HISTORY OF SIMILAR PROJECTS

6.1.1 There was no previously approved report for the Project, but reference to other similar projects applying directly for an Environmental Permit and approved is made including:

Table 6.1 Previous Direct Applications for Environmental Permit

EIAO Reference	Designated Project Title
EP-379/2009	Reuse of Treated Sewage Effluent from Redeveloped Lo Wu Correctional Institution for Toilet Flushing
AEP-255/2006	Tseung Kwan O Area 86 Property Development – Rainwater and Grey Water Recycling
EP-378/2009	TETRA Radio Base Station at Tai Long Au, Sai Kung East Country Park, Tai Po, New Territories
EP-380/2009	Proposed installation of Integrated Mobile Phone Base Station in Sai Wan Shan, Sai Kung East Country Park, Sai Kung, New Territories
EP-209/2005	Proposed Installation of High Pressure Gas Pipeline along Sai Sha Road from Shui Long Wo to Long Keng within Sai Kung West Country Park

7. REFERENCES

AFCD 2010. HONG KONG: THE FACTS - Country Parks and Conservation. in: http://www.afcd.gov.hk/english/country/cou_lea/the_facts.html

TPB 2010. Approved Tai Mong Tsai and Tsam Chuk Wan Outline Zoning Plan. Notes, Schedules of Use and Explanatory Statement.

FIGURES

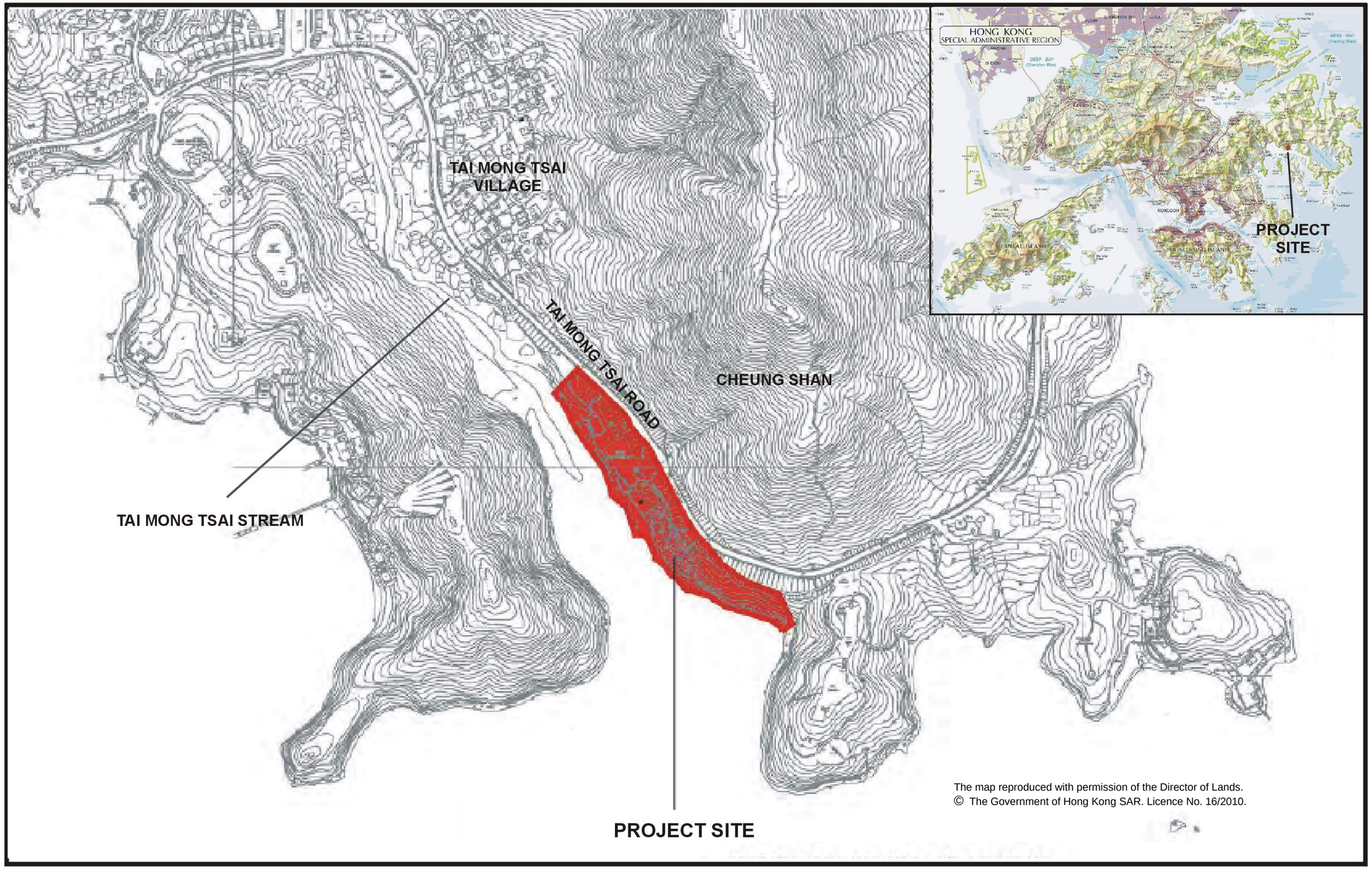

Figure 1.1 Site Location Plan

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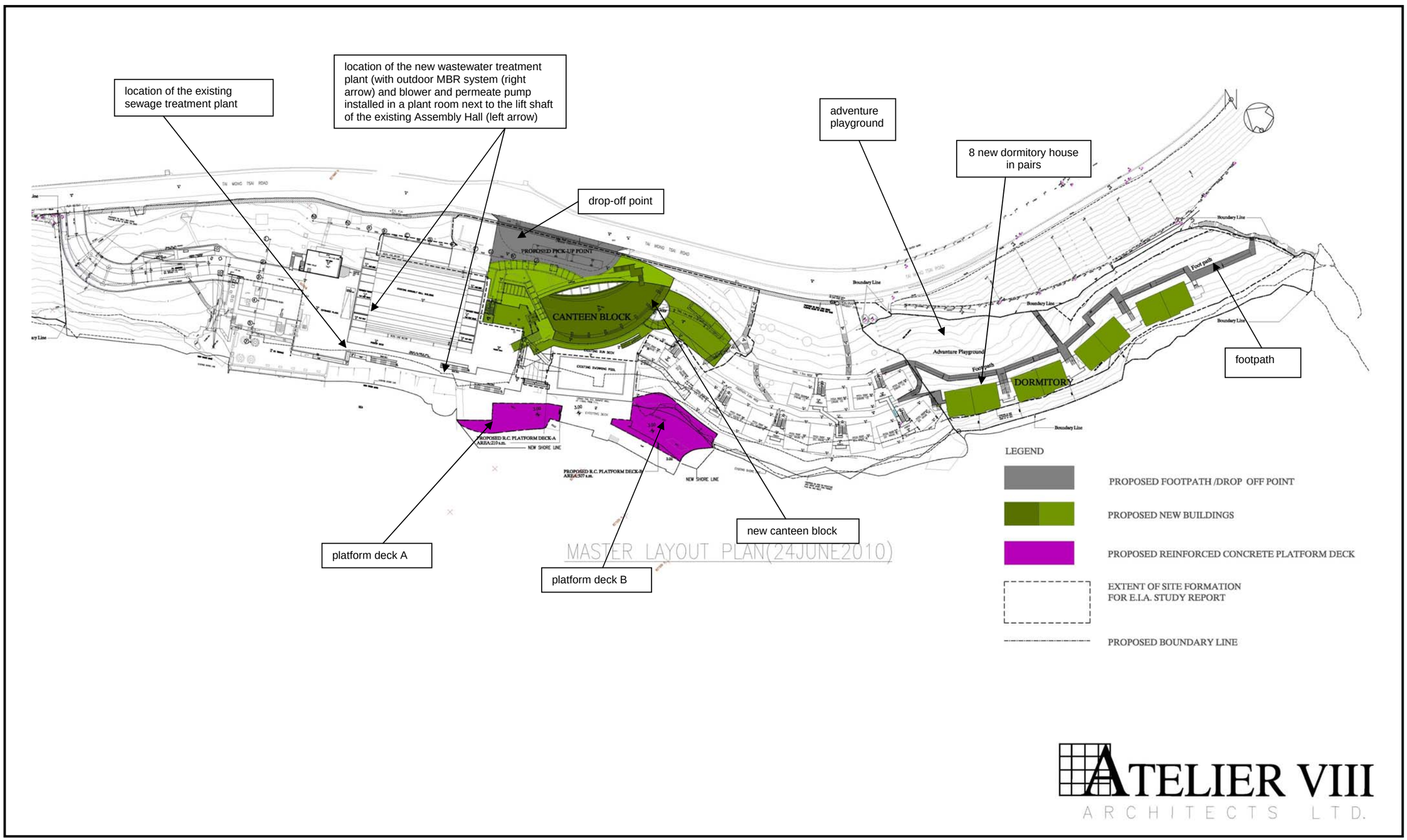

Figure 1.2 Master Layout Plan

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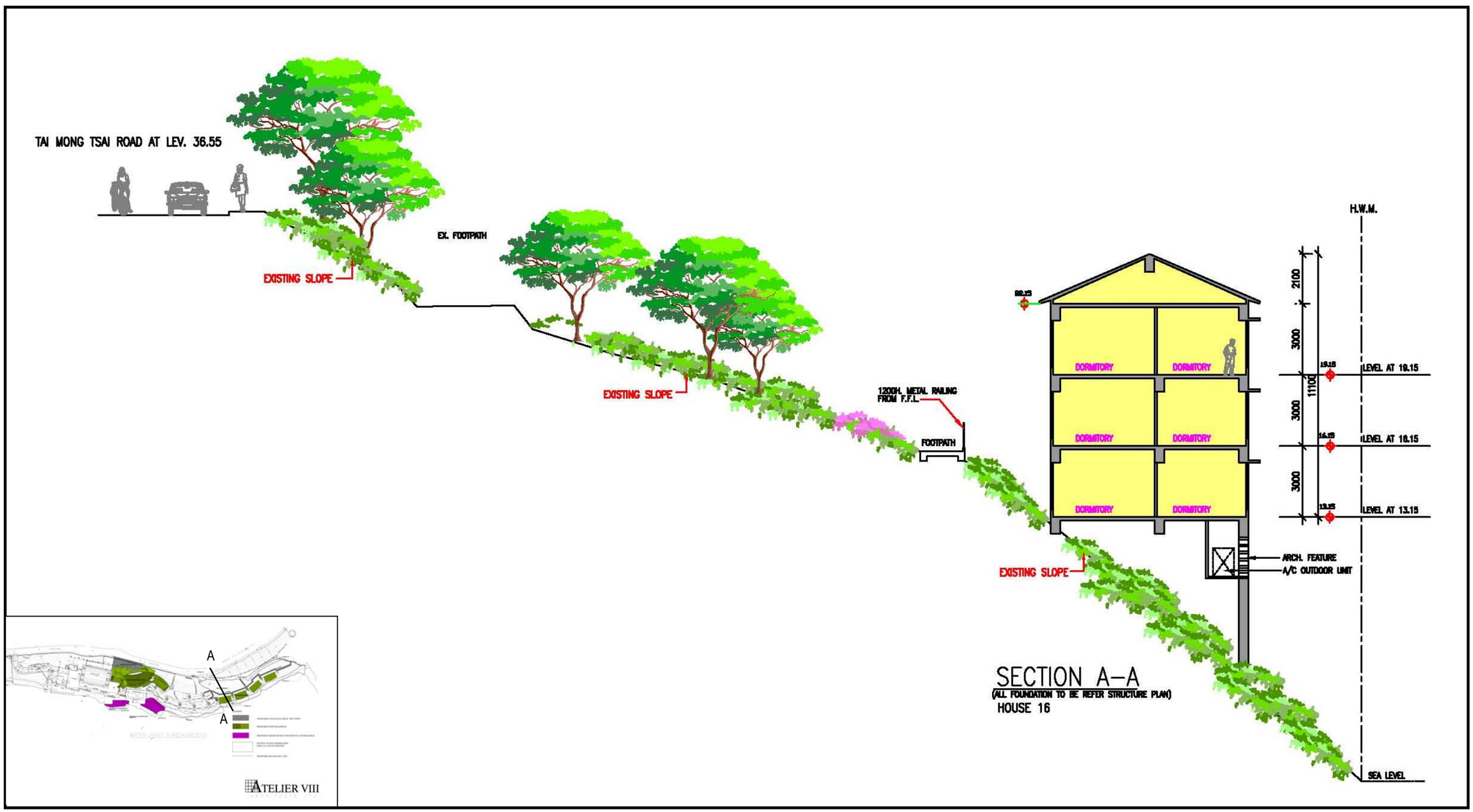
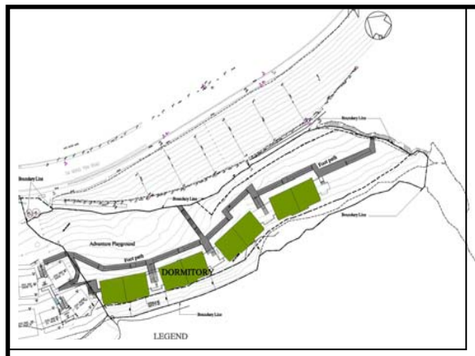


Figure 1.3a Cross Section of Proposed Dormitory



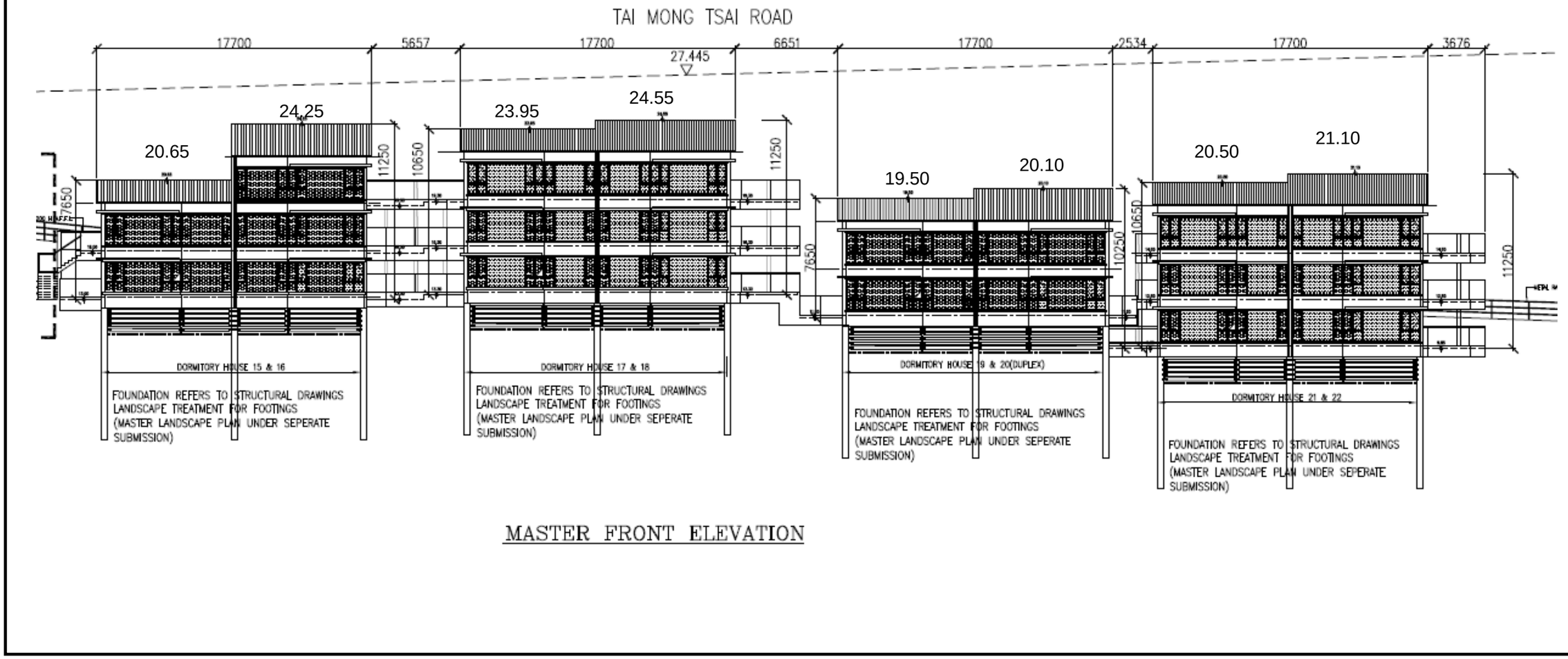


Figure 1.3b **Front View of Proposed Dormitory, showing the Elevations (in m) and Dimension (in mm) of Each House and its Relation to Tai Mong Tsai Road**

]

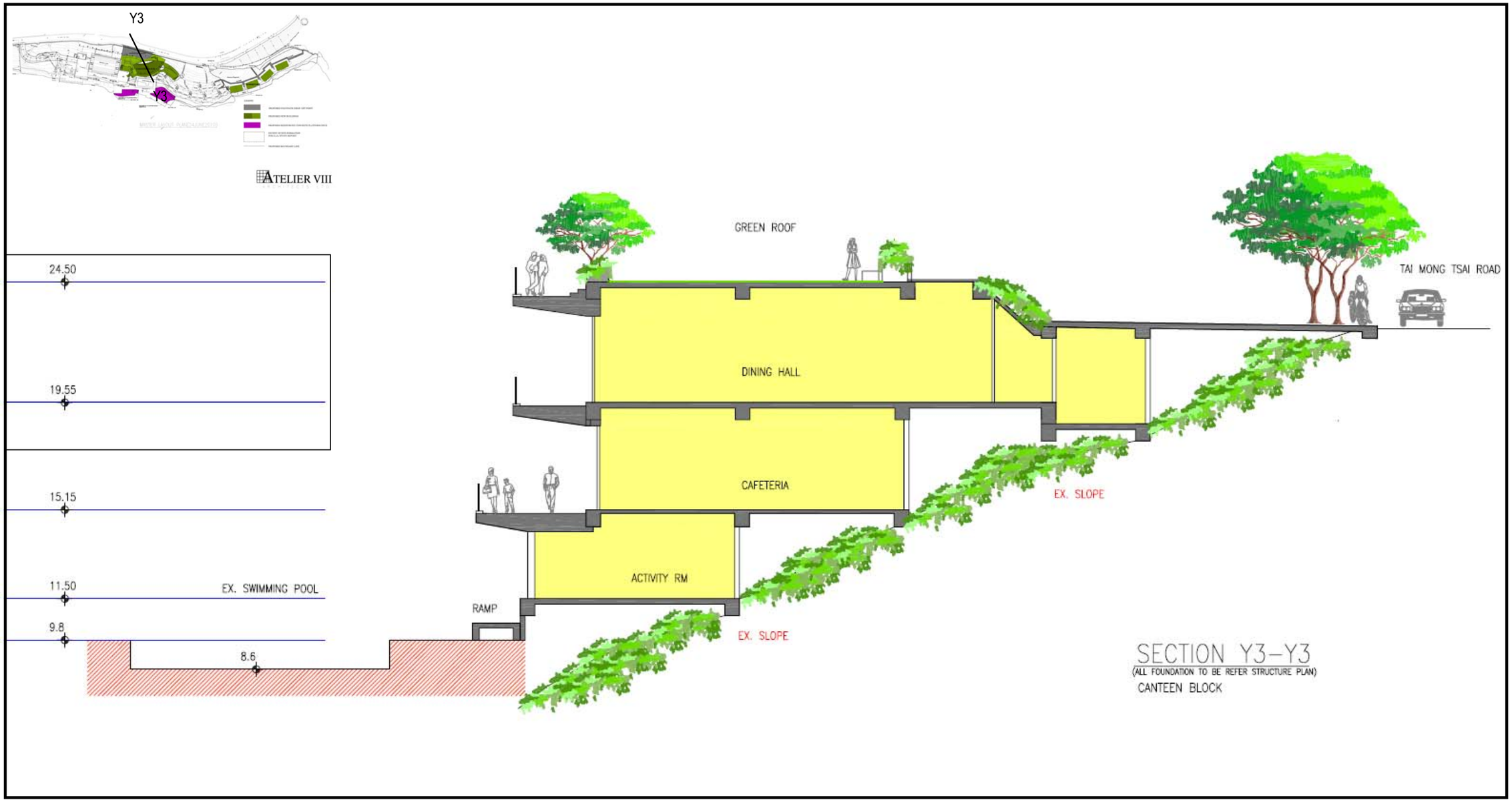


Figure 1.3c Cross Section of Proposed Canteen Block

]

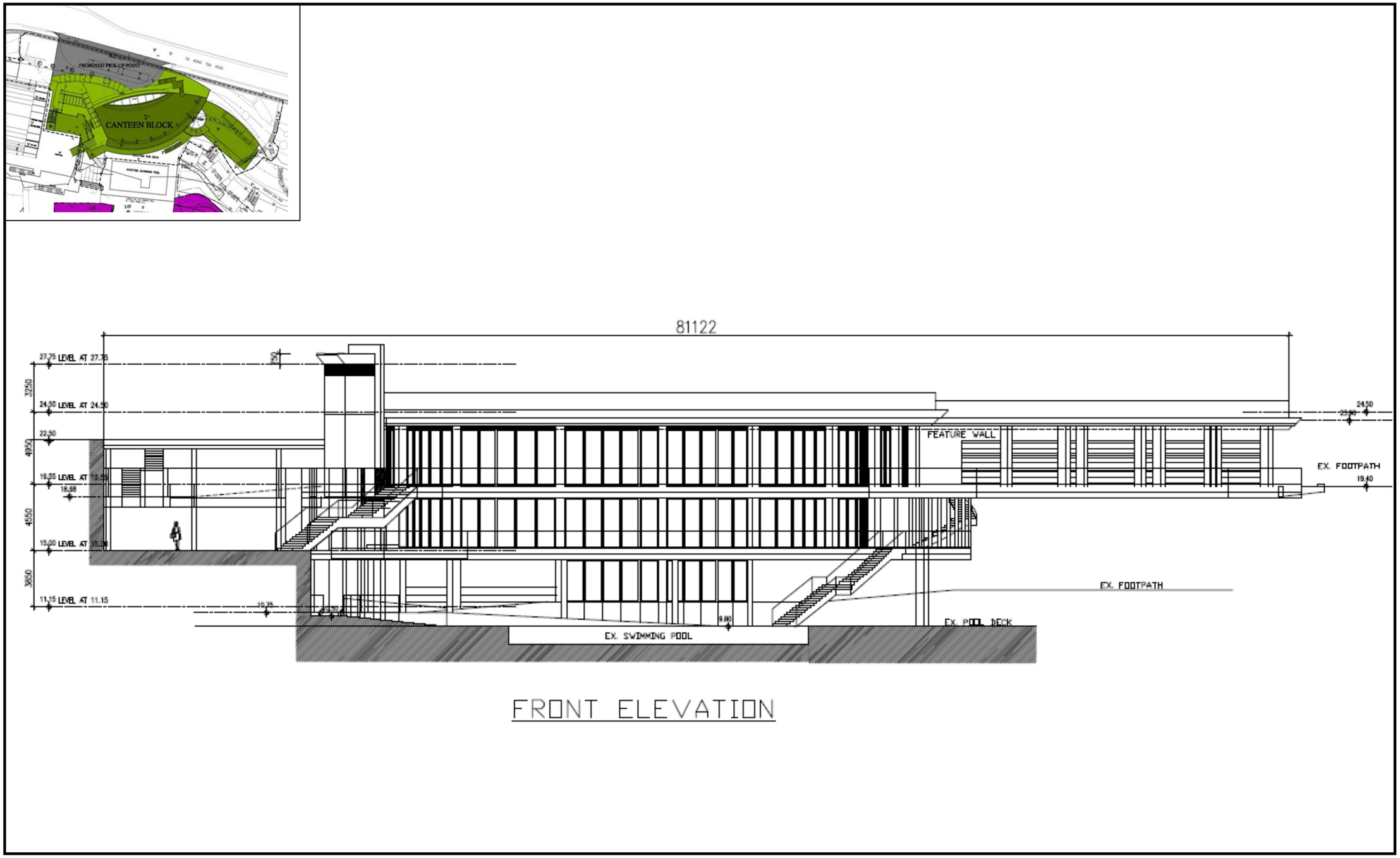


Figure 1.3d Front View of Proposed Canteen Block showing the Elevations (in m) and Dimension (in mm) and its Relation to Tai Mong Tsai Road

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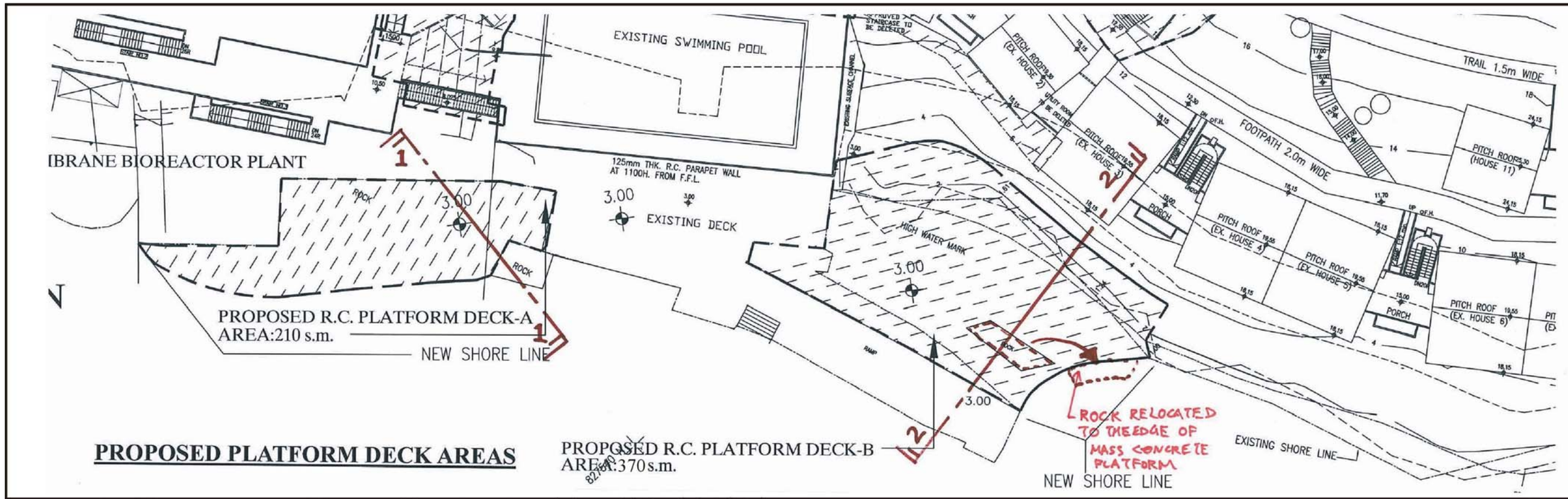
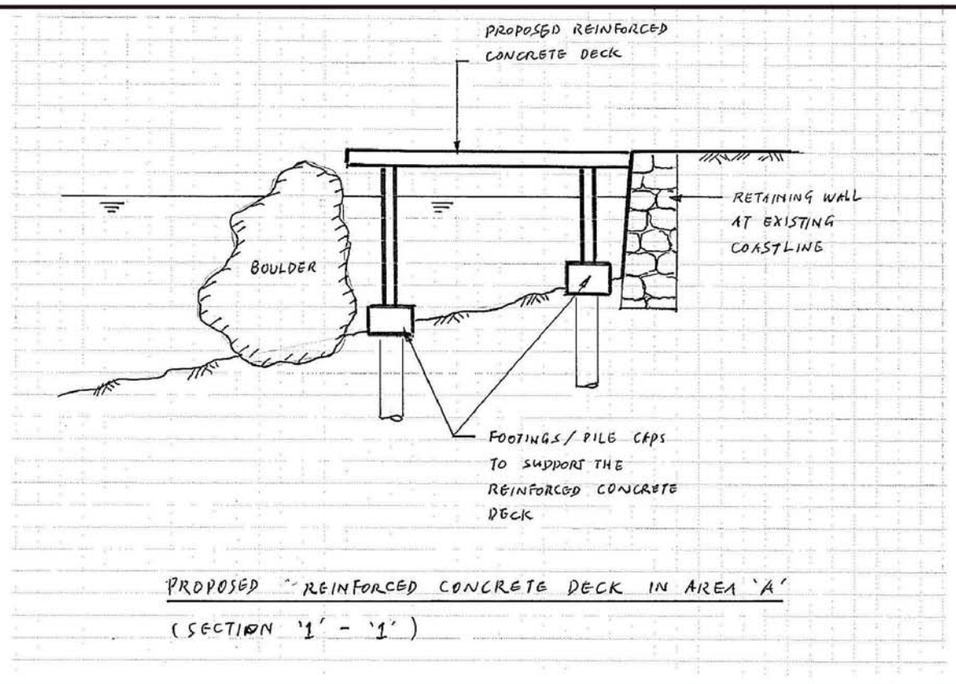
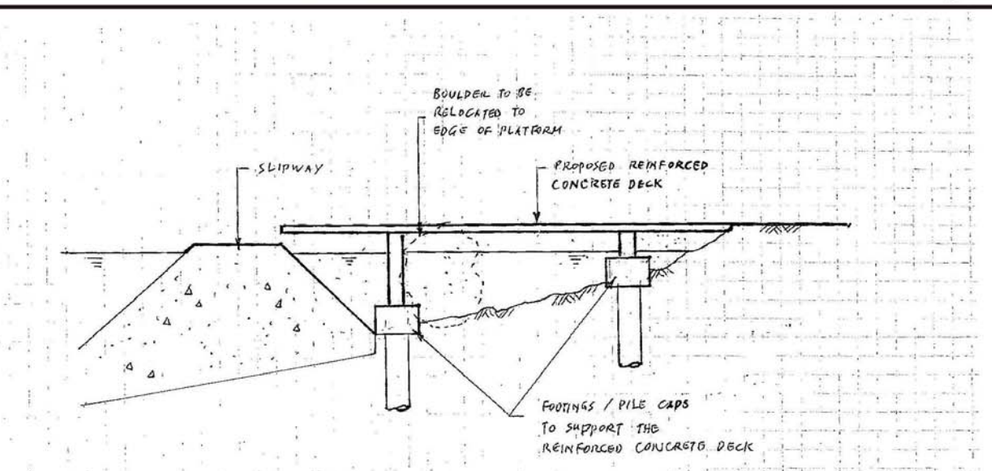


PROPOSED PLATFORM DECK AREAS



PROPOSED REINFORCED CONCRETE DECK IN AREA 'A'

(SECTION '1' - '1')



PROPOSED REINFORCED CONCRETE DECK IN AREA "B"

(SECTION '2' - '2')

Figure 1.4 Layout of Platform Decks – Close Up and Cross Sections

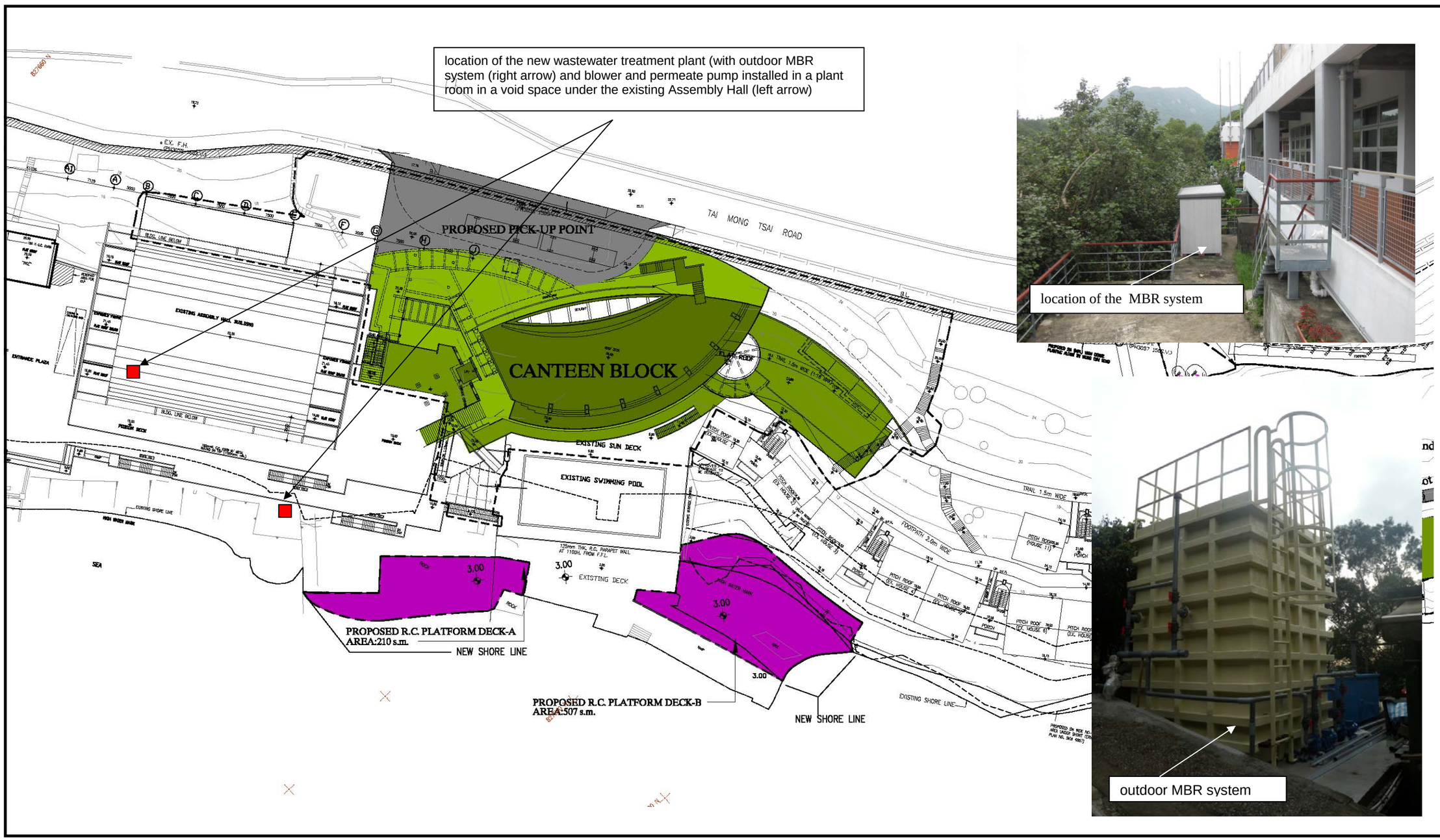


Figure 1.5a Location of the Proposed Wastewater Treatment System

Figure 1.5b **Flow Diagram of the Treatment Process of the existing Sewage Treatment Plant and Proposed Wastewater Treatment Plant**

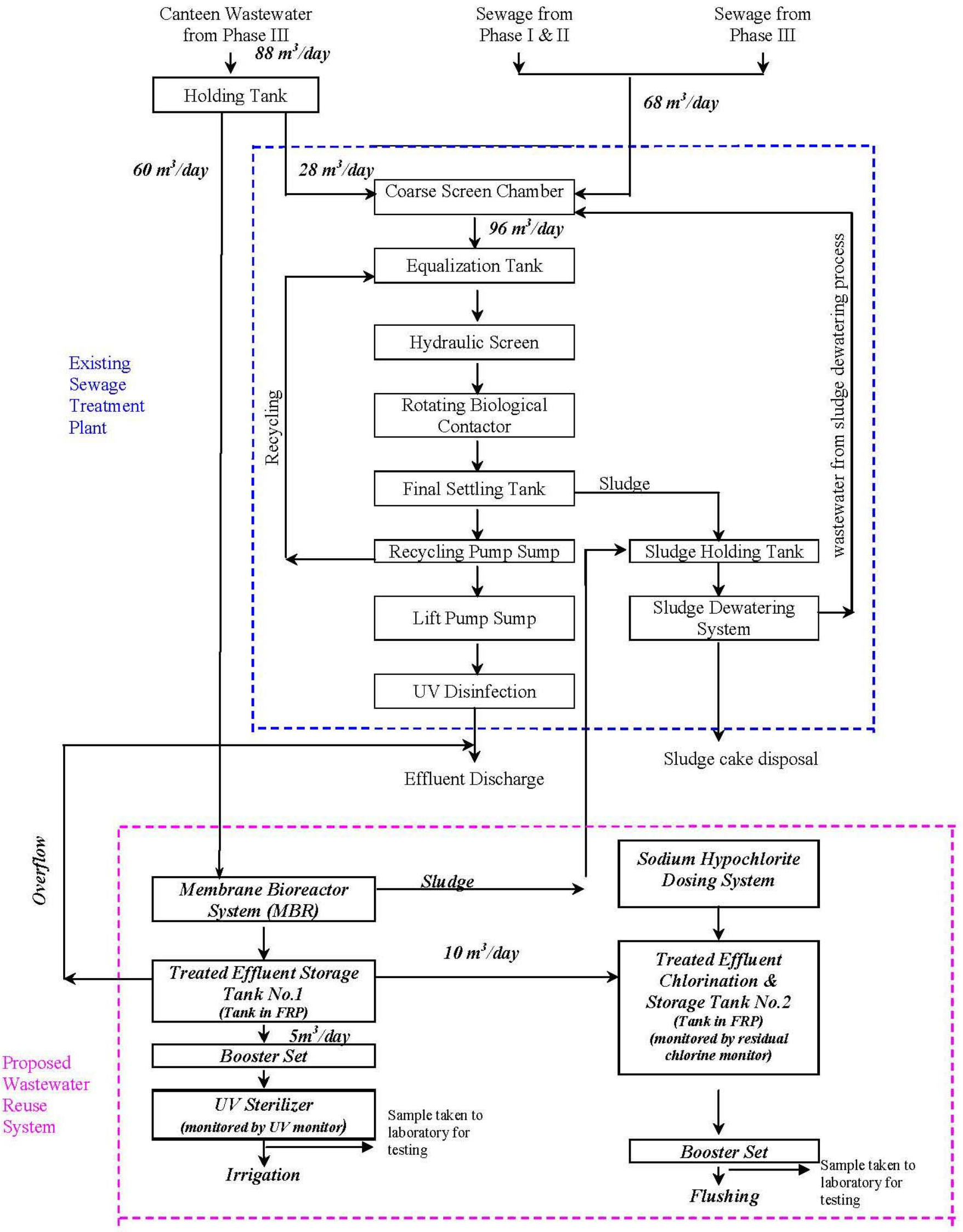


Figure 2.1 Tentative Construction Programme

Item	2010								2011						2012
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
A) Canteen Block and Dormitory															
Piling Installation															
Pile Cap Construction															
Superstructure Construction															
E&M Works															
Landscape Works															
B) Platform Decks															
Piling Installation															
Pile Cap & Concrete Deck Construction															

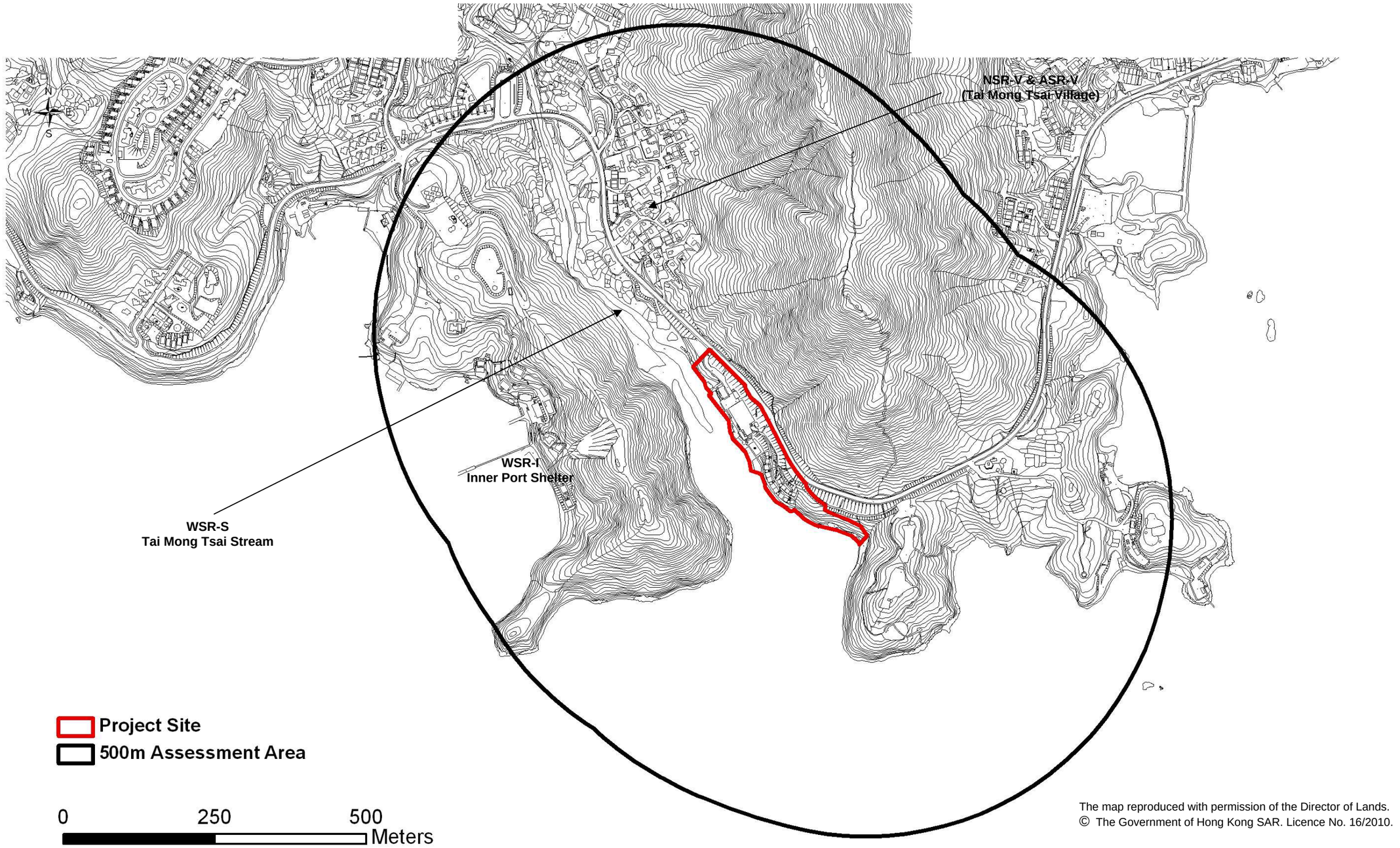


Figure 3.1a Air, Water, and Noise Sensitive Receivers – Construction Phase

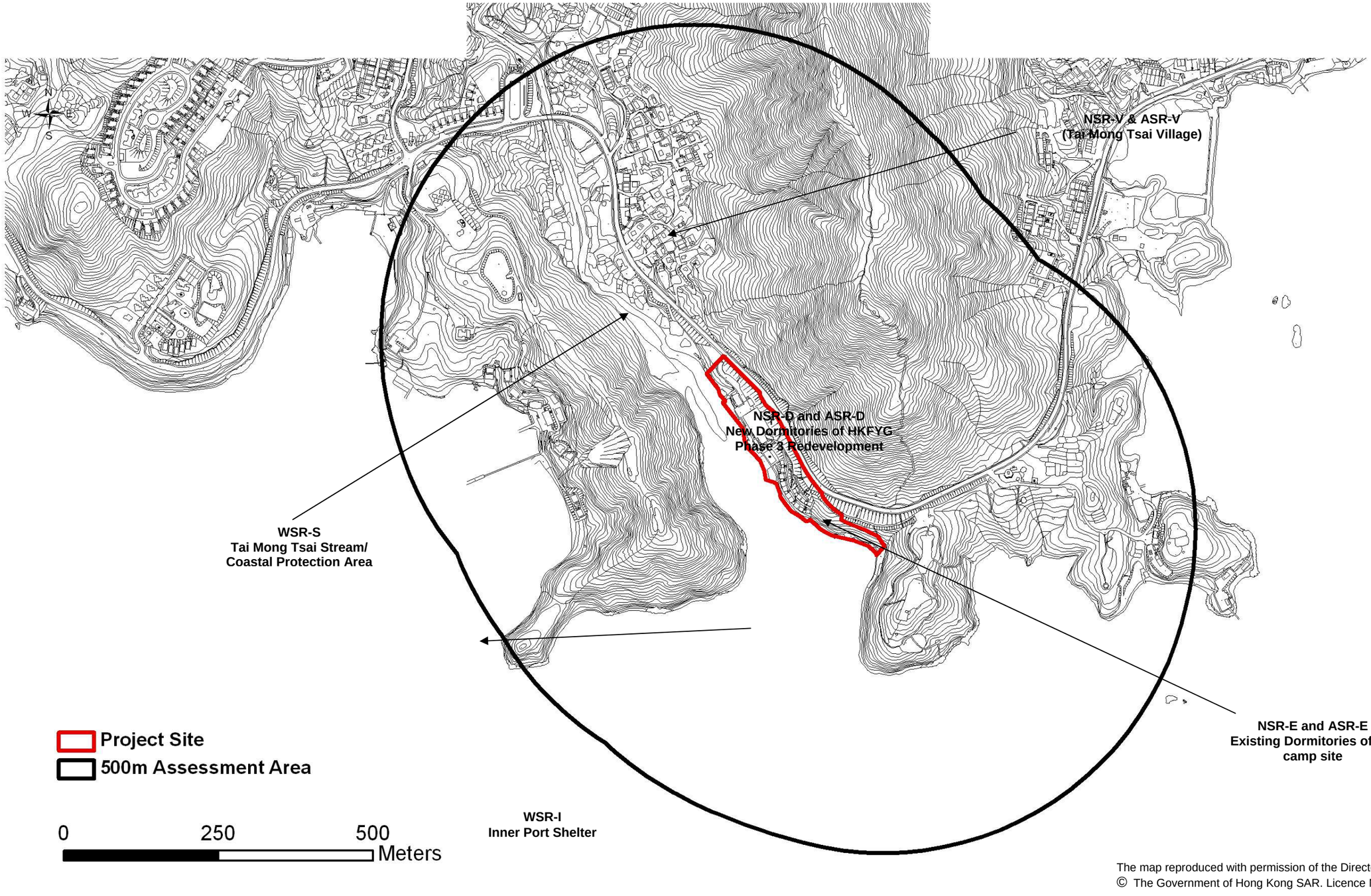


Figure 3.1b Air, Water, and Noise Sensitive Receivers – Operational Phase

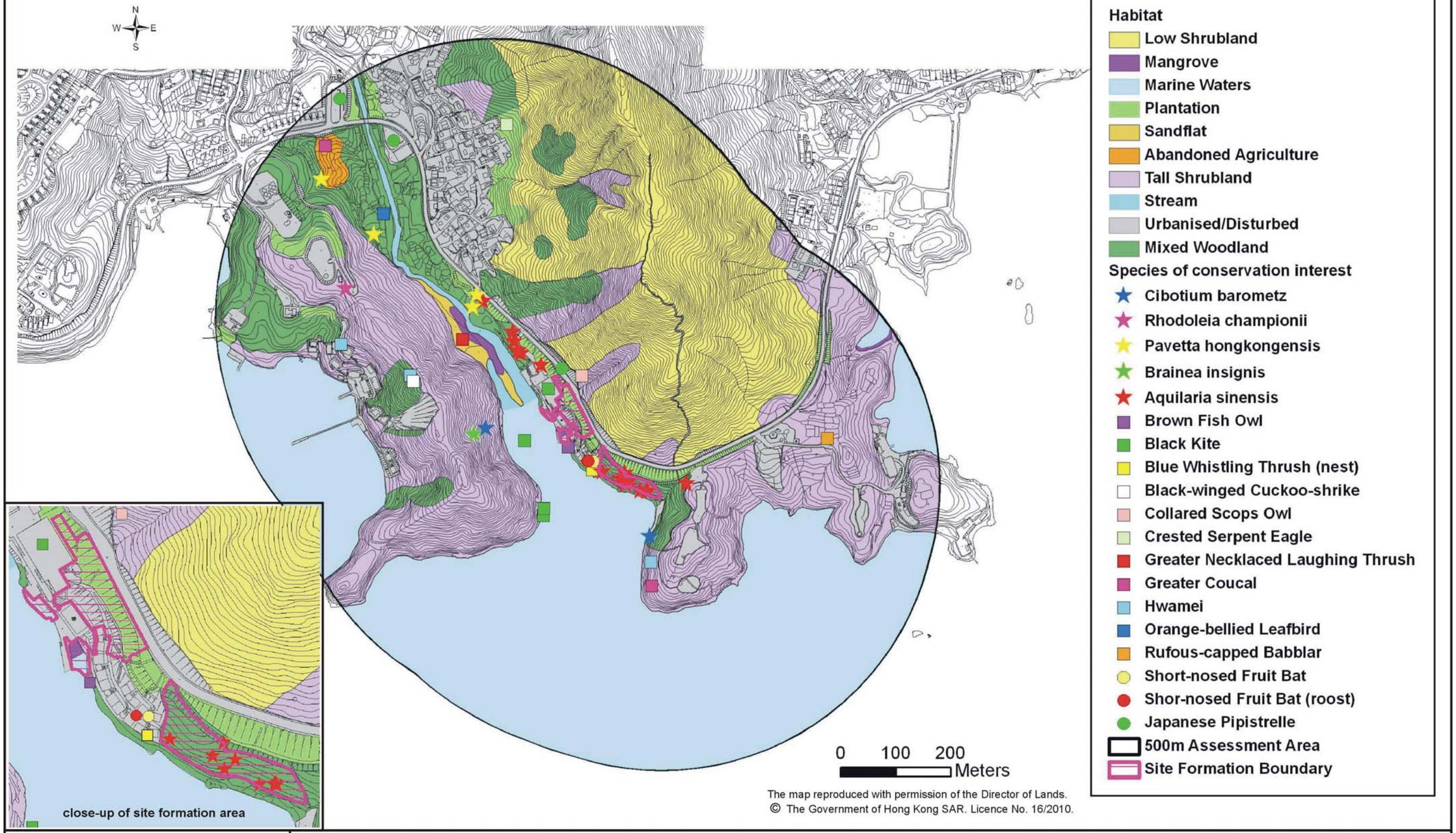


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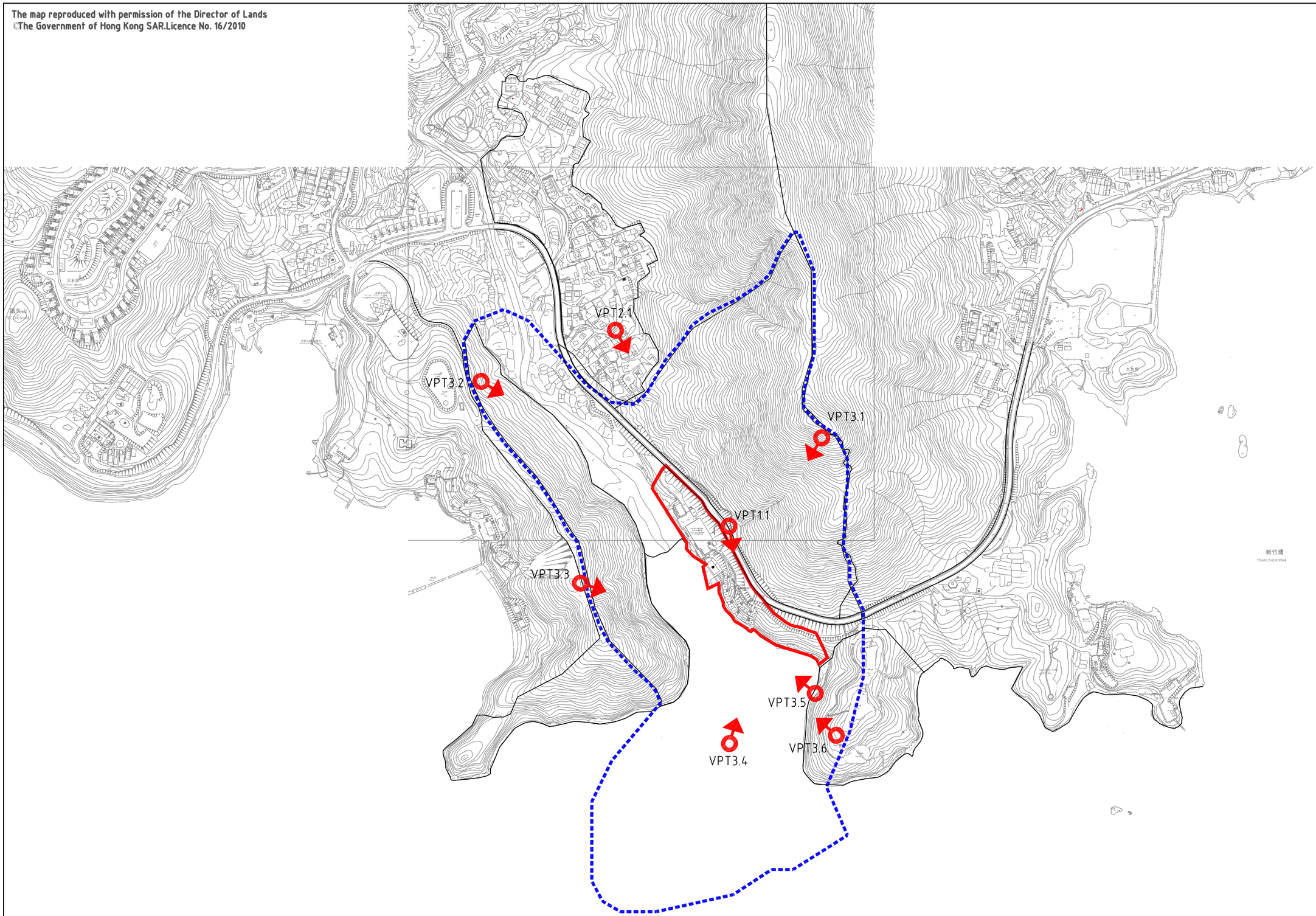
Figure 3. 2 Habitat Map and Species of Conservation Interest



LEGEND

- SUBJECT SITE
- VISUAL ENVELOP
- VPT1 — VIEW OF VSR

VPT1.1 – VIEW SOUTHEAST FROM TAI MONG TSAI ROAD

VPT2.1 – VIEW SOUTHEAST FROM TAI MONG TSAI VILLAGE

VPT3.1 – VIEW SOUTHWEST FROM CHEUNG SHAN

VPT3.2 – VIEW SOUTHEAST FROM HILLSIDE TRAIL &3.3 WEST OF SITE

VPT3.4 – VIEW NORTH FROM WATER CHANNEL BETWEEN WORK SITE AND YIM TIN TSAI

VPT3.5 – VIEW NORTHWEST FROM BARBECUE AREA 12

VPT3.6 – VIEWNORTHWEST FROM BARBECUE AREA 13

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	30JUN10	MINOR REVISION	IL

吳振麒園境規劃師事務所有限公司
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Landscape & Environmental Consultants
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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

ZONE OF VISUALLY SENSITIVE RECEIVERS
FIGURE 3.3

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/07.1A
Scale 比例	1:6000(A3)		
Date 日期	MAR10		

size = A1 plot scale 1 : 1

Figure 3.3 Zone of Visual Sensitive Receivers

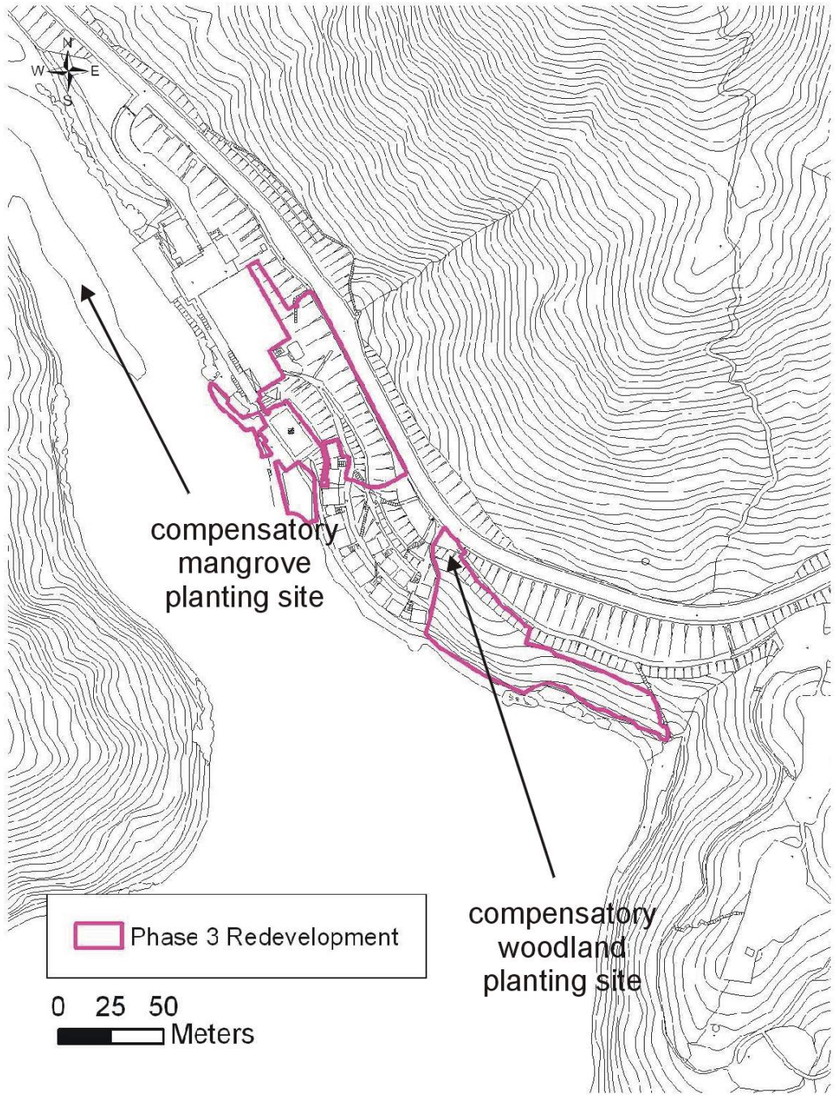

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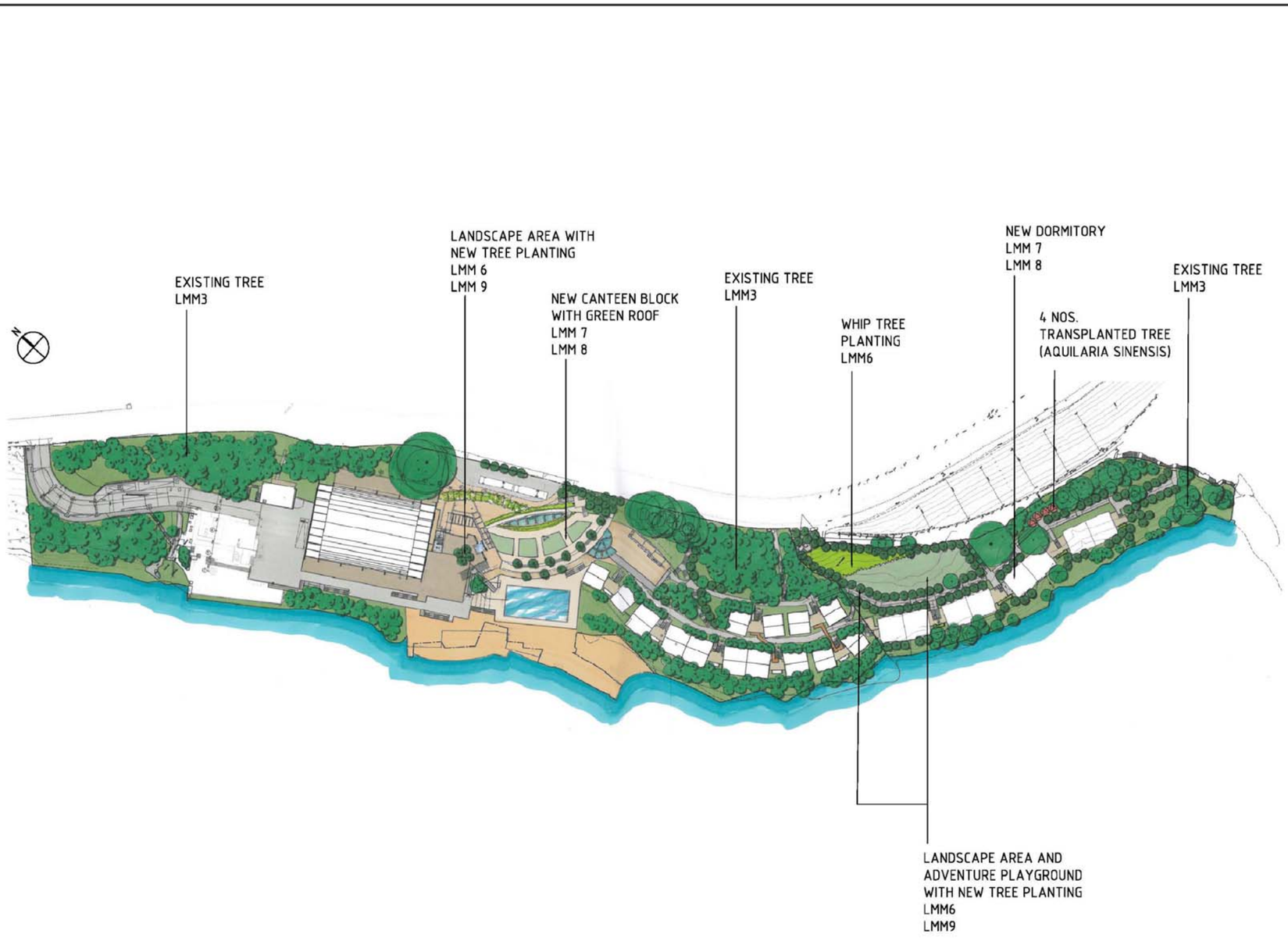
Figure 5.1 Location of mangrove and woodland compensatory planting area



LEGEND

- SITE BOUNDARY
- EXISTING TREE
- TRANSPLANTED TREE
- NEW TREE
- LMM1 LANDSCAPE MITIGATION MEASURES

參訂編號 No.	日期 Date	參訂 Revisions	繪圖 By
B	06.JUL.10	MINOR REVISION	IL
A	02.JUL.10	MAJOR REVISION	IL

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Project Title 項目

REDEVELOPMENT OF
HONG KONG FEDERATION OF YOUTH GROUPS
TAI MONG TSAI OUTDOOR TRAINING CAMP PHASE II
AT TAI MONG TSAI ROAD SAI KUNG

Drawing Title 圖題

LANDSCAPE LAYOUT PLAN
FIGURE 8

Designed by 設計	BEN	Approved by 審核	KN
Drawn by 繪圖	BEN	Job No. 參考號	AT3
Checked by 核對	AC	Drawing No. 圖號	AT3/LCP/08.1B
Scale 比例	N.T.S.		
Date 日期	MAR10		

size = A1 plot scale 1 : 1 Copyright Reserved. Do not scale from drawing

Figure 5.2 Landscape Layout Plan

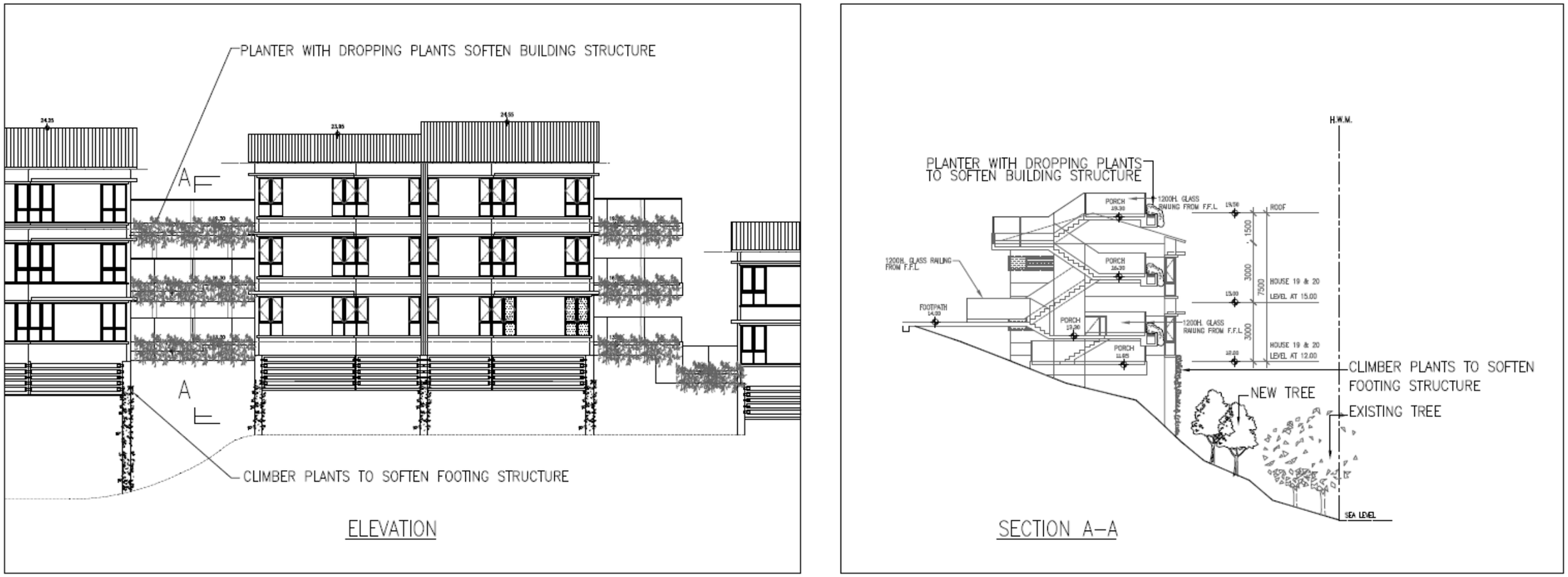

Figure 5.3 Proposed Landscape Treatment to Dormitory

APPENDICES

APPENDIX A
ECOLOGICAL IMPACT ASSESSMENT

Phase III Redevelopment
The Hong Kong Federation of Youth Groups
Jockey Club Sai Kung Outdoor Training Camp at Tai Mong Tsai
Ecological Impact Assessment

July 2010

Ecosystems Ltd.

Table of Content

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1. Introduction

The Hong Kong Federation of Youth Groups (HKFYG) Jockey Club Sai Kung Outdoor Training Camp was first constructed in 1960s to provide the general public, particularly young people, with social, recreational, educational, sports and leisure activities. Phase I and Phase II redevelopment, were completed in 1993 and in 2002 respectively to expand the capacity to meet the demand. Due to popularity of the site, Phase III redevelopment is currently proposed at the existing camp site and to the south of the existing camp site to meet the increasing demand from the public.

As the part of the proposed development is located inside Sai Kung West Country Park, ecological surveys were conducted in 2009 and 2010 to assess the ecological impacts of the proposed development. This report summarises the findings, impact assessment and mitigation measures proposed. This report also incorporates and addresses recommendations relevant to ecological impact assessment proposed by the Country and Marine Parks Board members during the board meeting in December 2006 and January 2010.

2. Legislation and Guidelines

The HKSAR ordinances and regulations relevant to ecological assessment of this Project include the following:

- Forests and Countryside Ordinance (Cap. 96) and its subsidiary legislation, the Forestry Regulations (Cap. 96A);
- Town Planning Ordinance (Cap. 131);
- Wild Animals Protection Ordinance (Cap. 170);
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586);
- Country Parks Ordinance (Cap. 208) and its subsidiary legislation;
- Marine Parks Ordinance (Cap 476); and
- Environmental Impact Assessment Ordinance ("the EIAO", Cap. 499) and the associated TM (EIAO-TM).

Ecological assessment will also make reference to the following guidelines and standards as well as international conventions:

- Hong Kong Planning Standards and Guidelines (HKPSG) Chapter 10, "Conservation";
- Ecological Baseline Survey For Ecological Assessment (EIAO Guidance Note No. 7/2002);
- Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys (EIAO Guidance Note No. 10/2004);
- Methodologies for Marine Ecological Baseline Surveys (EIAO Guidance Note No. 11/2004);
- PELB Technical Circular 1/97 / Works Branch Technical Circular 4/97, "Guidelines for Implementing the Policy on Off-site Ecological Mitigation Measures";
- ETWB Technical Circular (Works) No. 5/2005, “Protection of natural streams/rivers from adverse impacts arising from construction works”;
- Relevant wildlife protection laws in PRC;
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the "Ramsar Convention"), which requires parties to conserve and make wise use of wetland areas, particularly those supporting waterfowl populations;
- United Nations Convention on Biological Diversity, which requires parties to regulate or manage biological resources important for the conservation of biological diversity, to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;
- International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species.

3. Key Ecological Issues

Based on literature review, field surveys and discussion during Country and Marine Park Board meetings, key ecological issues identified include the followings:

- Intertidal habitat including mangrove;
- Woodland;
- Natural stream courses and rivers (e.g. Tai Mong Tsai Stream);
- Species of conservation concern including but not limited to Incense Tree, Lamb of Tartary, Brown Fish Owl and Hwamei.

4. Methodology

The study area for the purpose of ecological assessment include all areas within 500m from the site boundary of the land based works for Phase III redevelopment (**Figure 1**), or the areas of concern (e.g. sandflat and shallow subtidal zone, see **Figure 3c**). Surveys primarily focused on the Project Area and secondarily on the 500m area.

Relevant literature including previous ecological assessment reports and Hong Kong biodiversity database were reviewed. Field surveys were conducted between May to July 2009 and January to April 2010, covering both wet and dry seasons, to record ecological data within the study area and establish the ecological profile for incorporation into the assessment. In addition to day-time surveys, night-time surveys were conducted to record nocturnal fauna including birds, herpetofauna and mammals. Data analyses and discussions described habitats and species found in the study area, highlighting those that are rare, of conservation concern, or protected by law. Species groups surveyed and survey methods were described as below.

4.1 *Habitat and Vegetation*

Habitat of the Study Area was mapped based on 2009 government aerial photos and ground truthing. Walk-over surveys were conducted at representative areas of each habitat type. Plant species of each habitat type encountered and observed by binoculars and their relative abundance, with special attention to rare or protected species, were recorded. Colour photographs of all habitats encountered on site and of ecological features of special importance were provided. Habitat maps of the site were produced at the required scale using GIS software. Nomenclature and conservation status of plant species follow AFCD (2003, 2004) and Xing *et al*. (2000).

4.2 *Avifauna*

Birds within the Study Area were surveyed quantitatively. All birds seen and heard within the Study Area were identified, counted and recorded. Signs of breeding (e.g., nests, recent fledged juveniles, adult carrying nesting materials) were recorded. Night surveys were also conducted to identify nocturnal birds (e.g., owls) by active searching using spot-light and their calls. Signs of habitat uses by owls were also studied by search of regurgitated pellets. Ornithological nomenclature follows Viney *et al*. (2005).

4.3 *Other Terrestrial Fauna*

All dragonflies and butterflies encountered within the Study Area were identified, counted and recorded. Nomenclature for butterflies followed Yiu (2004) and dragonfly nomenclature followed Wilson (2004).

Surveys of herpetofauna within the Study Area were conducted through active searching. As herpetofauna are mostly nocturnal, night surveys were conducted to survey these fauna. Potential microhabitats of herpetofauna such as wall, litter, underneath of logs or other materials, artificial container (e.g., pots) were searched to locate cryptic or secretive herpetofauna species during night surveys. Amphibians were also identified by their calls during night surveys. Night surveys also covered mammals. Nocturnal mammals were actively searched using spot-light. Nomenclature used in this report for reptiles followed Karsen *et al*. (1998) while that for amphibians followed Chan *et al*. (2005).

Surveys of mammals were conducted by searching as well as recording all sightings, tracks, and signs of mammals found. Nomenclature for mammals follows Shek (2006).

4.4 *Stream Fauna*

The stream and estuarine area within the Study area were surveyed in both wet and dry seasons for the stream and estuarine invertebrates and fish.

Stream fauna within the Study Area were surveyed by active searching and direct observation, with the aid of hand net. Potential microhabitats such as beneath boulders and burrows were also searched to locate cryptic or secretive species. Encountered species were identified to the lowest practicable level and recorded.

A stream and estuarine fish survey was also conducted within the lower reach of the stream and the embayment to establish the fish species composition and their occurrence in the survey area. Survey techniques applied included active search, direct observation, baited traps and netting. Encountered species were identified to the lowest practicable level and recorded.

A list of stream invertebrates and fish for the survey area and their abundance was provided. The conservation status (including local, regional and international such as China Redlist and IUCN Redlist) of the recorded biota was also provided.

4.5 *Intertidal Surveys*

Intertidal communities (on both hard shores and soft shores) within the Study Area were surveyed during both wet season and dry season, by both quantitative transect survey as well as active searching and direct observation during walk-through survey. All surveys were conducted during suitable low tide (tide level below 1m).

Soft shores

The outlet of Tai Mong Tsai Stream forms an embayment, and a sandflat occupies the core part of the estuary.

The intertidal sandflat inside the embayment were surveyed. 50m horizontal transects were established at three tidal levels (High, Middle and Low tidal levels). (Locations of the soft shore transects are shown in **Figure 3c**).

There were ten 0.5m x 0.5m quadrats on each transect. The epifauna and infauna (within the top 5cm sediment) in each quadrat were identified and their numbers/coverage percentages were recorded. In addition, one core of 10cm diameter x 20cm depth was also collected within each quadrat. The sediments of the cores were sieved with 2mm mesh-size sieve and the biota inside were identified and counted. Species and abundance of biota in both cores and quadrats were reported.

Hard shores

Besides soft shores, there was also a belt of boulders along the fringe of the embayment and formed a narrow intertidal hard shore zone. One 50m Horizontal transect was established on the hard shore habitat at each of 3 locations within the embayment (including the Project Area inside the existing boundary of the camp as well as nearby hard shores in the embayment, see **Figure 3c**).

There were ten 0.5m x 0.5m quadrats on each transect. The epifauna in each quadrat were identified and their numbers/coverage percentages were recorded. Species and abundance of biota in quadrats were reported.

Besides the quantitative transect surveys, detailed active search surveys along the shore, on the sandflat, within the lower reach of the stream, and inside the embayment, were conducted during

both wet and dry season. to find out the species present and their occurrence in addition to the transect surveys, so as to produce a comprehensive species list of the survey area with their abundance.

4.6 *Dive Surveys*

There were shallow subtidal areas outside the embayment. A one-time spot-check dive survey for corals and other hard substrate marine organisms were conducted to investigate the conditions of subtidal habitats near the embayment. The purposes of the spot-check dive survey are to qualitatively record the habitat types and ecological values of the area by SCUBA diving. The locations for spot-check dive survey are shown in **Figure 3c**. Photos of the surveyed areas and the marine organisms encountered were taken during the dive survey.

5. Results of Literature Review

5.1 Sites of Conservation Importance/Land Zonings

The Study Area is located within Sai Kung West Country Park. It is also covered by the Outline Zoning Plan S/SK-TMT/4 - Tai Mong Tsai & Tsam Chuk Wan. Zonings within the Study Area include Recreation, Country Park, Coastal Protection Area, Green Belt, Village, Conservation Area, and Government/Institution/Community (**Figure 1**). The footprint of the proposed Phase 3 development is partially within Recreation zone (the existing camp site) and partially in Country Park area (government land) immediately to the south east of the existing camp site, while the proposed platform decks are mainly located below the high water mark.

5.2 Review of Existing Reports

Ecological surveys and assessments were conducted in 1998 for the Phase II redevelopment of the camp site. The baseline condition of the site back in 1998 is similar to the existing condition in terms of habitat type and species composition. No other ecological information concerning the Study Area has been identified.

A preliminary ecological survey conducted for the proposed Phase III redevelopment in October 2006 covered habitats, vegetation, mammals, avifauna, herpetofauna, dragonfly and butterfly. Habitats recorded included plantation, urbanised/disturbed area, mixed woodland and tall shrubland. Two plant species of conservation concern, *Aquilaria sinensis* (Incense Tree) and *Cibotium barometz* (the Lamb of Tartary), were recorded during the ecological field survey. The recorded fauna species were mostly common and generally of low conservation interest. Diversity of terrestrial fauna was considered low. The only terrestrial fauna of conservation interest recorded was Hwamei *Garrulax canorus*, which was recorded from tall shrubland. This species is listed in Appendix 2 of CITES.

A Brown Fish Owl *Ketupa zeylonensis* rehabilitated in Kadoorie Farm and Botanic Garden was released in Sai Kung in November 2003 (Kadoorie Farm and Botanic Garden 2008). This species is very rare in Hong Kong and with restricted distribution. Brown Fish Owls were only recorded at four localities between 1958 and 1998: Discovery Bay of Lantau, Tai Tan, Yung Shue O and Pak Tam Chung of Sai Kung (Carey *et al*. 2001). Brown Fish Owl is a Class 2 Protected Animal of PRC and listed in Appendix 2 of CITES (Wang 1998).

The Brown Fish Owl was radio-tracked between November 2003 and April 2004 as post-release monitoring. The bird was found in 15 locations in Sai Kung peninsula during the monitoring (*ibid*.). The final recorded location was about 13km from the release site (*ibid*.). These observations suggested that Brown Fish Owl might have a fairly large home range. For much of the study period, the owl roosted in woodland patches near rural villages with stream and fairly disturbed habitats (e.g., grassland, shrubland) in proximity (*ibid*.). The locations where the owl was recorded suggested that the bird might prey on rodents inhabiting areas near villages and the owl may also have been foraging along streams and stream outlets to the sea (*ibid*.).

During the surveys between 2001 and 2003, AFCD recorded two White-bellied Sea Eagles in coastal waters within 500m boundary of the present proposed project (Tsim et al. 2003). No nest

of this species was found within the 500m boundary of the present proposed project during the survey Most of the populations of White-bellied Sea Eagles in Hong Kong inhabit the eastern waters (ibid.).

AFCD conducted a long-term, territory-wide camera trap survey of medium-sized mammals of Hong Kong between 2002 and 2006 (Shek et al. 2007). The AFCD survey covered the hillside at the northern edge of the 500m boundary of the project area. The recorded mammal species in this area included East Asian Porcupine *Hystrix brachyura*, Small-toothed Ferret Badger *Melogale moschata*, Small Indian Civet *Viverricula indica*, Leopard Cat *Prionailurus bengalensis*, Eurasian Wild Pig *Sus scrofa* and Red Muntjac *Muntiacus muntjak*. All except Eurasian Wild Boar are protected under the WAPO. East Asian Porcupine, Small Indian Civet Viverricula indica and Red Muntjac are very common in Hong Kong (Shek et al. 2007). Small-toothed Ferret Badger is common while Leopard Cat is uncommon (ibid). Eurasian wild Pig occurs in many types of habitats. The other species mainly inhabit woodlands.

6. Results of Field Surveys

6.1 *Habitat and Vegetation*

Habitats recorded within the Study Area included mixed woodland, plantation, tall shrubland, low shrubland, stream, mangrove/sandflat, abandoned agricultural land, urbanised/disturbed, and marine waters (**Figure 2** and **Figure 3**). A total of 301 plant species were recorded, 85 of which are exotic species (**Annex 1**). Five plant species considered of conservation concern were recorded during the ecological field survey within the Study Area, i.e. *Aquilaria sinensis* (Incense Tree), Rhodoleia championii (Rhodoleia), *Pavetta hongkongensis* (Pavetta), *Cibotium barometz* (Lamb of Tartary) and *Brainea insignis* (Cycad Fern).

The mixed woodland was young with a canopy of about 5-8 m in height and has dense understorey. 153 plant species were recorded in this habitat. It was composed of planted a mixture of native species tree, shrub and herb species, including *Schefflera heptaphylla, Sterculia lanceolata, Cinnamomum parthenoxylon, Rhus succedanea, Psychotria rubra, Dicranopteris pedata* and *Lophatherum gracile* and exotic species including *Livistona chinensis, Casuarina equisetifolia* and *Gossapinus malabaricum.*

Three species of conservation interest were mainly recorded in mixed woodland. *Aquilaria sinensis* is protected under Cap. 586 in Hong Kong and is rather common in lowland forest and fung shui woods. It is also a Category II nationally protected species in China and is listed as vulnerable in the China Plant Red Data Book and by IUCN (2002). There were at least four mature trees and some seedlings encountered within the Study Area during the ecological field survey. The tree survey recorded 8 no. of *Aquilaria sinensis* within the site formation boundary.

Cibotium barometz is a large tree-like fern native to China including Hong Kong. It is widely distributed and commonly found in Hong Kong, mainly along shrubby and forested valleys and forest margins. Its rhizomes could be used in herbal formulas. It is listed in Appendix 2 of CITES, which is applied for species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. Within the mixed-woodland habitat, one individual was found at a ditch on the southern part of the site.

Pavetta hongkongensis is a shrub native to Hong Kong. It is a common woodland understorey species and is protected under Forestry Regulations (Cap. 96).

Plantation was mainly found on engineering slopes next to Tai Mong Tsai Road, It had a canopy of 12-15m, dominated by *Acacia confusa*. Other trees recorded at the canopy included *Sterculia lanceolata, Macaranga tanarius, Acronychia pedunculata*, and *Schefflera heptaphylla*. The understorey of the plantation was cleared for maintenance purpose and therefore was little vegetated. 79 plant species were recorded, including an individual of *Aquilaria sinensis* and *Pavetta hongkongensis* along Tai Mong Tsai Road

Tall shrubland has composition similar to mixed woodland except that it was less than 5 m in height and was composed of more shrubs, herbs and ferns than tree species. 104 plant species

were recorded. Common species recorded included *Rhodomyrtus tomentosa*, *Rhaphiolepis indica*, *Schefflera heptaphylla* and *Rhus spp*. Two trees of conservation interest (*Rhodoleia championii, Aquilaria sinensis*) and two ferns of conservation interest, *Cibotium* barometz and Brainea insignis were recorded in this habitat.

Low shrubland mainly occupied the hillside above Tai Mong Tsai Road. It was probably maintained by hillfires. 57 plant species were recorded. Species commonly seen included *Dicranopteris pedata*, *Miscanthus sinensis* and *Rhodomyrtus tomentosa*.

A small area of abandoned agricultural land was found near Tai Mong Tsai Road. It was dominated by grasses and weeds a few isolated trees also colonised the site. 19 plant species were recorded.

The urbanised/disturbed area was composed of existing camp site, villages and other recreational facilities in the nearby area. Ornamental or landscaping species recorded included *Bauhinia variegata, Schefflera arboricola, Rhododendron pulchrum, Bambusa ventricosa.* No plant species of conservation interest was recorded within this habitat.

The estuary and lower course of Tai Mong Tsai Stream are within the Study Area. Most of the section was subject to tidal influence and composed of a mixture of backshore species and native and exotic trees and shrubs. 42 plant species were recorded.

Small stands of mangrove established on the sandflat at Tai Mong Tsai Stream estuary and scattered along the intertidal zone along the coastlines within the study area boundary. Species found included *Kandelia obovata* of about 1 m in height, other mangrove species including *Excoecaria agallocha* and backshore species including *Hibiscus tiliaceus, Clerodendrum inerme,* and *Canavalia maritima*. The backshore species established along the coast above high tide line and merged to the mixed woodland habitat uphill.

6.2 *Avifauna*

Sixty-eight species of bird (e.g., Chinese Bulbul *Pycnonotus sinensis*) were recorded within the Study Area (**Annex 2**). Both abundance and species richness of birds were low to moderate in mixed woodland, and low in plantation, coastal habitats (including estuary, mangrove, sandflat and rocky shores), tall shrubland, urbanized/disturbed, abandoned agriculture and very low in low shrubland and stream within the Study Area.

A nest of Blue Whistling Thrush *Myiophoneus caeruleus* was found under a building in the Training Camp (**Figure 2**). This species is common in Hong Kong, and occurs in many types of habitats (e.g., urban parks). There was no other sign of breeding within the Study Area.

Ten species of birds were considered of conservation concern. These were Brown Fish Owl, Collared Scops Owl *Otus lettia*, Crested Serpent Eagle *Spilornis cheela*, Black Kite *Milvus lineatus*, Greater Coucal *Centropus sinensis*, Hwamei, Greater Necklaced Laughingthrush *Garrulax pectoralis*, Rufous-capped Babbler *Stachyris ruficeps*, Black-winged Cuckoo-shrike *Coracina melaschistos* and Orange-bellied Leafbirds *Chloropsis hardwickii*. Apart from Brown Fish Owl, all these species of recorded at localities away from the proposed project areas.

Brown Fish Owl, Collared Scops Owl, Crested Serpent Eagle, Black Kite and Hwamei are listed in Appendix 2 of CITES (Wang 1998). Brown Fish Owl, Collared Scops Owl, Crested Serpent Eagle, Black Kite and Greater Coucal are Class 2 Protected Animals of PRC (*ibid*.). Crested Serpent Eagle, Black-winged Cuckoo-shrike, Orange-bellied Leafbird, Rufous-capped Babbler and Greater Necklaced Laughingthrush are rare in Hong Kong. Brown Fish Owl is very rare in Hong Kong. All birds are protected under the WAPO.

Black Kites were soaring above the Training Camp and coastal area within the Study Area. This is a common resident in Hong Kong and occurs in many types of habitats (Carey *et al*. 2001).

Greater Coucal was recorded from tall shrubland and abandoned agriculture within the Study Area. This is a common resident in Hong Kong and occurs in many types of habitats (Carey *et al*. 2001).

A Hwamei was heard from tall shrubland within the Study Area. A flock of three birds were seen within the Outward Bound School. Hwamei is a common resident in Hong Kong. This species mainly found in hillsides covered by thick shrublands.

Flocks of Greater Necklaced Laughingthrush were recorded from mixed woodland within the Study Area. This is a rare resident in Hong Kong, and mainly confined to woodlands.

A Crested Serpent Eagle was soaring above plantation near Tai Mong Tsai village. This species is a rare resident in Hong Kong and is mainly found in large woodland.

A Brown Fish Owl was sighted at the Tai Mong Tsai estuary. This species is a very rare resident in Hong Kong. The owl was perching on mangroves. The favorite habitat of Brown Fish Owl is sparse woodland patches close to stream, reservoir or estuarine water (Kadoorie Farm and Botanic Garden 2008).

One Collared Scops Owl was heard in tall shrubland within the Study Area. This species is a common resident in Hong Kong and widely found in woodlands (Carey *et al*. 2001).

Two Orange-bellied Leafbirds were sighted in woodland in upstream of Tai Mong Tsai Stream. Orange-bellied Leafbird is a rare resident and winter visitor. This species is mainly found in woodlands and most records came from Tai Po Kau Nature Reserve (Carey *et al*. 2001, Viney *et al*. 2005).

Rufous-capped Babbler was sighted in tall shrubland near the Monument. This is a rare resident and considered of escaped/released cage bird origin (Carey *et al*. 2001). Rufous-capped Babbler mainly inhabits woodlands (*ibid*.).

Black-winged Cuckoo-shrike was sighted in mixed woodland near Outward Bound School. This is a rare winter visitor and passage migrant in Hong Kong (Carey *et al*. 2001). Black-winged Cuckoo-shrike is usually found in woodland edge areas. Most of the records of this species came from Tai Po Kau Nature Reserve (Carey *et al*. 2001).

One bird species of uncertain status was recorded within the Study Area. A Mountain Tailorbird *Orthotomus cuculatus* was sighted in mixed woodland near Outward Bound School. The status of Mountain Tailorbird in Hong Kong is uncertain (Viney *et al*. 2005). Hong Kong is outside the distribution range of this species (Mackinnon and Phillipps 2000). The Mountain Tailorbird observed might be originated from released birds.

6.3 *Other Terrestrial Fauna*

Forty-three species of butterfly were recorded (**Annex 3a**). All except Chocolate Pansy *Junonia iphita* and White-edged Blue Baron *Euthalia phemius* are common/very common in Hong Kong. Both Chocolate Pansy and White-edged Blue Baron are uncommon in Hong Kong (Yiu 2004). Both abundance and species richness of butterfly were low in coastal habitats (including estuary, mangrove, sandflat and rocky shores) and low shrubland, and low to moderate in other types of habitats.

Fourteen species of dragonfly were recorded (**Annex 3b**). All are common and widespread in Hong Kong (Wilson 2004). Apart from stream, both abundance and species richness of dragonfly were very low in all types of habitats within the Study Area. Both abundance and species richness of dragonfly were low in stream within the Study Area.

Three species of amphibian were recorded within the Study Area (**Annex 4**). All the recorded species are common and widespread in Hong Kong (Chan *et al*. 2005). These frog species were present in low abundance within the Study Area.

Seven species of reptile were recorded within the Study Area (**Annex4**). All except Buff-striped Keelback are common in Hong Kong and occurs in many types of habitats (Karen *et al*. 1998). Buff-striped Keelback is uncommon, and mainly inhabit streams and irrigation channels of cultivations (*ibid*.).

Three species of mammal were recorded within the Study Area (**Annex 4**). These were Short-nosed Fruit Bat *Cynopterus sphinx*, Japanese Pipistrelle *Pipistrellus abramus* and Wild Boar *Sus scrofa*. Short-nosed Fruit Bat and Japanese Pipistrelle are protected under the WAPO.

Digging and roosting signs of Wild Boars were found in low shrubland and tall shrubland within the Study Area. Wild Boar is common and has a wide distribution in Hong Kong (Shek 2006).

Japanese Pipistrelles were sighted foraging in urbanized/disturbed within the Study Area. This species is the most common bat species found in both the countryside and urban areas of Hong Kong (Shek and Chan 2006).

Two roosts of Short-nosed Fruit Bats were found Chinese Fan-palm within the Training Camp during surveys in dry season. The numbers of roosting bats in the two roosts were 14 and 6 individuals. The roosts translocated during the surveys and many leaves of the Chinese Fan-palm within the Training Camp were bittern to shape of tent roosts. The bats may change their roosts regularly.

Short-nosed Fruit Bat is very common in Hong Kong (Shek and Chan 2006). This bat species in Hong Kong make their "tent" roosts by chewing and modifying the large fan-shaped leaves of Chinese Fan-palm and Petticoat Palm (Shek 2006). The making of tent roost can be completed within 2 to 3 nights (Shek 2006). Short-nosed Fruit Bat lives in a wide variety of habitats, including woodlands and urban areas (Shek and Chan 2006). This species can be commonly found in the areas where human disturbance is prevalent, e.g., parks and gardens. This suggests that Short-nosed Fruit Bat can tolerate human disturbance in the vicinity of their roosts.

6.4 *Stream Fauna*

A list of the stream invertebrate fauna recorded during the survey Tai Mong Tsai Stream drains the southwest slope of Lui Ta Shek, and the main course is over 2 km in length. Although the majority of the habitat in the catchment area is still natural, Tai Mong Tsai Stream is not considered as an Ecologically Important Streams (see ETWB TCW No.5/2005).

The section of Tai Mong Tsai Stream near the Project Site is the outlet and estuary section of the stream, and is subject to tidal influence, evident by the colonization of mangroves, mangrove associates, or backshores plants. Abundant nerita snails were found inside the channel. Egg capsules were also found on boulder surfaces, indicating that the estuary section provides a certain level of breeding ground function.

Another species of snail *Melanoides tuberculata* was also recorded in the channel. This snail is usually found in lowland section of streams and the fishponds in Northwest New Territories.

On the channel banks, Sesarmind crab *Pseudosesarma patshuni* was recorded. It was an uncommon sesarmind crab usually found in stream banks in lowland or near mangroves. This species was previously recorded in Hong Kong as a species new to science.

Crab burrows and individuals of another sesarmind crab *Chasmagnathus convexus* were also found on the channel banks. .This species is usually found in backshore and near mangroves.

A total of 35 species of fish was recorded in the stream and estuary of Tai Mong Tsai Stream. Though typical freshwater species was not found, estuarine fish were sighted inside water. Among the fish species recorded, the majority was common and widespread fish species without special conservation value such as terapons (*Terapon jarbua*), Common silver biddy (*Gerres oyena*) and juveniles of Mangrove red snapper (*Lutjanus argentimaculatus*).

Only two goby fish species (i.e. *Psammogobius biocellatus* and *Favonigobius reichei*) were considered "Lower risk/near threatened" under the IUCN redlist. *Psammogobius biocellatus* is considered uncommon with records from some streams in Sai Kung and northeastern New Territories. *Favonigobius reichei* is a common intertidal goby fish in Hong Kong and could be found in intertidal waters throughout Hong Kong.

Three other species of fish are also listed in the IUCN redlist but they are not considered of risk. Mullet *Mugil cephalus* and the Goby *Tridentiger bifasciatus* are considered as 'Least Concern", while the Grass Puffer *Takifugu niphobles* is listed as "Data deficient".

6.5 *Intertidal Communities*

To the west of the stream channel there is a sandflat and mangrove mixture. The sandflat occupied the majority of the area and some mangroves colonized in the middle of the sandflat.

On the exposed sandflat, abundant Fiddler crab individuals, mainly *Uca lactea* and *Uca borealis* with a small number of *Uca crassipes*, were found. Mangrove snails *Terebralia sulcata* and *Cerithidea* sp. were also found on the sandflat. All of them are common in sandflat and estuarine habitats, and not of special conservation concern.

Further to the walk-through survey, two transect surveys were conducted on the sandflat at high middle and low tidal levels in both wet and dry seasons (i.e. January and April 2010).

The recorded species during the transect surveys were also all common species, and the abundance of epifauna and infauna were low. Especially in the low tidal level, where many quadrats had no record of epifauna or infauna.

Among the mangroves, more individuals of sesarmind crab *Chasmagnathus convexus* were recorded. As mentioned before, this species is typically found near mangroves.

On some locations such as near the stream channel, the substrates were more muddy and species typically found on muddy sandflat and/or mudflat were recorded including Sesarmind crab *Metaplex* sp., Small mangrove clam *Gafrarium* sp., and Pistol shrimp *Alpheus* sp. Individuals of Mudskipper *Periophthalmus modestus* were observed. This mudskipper is the most common and widely distributed species among the recorded mudskippers in Hong Kong.

There were only limited areas of hard substrates in the intertidal zone, mainly the rocks along the embayment boundary and the Project Site. Only very limited intertidal fauna mainly Rock oyster *Saccostrea cucullata*, which is the most common hard shore intertidal fauna in Hong Kong, was found on the hard substrates. Transect surveys were also conducted on the rock at the rocky substrate in both wet and dry seasons (i.e. January and April 2010). Only Rock oyster *Saccostrea cucullata* and Barnacle *Balanus amphitrite* were found on rocky surface. Beneath the boulders on these hard substrate area, more intertidal fauna was found, including Snail *Monodonta*, *Lunella coronata*, and Crab *Gaetice depressus*. They are also all common intertidal tidal fauna in Hong Kong and not of very high abundance

6.6 *Coral Communities*

Shallow subtidal habitat occurred outside the embayment opening. Basically the shallow subtidal areas were sandy and boulder substrates, and sheltered from direct wave actions (the area is located inside a channel between Kau Sai Chau and Sai Kung area). The surveyed areas were very shallow, and the water depth was mostly about 2m.

For the area to the west of the opening (Area 1), the dominant substrate was sandy bottom. There were limited boulders there and provided little hard substrate for coral colonization. There was no hard coral recorded there.

The seabed to the east of the opening (Area 2) was covered by more boulders, and 12 hard coral species were found. The coral coverage however was low (only 5-10%). The corals were mainly on boulders within 10 -20m from the shoreline and they were scattered. The 12 corals species were mostly dominant and abundant coral species in Hong Kong, only two of them were uncommon species (i.e. *Favites flexuosa* and *Goniastrea favulus*). No other species of conservation value found during the dive survey. Only common species such as rock oyster and soft-spine sea urchin were recorded.

Table 6.1 Coral species recorded during the dive survey

Scientific name	Commonness in Hong Kong
Cyphastrea serailia	Dominant
Favia lizardensis	Common
Favia speciosa	Abundant
Favites chinensis	Dominant
Favites flexuosa	**Uncommon**
Favites pentagona	Dominant
Goniastrea aspera	Common
Goniastrea favulus	**Uncommon**
Leptastrea pruinosa	Abundant
Pavona decussata	Abundant
Porites lobata	Common
Turbinaria peltata	Common

Table 6.2 Ecological Attributes and Substratum Attributes

Rank	Dive Area 1	Dive Area 2
Benthic attributes		
Hard coral	0	1
Octocoral (soft corals, and gorgonians)	0	0
Black Corals	0	0
Dead standing corals	0	0
Anemone beds	0	0
Other benthos (sponges, zoanthids, ascidians and bryozoans)	0	0.5
Macro-algae	0	0.5
Substratum Attributes		
Bedrock/continuous pavement	0	0
Boulder Blocks (diam.>50cm)	0	0
Boulder Blocks (diam.<50cm)	0.5	2
Rubble	0	1
Other	0	0
Soft Substrata		
Sand	5	4
Mud/Silt	0	0
Mud	0	0

* Rank of percentage cover: 0 = None recorded; 0.5 = 1-5%; 1 = 6-10%; 2 = 11-30 %; 3 = 31-50%; 4= 51-75 %; 5 = 76-100%.

7. Evaluation of Habitats and Species

The ecological importance of the habitats within the Study Area was evaluated in accordance with the criteria stipulated in Annex 8 of EIAO TM (Table 4.1 to 4.6).

In accordance with Table 3, Annex 8 of the EIAO-TM, the ecological value of species was assessed in terms of protection status (e.g. fauna protected under WAPO (except birds), and flora and fauna protected under regional/global legislations/conventions), species distribution (e.g. endemic), and rarity (e.g. rare or restricted). The list and evaluation of the flora and faunal species of conservation concern recorded within the study area, according to the TM-EIAO, are given in Tables 4.7 and 4.8.

Table 7.1 Evaluation of Mixed-Woodland Habitat within the Study Area

Criterion	Description
Naturalness	Semi-natural habitat, consisted of a mixture of pioneer native tree species and orchard species.
Size	A total 12.94 ha
Diversity	Moderate flora diversity. Low to moderate diversity of bird and butterfly, very low diversity of dragonfly.
Rarity	Flora: *Aquilaria sinensis*, *Cibotium barometz*, *Pavetta hongkongensis* (protected but not uncommon). Fauna: Orange-bellied Leafbird, Black-winged Cuckoo-shrike, Greater Necklaced Laughingthrush (rare).
Re-creatability	Quite easy to recreate as it was formed of common species
Fragmentation	Two separate stands within the study area.
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	High with protection
Nursery/breeding ground	No significant record, but can provide breeding habitats for mammals, birds, reptiles and butterflies
Age	Young, mostly about 5-15 years.
Abundance/richness of wildlife	Low to moderate bird and butterfly abundance, very low dragonfly abundance
Overall ecological value	Low to moderate

Table 7.2 Evaluation of Plantation Habitat within the Study Area

Criterion	Description
Naturalness	Man made (planted) with some natural colonisation. Understorey regularly cleared.
Size	A total of 2.9 ha
Diversity	Low to moderate flora diversity. Low to moderate diversity of butterfly, low diversity of bird, very low diversity of dragonfly.
Rarity	Flora: *Aquilaria sinensis, Pavetta hongkongensis* (protected but not uncommon) Fauna: Crested Serpent Eagle (Class 2 Protected Animal of PRC, Appendix 2 of CITES, rare)
Re-creatability	Easy to recreate
Fragmentation	Formed thin belts on engineering slopes
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Moderate with active management including thinning and interplant with native species
Nursery/breeding ground	No significant record. Value as breeding habitat for terrestrial fauna is low due to sparse canopy and made up of exotic tree species.
Age	Young
Abundance/richness of wildlife	Low to moderate butterfly, low bird, very low dragonfly abundance
Overall ecological value	Low

Table 7.3 Evaluation of Tall Shrubland Habitat within the Study Area

Criterion	Description
Naturalness	Mostly natural but frequently disturbed by fire
Size	26.71 ha
Diversity	Low flora diversity. Low to moderate diversity of butterfly, low diversity of bird, very low diversity of dragonfly.
Rarity	Flora: *Aquilaria sinensis, Cibotium barometz, Brainea insignis* (protected but not

Criterion	Description
	rare), *Rhodoleia championii* (very rare but also widely planted) Fauna: Collared Scops Owl (Class 2 Protected Animal of PRC, Appendix 2 of CITES), Hwamei (Appendix 2 of CITES), Greater Coucal (Class 2 Protected Animal of PRC), Rufous-capped Babbler (rare)
Re-creatability	Maintained by hillfire
Fragmentation	Formed continuous stands along coastal hillsides
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low due to presence of grave sites
Nursery/breeding ground	No significant record, but can provide breeding habitats for mammals, birds, reptiles and butterflies
Age	N/A
Abundance/richness of wildlife	Low to moderate butterfly, low bird, very low dragonfly abundance
Overall ecological value	Low to moderate

Table 7.4 Evaluation of Low Shrubland

Criterion	Description
Naturalness	Mostly natural but frequently disturbed by fire
Size	25.01 ha
Diversity	Low flora diversity. Low diversity of butterfly, very low diversity of bird and dragonfly
Rarity	No fauna of conservation concern was recorded
Re-creatability	Maintained by hillfire
Fragmentation	Large stand on hillsides within Country Park
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low due to presence of grave sites
Nursery/breeding ground	No significant record. Value as breeding habitat for terrestrial fauna is low due to high level of disturbance and low vegetation cover.
Age	N/A
Abundance/richness of wildlife	Low butterfly, very low bird and dragonfly abundance
Overall ecological value	Low

Table 7.5 Evaluation of Abandoned Agricultural Land

Criterion	Description
Naturalness	Man-made habitat
Size	0.43 ha
Diversity	Low flora diversity. Low to moderate diversity of butterfly, low diversity of bird and and very low diversity of dragonfly
Rarity	Fauna: Greater Coucal (Class 2 Protected Animal of PRC)
Re-creatability	Easy to re-create
Fragmentation	Isolated stand surrounded by mixed-woodland
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Limited, maintained by grazing
Nursery/breeding ground	No significant record.
Age	N/A
Abundance/richness of wildlife	Low to moderate butterfly, low bird and and very low dragonfly abundance

Criterion	Description
Overall ecological value	Low

Table 7.6 Evaluation of Urbanised/Disturbed Habitat within the Study Area

Criterion	Description
Naturalness	Man made habitat
Size	0.43 ha
Diversity	Low flora diversity. Low to moderate diversity of butterfly, low diversity of bird, very low diversity of dragonfly.
Rarity	No flora species recorded Fauna: Black Kite (Class 2 Protected Animal of PRC, Appendix 2 of CITES), Hwamei (Appendix 2 of CITES), Short-nosed Fruit Bat (WAPO), Japanese Pipistrelle (WAPO)
Re-creatability	Easy to recreate
Fragmentation	None
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low
Nursery/breeding ground	A nest of Blue whistling Thrush was found. Value as breeding habitat for terrestrial fauna is low due to high level of disturbance and low vegetation cover
Age	N/A
Abundance/richness of wildlife	Low to moderate butterfly, low bird, very low dragonfly abundance
Overall ecological value	Low

Table 7.7 Evaluation of Stream Habitat (Tai Mong Tsai Stream Estuary) within the Study Area

Criterion	Description
Naturalness	Fairly natural, although some exotic plant species also established along the bank
Size	800 m
Diversity	Low flora diversity. Very low diversity of bird and low dragonfly, low to moderate diversity of butterfly
Rarity	Fauna: Black Kite (Class 2 Protected Animal of PRC, Appendix 2 of CITES)
Re-creatability	Difficult to recreate
Fragmentation	Estuary fairly intact with upper course
Ecological linkage	Linked to mangrove/sandflat
Potential value	N/A
Nursery/breeding ground	Breeding ground for marine or estuarine species. Limited as breeding habitats for amphibians and dragonflies due to tidal influence.
Age	N/A
Abundance/richness of wildlife	Moderate aquatic fauna abundance. Very low bird, low dragonfly, low to moderate butterfly abundance
Overall ecological value	Low to moderate

Table 7.8 Evaluation of Sandflat/Mangrove, and Intertidal Habitat within the Study Area

Criterion	Description		
	Mangrove /sandflat	Intertidal hard substrate	Shallow subtidal
Naturalness	Fairly natural and little disturbed	Basically natural with occasional modification	Basically natural with small modifications from previous

Criterion	Description		
	Mangrove /sandflat	Intertidal hard substrate	Shallow subtidal
			cable/pipeline installation
Size	0.63 ha	NA. Scattered within the Study Area.	NA
Diversity	Low flora, low diversity of bird and butterfly, very low diversity of dragonfly, moderate intertidal fauna diversity	Very low or even no epifauna found	Low to moderate diversity of hard corals, low diversity of other subtidal fauna
Rarity	No rare species recorded Fauna: Brown fish Owl (Class 2 Protected Animal of PRC, Appendix 2 of CITES, very rare)	No rare species recorded	No rare species recorded. Only two hard corals considered uncommon in Hong Kong
Re-creatability	Difficult to recreate	Readily recreate	Difficult to recreate
Fragmentation	N/A	N/A	N/A
Ecological linkage	Linked to Tai Mong Tsai Stream	Not functionally linked to habitats of conservation importance	Linked to Tai Mong Tsai Stream estuary and sandflat
Potential value	Moderate in the sandflat, low for those in site formation boundary due to limited size	Low due to the nature of the substrate	Low
Nursery/breeding ground	No record	No record	No record
Age	N/A	N/A	N/A
Abundance/richness of wildlife	Low bird and butterfly, very low dragonfly abundance, moderate for intertidal fauna abundance	Low bird and butterfly abundance, very low butterfly abundance, very low intertidal fauna abundance	Low on subtidal fauna including corals (only 5-10% coverage)
Overall ecological value	Low to moderate	Low	Low to moderate

Table 7.9 Evaluation of floral species of conservation interest within the Study Area

Common Name	Scientific Name	Locations	Protection Status	Distribution	Rarity
Incense Tree	*Aquilaria sinensis*	Mixed Woodland; Tall Shrubland; Plantation	Protected by Protection of Endangered Species of Animals and Plants Ordinance, Cap. 586. Category II nationally protected species in China and is listed as vulnerable in the China Plant Red Data Book and by IUCN (2002).	Lowland forests and fung shui woods	Locally common
Rhodoleia	*Rhodoleia championii*	Tall Shrubland	Protected by Forestry Regulations (Cap.	Forest	Very rare naturally, but

Common Name	Scientific Name	Locations	Protection Status	Distribution	Rarity
			96)		also widely planted
Lam of Tartary	*Cibotium barometz*	Mixed Woodland, Tall shrubland	Protected by Protection of Endangered Species of Animals and Plants Ordinance, Cap. 586. Category II nationally protected species in China and is listed as vulnerable in the China Plant Red Data Book	Shade and moist places in ravines and under forests	Locally common
Pavetta	*Pavetta hongkongensis*	Mixed Woodland, Plantation	Protected by Forestry Regulations (Cap. 96)	thickets or forests	Locally common
Cycad-fern	*Brainea insignis*	Tall shrubland	Vulnerable (VU). Wild plant under State protection (category II).	open hillsides, margin of forests and sometimes in secondary forests	Locally common

Table 7.10 Evaluation of faunal species of conservation interest within the Study Area

Common name	Locations	Protection status	Distribution	Rarity
Short-nosed Fruit Bat *Cynopterus sphinx*	Flying and roosting in the Training Camp	Wild Animals Protection Ordinance (Cap 170)	Widely distributed in Hong Kong, occurs in many types of habitats.	Common in Hong Kong
Japanese Pipistrelle *Pipistrellus abramus*	Flying in urbanized/disturbed within the Study Area	Wild Animals Protection Ordinance (Cap 170)	Widely distributed in Hong Kong, occurs in many types of habitats.	Common in Hong Kong
Black Kite *Milvus lineatus*	Soaring above the Training Camp and coastal area	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES	Widely distributed in Hong Kong, occurs in many types of habitats	Common in Hong Kong
Crested Serpent Eagle *Spilornis cheela*	Soaring above the plantation near Tai Mong Tsai village	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES	Found in large woodland	Rare in Hong Kong
Greater Coucal *Centropus sinensis*	Tall shrubland and abandoned agriculture within the Study Area	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC	Widely distributed in Hong Kong, occurs in many types of habitats	Common in Hong Kong

Common name	Locations	Protection status	Distribution	Rarity
Black-winged Cuckoo-shrike	Mixed woodland near Outward Bound School	Wild Animals Protection Ordinance (Cap 170);	Found in woodland edge areas. Mainly recorded from Tai Po Kau Nature Reserve	Rare in Hong Kong
Orange-bellied Leafbird	Mixed woodland in upstream of Tai Mong Tsai Stream	Wild Animals Protection Ordinance (Cap 170);	Found in woodland. Mainly recorded from Tai Po Kau Nature Reserve	Rare in Hong Kong
Brown Fish Owl	Estuary of Tai Mong Tsai Stream	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES	Recorded in a few localities in Hong Kong, favors sparse woodland patches close to stream, reservoir or estuarine water	Very rare in Hong Kong
Collared Scops Owl	Tall shrubland near the Training Camp	Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES	Widely distributed in woodland in Hong Kong	Common in Hong Kong
Rufous-capped Babbler	Tall shrubland near the Monument	Wild Animals Protection Ordinance (Cap 170);	Mainly confined to woodlands	Rare in Hong Kong
Hwamei *Garrulax canorus*	Tall shrubland within the Study Area, urbanized/disturbed in Outward Bound School	Wild Animals Protection Ordinance (Cap 170); Appendix 2 of CITES	Widely distributed in hillsides covered by thick shrublands	Common in Hong Kong
Greater Necklaced Laughingthrush *Garrulax pectoralis*	Mixed woodland within the Study Area	Wild Animals Protection Ordinance (Cap 170)	Mainly confined to woodlands	Rare in Hong Kong
Psammogobius biocellatus	Recorded in the estuary	This species is NOT protected in Hong Kong,	Recorded from streams in Sai Kung and northeastern New territories	Lower Risk/near threatened in IUCN Redlist
Favonigobius reichei	Recorded in the estuary	This species is NOT protected in Hong Kong,	Common and widespread in Hong Kong	Lower Risk/near threatened in IUCN Redlist
Seasarma crab *Pseudosesarma pakshuni*	Recorded on the stream banks upstream to the Site formation boundary.	This species is NOT protected in Hong Kong,	Widely distributed in Hong Kong	Uncommon
Hard Corals	Recorded outside the embayment, to the east of the embayment opening.	All hard corals are protected in Hong Kong under Cap. 586.	Widely distributed in Hong Kong	Small coverage (5-10%) and mostly common, abundant, and dominant species. Only two species are considered uncommon in Hong

Common name	Locations	Protection status	Distribution	Rarity
				Kong, i.e. Favites flexuosa and Goniastrea favulus.

8. Impact Identification and Evaluation

8.1 *Proposed Construction Works*

The footprint of the proposed Phase III redevelopment will include construction of 1 new canteen block at the center, 16 units of new bungalow and adventure facilities on the east side (**Figure 4**), and extension of ground level open area at two areas next to existing slipway in the form of platform deck (**Figures 4 and 5**).

The potential terrestrial and aquatic ecological impacts arising from the construction works, including loss of habitats, removal of vegetation, and disturbance to animals were assessed in accordance with Annexes 8 and 16 of the TM-EIAO. Impacts to species of conservation interest are summarised in Tables 8.1.

8.2 *Construction Phase Impact*

Terrestrial Ecology

Loss of habitats and associated vegetation due to site formation will constitute direct ecological impacts of the project. Estimated habitat loss includes 0.16 ha of urbanised/disturbed area (existing camp site), 0.18 ha of plantation and 0.31 ha of mixed woodland. In terms of zoning, about half of the new development would be confined to the existing camp site (Recreation Zone) while the rest in the Country Park boundary. The Coastal Protection Area (CPA) will be avoided.

Potential impacts due to losses of mixed woodland habitat and its associated flora and fauna are considered minor to moderate due to the young age, simple structure, commonness of the habitats in local context and low fauna and medium flora diversity. Plant species to be affected by the development mainly consist of exotic plantation trees and common pioneer native species. A few individuals of *Aquilaria sinensis* would be encroached by the development, while other individuals recorded during the current survey would be avoided. The other plant species of conservation interest, *Brainea insignis*, *Cibotium barometz* and *Pavetta hongkongensis* were located outside the development footprint and therefore would not be affected. Mitigation is recommended to compensate the loss of native tree and shrub species due to their potential ecological values to wildlife.

Losses of limited extent of the urbanised/disturbed area and plantation and their associated flora and fauna are considered minor due to the small footprint of loss and presence of only common species. No mitigation for loss of these habitats is required. Woodland compensation planting will also compensate the loss of plantation with native species of higher ecological values.

Indirect construction impacts include disturbance of vegetation and wildlife due to road access, human traffic, dust and soil erosion generated during construction. Due to the temporary and localized nature of the impacts, potential impacts to flora and fauna are ranked as minor. Dispersion of dust and noise and silted runoff generated during construction can be minimized by good site practice.

Apart from Brown Fish Owl and Short-nosed Fruit Bat, all terrestrial fauna of conservation concern were recorded at localities away from the proposed project areas. The mixed woodlands affected by the project are mainly young ones and near localities of high disturbance level. No optimal habitat of the fauna species of conservation concern will be affected by proposed project. Impact

to these terrestrial fauna species of conservation concern during construction phase is anticipated to be minor.

Brown Fish Owl predominately hunts at night. The foraging behavior of this species will not be affected by the construction work. Site formation may only affect the use of foraging perch near the project area. According to the radio tracking study (KFBG 2008), this species may have a large home range. Alternative foraging perches are present in Tai Mong Tsai estuary and alternative foraging habitats of Brown Fish Owl are available in other parts of Sai Kung Peninsula. The affected area will only account for insignificant proportion of the foraging habitats of Brown Fish Owl. The potential impact to Brown Fish Owl is anticipated to be minimal.

Potential direct impacts to Short-nosed Fruit Bats is not anticipated as only limited area of woodland would be affected, and its roosting site (Chinese Fan Palm planted behind existing bungalows) would be left intact. The potential indirect impact to Short-nosed Fruit Bats would be temporary disturbance by noise and dust generated from construction works. As this bat species is highly mobile and new roosts can be readily created in short time, they may move and roost in other Chinese Fan Palm trees at or near the site. The potential impacts to Short-nosed Fruit Bat is expected to be minor.

Disturbance to the nesting bird species Blue whistling Thrush will be minimal as this species is disturbance tolerant (Carey *et. al*. 2001), and its nesting site (existing bungalow building) would not be affected.

Aquatic and Marine Ecology

The proposed extension of ground level open area consists of two parts, i.e. Area A and Area B, both in the form of decking on minipiles (**Figure 5**). Area A is located at the waterfront between the BBQ site and the existing slipway, of 210 m^2 in area. Area B is the area adjacent to the existing slipway, currently separated from the stream channel by the slipway. It will be of 370 m^2 in area. Both platform decks are located outside the Coastal Protection Area. It is estimated that a total of 60 nos. of minipiles of 273mm diameter would be required to support the two platform decks.

Direct impacts to aquatic/marine habitats include a minute loss of about 3.5m^2 of intertidal habitats at hard substrate intertidal zone by construction of Area A and muddy substrate under Area B. The hard substrate intertidal zone only supported common species such as rock oyster. The muddy area in Area B is currently colonized by a number of small seedlings of common mangrove species (mainly *Kandelia obovata*). About 0.01 ha of mangrove will be decked over. The direct loss impact is minor. Mitigation measures including compensatory mangrove planting is proposed.

Indirect Impacts to aquatic fauna and marine communities are largely avoided by the construction method and the planning of construction works. The supporting pile for the platform deck would be constructed using mini bore piling method. No dredging is required. Sand bags will be placed in the peripheral of piling works area to prevent the displaced soil from flowing into sea. The piling works will be scheduled to be conducted during low tide as much as possible to minimise water quality impact. Therefore indirect impacts to aquatic habitats and marine communities would be **insignificant**.

Regarding the aquatic/marine species of concern, the uncommon sesarmine crab Pseudosesarma pakshuni inhabited the stream bank lowland upstream to the Project Site, while the hard corals were found far away outside the embayment, and are thus unlikely to be impact directly or indirectly by the construction works. The two fish species of concern Sleepy goby *Psammogobius biocellatus* and Indo-Pacific tropical sand goby *Favonigobius reichei* inhabit the estuary of Tai Mong Tsai Stream. Though they are not going to be impacted directly as the project would not encroach water area, when they move inside the estuary, they might get close to the Project Site during construction, and might potentially be affected by indirect impacts such as site runoff. But as mentioned above, the potential of having water quality impact would be very low due to the construction method adopted. The potential impacts to the concerned fish species would be **insignificant**.

8.3 *Operational Impact*

Potential operational impacts would include noise from increased visitors and traffic, sewage discharge, surface runoff and artificial lightings.

Disturbance to wildlife by traffic, artificial lighting and human activities will increase when number of visitors increases. Noise from recreational area is not expected to be intense. It is anticipated that the impact of human disturbance will be confined to the camp site and adjacent habitats. In addition, fauna in nearby habitats have probably been habituated to disturbance as the camp site has a history longer than 30 years, recreational facilities (e.g., barbecue sites) and residential houses are present in the nearby areas. It is estimated that 280 groups will join the "Mangrove Conservation Program" annually. To minimise disturbance to intertidal fauna, field trips organised by the camp site to intertidal areas would be kept in small groups (20-30 participants as the current group size). Code of field visits including no littering, vandalism, disturbance of animals, etc. should be instructed and followed. Use of binoculars instead of direct searching should be adopted unless necessary. With well organised field trips and observation of codes, potential impacts to terrestrial and intertidal fauna from this source are thus ranked as minor and mitigation will not be required.

Similar to the existing camp site, the sewage generated by the proposed development will be collected and treated on-site before discharged to the sea. To cater for relocation of the canteen and increased sewer generated by additional visitors, a new wastewater reuse system (membrane bioreactor) is proposed to treat a portion of the canteen wastewater in the site for irrigation and flushing purpose. The wastewater reuse system will share the loading of the existing STP and also to reduce the fresh water consumption within the camp site. The design of both the existing and the new wastewater treatment plants, including recommended flow rate and SS and BOD loadings followed EPD's guidelines and USEPA guidelines respectively. Potential impacts are ranked as minimal.

Similar to the existing camp site, the surface run-off of the proposed development will be collected through the surface drainage system and discharged directly into the sea via sand trap. Due to the limited footprint and nature of landuse, additional surface runoff generated from concrete surface would not have significant impacts on hydrology or water quality of the surrounding area.

Operational impacts to fauna species of conservation concern is considered minimal. Apart from Brown Fish Owl and Short-nosed Fruit Bat, all the terrestrial fauna of conservation concern were recorded at localities away from the camp site. It is anticipated that the impact of human disturbance will be confined to the camp site and adjacent habitats and of similar nature.. Short-nosed Fruit Bat would likely to continue to roost in Chinese Fan Palm in the Training Camp. Impact to Brown Fish Owl during operation phase is anticipated to be minimal. Brown fish Owl is predominate a nocturnal raptor. Most activities in the Training Camp will be carried out in daytime and therefore the use of foraging habitats near the camp by this species will not be affected.

The overall potential operational impact is ranked as minimal. No mitigation is required.

Table 8.1 Summary of Potential Impacts to Species of Conservation Interest

Common name	Descriptions	Evaluation of impacts	Mitigation Required
Flora			
Incense Tree *Aquilaria sinensis*	A few mature trees and seedlings/saplings recorded mainly in mixed woodland and tall shrubland outside site formation boundary. Eight trees recorded at the proposed dormitory area.	Minor	Yes. Retention of 3 no. tree, transplantation of four no. trees and inclusion of Incense Tree in compensatory tree planting.
Rhodoleia *Rhodoleia championii*	One individual recorded in tall shrubland outside site formation boundary.	None	No
Pavetta *Pavetta hongkongensis*	A few individuals recorded in mixed woodland outside site formation boundary.	None	No
Lamb of Tartary Cibotium barometz	A few individuals recorded in mixed woodland and tall shrubland outside site formation boundary.	None	No
Cycad Fern Brainea insignis	A few individuals recorded in tall shrubland outside site formation boundary.	None	No
Fauna			
Short-nosed Fruit Bat *Cynopterus sphinx*	One individual was flying in the Training Camp during survey in wet season. No roost was found during wet season surveys. Roosts were found in the Training Camp during dry season surveys: A roost of 14 bats on 3 Mar 10. This roosting site was later found abandoned during following survey; Two roosts (14 and 6 bats respectively) were found during surveys on 12 Mar 10. Short-nosed Fruit Bar is common and widely distributed in Hong Kong, occurs in many types of habitats (including urban parks). This species is disturbance tolerant. The bats appears fairly mobile and changed roosting locations fairly frequently. No roost was found during wet season surveys. Only Short-nosed Fruit Bats roosting in Chinese Fan Palm near the construction site may be disturbed by noise and dust generated from construction works. These bats may move and roost in other Chinese Fan Palm away from the construction sites. As alternative roosts are available in the Training Camp and the making of new roosts can be completed in a short time, the potential impact during construction phase to	Minor	No mitigation required, but enhancement is proposed: planting of Chinese Fan-palm in camp extension.

Common name	Descriptions	Evaluation of impacts	Mitigation Required
	Short-nosed Fruit Bat is anticipated to be minor.		
Japanese Pipistrelle *Pipistrellus abramus*	10-20 individuals were sighted in urbanized/disturbed within the Study Area, but not within the Training Camp. This is the commonest bat species in Hong Kong, and occurs in many types of habitats. The proposed project might affect the potential foraging habitats of this species. Japanese Pipistrelle can use a wide range of habitats and alternative habitats are available in nearby localities. Bats are nocturnal and forage and not affected by construction works conducted at daytime. Japanese Pipistrelle also forages in urbanised areas. This species can make use of the camp extension during operation phase.	Insignificant	No
Brown Fish Owl	One bird was sighted in estuary of Tai Mong Tsai Stream during night survey. This species is very rare in Hong Kong, and only recorded in a few localities in Hong Kong. Their habitat include sparse woodland patches close to stream, reservoir or estuarine water. Insignificant impact anticipated due to large range of available habitat in Sai Kung, little/no intertidal habitat affected, and no night construction activities and minimal night activities of campers which minimise the impact to the nocturnal feeding habit of the owl. Enhancement measure would include translocation of large rocks along intertidal zone as far as possible to retain roosting site, and compensation planting of trees on site to provide potential roosting site for the owl.	Insignificant	No.
Black Kite	Single birds were sighted soaring above the Training Camp and coastal area. This species is common in Hong Kong, widely distributed and occurs in many types of habitats. The proposed project may affect the potential habitats of this species. However, the affected habitat only accounts for a very small proportion of Black Kite. Black Kite can use a wide range of habitats and alternative habitats are present nearby.	Insignificant	No
Crested Serpent Eagle *Spilornis cheela*	One bird was sighted soaring above the plantation near Tai Mong Tsai village outside the impact area. This species is rare in Hong Kong and mainly found in large woodland area There is no loss of important habitat of Crested Serpent Eagle. The mixed woodland affected is rather disturbed and small compared to the daily range of this species. The young mixed woodland affected is not considered optimal habitat of Crested Serpent Eagle.	Insignificant	No

Common name	Descriptions	Evaluation of impacts	Mitigation Required
Greater Coucal *Centropus sinensis*	One bird was sighted in each of tall shrubland and abandoned agriculture outside the Project Area. This species is common in Hong Kong, and occurs in many types of habitats. The proposed project may affect the potential habitats of this species. The number of individual affected is low. Alternative habitats are present nearby and Greater Coucal can use wide range of habitats.	Insignificant	No
Black-winged Cuckoo-shrike	One bird was sighted in mixed woodland near Outward Bound School. This species is rare in Hong Kong, and found in woodland edge areas. Mainly recorded from Tai Po Kau Nature Reserve. The proposed project may affect the potential habitats of this species. The number of individual affected is low. Alternative habitats of Black-winged Cuckoo-shrike are present nearby.	Insignificant	No
Orange-bellied Leafbird	Two individuals were sighted in mixed woodland in upstream of Tai Mong Tsai Stream. Both were eating fruits. This species is rare in Hong Kong and found in woodland area. Orange-bellied Leaf Bird is mainly recorded from Tai Po Kau Nature Reserve. There is no loss of important habitat of Orange-bellied Leafbird. The mixed woodland affected is rather disturbed and is not considered optimal habitat of Orange-bellied Leafbird.	Insignificant	No
Collared Scops Owl	One individual was heard in tall shrubland outside site formation boundary during night survey. This species is common in Hong Kong, and widely found in woodland. The proposed project may affect the potential habitats of this species. The number of individual affected is low and alternative habitats are present nearby.	Insignificant	No
Rufous-capped Babbler	A single bird was heard in tall shrubland near the Monument outside the Project Area. This species is rare in Hong Kong and mainly confined to woodlands. There is no loss of important habitat of Rufous-capped Babbler. The mixed woodland affected is rather disturbed and is not considered optimal habitat of Rufous-capped Babbler.	Insignificant	No
Hwamei	Single bird and small flock were recorded at tall shrubland at urbanized/disturbed habitat in Outward Bound School outside the Project Area. This species is a common resident in Hong Kong, and found in hillsides covered by thick shrublands. The proposed project may affect the potential habitats of this species. The number of individual affected is	Insignificant	No

Common name	Descriptions	Evaluation of impacts	Mitigation Required
	low and alternative habitats of Hwamei are present nearby.		
Greater Necklaced Laughingthrush	Flocks of Greater Necklaced Laughing thrushes were sighted in mixed woodland outside the Site formation boundary. This species is a rare resident in Hong Kong and mainly confined to woodlands. There is no loss of important habitat of Greater Necklaced Laughingthrush. The mixed woodland affected is rather disturbed and is not considered optimal habitat of Greater Necklaced Laughingthrush.	Insignificant	No
Psammogobius biocellatus	Recorded in the estuary. Lower Risk/near threatened in IUCN Redlist, but NOT protected in Hong Kong. Unlikely to be affected by the Project as the estuary will not be encroached and the potential of water quality impact is very low.	Insignificant	
Favonigobius reichei	Recorded in the estuary. Lower Risk/near threatened in IUCN Redlist, but NOT protected in Hong Kong. Unlikely to be affected by the Project as the estuary will not be encroached and the potential of water quality impact is very low.	Insignificant	
Seasarma crab *Pseudosesarna pakshuni*	Recorded on the stream banks upstream to the Site formation boundary. This species is NOT protected in Hong Kong, but considered uncommon. Unlikely to be affected by the Project as their habitats are outside and upstream to the Site formation boundary.	Insignificant	No. But the ET will ensure good site practices in particular site runoff control will be strictly enforced by the contractor.
Hard Corals	Recorded outside the embayment, to the east of the embayment opening. All hard corals are protected in Hong Kong under Cap. 586. Small coverage (5-10%) and mostly common, abundant, and dominant species. Only two species are considered uncommon in Hong Kong, i.e. *Favites flexuosa* and *Goniastrea favulus*. Unlikely to be affected by the Project as they are far away from the Site formation boundary.	Insignificant	No. But the ET will ensure good site practices in particular site runoff control will be strictly enforced by the contractor.

9. Impact Avoidance, Minimisation and Mitigation Measures

9.1 *Impact Avoidance*

The proposed development has avoided sensitive habitat such as the stream estuary in Coastal Protection Area and major mangrove/sandflat habitat.

9.2 *Impact Minimization*

Compared to the original layout in November 2006, the current layout reduced the footprint and impacts on terrestrial habitat by removing the learning block, boat house, new slipway. Woodland loss is minimised. The areas to be decked near the existing slipway is also similar to the previous proposed slipway; however, the current proposal is considered more desirable as it has minimised encroachment on the natural coastline and is sittted near to the Phase III redevelopment near the already formed coastline. Decking rather than reclamation is proposed to minimise the loss and disturbance of seabed.

Impacts to *Aquilaria sinensis* have also been minimised by adjustment of layout. Of the 8 no. of *Aquilaria sinensis* recorded within the site formation boundary, 3 will be retained, 4 will be transplanted and 1 will be fell (due to technical difficulties for transplantation including poor survival rate and limited access), Potential sites for transplantation include the landscape area within the existing camp site and are indicated in **Figure 6**.

Potential disturbance to the surrounding environment will also be minimised through good site practice and precautionary measures for air and water quality and noise impacts. .

In both Area A and Area B, the open area is a platform of reinforced concrete deck, supported by piles, expanding from the existing retaining wall (**Figure 5**). The future supporting piles would provide hard surfaces for intertidal fauna to colonise, and boulders will be deposited along the edge of the platform to provide more hard substrate intertidal zone habitat. It is expected that more hard substrate surfaces will be available after the platform is constructed. The impact of hard substrate intertidal zone loss could thus be compensated.

The supporting pile for the platform deck would be constructed using mini bore piling method, to avoid the need of dredging. Sand bags will be placed in the peripheral of piling works area to prevent the displaced soil from flowing into sea. The piling works will be scheduled to meet low tide periods as possible to minimise water quality impact.

9.3 *Impact Mitigation*

Loss of the small mangrove area under Platform Deck at Area B would be mitigated by planting mangrove droppers on the sandflat near existing established mangrove stands. An area of 0.01 ha along the intertidal zone on the existing sandflat would be replanted with mangrove. Mangrove planting has been one of the activities organised by the camp and the compensatory mangrove planting can also be participated by campers. A total area of 160m^2 at the intertidal zone was planted with Kandelia droppers during conservation education activities by campers between Mar-Apr 2010 when droppers were ripen. This can be considered as advanced implementation of mangrove compensation. Survival and growth of these mangrove stands should be monitored quantitatively.

Loss of 0.31 ha of woodland and associated vegetation will be mitigated by compensatory woodland planting. The plant list will include mainly native tree and shrub species which are present in the existing habitats and are valuable to wildlife, e.g. providing food source for birds, bats and butterflies. Species selected would include *Aquilaria sinensis, Schefflera heptaphylla, Machilus spp., Sapium discolor, Sapium sebiferum* and *Gordonia axillaris*. Due to limited space within the project site, only about 0.03 ha of temporary works area would be replanted with native tree has been made. Liaison has been made with AFCD to identify a site of 0.8 ha for compensatory planting in the vicinity of the site (Lui Ta Shek) within Sai Kung Country Park

(**Figure 6**). About 4000 no. trees will be planted at 1.5m spacing on the site. Both on-site and off-site tree planting would be implemented by qualitfied landscape contractor appoitned by the project proponent. The landscape constract should also cover 2 years of maintenance to ensure survival of the planting during the establishment period. Species to be planted should include native species found in the area and pioneer species which has higher survival rate. Species recommended for planting is listed in **Table 9.1**.

Table 9.1 Native tree and shrub species recommended for compensatory woodland planting

Species	Growth Form
Acronychia pedunculata	Tree
Alangium chinense	Tree
Aporosa dioica	Shrub
Aquilaria sinensis	Tree
Ardisia crenata	Shrub
Baeckea frutescens	Shrub
Bischofia javanica	Tree
Castanopsis fissa	Tree
Celtis sinensis	Tree
Cerbera manghas	Tree
Cleistocalyx operculata	Tree
Cratoxylum cochinchinensis	Tree
Excoecaria agallocha	Tree
Ficus microcarpa	Tree
Ficus superba	Tree
Hibiscus tiliaceus	Tree
Ilex rotunda	Tree
Litsea cubeba	Tree
Litsea glutinosa	Tree
Machilus brevifolia	Tree
Machilus chekiangensis	Tree
Melastoma candidum	Shrub
Melastoma sanguineum	Shrub
Psychotria asiatica	Shrub
Reevesia thyrsoidea	Tree
Rhaphiolepis indica	Shrub
Rhodoleia championii	Tree
Sapium discolor	Tree
Sapium sebiferum	Tree
Schefflera heptaphylla	Tree
Schima superba	Tree
Sterculia lanceolata	Tree
Viburnum odoratissimum	Tree
Liquidambar formosana	Tree
Rhododendron simsii	Shrub
Rhodomyrtus tomentosa	Shrub

To further enhance the ecological and educational values of the camp site, nature conservation programme can be considered such as installation and monitoring of nest box for birds and roost box for bats. Nesting habitats of birds and roosting habitats of bats are limited by the lacking of mature trees on site. Chinese Fan-palm, which provides roosting habitats for Short-nosed Fruit

Bats, can be included in the landscape planting list. Bird feeders, bird baths and drinking tables for butterflies can also be installed for educational purpose.

Nature conservation programmes can also be well planned to minimise impacts on stream and intertidal communities, for example, by limiting the size of organised groups and to provide sufficient guidelines for surveying wildlife and vegetation.

10. Environmental Monitoring Programme

In order to ensure the effectiveness of the site practices and mitigation measures, an environmental monitoring is proposed during construction phase, including:

- weekly site inspection will be carried out by a qualified environmental consultant to ensure the implementation of good site practices and to identify areas necessary for maintenance, cleaning or repair.
- monthly water quality monitoring at the Coastal Protection Area and Tai Mong Tsai Stream Estuary
- monitoring of survival and growth transplanted species and compensatory woodland planting and mangrove, monthly for first three months and quarterly after for one year. The landscape contract should cover 2 years of maintenance to ensure survival of new plantings and replacement of dead plants.

11. Conclusion

Habitats recorded within the Study Area included mixed woodland, plantation, tall shrubland, low shrubland, abandoned agricultural land, urbanised/disturbed area, stream, mangrove/sandflat and coastal waters. Loss of mixed woodland and mangroves would constitute the key ecological impact of the project and will be mitigated by compensatory planting and good site practice. With mitigation measures implemented, no insurmountable ecological impacts are anticipated.

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13. Appendices

Annex 1 Plant species recorded in the Study Area

				Study Area									
Species	**Habit**	**Exotic**	**Relative Abundance**	**Mixed Woodland**	**Plantation**	**Tall Shrubland**	**Low Shrubland**	**Abandoned Field**	**Urbanised/ disturbed Area**	**Mangrove/ Sandflat**	**other coastal**	**Stream**	**Impacted Area**
Abrus mollis	C		Scarce	Y									
Acacia confusa	T	Exotic	Common	Y	Y				Y		Y		Y
Acacia auriculiformis	T	Exotic				Y			Y				
Acacia mangium	T	Exotic	Scarce						Y				
Acanthus ilicifolius	S		Scarce									Y	
Acorus gramineus	H		Occasional									Y	
Acronychia pedunculata	T		Common	Y		Y	Y						Y
Acrostichum aureum	F		Scarce									Y	
Adiantum capillus-veneris	F		Scarce			Y	Y						
Adiantum flabellatum	T	Exotic	Common	Y		Y							Y
Adinandra millettii	T		Common	Y		Y	Y						Y
Aegiceras corniculatum	S		Scarce				Y			Y	Y		
Agave angustifolia	H	Exotic	Scarce						Y				
Ageratum conyzoides	H		Common	Y								Y	Y
Aglaia odorata	S	Exotic	Scarce		Y				Y				Y
Alangium chinense	T		Occasional		Y								
Albizia lebbeck	T		Occasional	Y	Y								Y
Alocasia odora	H		Common	Y	Y				Y				Y
Aloe vera	H	Exotic	Scarce						Y				
Alpinia zerumbet	H		Common	Y								Y	Y
Alpinia zerumbet cv. Variegata	H	Exotic	Occasional						Y				
Alyxia sinensis	C		Scarce			Y	Y						
Antidesma ghaesembilla	S		Scarce	Y									Y
Antirhea chinensis	T		Scarce			Y							
Aporosa dioica	T		Common	Y	Y	Y	Y		Y				Y
Aquilaria sinensis	T		Occasional	Y	Y	Y							Y
Aralia armata	T		Occasional	Y									Y
Araucaria heterophylla	T	Exotic	Scarce						Y				Y

				Study Area									
Species	**Habit**	**Exotic**	**Relative Abundance**	**Mixed Woodland**	**Plantation**	**Tall Shrubland**	**Low Shrubland**	**Abandoned Field**	**Urbanised/ disturbed Area**	**Mangrove/ Sandflat**	**other coastal**	**Stream**	**Impacted Area**
Archontophoenix alexandrae	T	Exotic	Scarce						Y				
Ardisia crenata	S		Occasional	Y		Y							Y
Ardisia quinquegona	S		Occasional	Y									
Ardisia punctata	S		Scarce			Y							
Artemisia sp.	H		Occasional									Y	
Artocarpus heterophylla	T	Exotic	Scarce		Y				Y				Y
Asparagus cochinchinensis	C		Occasional	Y		Y							Y
Aster baccharoides	H		Occasional			Y	Y						
Averrhoa carambola	T	Exotic	Scarce						Y				
Axonopus compressus	G		Occasional	Y				Y					Y
Baeckea frutescens	S		Occasional			Y	Y						
Bamboo	H		Occasional	Y	Y				Y			Y	Y
Bambusa ventricosa	T	Exotic	Common		Y				Y				Y
Bambusa vulgaris cv Vittata	T	Exotic	Scarce						Y				
Bauhinia blakeana	T		Common	Y	Y				Y				Y
Bauhinia purpurea	T		Occasional						Y				
Berchemia floribunda	S		Occasional			Y							
Berchemia lineata	C		Scarce	Y		Y	Y						Y
Bidens pilosa	H		Occasional	Y	Y						Y		Y
Bischofia javanica	T		Occasional		Y				Y				Y
Blechnum orientale	F		Common	Y	Y	Y	Y						Y
Bombax ceiba	T	Exotic	Occasional	Y	Y				Y				
Bougainvillea spectabilis	C	Exotic	Occasional						Y				
Brainea insignis	F		Scarce			Y							
Breynia fruticosa	S		Common	Y		Y	Y						Y
Bridelia tomentosa	T		Common	Y	Y	Y							Y
Brucea javanica	T		Occasional	Y	Y								Y
Bruguiera gymnorhiza	T		Scarce							Y	Y	Y	
Bryophyllum pinnatum	H	Exotic	Occasional							Y			
Caesalpinia crista	C		Occasional								Y		
Caesalpinia sp.	C		Occasional	Y									Y
Cairica papaya	T	Exotic	Scarce		Y				Y				Y
Calliandra haematocephala	S	Exotic	Occasional						Y				

				Study Area									
Species	**Habit**	**Exotic**	**Relative Abundance**	**Mixed Woodland**	**Plantation**	**Tall Shrubland**	**Low Shrubland**	**Abandoned Field**	**Urbanised/ disturbed Area**	**Mangrove/ Sandflat**	**other coastal**	**Stream**	**Impacted Area**
Callicarpa nudiflora	S		Occasional		Y	Y			Y				Y
Camellia japonica	S	Exotic	Scarce						Y				
Castanopsis fissa	T		Scarce			Y							
Cassia alata	S	Exotic	Scarce	Y									
Cassia surattensis	T	Exotic	Scarce	Y					Y				
Cassytha filiformis	C		Scarce				Y					Y	
Casuarina equisetifolia	T	Exotic	Occasional	Y	Y	Y	Y		Y		Y		Y
Catharanthus roseus	S	Exotic	Occasional						Y				
Celtis sinensis	T		Occasional		Y	Y		Y					Y
Centella asiatica	H		Scarce					Y					
Centotheca lappacea	G		Occasional	Y									
Cerbera manghas	T		Occasional							Y			
Christella parasitica	F		Common	Y	Y				Y			Y	Y
Christella semi-pinnata	F		Occasional	Y									Y
Chrysalidocarpus lutescens	T	Exotic	Scarce						Y				
Cibotium barometz	F		Scarce	Y		Y							
Cinnamomum camphora	T		Common	Y	Y	Y		Y	Y			Y	Y
Citrus maxima	T	Exotic	Scarce	Y	Y				Y				Y
Citrus reticulata	S	Exotic	Scarce		Y				Y				Y
Clausena lansium	T	Exotic	Scarce		Y				Y				
Cleistocalyx operculata	T		Scarce									Y	
Clerodendrum fortunatum	S		Scarce									Y	
Clerodendrum inerme	S		Occasional	Y						Y	Y	Y	
Codiaeum variegatum	S	Exotic	Occasional						Y				
Codiaeum variegatum	S	Exotic	Occasional						Y				
Colocasia esculenta	H	Exotic	Scarce						Y				
Commelina communis	H		Scarce					Y					
Conyza canadensis	H		Occasional	Y									Y
Crateva religiosa	T	Exotic	Scarce	Y									Y
Cratoxylum cochinchinense	F		Common	Y	Y	Y	Y						
Cynodon dactylon	G		Occasional						Y				
Cyperus flabelliformis	H	Exotic	Scarce									Y	
Cyperus spp.	H		Occasional								Y	Y	

				Study Area									
Species	Habit	Exotic	Relative Abundance	Mixed Woodland	Plantation	Tall Shrubland	Low Shrubland	Abandoned Field	Urbanised/ disturbed Area	Mangrove/ Sandflat	other coastal	Stream	Impacted Area
Cyclosorus interruptus	F		Occasional					Y					
Cyrtococcum patens	G		Common	Y	Y			Y					Y
Cyclobalanopsis myrsinifolia	S		Scarce			Y							
Dalbergia hancei	C		Occasional	Y		Y							Y
Daphniphyllum calycinum	T		Common	Y		Y			Y				Y
Delonix regia	T	Exotic	Occasional	Y	Y								Y
Dendrotrophe frutescens	C		Common	Y		Y	Y						Y
Desmodium heterocarpon	H		Occasional	Y									
Desmos chinensis	S		Occasional	Y		Y							Y
Dianella ensifolia	H		Occasional				Y						
Dicranopteris pedata	F		Common	Y		Y	Y						Y
Dimocarpus longan	T	Exotic	Occasional	Y	Y				Y			Y	Y
Diospyros kaki	T	Exotic	Occasional		Y				Y				Y
Diospyros vaccinioides	S		Common			Y							
Diplospora dubia	S		Scarce			Y	Y						
Dracaena sp.	S	Exotic	Scarce						Y				
Duranta repens	S	Exotic	Occasional						Y				
Elaeagnus loureirii	T		Occasional	Y									Y
Elaeocarpus chinensis	T		Common	Y		Y							
Elaeocarpus sylvestris	T		Occasional	Y									
Elephantopus scaber	H		Scarce	Y									
Elephantopus tomentosa	H		Scarce			Y							
Eleutherococcus trifoliatus	C		Occasional	Y									Y
Embelia laeta	C		Occasional	Y	Y	Y							
Emilia sonchifolia	H		Scarce	Y			Y						
Epipremnum aureum	C	Exotic	Scarce		Y								
Erythrina sp.	T	Exotic	Scarce						Y				
Eucalyptus robusta	T	Exotic	Scarce						Y				
Eucalyptus torelliana	T	Exotic	Scarce				Y						
Euonymus chinensis	T		Occasional	Y									Y
Euphorbia pulcherrima	R	Exotic	Scarce						Y				
Eupatorium catarium	H	Exotic	Occasional					Y					
Eurya japonica	S		Occasional	Y		Y	Y						Y

				Study Area									
Species	Habit	Exotic	Relative Abundance	Mixed Woodland	Plantation	Tall Shrubland	Low Shrubland	Abandoned Field	Urbanised/ disturbed Area	Mangrove/ Sandflat	other coastal	Stream	Impacted Area
Eriobotrya japonica	T	Exotic	Scarce						Y				
Excoecaria agallocha	T		Common	Y		Y				Y	Y	Y	
Ficus altissima	T		Scarce						Y				
Ficus benjamina	T	Exotic	Occasional		Y				Y				
Ficus elastica	T	Exotic	Scarce		Y				Y				
Ficus hirta	S		Scarce	Y	Y	Y							Y
Ficus hispida	T		Common	Y	Y	Y						Y	Y
Ficus microcarpa	T		Common	Y	Y				Y				
Ficus pumila	C		Scarce	Y								Y	Y
Ficus superba	T		Scarce	Y									
Ficus variegata	T		Occasional	Y		Y							Y
Ficus variolosa	S		Occasional			Y	Y						
Fimbristylis sp.	H		Occasional									Y	
Gahnia tristyla	H		Occasional			Y	Y						
Garcinia oblongifolia	T		Scarce	Y		Y							
Gardenia jasminoides	S		Common	Y	Y	Y	Y						Y
Glochidion eriocarpum	S		Common	Y	Y								Y
Glochidion wightianum	S		Occasional	Y			Y						Y
Glochidion zeylanicum	T		Occasional	Y		Y		Y					
Gnetum montanum	C		Common	Y		Y	Y						Y
Gordonia axillaris	S		Occasional				Y						
Hedyotis acutangula	H		Common	Y		Y	Y						Y
Helicteres angustifolia	H		Occasional			Y							
Hibiscus mutabilis	S	Exotic	Scarce						Y				
Hibiscus rosa-sinensis	S	Exotic	Scarce						Y				Y
Hibiscus tiliaceus	T		Common	Y		Y				Y		Y	Y
Homalium cochinchinensis	T		Common	Y		Y	Y						
Hypolytrum nemorum	H		Scarce			Y							
Ilex asprella	S		Common	Y	Y								Y
Ilex pubescens	S		Occasional	Y		Y	Y						
Ilex rotunda	T		Scarce	Y									
Ipomoea cairica	C		Common	Y	Y				Y				Y
Itea chinensis	T		Common	Y		Y	Y						

				Study Area									
Species	Habit	Exotic	Relative Abundance	Mixed Woodland	Plantation	Tall Shrubland	Low Shrubland	Abandoned Field	Urbanised/ disturbed Area	Mangrove/ Sandflat	other coastal	Stream	Impacted Area
Ixora coccinea	S	Exotic	Occasional						Y				
Juniperus chinensis	T	Exotic	Occasional						Y				
Kandelia obovata	S		Occasional							Y	Y	Y	Y
Lagerstroemia speciosa	T	Exotic	Scarce						Y				
Lasianthus chinensis	T		Scarce			Y							
Lantana camara	S	Exotic	Occasional	Y		Y			Y		Y		Y
Lepidosperma chinense	H		Occasional				Y						
Leucaena leucocephala	T	Exotic	Common	Y					Y				Y
Ligustrum sinense	S		Occasional	Y	Y			Y	Y			Y	Y
Lindsaea orbiculata	F		Scarce			Y							
Lindernia crustacea	H		Scarce					Y					
Liriope spicata	H		Occasional	Y	Y	Y							Y
Liquidambar formosana	T		Scarce	Y			Y						
Litchi chinensis	T	Exotic	Scarce						Y				
Litsea cubeba	T		Occasional				Y						
Litsea glutinosa	T		Occasional	Y	Y								Y
Litsea rotundifolia	S		Occasional	Y	Y	Y	Y						Y
Livistona chinensis	T	Exotic	Occasional	Y	Y				Y				Y
Lophatherum gracile	G		Common	Y	Y								Y
Lophostemon confertus	T		Occasional	Y		Y	Y		Y				
Loropetalum chinense	S	Exotic	Occasional						Y				
Lumnitzera racemosa	S		Scarce								Y		
Lycopodium cernuum	F		Scarce			Y	Y						
Lygodium japonicum	C		Common	Y	Y	Y							Y
Lygodium microphyllum	F		Scarce			Y							
Macaranga tanarius	T		Common	Y	Y						Y	Y	Y
Machilus brevifolia	T		Occasional	Y			Y		Y				Y
Machilus chekiangensis	T		Common	Y	Y	Y	Y						Y
Machilus velutina	T		Scarce			Y							
Maesa perlarius	S		Occasional	Y	Y							Y	Y
Mallotus paniculatus	T		Common	Y	Y	Y	Y		Y			Y	Y
Malvaviscus arboreus	S	Exotic	Scarce			Y			Y				
Mangifera indica	T	Exotic	Scarce						Y				

				Study Area									
Species	**Habit**	**Exotic**	**Relative Abundance**	**Mixed Woodland**	**Plantation**	**Tall Shrubland**	**Low Shrubland**	**Abandoned Field**	**Urbanised/ disturbed Area**	**Mangrove/ Sandflat**	**other coastal**	**Stream**	**Impacted Area**
Manihot esculenta	S	Exotic	Scarce						Y				
Melaleuca quinquenervia	T	Exotic	Scarce	Y					Y				
Melastoma candidum	S		Occasional			Y							
Melastoma sanguineum	S		Occasional	Y		Y	Y						
Melastoma sp.	S	Exotic	Occasional						Y				Y
Melodinus suaveolens	C		Occasional	Y		Y							
Melicope pteleifolia	T		Scarce									Y	
Michelia alba	T	Exotic	Scarce		Y				Y				Y
Mikania micrantha	C	Exotic	Common	Y	Y			Y	Y				Y
Millettia nitida	C		Common	Y		Y	Y						
Millettia speciosa	C		Occasional	Y									Y
Mimosa pudica	S		Occasional	Y									Y
Miscanthus floridulus	G		Scarce				Y						
Miscanthus sinensis	G		Scarce		Y		Y				Y		
Morinda umbellata	C		Scarce			Y							
Morus alba	T	Exotic	Scarce						Y				
Murraya paniculata	S	Exotic	Common	Y	Y								Y
Musa paradisiaca	T	Exotic	Occasional	Y	Y				Y			Y	Y
Mussaenda pubescens	S		Occasional	Y	Y		Y						Y
Neyraudia reynaudiana	G		Scarce			Y	Y		Y		Y		
Ormosia emarginata	T		Occasional			Y							
Oxalis corymbosa	H		Occasional		Y				Y				Y
Paederia scandens	C		Scarce	Y		Y							Y
Paliurus ramosissimus	T		Scarce	Y									
Pandanus tectorius	T		Scarce	Y		Y				Y	Y		Y
Panicum maximum	G	Exotic	Common		Y								
Paspalum conjugatum	G		Occasional									Y	
Pavetta hongkongensis	S		Occasional	Y	Y								
Peltophorum pterocarpum	T		Scarce	Y	Y				Y				Y
Perilla frutescens	S	Exotic	Occasional						Y				
Phoenix hanceana	S		Occasional	Y				Y		Y	Y	Y	Y
Phyllanthus cochinchinensis	S		Occasional	Y			Y						Y
Phyllanthus emblica	T		Occasional			Y			Y				

				Study Area									
Species	**Habit**	**Exotic**	**Relative Abundance**	**Mixed Woodland**	**Plantation**	**Tall Shrubland**	**Low Shrubland**	**Abandoned Field**	**Urbanised/ disturbed Area**	**Mangrove/ Sandflat**	**other coastal**	**Stream**	**Impacted Area**
Phyllanthus urinaria	S		Occasional		Y								Y
Pinus elliottii	T	Exotic	Scarce						Y				
Pinus massoniana	T		Scarce			Y							
Piper sp.	H		Scarce	Y									Y
Pittosporum tobira	S	Exotic	Scarce			Y							
Plantago major	H		Scarce		Y								Y
Podocarpus macrophyllus	T		Scarce	Y									
Polygonum chinense	H		Occasional	Y				Y					Y
Prunus persica	T	Exotic	Scarce						Y				
Psidium guajava	T	Exotic	Scarce						Y				
Psychotria asiatica	S		Common	Y	Y	Y			Y				Y
Psychotria serpens	C		Common	Y	Y	Y	Y		Y				Y
Pteris biaurita	F		Occasional	Y									Y
Pteris ensiformis	F		Occasional	Y									
Pteris semipinnata	F		Occasional	Y									Y
Pteris vittata	F		Scarce						Y				
Pueraria lobata	C		Scarce									Y	
Pycreus flavidus	H		Scarce									Y	
Reevesia thyrsoidea	T		Scarce	Y			Y						
Rhaphiolepis indica	S		Occasional	Y		Y	Y						
Rhododendron pulchrum	S	Exotic	Common						Y				
Rhodoleia championii	T		Scarce			Y							
Rhodomyrtus tomentosa	S		Common	Y		Y	Y		Y				Y
Rhoeo discolor	H	Exotic	Occasional						Y				
Rhus hypoleuca	T		Occasional			Y							
Rhus succedanea	T		Common	Y		Y	Y		Y				Y
Ricinus communis	S	Exotic	Scarce		Y								Y
Rourea microphylla	C		Scarce	Y		Y							
Roystonea regia	S	Exotic	Scarce						Y				
Rubus reflexus	C		Scarce			Y							
Sageretia thea	C	Exotic	Occasional	Y		Y			Y				Y
Sansevieria trifasciata	H	Exotic	Scarce	Y					Y				
Sapium discolor	T		Occasional	Y		Y			Y				Y

				Study Area									
Species	Habit	Exotic	Relative Abundance	Mixed Woodland	Plantation	Tall Shrubland	Low Shrubland	Abandoned Field	Urbanised/ disturbed Area	Mangrove/ Sandflat	other coastal	Stream	Impacted Area
Sapium sebiferum	T		Occasional	Y	Y			Y	Y				Y
Sarcandra glaber	S		Scarce			Y							
Scaevola sericea	S		Scarce	Y		Y				Y	Y	Y	
Schefflera arboricola	S	Exotic	Common						Y				Y
Schefflera heptaphylla	T		Common	Y	Y	Y							Y
Schima superba	T		Scarce			Y	Y						
Schizoloma heterophyllum	F		Occasional	Y									
Scleria sp.	H		Scarce	Y									Y
Scolopia chinensis	T		Scarce	Y						Y		Y	
Scoparia dulcis	H	Exotic	Occasional									Y	
Severinia buxifolia	T		Occasional	Y		Y							
Sigesbeckia orientalis	H		Scarce						Y			Y	
Smilax glaber	C		Occasional	Y		Y	Y						Y
Solanum torvum	S	Exotic	Scarce	Y	Y			Y				Y	Y
Solena amplexicaulis	C		Scarce		Y								
Stephania longa	C		Scarce	Y									Y
Sterculia lanceolata	T		Common	Y	Y	Y						Y	Y
Strophanthus divaricatus	C		Occasional	Y		Y	Y						Y
Styrax suberifolius	T		Scarce			Y							
Strychnos angustiflora	C		Scarce										
Suaeda australis	H		Scarce							Y			
Symplocos laurina	T		Occasional	Y				Y					Y
Syzygium jambos	T	Exotic	Occasional	Y								Y	Y
Syzygium levinei	T		Common	Y									Y
Tetracera asiatica	C		Common	Y	Y	Y			Y				Y
Tetradium glabrifolium	T		Occasional		Y								Y
Thevetia peruviana	S	Exotic	Scarce						Y				
Toddalia asiatica	C		Occasional	Y				Y					
Toxocarpus wightianum	C		Scarce							Y			
Trema orientalis	S		Scarce				Y						
Tylophora ovata	C		Occasional	Y	Y								
Urena lobata	S		Occasional					Y					
Uvaria macrophylla	S		Occasional	Y	Y								Y

				Study Area									
Species	**Habit**	**Exotic**	**Relative Abundance**	**Mixed Woodland**	**Plantation**	**Tall Shrubland**	**Low Shrubland**	**Abandoned Field**	**Urbanised/ disturbed Area**	**Mangrove/ Sandflat**	**other coastal**	**Stream**	**Impacted Area**
Uvaria microcarpa	S		Occasional	Y		Y			Y				
Vaccinium bracteatum var. chinense	T		Scarce	Y									
Vernonia cinerea	H		Occasional	Y									
Viburnum odoratissimum	T		Common	Y	Y					Y	Y		
Wedelia triloba	C	Exotic	Common	Y	Y				Y				Y
Wikstroemia indica	S		Scarce									Y	
Zanthoxylum avicennae	T		Common	Y	Y	Y							
Zanthoxylum nitida	C		Common	Y	Y		Y						Y
Zoysia sinica	G		Occasional							Y	Y	Y	

*T = tree, S = shrub, C = climber, G = grass, F = Fern
Species in boldface = of conservation interest

Annex 2 Bird species and their abundance recorded in the Study Area

Common name	Scientific name	U	W	P	S	C	G	St	Ag	Commonness
Little Egret	*Egretta garzetta*					22		1		CW
Great Egret	*Casmerodius albus*					2				CL
Grey Heron	*Ardea cinerea*					1				CL
Chinese Pond Heron	*Ardeola bacchus*							1		CW
Cattle Egret	*Bubulcus ibis*					1				CW
Black-crowned Night Heron	*Nycticorax nycticorax*					1				CL
Black Kite	*Milvus lineatus*	1				4				CW
Crested Serpent Eagle	*Spilornis cheela*			1						R
Common Sandpiper	*Actitis hypoleucos*					3				CW
Collared Scops Owl	*Otus lettia*				1					CL
Brown Fish Owl	*Ketupa zeylonensis*					1				VR
Large Hawk Cuckoo	*Hierococcyx sparverioides*				1					CW
Common Koel	*Eudynamis scolopacea*	1	1	1					1	CW
Common Kingfisher	*Alcedo atthis*					1				CW
Greater Coucal	*Centropus sinensis*				1				1	CW
Barn Swallow	*Hirundo rustica*	2			2		1		2	CW
House Swift	*Apus nipalensis*	2							2	CW
Oriental Turtle Dove	*Streptopelia orientalis*		2							CW
Spotted Dove	*Streptopelia chinensis*	2	5	2	1		1		1	CW
Olive-backed Pipit	*Anthus hodgsoni*		6	6	8				12	CW
Grey Wagtail	*Motacilla cinerea*							1		CW
White Wagtail	*Motacilla alba*	2				5			2	CW
Scarlet Minivet	*Pericrocotus flammeus*		2							CL
Grey-throated Minivet	*Pericrocotus solaris*		28							CL
Black-winged Cuckoo-shrike	*Coracina melaschistos*		1							R
Orange-bellied Leafbird	*Chloropsis hardwickii*		2							R
Chinese Bulbul	*Pycnonotus sinensis*	5	19	7	1	1	2	1	2	CW
Crested Bulbul	*Pycnonotus jocosus*	2	12	2	26	1		2	1	CW
Red-vented Bulbul	*Pycnonotus aurigaster*			2	3		1		1	CW
Chestnut Bulbul	*Hypsipetes castanonotus*		18							CL
Magpie Robin	*Copsychus saularis*	4	1	1	1	2		2	2	CW
Siberian Stonechat	*Saxicola maurus*		1							CL
Red-flanked Bluetail	*Tarsiger cyanurus*		1		1					CL
Japanese Thrush	*Turdus cardis*					1				CL
Grey-backed Thrush	*Turdus hortulorum*		1	1						CL
Common Blackbird	*Turdus merula*							6	6	CL
Blue Whistling Thrush	*Myiophoneus caeruleus*	3	1			1		1		CW
Daurian Redstart	*Phoenicurus auroreus*			1	1				1	CL
Hwamei	*Garrulax canorus*	3			1					CL
Black-throated Laughingthrush	*Garrulax chinensis*		2		1					CW
Greater Necklaced Laughingthrush	*Garrulax pectoralis*		18							R
Masked Laughingthrush	*Garrulax pespicillatus*				6	2			2	CW
Great Tit	*Parus major*	1	6	3						CW
Scarlett-backed Flowerpecker	*Dicaeum cruentatum*		1						1	CL
Fork-tailed Sunbird	*Aethopyga christinae*	5	1	3					2	CW
Common Tailorbird	*Orthotomus sutorius*	1	1	1		4	2			CW
Mountain Tailorbird	*Orthotomus cuculatus*		1							uncertain

Zitting Cisticola	*Cisticola juncidis*		1							CL
Plain Prinia	*Prinia inornata*							1	1	CL
Yellow-bellied Prinia	*Prinia flaviventris*				4		6			CW
Yellow-browed Warbler	*Phylloscopus borealis*	2	4	3						CW
Pallas's Warbler	*Phylloscopus proregulus*		5							CL
Dusky Warbler	*Phylloscopus fuscatus*				1			2		CL
Asian Brown Flycatcher	*Muscicapa dauurica*		1							CL
Japanese White-eye	*Zosterops japonica*	4	19	8	1	2				CW
Rufous-capped Babbler	*Stachyris ruficeps*				1					VR
Black Drongo	*Dicrurus macrocercus*			1		1				CW
Hair-crested Drongo	*Dicrurus hottentottus*		2	1		1				CL
Crested Myna	*Acridotheres cristatellus*	8		5	2					CW
Black-collared Starling	*Sturnus nigricollis*	6								CW
Large-billed Crow	*Corvus macrorhynchus*	3	3		2					CW
Collared Crow	*Corvus torquatus*		2			1				CL
Common Magpie	*Pica pica*	1		1		1				CW
Blue Magpie	*Urocissa erythrorhyncha*		1							CW
Eurasian Tree Sparrow	*Passer montanus*	19								CW
Scaly-breasted Munia	*Lonchura punctulata*		1			2				CL
Little Bunting	*Emberiza pusilla*					1				CL
Black-faced Bunting	*Emberiza spodocephala*		1		2					CW
No. of birds		77	171	50	68	62	13	18	40	
No. of species		21	34	19	22	24	6	10	17	

U = urbanized/disturbed, W = woodland, P = plantation, S = tall shrubland, C = coastal habitat (including estuary, mangrove, sandflat and rocky shores), G = low shrubland, St = stream, Ag = abandoned agriculture
Commonness: CW = common and widespread, CL = common/uncommon and localized, R = uncommon/rare and localized, VR = very rare

Annex 3a Butterfly species and their abundance recorded in the Study Area

Common name	**Scientific name**	**U**	**W**	**P**	**S**	**C**	**G**	**St**	**Ag**	**Commonness**
Forest Hopper	*Astictopterus jama*		1						1	C
Tailed Jay	*Graphium agamemnon*	1	4	1						VC
Common Jay	*Graphium doson*				1					C
Common Bluebottle	*Graphium sarpedon*		2	1	3			1	1	VC
Five-bar Swordtail	*Pathysa antiphates*		1							C
Red Helen	*Papilio helenus*		3	1	2					VC
Lime Butterfly	*Papilio demoleus*					2				C
Common Mormon	*Papilio polytes*	8	3	2	2			1	2	VC
Great Mormon	*Papilio memnon*	1	2	1	1					C
Spangle	*Papilio protenor*		1	1	1					VC
Paris Peacock	*Papilio paris*				2					VC
Lime Blue	*Chilades lajus*	3			3			2		VC
Pale Grass Blue	*Zizeeria maha*				1					VC
Red-base Jezebel	*Delias pasithoe*	22	14	20	6					VC
Great Orange Tip	*Hebomoia glaucippe*	2	1						1	C
Lemon Emigrant	*Catopsilia pomona*					1				C
Indian Cabbage White	*Pieris canidia*				2				2	VC
Common Grass Yellow	*Eurema hecabe*	4	6	8	2	4			2	VC
Slate Flash	*Rapala manea*				1					C
Rustic	*Cupha erymanthis*				1	1				VC
Tawny Rajah	*Charaxes bernardus*			1						C
Angled Castor	*Ariadne ariadne*		2							C
Great Eggfly	*Hypolimnas bolina*	2								C
Grey Pansy	*Junonia atlites*	3						1		C

Common name	Scientific name	U	W	P	S	C	G	St	Ag	Commonness
Chocolate Pansy	*Junonia iphita*		1			1		1		UC
Lemon Pansy	*Junonia lemonias*	2				2				C
Peacock Pansy	*Junonia almana*		1						1	C
White-edged Blue Baron	*Euthalia phemius*	1								UC
Blue Admiral	*Kaniska canace*				1			2		C
Common Mapwing	*Cyrestis thyodamas*	1								C
Black Prince	*Rohana parisatis*						1		1	C
Colour Sergeant	*Athyma nefte*	2								C
Common Sergeant	*Athyma perius*	1								C
Slate Flash	*Rapala manea*			1						C
Plum Judy	*Abisara echerius*	1	2		1		2			VC
Punchinello	*Zemeros flegyas*				1		5			C
Dark-band Bush Brow	*Mycalesis mineus*		1	1						VC
Common Five-ring	*Ypthima baldus*		3				2	7		VC
Straight Five-ring	*Ypthima lisandra*		2	1	1	1	1	5		C
Common Fauna	*Faunis eumeus*	1	12		1				2	VC
Common Tiger	*Danaus genutia*		1						1	VC
Blue-spotted Crow	*Euploea midamus*		1					1		VC
Ceylon Blue Tiger	*Ideopsis similis*	2						1		VC
No. of butterflies		57	64	39	33	12	11	22	14	
No. of species		17	21	12	19	7	5	10	10	

U = urbanized/disturbed, W = mixed woodland, P = plantation, S = tall shrubland, C = coastal habitat (including estuary, mangrove, sandflat and rocky shores), G = low shrubland, St = stream, Ag = abandoned agriculture
Commonness: VC = very common, C = common, UC = uncommon

Annex 3b Dragonfly species and their abundance recorded in the Study Area

Common name	Scientific name	U	W	P	S	C	G	St	Ag	Commonness
Chinese Greenwing	*Neurobasis chinensis*							2		C
Common Blue Jewel	*Rhinocypha perforata*							2		A
Orange-tailed Midget	*Agriocnemis femina*							1	2	A
Wandering Midget	*Agriocnemis pygmaea*							4	3	C
Orange-tailed Sprite	*Ceriagrion auranticum*			3						A
Common Bluetail	*Ischnura senegalensis*							6	3	A
Fiery Emperor	*Anax immaculifrons*							1		C
Green Skimmer	*Orthetrum sabina*	1	1	1				2		C
Red-faced Skimmer	*Orthetrum chrysis*				1				1	C
Common Blue Skimmer	*Orthetrum glaucum*					1		1		A
Common Red Skimmer	*Orthetrum pruinosum*			1						A
Pied Skimmer	*Pseudothemis zonata*							1		C
Wandering Glider	*Pantala flavescens*	6	5		6	2	17		6	A
Crimson Dropwing	*Trithemis aurora*							6		A
No. of dragonflies		7	6	5	7	3	17	26	15	
No. of species		2	2	3	2	2	1	10	5	

U = urbanized/disturbed, W = mixed woodland, P = plantation, S = tall shrubland, C = coastal habitat (including estuary, mangrove, sandflat and rocky shores), G = low shrubland, St = stream, Ag = abandoned agriculture
Commonness: A = abundant, C = common

Annex 4 Herptofauna and mammal recorded at the Study Area

Common Name	Scientific Name	U	W	P	S	C	G	St	Ag	Commonness
Amphibians										
Asian Common Toad	*Bufo melanostictus*	+						++		Common

Gunther's Frog	*Rana guentheri*	+						+		Common
Brown Tree Frog	*Polypedates megacephalus*	+								Common
Reptiles										
Chinese Skink	*Eumeces chinensis*							+	+	Common
Five-striped Blue-tailed Skink	*Eumeces elegans*						++		+	Common
Reeves' Smooth Skink	*Scincella reevesii*						++			Common
Changeable Lizard	*Calotes versicolor*	+		+	+				+	Common
Chinese Gecko	*Gekko chinensis*			++						Common
Long-tailed Skink	*Mabuya longicaudata*		+							Common
Buff-striped Keelback	*Amphiesma stolatum*				+					Common
Mammals										
Wild Boar	*Sus scrofa*				s		s			Common
Short-nosed Fruit Bat	*Cynopterus sphinx*	++								Common
Japanese Pipistrelle	*Pipistrellus abramus*	++								Very common

Habitats: U = urbanized/disturbed, W = mixed woodland, P = plantation, S = tall shrubland, C = coastal habitat (including estuary, sandflat and rocky shores), G = low shrubland, St = stream, Ag = abandoned agriculture
Abundance: + = < 5 individuals, ++ = 5 – 20 individuals, s = signs and tracks found

Annex 5 Stream, Intertidal and Subtidal fauna (invertebrates) recorded at the Study Area

No.	Common Name	Scientific Name	Abundance	Commonness
Stream/estuary				
1	Snail	*Nerita* sp.	+++	Common
2	Snail	*Melanoides tuberculata*	+++	Common
3	Palaemond shrimp	*Macrobrachium*		Common
4	Grapsid crab	*Hemigrapsus penicillatus*		Common
5	**Sesarmind crab**	***Pseudosesarma patshuni***	**++**	**Uncommon**
6	**Sesarmind crab**	***Chasmagnathus convexus***	**+**	**Common**
Intertidal				
7	Inn Keeper worm	*Ochetostoma erythrogammon*	+++	Common
8	Sponge		+	Common
9	Sea anemone		+	Common
10	Rock oyster	*Saccostrea cucullata*	+++	Common
11	Small mangrove clam	*Gafrarium* sp.	+++	Common
12	Bivalve	Unidentified bivalve sp A	+	
13	Bivalve	Unidentified bivalve sp B	+	
14	Cockles	*Anomalocadia* sp.	+	Common
15	Mangrove snail	*Terebralia sulcata*	+++	Common
16	Mangrove snail	*Cerithidea* sp.	+++	Common
17	Sand snail	*Batillaria* sp.	+++	Common
18	Tiny nerites	*Clithon* sp.	+++	Common
19	Snail	*Monodonta*	+++	Common
20	Snail	*Lunella coronata*	+++	Common
21	Snail	*Planaxis sulcatus*	+++	Common

22	Snail	*Nerita* sp.	+++	Common
23	Snail	*Nassarius festivus*	++	Common
24	Snail	*Thais*	++	Common
25	Polychaete	Polychaete sp A	++	Common
26	Polychaete	Polychaete sp B	+	Common
27	Barnacle	*Balanus amphitrite*	++	Common
28	Pistol shrimp	*Alpheus* sp.	++	Common
29	Hermit crab	*Clibanaria infra*	++	Common
30	Hermit crab	Unidentified sp.	+++	Common
31	Xanthid crab	*Epixanthus frontalis*		Common
32	Sesarmind crab	*Chasmagnathus convexus*	++	Common
33	Sesarmind crab	*Metaplex* sp.	++	Common
34	Sesarmind crab	*Clistocoeloma* sp.	+	Common
35	Sesarmind crab	*Nanosesarma minutum*	+++	Common
36	Sesarmind crab	*Parasesarma pictum*	+++	Common
37	Sesarmind crab	*Perisesarma bidens*	++	Common
38	Grapsid crab	*Gaetice depressus*	++	Common
39	Fiddler crab	*Uca lactea*	+++	Common
40	Fiddler crab	*Uca borealis*	+++	Common
41	Fiddler crab	*Uca crassipes*	++	Common
42	Sand Bubbler Crab	*Scopimera*	++	Common
43	Solider crab	*Mictyris* sp.	+++	Common
44	Starfish	*Archaster typicus*	++	Common
45	Sea squirt	*Styela plicata*	+	Common
Subtidal				
46	Brown algae		+	Common
47	Sponge		++	Common
48	Coral	*Cyphastrea serailia*	++	Dominant
49	Coral	*Favia lizardensis*	+	Common
50	Coral	*Favia speciosa*	++	Abundant
51	Coral	*Favites chinensis*	++	Dominant
52	**Coral**	***Favites flexuosa***	**+**	**Uncommon**
53	Coral	*Favites pentagona*	+	Dominant
54	Coral	*Goniastrea aspera*	+	Common
55	**Coral**	***Goniastrea favulus***	**+**	**Uncommon**
56	Coral	*Leptastrea pruinosa*	+	Abundant
57	Coral	*Pavona decussata*	++	Abundant
58	Coral	*Porites lobata*	+	Common
59	Coral	*Turbinaria peltata*	+	Common
60	Rock oyster	*Saccostrea cucullata*	+	Common
61	Soft-spine sea urchin	*Salmacis sphaeroides*	++	Common
62	Sea squirt	*Styela plicata*	++	Common

Abundance: + = < 10 individuals, ++ = 10 – 100 individuals, +++ = > 100 individuals

Annex 6a Intertidal sandflat transect survey results

Wet Season			Inn Keepr worm	Rock oyster	Cockle	Bivalve	Tiny nerites Clithon sp.	Batillaria sp.	Cerithidea	Lunella coronata	Nerita sp.	Planaxis	Barnacle	Scopimera crab	Mictyris crab	Polychaete
Transect 1 (High tidal level)	Quadrat	1		3			21						2			
	Core	1			2	3		8	7					2		
	Quadrat	2	3				8									
	Core	2				1			10							
	Quadrat	3		15			45		3			4				
	Core	3														
	Quadrat	4														
	Core	4														
	Quadrat	5					6		1							
	Core	5			1				10					1		1
	Quadrat	6					2									
	Core	6														
	Quadrat	7														
	Core	7														
	Quadrat	8														
	Core	8														
	Quadrat	9														
	Core	9														
	Quadrat	10														
	Core	10														

Annex 6b Intertidal sandflat transect survey results

Wet Season			Inn Keepr worm	Rock oyster	Cockle	Bivalve	Tiny nerites Clithon sp.	Batillaria sp.	Cerithidea	Lunella coronata	Nerita sp.	Planaxis	Barnacle	Scopimera crab	Mictyris crab	Polychaete
Transect 2 (Middle tidal level)	Quadrat	1	4				15		5							
	Core	1														

	Quadrat	2		3			5									
	Core	2														
	Quadrat	3	3					3	12							
	Core	3														
	Quadrat	4		2			6			1			3			
	Core	4			2		2									
	Quadrat	5		3							2					
	Core	5														
	Quadrat	6	10					3	3							
	Core	6														
	Quadrat	7														
	Core	7														
	Quadrat	8	6				6									
	Core	8														
	Quadrat	9							3							
	Core	9														
	Quadrat	10	5				16		6							
	Core	10														

Annex 6c Intertidal sandflat transect survey results

Wet Season			Inn Keepr worm	Rock oyster	Cockle	Bivalve	Tiny nerites Clithon sp.	Batillaria sp.	Cerithidea	Lunella coronata	Nerita sp.	Planaxis	Barnacle	Scopimera crab	Mictyris crab	Polychaete
Transect 3 (Low tidal level)	Quadrat	1														
	Core	1												1		
	Quadrat	2														
	Core	2														
	Quadrat	3														
	Core	3														
	Quadrat	4														

	Core	4			1									1		
	Quadrat	5														
	Core	5														
	Quadrat	6														
	Core	6				1										
	Quadrat	7														
	Core	7														
	Quadrat	8														
	Core	8														
	Quadrat	9														
	Core	9														
	Quadrat	10														
	Core	10														

Annex 6d Intertidal sandflat transect survey results

Dry Season			Inn Keepr worm	Rock oyster	Cockle	Bivalve	Tiny nerites Clithon sp.	Batillaria sp.	Cerithidea	Lunella coronata	Nerita sp.	Planaxis	Barnacle	Scopimera crab	Mictyris crab	Polychaete
Transect 1 (High tidal level)	Quadrat	1														
	Core	1					2		1	1	1					
	Quadrat	2	3	5									2			
	Core	2						10	4							
	Quadrat	3		6					4			4				
	Core	3							8							
	Quadrat	4							3							
	Core	4					3		9					1		
	Quadrat	5														
	Core	5												3		
	Quadrat	6														
	Core	6														
	Quadrat	7		2				1	2							

	Core	7						2								
	Quadrat	8														
	Core	8														
	Quadrat	9														
	Core	9												2	1	
	Quadrat	10		3												
	Core	10														

Annex 6e Intertidal sandflat transect survey results

Dry Season			Inn Keepr worm	Rock oyster	Cockle	Bivalve	Tiny nerites Clithon sp.	Batillaria sp.	Cerithidea	Lunella coronata	Nerita sp.	Planaxis	Barnacle	Scopimera crab	Mictyris crab	Polychaete
Transect 2 (Middle tidal level)	Quadrat	1							8							
	Core	1												1		
	Quadrat	2	2	3			10		2				3			
	Core	2					4		1							
	Quadrat	3		4							2					
	Core	3														
	Quadrat	4		6				5				2	5			
	Core	4					2	1								
	Quadrat	5	2						6							
	Core	5			1	1										
	Quadrat	6					8									
	Core	6														
	Quadrat	7														
	Core	7			1											
	Quadrat	8	4				15									
	Core	8					3									
	Quadrat	9														
	Core	9														

	Quadrat	10					6									
	Core	10														

Annex 6f Intertidal sandflat transect survey results

Dry Season			Inn Keepr worm	Rock oyster	Cockle	Bivalve	Tiny nerites Clithon sp.	Batillaria sp.	Cerithidea	Lunella coronata	Nerita sp.	Planaxis	Barnacle	Scopimera crab	Mictyris crab	Polychaete
Transect 3 (Low tidal level)	Quadrat	1														
	Core	1			1											1
	Quadrat	2														
	Core	2														1
	Quadrat	3														
	Core	3				1										
	Quadrat	4														
	Core	4														
	Quadrat	5														
	Core	5														1
	Quadrat	6														
	Core	6				1										
	Quadrat	7														
	Core	7														2
	Quadrat	8														
	Core	8														
	Quadrat	9														
	Core	9														
	Quadrat	10														
	Core	10														

Annex 6g Intertidal hard shore transect survey results

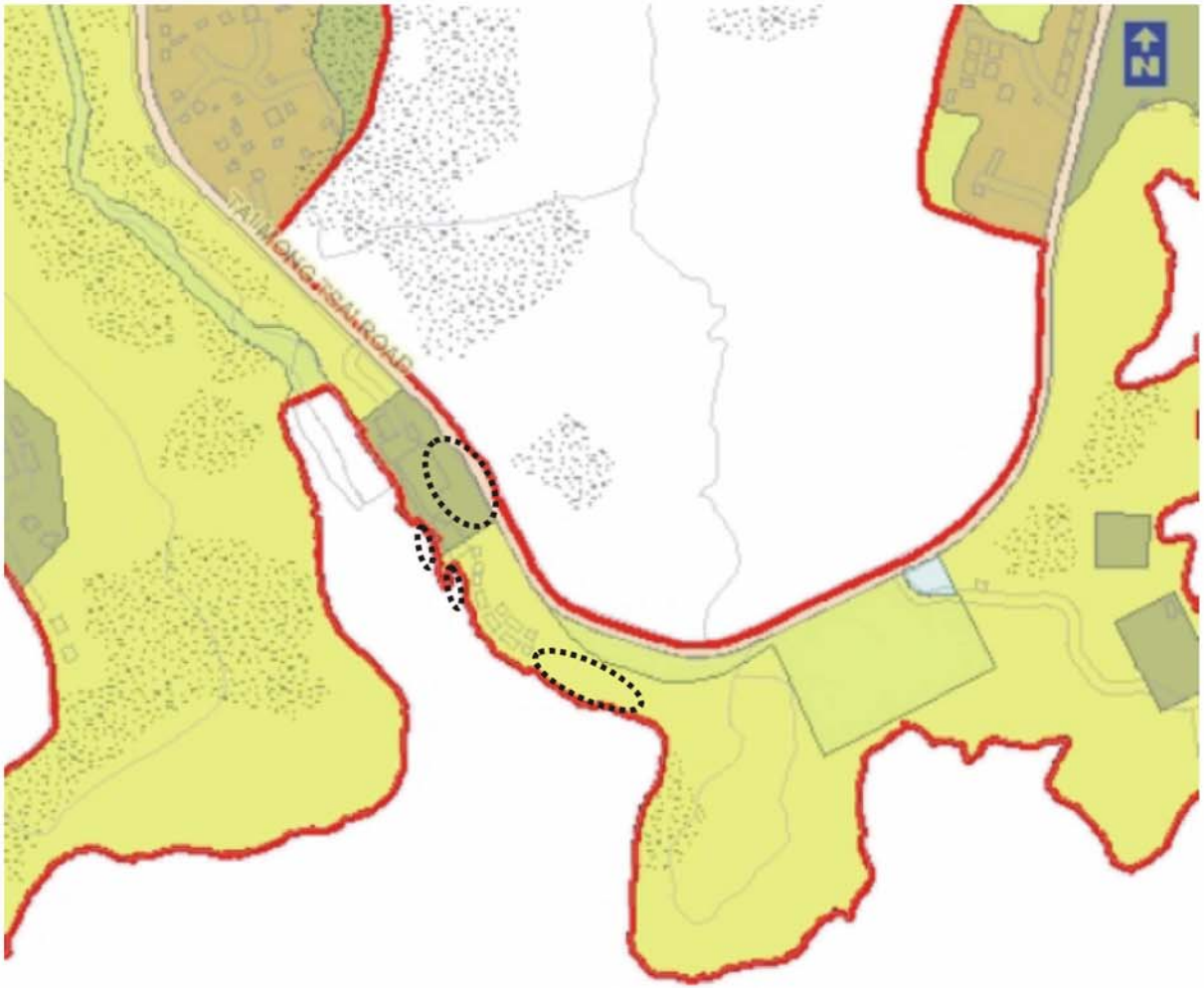
Wet Season	Quadrat	Rock oyster	Mono donta	Lunell a coron	Barna cle	Gaetic e depre	Dry Seaso n	Quadr at	Rock oyster	Mono donta	Lunell a coron	Barna cle	Gaetic e depre

				ata		ssus					ata		ssus
Transect Project Site	1						Transect Project Site	1					
	2	31			29			2	24				
	3							3	13	4		23	
	4							4					
	5	11						5				5	
	6				2			6	26			12	
	7							7					
	8	29			5			8					
	9							9	36	2		41	
	10				4			10				6	
Transect North	1						Transect North	1	5				
	2							2					
	3	6			26			3		3	1	14	
	4		6	2				4					
	5				3			5	6	7			
	6							6					
	7	15	2					7				5	
	8							8					
	9	15			2			9	12	2	1	2	
	10			2				10					
Transect South	1		4				Transect South	1			1		
	2	2	2					2		14			2
	3		21	3		3		3	5				
	4		8					4		12	3		
	5	3						5					
	6		15					6	12				
	7					2		7		5			1
	8	14						8	19	6			
	9		10					9			2		
	10	6	13			3		10	9	11	1		2

Annex 7 Fish species recoded in the Study Area

No.	Valid species name	Chinese Name	English Name	Ecological Group	Typical Habitat	Conservation status
1	*Anguilla japonica*	日本鰻鱺	Japanese eel	Anadromous	Fresh/Brackish	
2	*Pisodonophis cancrivorous*	食蟹豆齒鰻	Crab eating eel	Brackishwater	Brackish	
3	*Engraulidae sp.*	鯷 (未明種)		Vagrant	Brackish	
4	*Mugil cephalus*	鯔	Mullet	Brackishwater	Marine/Brackish	IUCN-Least concern
5	*Mugil subviridis*	綠背鯔	Greenback mullet	Brackishwater	Marine/Brackish	
6	*Platycephalus sp.*	鮡	Flathead grey mullet	Vagrant	Marine/Brackish	
7	*Ambassis gymnocephalus*	眶棘雙邊魚	Bald galssy	Brackishwater	Brackish	
8	*Apogonichthyoides niger (=Apogon niger)*	黑天竺鯛		Vagrant	Marine/Brackish	
9	*Siganus canaliculatus*	長鰭篮子魚	Rabbit fish	Amphidromous	Marine/Brackish	
10	*Sillago japonica*	少鱗鱚	Japanese sillago	Amphidromous	Marine/Brackish	
11	*Sillago sihama*	鱚	Silver sillago	Amphidromous	Marine/Brackish	
12	*Lutjanus argentimaculatus*	紫紅笛鯛	Mangrove red snapper	Amphidromous	Marine/Brackish	
13	*Gerres oyena*	奧奈銀鱸	Common silver-biddy	Vagrant	Marine/Brackish	
14	*Pomadasys maculatus*	大斑石鱸	Saddle grunt	Vagrant	Marine/Brackish	
15	Unidentified sea bream sp.A	鯛 (未明種)	Sea bream	Vagrant	Marine/Brackish	
16	*Acanthopagrus latus*	黃鰭鯛	Yellowfin seabream	Vagrant	Marine/Brackish	
17	*Terapon jarbua*	細鱗鯻	Jarbua terapon	Amphidromous	Marine/Brackish	
18	*Omobranchus fasciolatoceps*	斑頭肩鰓鰨	Barhead blenny	Brackishwater	Brackish	
19	*Paradiplogrammus enneactis*	斑鰭 (魚銜)	Mangrove dragonet	Brackishwater	Brackish	
20	*Eleotris acanthopoma*	刺蓋塘鱧	Spinecheek gudgeon	Amphidromous	Brackish	
21	*Acentrogobius caninus*	犬牙细棘蝦虎鱼	Tropical sandy goby	Brackishwater	Brackish	
22	*Bathygobius fuscus*	深蝦虎魚	Dusky frillgoby	Brackishwater	Brackish	
23	*Drombus sp.*	捷蝦虎魚 (未明種)	Goby	Brackishwater	Brackish	
24	*Glossogobius giuris*	舌蝦虎	Tank goby	Amphidromous	Fresh/Brackish	
25	***Psammogobius biocellatus (= Glossogobius biocellatus)***	**雙斑砂蝦虎魚**	**Sleepy goby**	**Brackishwater**	**Brackish**	**IUCN - Lower Risk/near threatened**
26	*Luciogobius guttatus*	竿蝦虎魚	Flat-headed goby	Amphidromous	Brackish	
27	*Mugiogobius abei*	阿部鰕虎	Abe goby	Amphidromous	Brackish	
28	***Favonigobius reichei (=Papillogobius***	**雷氏乳突蝦虎魚**	**Indo-Pacific tropical sand goby**	**Brackishwater**	**Brackish**	**IUCN - Lower Risk/near threatened**

	reichei)					
29	*Periophthalmus modestus*	彈塗魚	Mudskipper	Brackishwater	Brackish	
30	*Pseudogobius javanicus*	爪哇擬蝦虎魚	Java goby	Brackishwater	Brackish	
31	*Redigobius sp.*	雷蝦虎		Brackishwater	Brackish	
32	*Tridentiger bifasciatus*	雙帶縞蝦虎魚	Shimofuri goby	Amphidromous	Brackish	IUCN - Least concern
33	*Scatophagus argus*	金錢魚	Spotted scat	Amphidromous	Marine/Brackish	
34	*Takifugu niphobles*	黑點多紀魨	Grass puffer	Vagrant	Marine/Brackish	IUCN - Data deficient
35	*Takifugu ocellatus*	弓斑多紀魨	Eye-spotted puffer	Vagrant	Marine/Brackish	



OZP Zoning

- CA Conservation Area
- CP Country Park
- CPA Coastal Protection Area
- G/IC Government / Institution / Community
- GB Green Belt
- REC Recreation
- V Village Type Development

0 ——— 161m

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Figure 1 **Outline Zoning Plan S/SK-TMT/4 - Tai Mong Tsai & Tsam Chuk Wan in relation to the proposed Phase III redevelopment area ( ).**

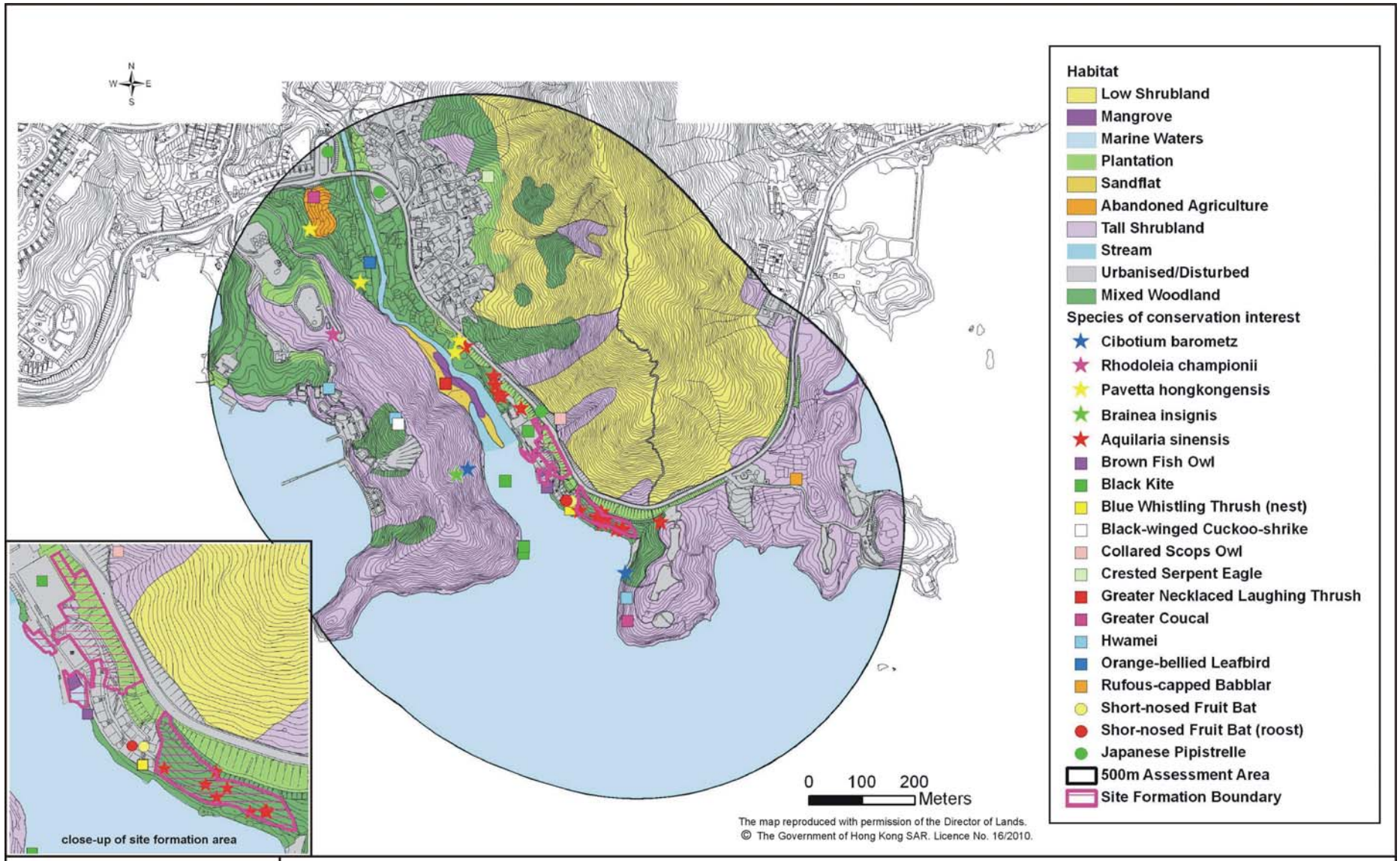

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Figure 2 Habitat Map and Species of Conservation Interest

Mixed Woodland

Tall Shrubland

Low Shrubland

Abandoned Agricultural Land

Plantation

Urbanised/Disturbed

Stream

Mangrove/Sandflat

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Figure 3a **Photos of habitats and species of conservation interest recorded within the Study Area**

			
Aquilaria sinensis	*Cibotium barometz*	*Pavetta hongkongensis*	Brainea insignis
			
seasarma crab *Pseudosesarma pakshuni*	*Goniastrea favulus*	Nest of Blue Whistling Thrush	Short-nosed Fruit Bat

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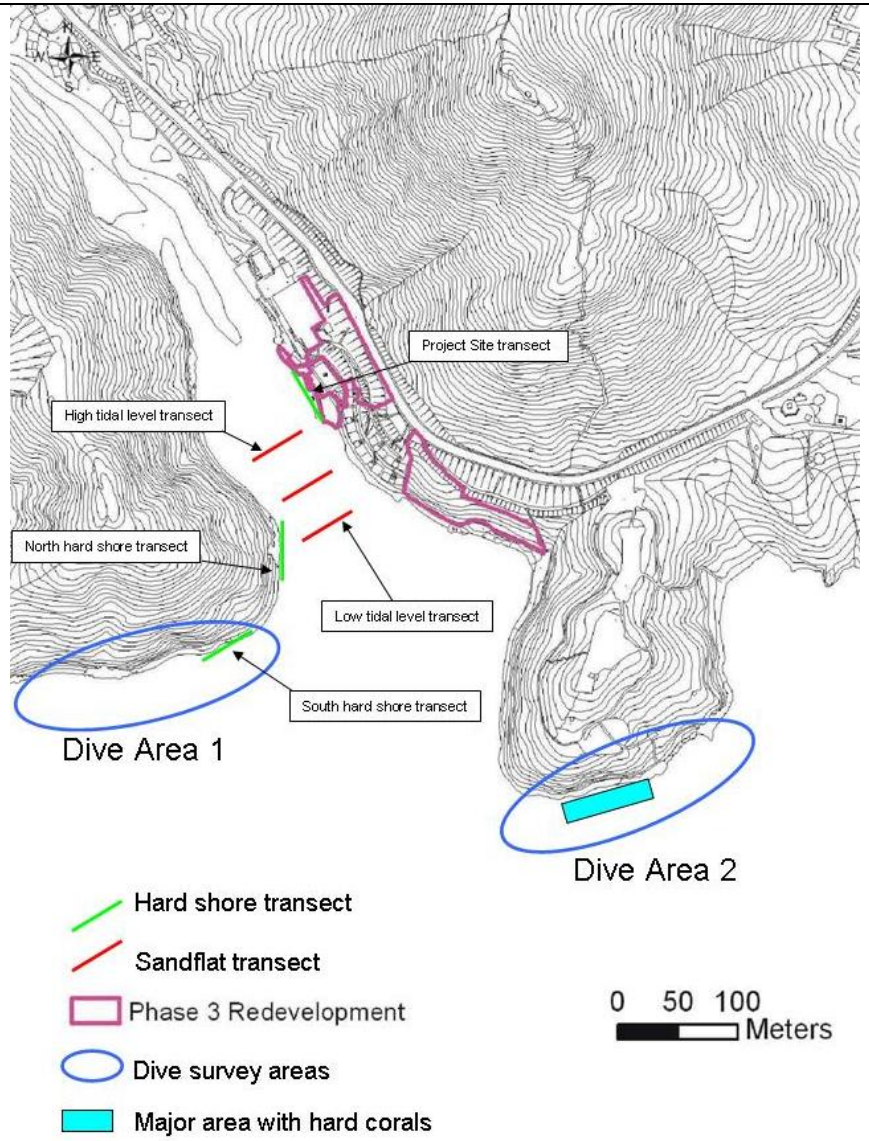
Figure 3b Photos of habitats and species of conservation interest recorded within the Study Area



Favites flexuosa

Goniastrea favulus

Figure 3c Locations of intertidal survey and dive survey and the two uncommon coral species found

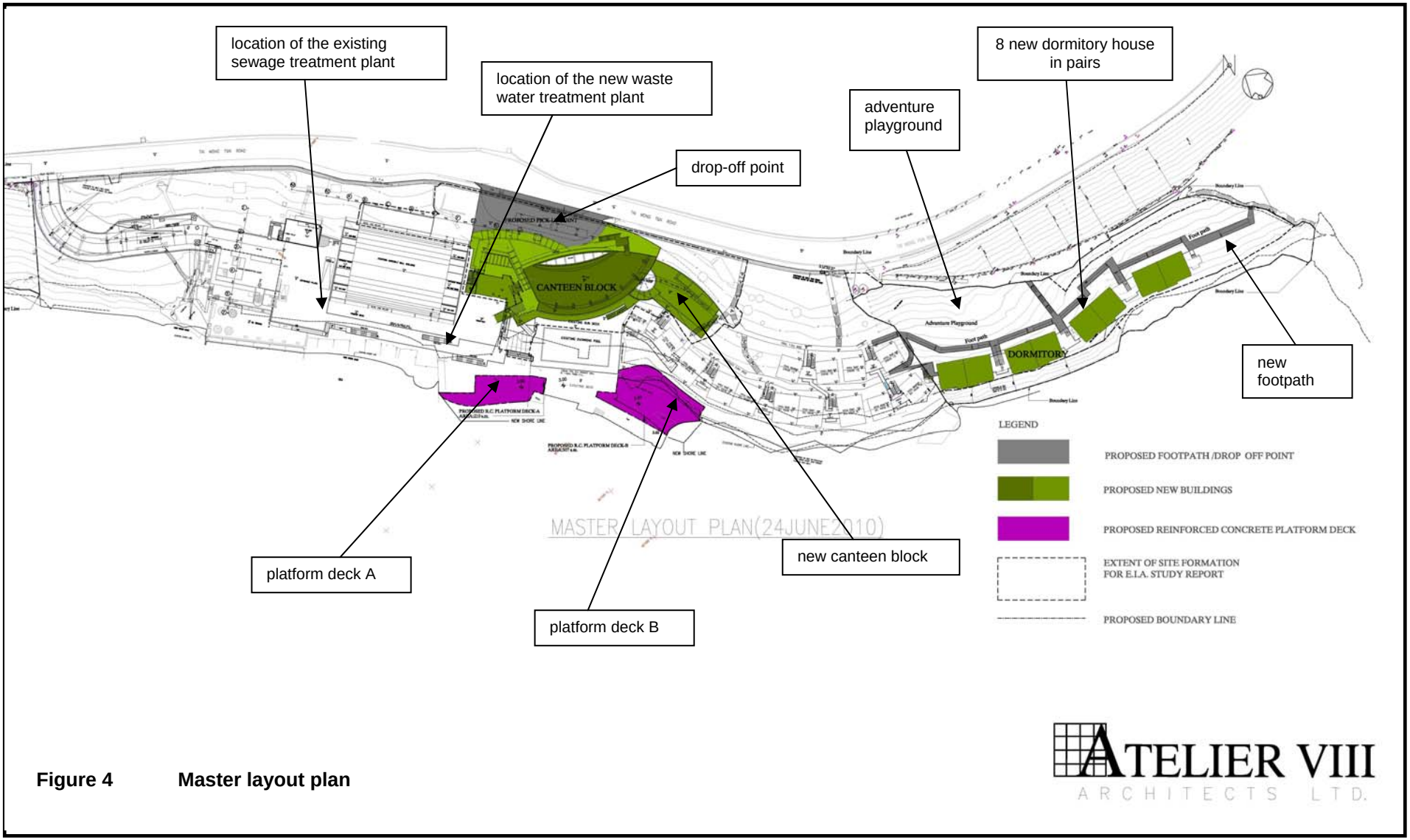


Figure 4 **Master layout plan**

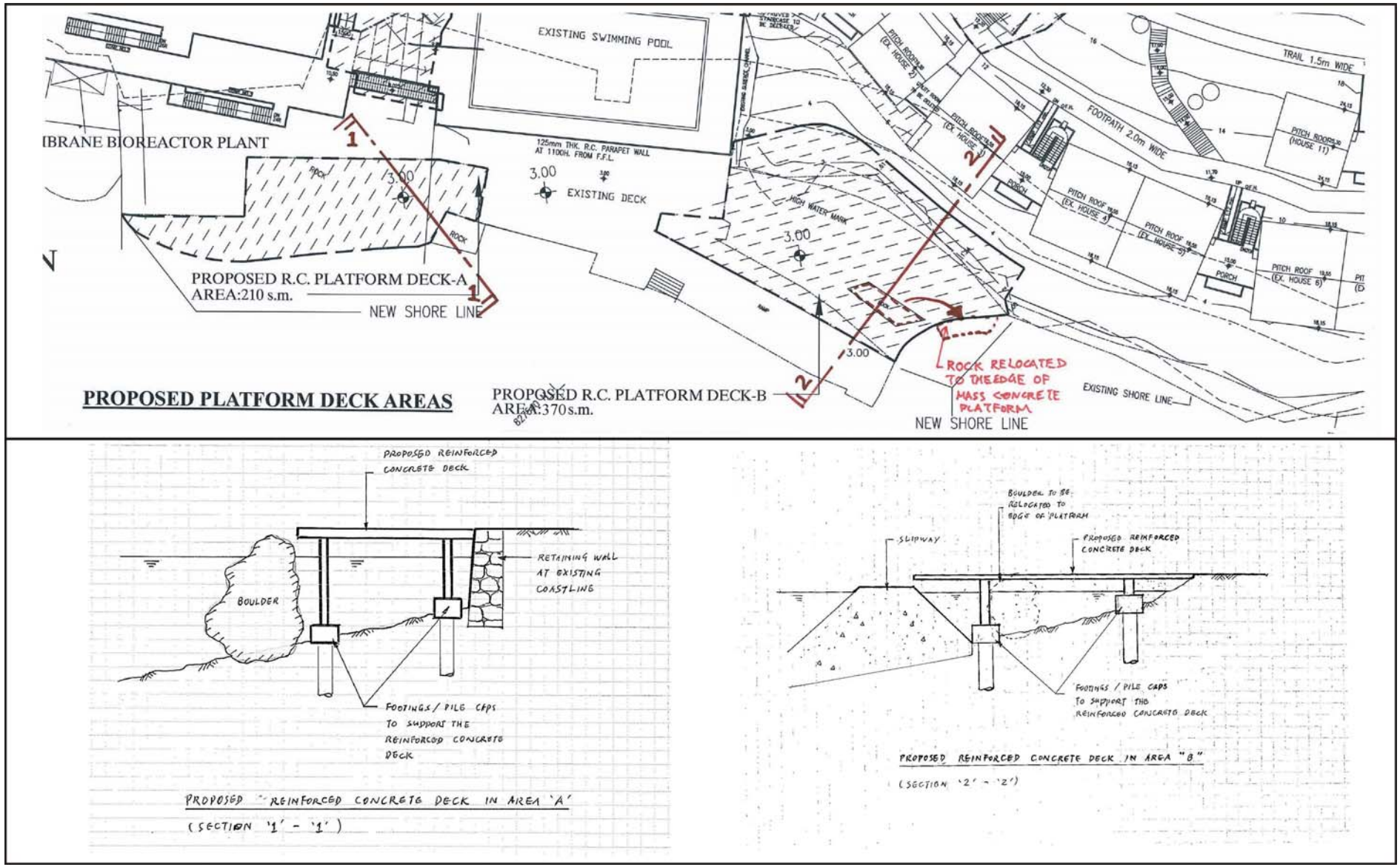
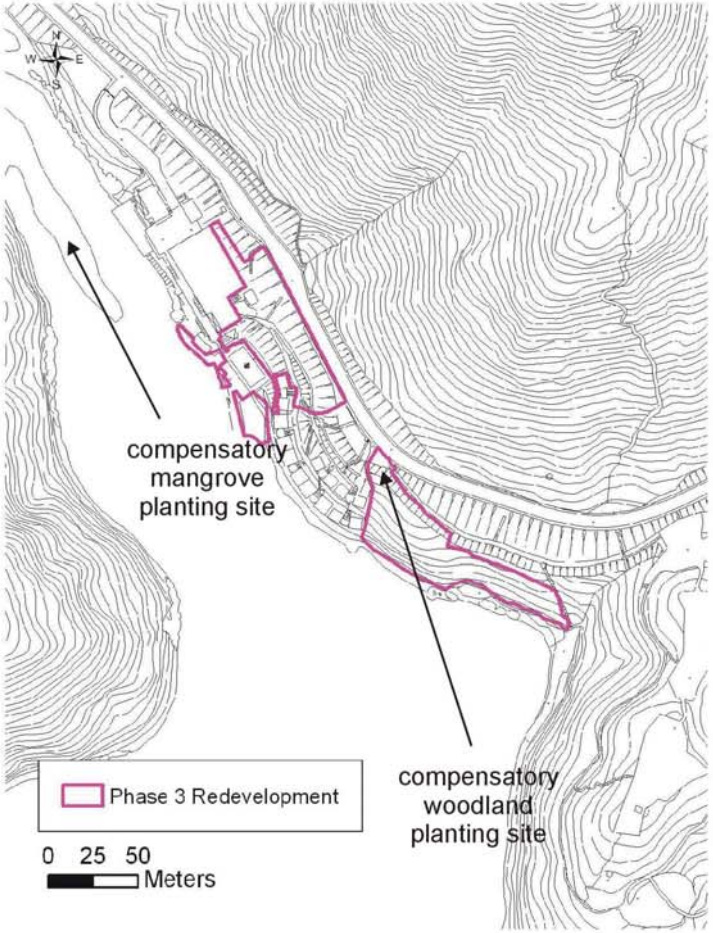


Figure 5 **Close up of proposed platform decks**



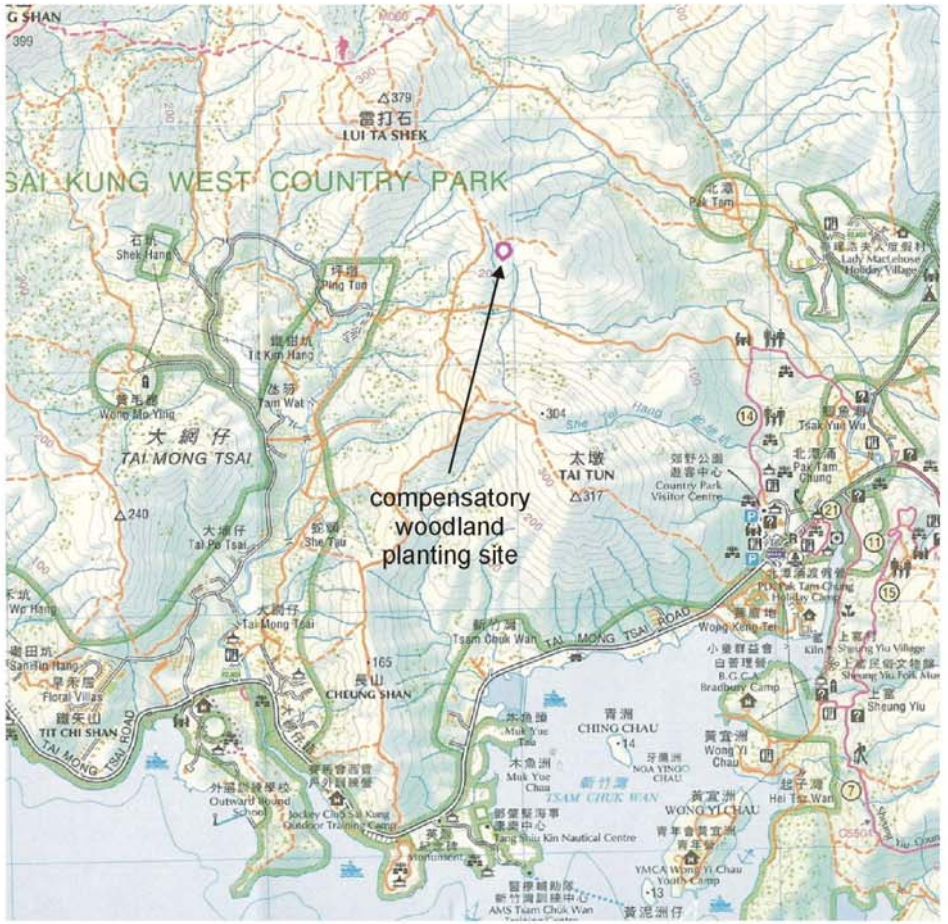


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Figure 6 **Location of mangrove and woodland compensatory planting area**

APPENDIX B
LANDSCAPE AND VISUAL IMPACT ASSESSMENT

Landscape and Visual Impact Assessment

For

Redevelopment of Hong Kong Federation of Youth Groups
Tai Mong Tsai Outdoor Training Camp Phase III

At

Tai Mong Tsai Road, Sai Kung

Prepared by

Kenneth Ng & Associates Ltd

August 2010

AT3

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1. Introduction

1.1 The objective of this Landscape and Visual Impact Assessment (LVIA) report is to identify the existing and proposed landscape elements and the visual quality within the limits of the primary visual envelop of the study area (***Figure 1***) and provide an evaluation of the impact on the landscape and visual aspects due to the proposed Redevelopment of Hong Kong Federation of Youth Groups Tai Mong Tsai Outdoor Training Camp Phase III (the Project). The assessment will cover the landscape and visual impact on the surrounding with stage of the life cycle through out the Project.

1.2 It will address the main concerns from the visual and landscape point of view in order to derive mitigation measures to minimize the landscape and visual impact due to the Project.

2. Legislation

2.1. The assessment of the landscape and visual impact due to the proposed Project has been carried out all in accordance with the criteria and methodology in Annexes 10 and 18 of the Technical Memorandum on EIA Process (EIAO-TM) issued under the EIAO (Cap.499).

2.2 The HKPSG (Chapter 10 – Landscape and Conservation) outlines the criteria, which should be considered when planning in the rural environment; the Government Circular regarding tree preservation LAO PN No. 7/2007 – Tree Preservation is also applied to this assessment.

2.3 In addition, the following guidelines and technical circulars have been considered in the landscape and visual assessment:

(i) EIAO Guidance Note No. 8/2002 – Preparation of Landscape and Visual Impact Assessment under the EIAO;
(ii) WBTC No. 17/2000 – Improvement to the Appearance of Slopes;
(iii) ETWB TC(W) No. 2/2004 – Maintenance of Vegetation and Hard Landscape Features;
(iv) ETWB TC(W) No. 29/2004 – Registration of Old and Valuable Trees, and Guidelines for their Preservation;
(v) Technical Guidelines on Landscape Treatment and Bio-Engineering of Man-made Slope and Retaining Walls (GEO Publication No. 1/2000); and
(vi) Use of Vegetation as Surface Protection on Slope (GEO 1999).
(vii) Approved Tai Mong Tsai & Tsam Chuk Wan OZP No. S/SK-TMT/4

3. Assessment Methodology

3.1 The methodology adopted for the proposed Project conforms to the requirements of the EIAO. A robust methodology will be derived for the LVIA to meet the requirements of the EIA Study Brief and the EIAO-TM. It consists of:

- A definition of the scope and contents of the proposed works;
- Review of Planning Development Control Framework;
- A comprehensive description of the baseline landscape and visual character;
- Identification of the potential landscape and visual impacts and prediction of its magnitude and extent of impact;
- Recommendations on mitigation measures; and
- Assessment of residual impact and conclusion.

Scope and Contents

3.2 In setting the scope of the landscape and visual impact assessment for proposed development, the following aspects will be considered:

- Site description;
- Proposed development;
- Level of details required for baseline studies;
- Key viewpoints to be covered;
- System to be used for judging significance of impact;
- Other development if cumulative impacts are to be assessed;
- Impact assessment; and
- Recommended mitigation measures.

Key Issues to be Addressed

3.3 The assessment identifies the impacts of the proposed Project based on the character of that landscape and the visual amenity of that area. The surrounding area has its distinctive character and its own landscape value. The alteration of the existing landscape elements, such as tree belt would be vulnerable to the existing landscape character. The study area is exposed to view thus lead to the loss of visual quality on the surrounding. Mitigation measures should be addressed to compensate on the loss of visual quality due to the proposed Project.

3.4 Key issues relating to landscape impact of the Project will include:

- Impacts upon the landscape character within the study area; and
- Impacts upon the proposed landscaping in the study area from the surrounding area.

3.5 Key issues relating to the visual impact of the Project will include:

- Impact upon sensitive receivers due to the proposed development works during the construction stage and operation stage; and
- Interference of views due to the proposed development works.

Baseline Study

3.6 The baseline study will present an appraisal of the landscape and visual resources of the study area. It will focus on the sensitivity of the landscape and visual impact on the visual receiver and its ability to accommodate change. Under the EIA Study Brief, the study area defined for the Landscape Impact Assessment is approximately 500 meters from the proposed works site boundary. A visual envelop defines the area for the Visual Impact Assessment. This is generally the view shed formed by natural/manmade feature such as tree line and building block.

3.7 Landscape resources considered include topography, woodland, and other vegetation, built form, settlement pattern, land use, scenic spots and details of local streetscapes. The baseline study described the landscape resources by identifying broadly homogenous Landscape Character Units (LCUs) of a similar character. They are rated based on the quality of element, their sensitivity to change and its importance at various geographical levels.

3.8 Visual resources considered are typical viewpoints located at and direct towards the Project Site. A visual envelop will establish which defines the extent of visual influence of the Project and the potential visual impacts. Definition of the extent of the view shed formed by natural / man-made feature, such as ridgeline or building blocks, will be based on desktop study and site investigation. As the topography of the site area is situated within a lower ground level, the zone of visual influence is expected to be limited within the immediate surrounding area. Visually Sensitive Receivers (VSRs) identified in this assessment are representatives among that individuals or groups that have a similar sensitivity to changes in the visual and landscape environment.

Review of the Planning and Development Control Framework

3.9 A review of the planning and development control framework has been undertaken to provide an insight to the future outlook of the area affected and the way the proposed development would fit into its wider context. This will also give further insight into possible future sensitive receiver that might be affected by the proposed improvement works.

Principle View Point

3.10 Viewpoints from area surrounding the study area will be established and examined. They are representation of the specific type of VSRs subject to the impact covered by proposed development works.

Methodology for Assessment of Landscape and Visual Impact

Landscape Impact

3.11 Landscape impacts can be positive or negative. They are assessed at two levels:

- Impacts upon individual landscape features and resources; and
- Impacts upon landscape character.

3.12 Landscape impacts are assessed as a function of the magnitude of change and the sensitivity of the landscape resource or landscape character. Landscape sensitivity is assessed as high, medium and low, and magnitude of change is assessed as large, intermediate, small and negligible. Landscape impacts are assessed subsequent to the implementation of prescribed mitigation measures at both construction and operation stages.

- Landscape sensitivity is the ability of the landscape resource or character to accommodate change without prejudice to the quality of that resource.
- Magnitude of change is the degree of degradation or intrusion on the landscape element on which it may be possible to affect through landscape or environment enhancement.

3.13 Impacts are assessed as substantial, moderate and slight (positive or negative). Insignificant impacts are termed negligible. A matrix is used to assess landscape impacts and is shown in the Table below:

Landscape Impact Characteristic (Positive or Negative)

Magnitude of Change	Sensitivity of Landscape Resource / Character		
	High	**Medium**	**Low**
Large	Substantial	Substantial / Moderate	Moderate
Intermediate	Substantial / Moderate	Moderate	Moderate / Slight
Small	Moderate	Moderate / Slight	Slight
Negligible	Negligible	Negligible	Negligible

Substantial - Adverse / Beneficial impact where the proposed project would cause significant degradation or improvement in existing landscape baseline conditions.

Moderate - Adverse / Beneficial impact where the proposed project would cause noticeable degradation or improvement in existing landscape baseline conditions.

Slight - Adverse / Beneficial impact where the proposed project would cause a barely noticeable degradation or improvement in existing landscape conditions or where the changes brought about by the project would not be apparent in visual terms.

Negligible - The proposed project does not perceptibly affect the existing landscape baseline conditions.

Visual Impact

3.14 Visual impacts can be positive or negative and are defined as a function of the sensitivity of a receiver and the magnitude of the change to that receiver's existing view.

3.15 The assessment of visual impacts is structured by receiver sensitivity. Visually Sensitive Receivers (VSRs) are identified through the definition of the structure's Zone of Visual Influence or ZVI (i.e. the area within which views of the study area are possible). For the purpose of this study, receivers have been grouped into the following categories:

Residential - Those people who would view the proposal from their home.

Occupational - Those people who would view the proposal from their workplace.

Travelers - Those people who would view the proposal from their vehicles or on foot.

Recreational - Those people who would view the proposal whilst engaging in recreational activities.

3.16 The sensitivity of receivers to visual impacts is influenced by the immediate context of the viewer, the activity in which they are engaged and the value that

they attach to this location in particular. Receivers are categorized as being of high, medium or low sensitivity to visual impacts.

3.17 Those who view the scheme from their homes are considered to be highly sensitive to any visual intrusion. This is because the attractiveness, or otherwise, of the view would have a notable effect on a resident's general quality of life and acceptability of their home environment.

3.18 Those people who view the scheme from their workplace are considered relatively less sensitive to visual intrusion. This is because they are employed in activities where visual outlook plays a less important role in the perception of the quality of the working environment. They are classified as a low sensitivity group.

3.19 For those who view the scheme whilst engaging in outdoor leisure pursuits, visual sensitivity varies depending on the type of recreational activity. Those taking a stroll in a park, for example, would be classified as a high sensitivity group compared to football players who would have a low sensitivity rating.

3.20 For those people who view the scheme from public thoroughfares, the degree of visual intrusion experienced depends on the speed of travel and whether views are continuous or only occasional. Generally, the slower the speed of travel and the more continuous the viewing experience, then the greater the degree of sensitivity.

3.21 The criteria used to determine the sensitivity of VSRs are given below:

- Value and quality of existing views;
- Type of view;
- Availability and amenity of alternative views;
- The number of visual receivers;
- The category or type of visual receivers as discussed above;
- The particular visual backdrop from specific viewpoints;
- The frequency (length and duration of time) the proposed development is in view; and
- Distance to the project.

3.22 The criteria used to determine the magnitude of change to a view are given below:

- Proximity of receivers;
- Degree of change of views;
- The particular visual backdrop to the development from specific important view points;
- The landscape context of the proposed development;
- The nature of the proposed development and its compatibility with the surrounding landscape;
- Scale of development;
- Reversibility of change;
- Potential blockage of view; and
- Duration of impacts under construction and operation phase.

3.23 Impacts are assessed as substantial, moderate and slight. Insubstantial impacts are termed negligible. A matrix is used to assess visual impacts and is shown in Table below:

Visual Impact Characteristic (Positive or Negative)

Magnitude of Change	**Sensitivity of Receiver Group**		
	High	**Medium**	**Low**
Large	Substantial	Substantial / Moderate	Moderate
Intermediate	Substantial / Moderate	Moderate	Moderate / Slight
Small	Moderate	Moderate / Slight	Slight
Negligible	Negligible	Negligible	Negligible

Substantial - Adverse / Beneficial impact where the proposed project would cause significant degradation or improvement in existing visual baseline conditions.

Moderate - Adverse / Beneficial impact where the proposed project would cause noticeable degradation or improvement in existing visual baseline conditions.

Slight - Adverse / Beneficial impact where the proposed project would cause a barely noticeable degradation or improvement in existing visual conditions or where the changes brought about by the project would not be apparent in visual terms.

Negligible - The proposed project does not perceptibly affect the existing visual baseline conditions

Residual Landscape and Visual Impact

3.24 Residual impact is defined as the impact remaining after all practical methods of mitigation have been implemented. The final stage of the LVIA study is to assess the significance of the residual impacts. The impacts will be classified according to their level of significance as summarized below:

- Beneficial - the project will complement the landscape and visual character of its setting, will follow the relevant planning objectives and will improvement the landscape and visual quality of the study area.
- Acceptable - the assessment indicates that there will be no significant effects on the landscape, no significant visual effects caused by the appearance of the project, or no interference with key views.
- Acceptable with mitigation measure - there will be some adverse effects; these can be eliminated, reduced or offset to a large extent by specific measures.
- Unacceptable - the adverse effects are considered too excessive and are unable to mitigate practically.
- Undetermined - significant adverse effects are likely, but the extent to which they may occur or may be mitigated cannot be determined from the study. Further detailed study will be required for the specific effects in question.

4. Existing Site Condition

4.1 The Project is located at the south of Tai Mong Tsai at the foothill of Cheung Shan. Oriented in a northwest-southeast direction, access to the site is via Tai Mong Tsai Road. The aerial photograph of the subject site is shown in ***Figure 2***. To the north the site is sandwiched and bounded between the wooded hill slopes of Cheung Shan and Tai Mong Tsai Road along the northeast, and the water channel between study area and Yim Tin Tsai with a wooded hill slope at the opposite of study area to the southwest. Located at the existing HKFYG Jockey Club Sai Kung Outdoor Training Camp, the site is currently occupied by existing camp facilities/buildings, landscape amenity areas and vegetated slopes.

Landscape and Visual Context in the Study Area

4.2 The landscape elements and visual context in the immediate vicinity have been characterized by a number of contrasting features as illustrated in ***Figure 4 and 5.***

4.3 The subject site is situated at the existing HKFYG Jockey Club Sai Kung Outdoor Training Camp, bounded by Tai Mong Tsai Road to the northeast and the water channel between study area and Yim Tin Tsai to the southwest. Existing camp facilities/buildings, dormitory and landscape amenity areas occupy the area within the northwest portion of the site with vegetated hill slopes largely occupy the undeveloped southeast portion of site. The site is located along the foothill of Cheung Shan, surround by hill slope to the northeast and southwest, open view to the subject site is limited to the direction from the sea to the southwest and along Tai Mong Tsai Road to the northeast.

Woodland / Vegetated Area

4.4 Wooded hill slopes are largely located at foothill of the Cheung Shan and on the knoll opposite to the subject site. At the upland of Cheung Shan to the northeast, the vegetated hill slope area is largely covered by scrubland. It is this extensive vegetated hillside that forms a green pleasant backdrop on views to the northeast. Other vegetated areas are found mainly along roadsides, in villages, abandoned agricultural fields and in amenity areas such as barbecue/picnic area within the study area.

Residential / Settlement Area

4.5 Village Settlement area of Tai Mong Tsai Village is located at the northwest of the study area, which largely consists of village houses of 1 to 3 storeys high. Other settlement areas include institutional outdoor recreational centers/camps found scattered along the flatter coastline area with in the study area. Due to the topography of the site area is located at a lower ground level surrounded by wooded hill slopes, distant open view to the site is limited to the direction from the sea.

Coastal Area

4.6 Open water is located to the southwest of the study area. This inshore coastal water is enclosed by significant landforms on two sides creating a distinct sense of enclosure with scenic surrounding views. The coastal area near the estuary is partially colonized by mangrove and the area is mainly used for waterborne recreational activity by the training camp.

5. Description of the Proposed Redevelopment

5.1 The proposed redevelopment include the followings:

- The Project site is located partly within the existing campsite and partly on the vegetated slopes along Tai Mong Tsai Road to the southeast of the campsite. It is visible mainly from the water channel area in the southwest.

- The proposed redevelopment will consist of a new 3-storey canteen block with green roof at the center of the existing campsite, eight nos. of 2 to 3-storey dormitories in pairs with adventure playground and two small platform decks on minipiles near the existing slipway to provide leveled areas for outdoor activities. The staggered building form with differences in building height will provide an interesting profile when viewed from the south.

- For better visual effect, the building height of the new canteen block and dormitory will be below the eye-level of Tai Mong Tsai Road, resulted that the proposed redevelopment will have minimal visual intrusion above Tai Mong Tsai Road.

- The new canteen block and dormitory will sit on mini-pile foundation and no slope cuttings are adopted to minimize the extent of site formation required and thus reduce the impact of existing vegetation slopes.

Life Cycle of the Proposed Development

5.2 The life cycle of this work can be divided into the construction stage and operation stage.

6. Baseline Study

Background

6.1 The Project is located at the south of Tai Mong Tsai at the foothill of Cheung Shan. Situated partly within the existing campsite and partly on the vegetated slopes along Tai Mong Tsai Road to the southeast of the campsite, the proposed development will consist of a new canteen block at the center of the existing campsite, eight nos. of 2 to 3-storey dormitory in pairs with adventure playground and two small platform decks on minipiles near the existing slipway. The site is open to view mainly from the water channel area in the southwest. Site inspection reveals that residents in Tai Mong Tsai Village will have no view of the Project due to distance, topography and the existing tree screen. Thus, visual resources are mainly in the local context and the traffic along Tai Mong Tsai Road.

Baseline Landscape Resources

6.2 In accordance with the EIA Study Brief, Landscape Character Units (LCUs) and Landscape Elements (LEs) have been identified within 500m from the site boundary. Their results are described in ***Table 1.1*** for Landscape Elements and ***Table 1.2*** for Landscape Character Units. These to include the followings:

LEs

- LE1 - Woodland including plantation (Approx. 42.86 ha)
  - Existing wooded area comprises the predominantly wooded hillsides of Cheung Shan.
- LE2 - Existing Vehicle Corridor (Approx. 0.98 ha)
  - Existing linear structure for vehicle of Tai Mong Tsai Road.

- LE3 - Residential/Settlement area (Approx. 8.28 ha)
  - Existing residential areas and settlement at Tai Mong Tsai Village, Tai Mong Tsai New Village and as well as institution centre and campsites within the study area.
- LE4 - Stream course (Approx. 1.47 ha)
  - Existing natural stream course between site and Yim Tin Tsai.
- LE5 - Abandon Agricultural Area (Approx. 0.33 ha)
  - Abandon agricultural area within the study area.
- LE6 - Barbecue Area, Picnic Area & Sitting-Out Area (Approx. 1.13 ha)
  - Existing leisure area of Barbecue sites, Picnic Area & Sitting-Out Area within the study area.
- LE7 - Open Water (Approx. 42.47 ha)
  - Existing open water at the west of the subject site
- LE8 - Scrubland (Approx. 22.30 ha)
  - Existing scrubland located predominantly on the upland of Cheung Shan.

LCUs

- LCU1 - Strait Landscape
  - This LCU refer to the inshore coastal water is enclosed by significant landforms on two sides, thereby creating a distinct sense of enclosure on those two sides. Characterized predominantly by their surrounding landforms and the muted hues and horizontality of their coastal waters, which also include small, isolated islands, passing vessels, and marine activities of all kinds, including anchorages, shipping lanes, ferry traffic and waterborne recreational activity. These features produce a natural, marine landscape with a distinct sense of enclosure.

- LCU2 - In-shore Water Landscape
  - This is an area of coastal water lying close to the shore and enclosed to a certain degree by nearby landmasses and islands, which create a sense of enclosed or containment. Whilst this landscape is characterized predominantly by the horizontality and muted hues of its coastal waters, its also includes small, isolated islands, outlying rocks and marine activities including ferry traffic and waterborne recreational activity. The result is largely open, tranquil and natural landscape, which is punctuated by the colours and movement of human features and activities.

- LCU3 - Settled Valley Landscape
  - This LCU refer to foothill of Cheung Shan and nearby hill valleys located in close proximity to the coastline. While the valley sides are mostly wooded, the flatter valley floors near the coast and stream area are mostly settled with man-made features including villages, outdoors recreational centre/camps, roads,

abandoned agriculture fields, barbeque pits and picnic sites.

- LCU4 - Un-settled Valley Landscape
  - This LCU refer to the upland and hillside of Cheung Shan lying at levels between 30 and 165mPD. Consisting of hillsides, knolls, ridges and spurs, it is covered in low scrub and grassland. Woodland can be found on the lower slopes and in sheltered gullies and ravines. Due to its remoteness, this landscape contains few human features and possesses a distinctly remote and exposed character.

Table 1.1
Landscape Elements (LEs)

Landscape Elements			
LE	**Type**	**Description**	**Sensitivity to Change**
LE1	Woodland (including plantation) Quantity: Large	Existing wooded area comprises the predominantly wooded hillsides of Cheung Shan.	High
LE2	Existing Vehicle Corridor Quantity: Low	Existing linear structure for vehicle of Tai Mong Tsai Road.	Low
LE3	Residential and Settlement Area Quantity: Medium	Existing residential areas and settlement at Tai Mong Tsai Village, Tai Mong Tsai New Village and, as well as institution centre and campsites within the study area.	Medium
LE4	Stream Course Quantity: Medium	Existing natural stream course between site and Yim Tin Tsai.	High
LE5	Abandon Agricultural Area Quantity: Low	Abandoned agricultural area within the study area.	Low
LE6	Barbecue Area, Picnic Area & Sitting-Out Area Quantity: Low	Existing leisure area of Barbecue sites, Picnic Area & Sitting-Out Area within the study area.	Medium
LE7	Open Water Quantity: Large	Existing open water within the study area.	High
LE8	Scrubland Quantity: Large	Existing scrubland located predominantly on the upland of Cheung Shan.	High

Table 1.2
Landscape Character Units (LCUs)

Landscape Character Units			
LCU	**Name**	**Description**	**Quality / Sensitivity to Change**
LCU1	Strait Landscape	This is an area of inshore coastal water is enclosed by significant landforms on two sides, thereby creating a distinct sense of enclosure on those two sides. Characterised predominantly by their surrounding landforms and the muted hues and horizontality of their coastal waters, which also include small, isolated islands, passing vessels, and marine activities of all kinds, including anchorages, shipping lanes, ferry traffic and waterborne recreational activity. These features produce a natural, marine landscape with a distinct sense of enclosure	Large/High
LCU2	In-shore Water Landscape	This is an area of coastal water lying close to the shore and enclosed to a certain degree by nearby landmasses and islands, which create a sense of enclosed or containment. Whilst this landscape is characterized predominantly by the horizontality and muted hues of its coastal waters, its also includes small, isolated islands, outlying rocks and marine activities including ferry traffic and waterborne recreational activity. The result is largely open, tranquil and natural landscape, which is punctuated by the colours and movement of human features and activities.	Medium/High
LCU3	Settled Valley Landscape	This refers to the foothill of Cheung Shan and nearby hill valleys located in close proximity to the coastline. While the valley sides are mostly wooded, the flatter valley floors near the coast and stream area are mostly settled with man-made features including villages, outdoors recreational centre/camps, roads, abandoned agriculture fields, barbeque pits and picnic sites.	Large/Medium
LCU4	Un-settled Valley Landscape	This refer to the upland and hillside of Cheung Shan lying at levels between 30 and 165mPD. Consisting of hillsides, knolls, ridges and spurs, it is covered in low scrub and grassland. Woodland can be found on the lower slopes and in sheltered gullies and ravines. Due to its remoteness, this landscape contains few human features and possesses a distinctly remote and exposed character.	Large/High

6.3 A tree survey has been carried out and the extent of existing trees in conflict with the development works was assessed in the Tree Survey Report. The location of trees surveyed is shown on ***Figure 6.1 to 6.4***. Information from the Tree Survey Report is summarized below:

(i) A total of 724 trees are found within the site boundary. For the proposed development, 354 existing trees including 22 dead trees were surveyed within the proposed works area.

(ii) The affected trees can be divided into 3 main areas; these include the existing campsite, unmanaged slope and man-made slope. There are in total 45 tree species found within the captioned location, most of these trees are native species. The pre-dominant species is *Schefflera heptaphylla* (75 nos.), other native species include *Acronychia pedunculata* (3 nos.), *Adinandra millettii* (2 nos.); *Aporusa dioica* (5 nos.); *Aquilaria sinensis* (8 nos.); *Bauhinia variegata* (1 no.); *Bischofia javanica* (7 nos.); *Bridelia tomentosa* (1 no.); *Carallia brachiata* (9 nos.); *Celtis sinensis* (4 nos.); *Cinnamomum parthenoxylon* (5 nos.); *Cinnamomum camphora* (1 no.); *Cratoxylum cochinchinense* (1 no.); *Diospyros morrisiana* (9 nos.); *Elaeocarpus chinensis* (10 nos.); *Ficus altissima* (2 nos.); *Ficus hispida* (2 nos.); *Ficus variolosa* (1 no.); *Garcinia oblongifolia* (2 nos.); *Hibiscus tiliaceus* (9 nos.); *Homalium cochinchinense* (3 nos.); *Ilex pubescens* (1 no.); *Litsea cubeba* (3 nos.); *Litsea rotundifolia var. oblongifolia* (7 nos.); *Macaranga tanarius* (4 nos.); *Machilus chekiangensis* (13 nos.); *Machilus* sp. (1 no.); *Mallotus paniculatus* (8 nos.); *Melicope pteleifolia* (3 nos.); *Michelia alba* (1no.); *Phyllanthus emblica* (1 no.); *Rhaphiolepis indica* (1 no.); *Rhus succedanea* (7 nos.); *Sterculia lanceolata* (13 nos.); *Tetradium glabrifolium* (4 nos.); *Viburnum odoratissimum* (1 no.) and *Zanthoxylum avicennae* (1 no.). In general, majority of the existing tree are found to be poor to fair in terms of tree form and health condition.

(iii) Some exotic species are also found within the site, the pre-dominant species is *Acacia confusa* (83 nos.). Other exotic species include *Araucaria heterophylla* (2 nos.); *Casuarina equisetifolia* (2 nos.); *Delonix regia* (5 nos.); *Carica papaya* (2 nos.); *Citrus maxima* (1no.); *Dimocarpus longan* (1 no.) and *Roystonea regia* (6 nos.).

(iv) None of trees within the lot is identified as rare, endangered or protected flora species in Hong Kong. However, 8 no. of *Aquilaria sinensis* were found within the site, which is common in Hong Kong, but the species is regarded as rare species in China and may warrant special attention.

(v) One common fruit tree species of *Dimocarpus longan* (1 no.) is also found within the existing campsite area.

(vi) No trees in the Study Area are registered as Old and Valuable Trees (OVTs) under ETWB TC(W) No. 29/2004 or are considered potentially registrable as OVTs.

(vii) The proposed development involves 354 nos. existing trees including 22 dead trees. Most of the trees surveyed have fair to poor form and health condition due to growing on steep slopes, overcrowding growing conditions where trees are

fighting for space and lack of maintenance care for trees on unmanaged slopes. For dominant tree *Acacia confusa*, survival rate after transplanting is generally low and with majority of these trees growing on slope, the formation of root ball for transplanting will be very difficult. For other native trees and amenity trees within the inner campsite and unmanaged slope area, due to there being no proper vehicular access for the transplanting and formation of suitable root ball successful transplanting is also consider not technically feasible.

To minimize extensive site formation and disturbance to existing trees, the proposed new buildings are designed in respect to the existing site contour levels. Tree groups around the proposed development area are left intact as far as possible to maintain an existing green buffer to the development. Trees unavoidably affected by the construction works will be compensated with new tree planting.

Based on the layout of the development, the proposed treatment to the existing trees is as follows:

- Existing trees survey within works area 354 nos.
- No of trees proposed for retention 90 nos.
- No of trees proposed for transplantation 4 nos.
- No of trees proposed for felling 238 nos.
- No of dead trees 22 nos.
- No of tree outside works area (to be retained) 370 nos.

(viii) Due to low survival rate as majority of the trees are located on slope with no proper vehicular access for the formation of suitable root ball successful transplanting, a total of 238 trees located directly within the new building footprint and within the required formation area for site access are unavoidability affected are proposed to be felled with compensatory planting.

(ix) As *Aquilaria sinensis* is regarded as species of conservation interest, extra effort to preserve these trees by transplanting is proposed if found technical feasible. 4 trees of *Aquilaria sinensis* affected within the footprint of the proposed new building is proposed to be transplanted, due these trees are of a relative small size even with no mechanical crane/vehicle access this tree can be transplanted manually to nearby unaffected site area.

Baseline Visual Resources

6.4 In accordance with the study methodology, Visually Sensitive Receivers (VSRs) within the visual envelop were identified and grouped into types as shown in ***Table 2***. The visual resources closely relate to the landscape character units. These units vary from traffic corridor, residential to coastal area.

6.5 A visual envelop has been mapped to determine VSRs. Key views from and towards the proposed Project are shown in ***Figure 7.1 to 7.5*** and described as below.

Key Views toward the Proposed Development

VSR	**Viewpoint Location**
VPT1.1	View southeast from Tai Mong Tsai Road
VPT2.1	View southeast from Tai Mong Tsai Village
VPT3.1	View southwest from Cheung Shan
VPT3.2 & 3.3	View southeast from hillside trail west of site
VPT3.4	View north from water channel
VPT3.5	View northwest from barbecue area 12
VPT3.6	View northwest from barbecue area 13

6.6 Details of the VSRs are listed in ***Table 2***.

Table 2
Visually Sensitive Receivers (VSRs)

VSR	Key Visually Sensitive Receivers (VSRs)	Viewer Group	Max. Staying Time	Distance to the Project	Frequency and Duration of View and Sources of Impact Type of view	Sensitivity to Change (Low/Medium/High)
VSR1	VPT1.1 Passengers along Tai Mong Tsai Road	Passengers & Pedestrian	Approx. 2min	Approx. 0 – 200m	-Full view towards the proposed subject site. -Low frequency	Low
VSR2	VPT2.1 Tai Mong Tsai Village	Residents	24hr Depends on VSRs	Approx. 120m	-No view towards the proposed subject site. -High frequency -View during day and night. Duration of view is varies depends on the activity of VSRs.	High
VSR3	VPT3.1 Hiker to the south of Cheung Shan	Visitors	Approx. 30 mins Depends on VSRs	Approx. 10 – 200m	-Partial to glimpse view towards the proposed subject site. -Low frequency	Medium
	VPT3.2 & 3.3 Hiker to the hillside trail west of site	Visitors	Approx. 30 mins Depends on VSRs	Approx. 150 – 300m	-Limited view towards the proposed subject site. -Low frequency	Medium
	VPT3.4 Visitors to the water channel between subject site and Yim Tin Tsai	Visitors	Approx. 1-2 hrs Depends on VSRs	Approx. 0 – 500m	-Full view towards the proposed subject site. -Low frequency	Medium
	VPT3.5 Visitors at barbecue area 12	Visitors	Approx. 4 hrs Depends on VSRs	Approx. 10 – 50m	-Partial view towards the proposed subject site. -Low frequency	Medium
VSR8	VPT3.6 Visitors at barbecue area 13	Visitors	Approx. 4 hrs Depends on VSRs	Approx. 100m	-Partial view towards the proposed subject site. -Low frequency	Medium

7. Review of Planning and Development Control Framework

7.1 The board statutory planning framework of the proposed subject site is currently covered by the approved Tai Mong Tsai & Tsam Chuk Wan Outline Zoning Plan (OZP) No. S/SK-TMT/4. The proposed subject site is partly zoned "Recreation" and partly zoned of "Country Park" on OZP No. S/SK-TMT/4. In the schedule of uses, Holiday Camp on area zoned for "Recreation" is always permitted. Area zoned for "Country Park" is designated under the Country Park Ordinance (Cap. 208). All uses and developments require consent from the Country and Marine Parks Authority and approval from the Town Planning Board is not required.

8. Landscape and Visual Impact Assessment

Landscape & Visual Impact Assessment during Construction Stage

Background

8.1 The proposed Project is located on the foothill of Cheung Shan. Potential construction impact will be the removal of existing vegetation, building material delivery, site formation, and construction of the building blocks and associated works. The area of potential landscape impact on the Landscape Character Units (***Figure 5***) and Landscape Elements (***Figure 4***) are shown in ***Table 3*** and ***Table 4*** respectively. The level of potential landscape impact is shown in ***Tables 5 - 6***.

Table 3
Summary of Disturbance to Landscape Character Units

Landscape Character Units (LCUs)	Description	Disturbance
LCU1	Strait Landscape	0.07 ha.
LCU2	In-shore Water Landscape	Nil
LCU3	Settled Valley Landscape	0.57 ha.
LCU4	Un-settled Valley Landscape	Nil.

Table 4
Summary of Disturbance to Landscape Elements

Landscape Elements (LEs)	Type of Landscape Element	Total Area within the Study Area	Area in Interaction with Development
LE1	Woodland (including plantation)	42.86 ha.	0.49 ha.
LE2	Existing Vehicle corridor	0.98 ha.	Nil
LE3	Residential and Settlement Area	8.28 ha	0.08 ha
LE4	Steam Course	1.47 ha.	Nil
LE5	Abandonment Agricultural land	0.33 ha.	Nil
LE6	Barbecue Area, Picnic Area & Sitting-Out Area	1.13 ha.	Nil
LE7	Open Water	42.47 ha.	Nil
LE8	Scrubland	22.30 ha.	Nil

Table 5
Summary of Landscape Impact on Landscape Character Units (Without Mitigation Measures)

Landscape Impact (Without Mitigation Measures)							
Landscape Character Units		**Disturbed Area**	**Quality / Sensitivity of Change**	**Construction Stage**		**Operation Stage**	
				Magnitude of Change and Source of Landscape Impact	**Significance Threshold of Residual Landscape Impact**	**Magnitude of Change**	**Significance Threshold of Residual Landscape Impact**
LCU 1	Strait Landscape	0.07 ha	Large/High	Small (Construction of two small platform decks)	Moderate adverse	Small	Moderate
LCU 2	In-shore Water Landscape	Nil	Medium/High	Negligible	Negligible	Negligible	Negligible
LCU 3	Settled Valley Landscape	0.57 ha	Large / Medium	Large (Site formation + Construction Works)	Substantial	Large	Substantial
LCU 4	Un-settled Valley Landscape	Nil	Large / High	Negligible	Negligible	Negligible	Negligible

Table 6
Summary of Landscape Impact on Landscape Elements (Without Mitigation Measures)

Landscape Impact (Without Mitigation Measures)							
Landscape Elements (LEs)		**Disturbed Area**	**Quantity/ Sensitivity of Change**	**Construction Stage**		**Operation Stage**	
				Magnitude of Change and Source of Landscape Impact	**Significance Threshold of Residual Landscape Impact**	**Magnitude of Change**	**Significance Threshold of Residual Landscape Impact**
LE1	Woodland (including plantation)	0.49 ha.	Large/High	Large (Site formation and construction works)	Substantial	Large	Substantial
LE2	Existing Vehicle Corridor	Nil	Low/Low	Negligible	Negligible	Negligible	Negligible
LE3	Residential and Settlement Area	0.08 ha.	Medium/Medium	Small (Site formation and construction works)	Moderate	Small	Slight
LE4	Stream Course	Nil	Medium/High	Negligible	Negligible	Negligible	Negligible
LE5	Abandonment Agricultural Land	Nil	Low/Low	Negligible	Negligible	Negligible	Negligible
LE6	Barbecue Area, Picnic Area & Sitting-Out Area	Nil	Low/Medium	Negligible	Negligible	Negligible	Negligible
LE7	Open Water	Nil	Large/High	Negligible	Negligible	Negligible	Negligible
LE8	Scrubland	Nil	Large/High	Negligible	Negligible	Negligible	Negligible

Source of Landscape Impact

8.2 The source of construction landscape impact will include:

- The removal of existing vegetation;
- The construction works of principle site formation works for the proposed building works and associated works;
- Designation of temporary site area for storage, plant cabins and associated site equipment; and
- Temporary construction arrangement that affect access to adjacent area.

Prediction and Evaluation of Landscape Impact during Construction

8.3 A landscape impact is a physical change to an existing landscape resource. Any loss or alteration can be assessed and re-provisioned or compensated by landscape mitigation measures. The landscape impact in the construction stage will have a substantial to moderate negative impact upon the landscape character units and landscape element of the study area by the construction of the new canteen block and dormitory. A summary of the disturbance to the LCUs is shown in ***Table 3*** and to the LEs in ***Table 4***. The potential landscape impact is quantified in ***Tables 3 and 4***. The levels of the landscape impact on individual LCUs and LEs at construction stage have been stated in ***Tables 5 and 6*** respectively.

LCU1 –Strait Landscape

8.4 The construction of the two small platform decks on minipiles will affect the natural coastal landforms of the landscape area. As the proposed platform decks are relatively small and sitting closed to the existing built-up campsite, the magnitude of change would be small, inducing a moderate impact during construction.

LCU2 –In-shore Water Landscape

8.5 No work is carried out within this LCU, therefore the magnitude of change is negligible and the impact is also negligible.

LCU3 –Settled Valley Landscape

8.6 This site formation works and proposed building works will affect the vegetated hill slopes and portion of the existing outdoor recreational campsite facilities. The magnitude of change would be large during construction and the impact would be substantial.

LCU4 –Un-settled Valley Landscape

8.7 No work is carried out within this LCU, therefore the magnitude of change is negligible and the impact is also negligible.

LE1 – Woodland (including plantation)

8.8 This site formation works and proposed building works, partly sit on the existing woodland area affecting approximately 0.49 ha. The magnitude of change would be large during construction and the impact would be substantial adverse.

LE2 – Existing Vehicle Corridor

8.9 No work is carried out within the LE, therefore the magnitude of change is negligible and the impact is also negligible.

LE3 – Residential / Settlement Area

8.10 The site formation works and proposed building works will partly site on the built up area of the existing campsite affecting approximately 0.08.ha. The magnitude of change during construction would be small, inducing a moderate impact.

LE4 – Stream Course

8.11 No work is carried out within the LE, therefore the magnitude of change is negligible and the impact is also negligible.

LE5 –Abandonment Agricultural Land

8.12 No work is carried out within the LE, therefore the magnitude of change is negligible and the impact is also negligible.

LE6 –Barbecue Area, Picnic Area & Sitting-Out Area

8.13 No work is carried out within the LE, therefore the magnitude of change is negligible and the impact is also negligible.

LE7 –Open Water

8.14 No work is carried out within the LE, therefore the magnitude of change is negligible and the impact is also negligible.

LE8 – Scrubland

8.15 No work is carried out within the LE, therefore the magnitude of change is negligible and the impact is also negligible.

Source of Visual Impact

8.16 The elements of the proposed development would create varying levels of visual impact on the visual amenity of the surrounding area during construction stage. Potential impact would result from the followings:

- Removal of existing vegetation within the site;
- Storage of existing topsoil and reinstatement works;
- Possible glares generated from the area flood light at night;
- Material stockpiling;
- Construction equipment and plants; and
- Temporary parking area on site, accommodation and working areas.

Prediction and Evaluation of Visual Impacts during Construction

8.17 It is considered that VSRs located close to the construction works will receive a substantial to moderate negative visual impact. On this basis, VSRs in the following location as illustrated in ***Table 7*** would be worst affected during the construction stage.

VSR1 (VPT1.1) - Passengers along Tai Mong Tsai Road

8.18 This group of visual receivers is the passengers and pedestrians traveling along Tai Mong Tsai Road. Along a small section of this well planted and relatively quiet countryside road immediate next to the site, the visual receivers have an open view to the site. This group of visual receivers is mainly transit in nature and the time to pass though this section of road is relatively short, thus the visual impact is considered as moderate during construction stage.

VSR3 (VPT3.1) - Hiker to the south of Cheung Shan

8.19 This group of visual receivers is the hiker from Cheung Shan upland. Dense vegetation largely screens the views towards the subject site. At a few height advantage locations the visual receivers can see partial to glimpse view of the subject site. As the natural scenic surrounding view plays an important part of their leisure activities, the visual impact on this group of visual is considered as moderate during construction stage.

VSR3 (VPT3.2 & 3.3) - Hiker to the hillside trail west of site

8.20 This group of visual receivers is the hiker from hillside trail opposite to the subject site. The existing scrub planting and trees largely screens off the view towards the subject site. At a few height advantage locations the visual receivers can see glimpse view of the subject site. As the natural scenic surrounding view plays an important part of their leisure activities, the visual impact on this group of visual is considered as slight during construction stage.

VSR3 (VPT3.4) - Visitors to the water channel between subject site and Yim Tin Tsai

8.21 This group of visual receivers is the waterborne recreational visitors to the water channel between subject site and Yim Tin Tsai. The visual receivers have close and open view of the subject site and would consider that the natural scenic surrounding view plays an important part of their leisure activities. The visual impact on this group of receptors is considered as substantial during construction stage.

VSR3 (VPT3.5) - Visitors at barbecue area 12

8.22 This group of visual receivers is the visitors at barbecue area 12 located at the southeast from the subject site near the shoreline. The existing scrub planting and trees partially screens off the view towards the subject site. At some key locations the visual receivers can see partial view of the subject site. As the natural scenic surrounding view plays an important part of their leisure activities, the visual impact on this group of visual is considered as moderate during construction stage.

VSR3 (VPT3.6) - Visitors at barbecue area 13

8.23 This group of visual receivers is the visitors at barbecue area 13 located at the southeast from the subject site. Located within wooded hill slopes views towards the subject site are largely screens off by existing scrub planting and trees. At some key locations the visual receivers can see partial to glimpse view of the subject site. As the natural scenic surrounding view plays an important part of their leisure activities, the visual impact on this group of visual is considered as moderate during construction stage.

8.24 Negligible visual impact will be felt by VSRs located in the distance of the subject site.

VSR2 (VPT2.1) - Tai Mong Tsai Village

8.25 This group of visual receivers is the residents from Tai Mong Tsai Village, which located at valley to the south west of the subject site area. The distant view towards the site is largely screened by the landmass of Cheung Shan and immediate existing tree and vegetation. This group of visual receivers have no view of the proposed works. Thus, the visual impact is considered as negligible during construction stage.

Landscape and Visual Impact Assessment during Operation Stage

Background

8.26 The proposed development of the new canteen block and dormitories in the eastern side of the site will intrude into the local landscape context. Once the development is put into operation, it will not result in any further perceptible change to the existing landscape and visual character.

Prediction and Evaluation of Landscape Impact during Operation

8.27 During operation stage, it is anticipated that the magnitude of change from the baseline condition will be vary from small to large. Due to the disturbance to the vegetated hill slopes and portion of the existing campsite facilities, LE1, LE3, LCU1 and LCU3 will experience a substantial to slight impact. No change is predicted to the other LCUs and LEs. A summary of landscape impact during operation is given in ***Tables 5 and 6***

Prediction and Evaluation of Visual Impact during Operation

8.28 On completion of construction and during operation of proposed development, the magnitude of change to the views of VSRs will vary from small to large. The most significantly affected will be those visitors to the water channel between subject site and Yim Tin Tsai (VPT 3.4) with direct open view of the new canteen block and dormitory. Other VSRs with only have partial to glimpse view of the new canteen block and dormitory will experience some lesser degree of adverse visual impact at the operation stage. A summary of visual impact during operation is given in ***Table 7***.

VSR1 (VPT1.1) - Passengers along Tai Mong Tsai Road

8.29 This group of passengers and pedestrian along Tai Mong Tsai will have direct view of the new canteen block. Due to the time pass though this section of road is short, the visual impact caused during operation stage is considered moderate adverse with the incorporation of the proposed mitigation measure of landscape treatment including tree screen planting and proposed green roof above the new canteen block, the residual visual impact is considered slight. Photomontage of views from along Tai Mong Tsai Road towards the proposed Project is shown in ***Figure 9.2.***

VSR2 (VPT2.1) - Tai Mong Tsai Village

8.30 This group of visual receivers have no view of the new canteen block and dormitory. Thus, the visual impact is considered as negligible during operation stage.

VSR3 (VPT3.1) - Hiker to the south of Cheung Shan

8.31 This group of hikers will only have glimpse view of the new canteen block.

The visual impact caused during operation stage is considered slight. With the incorporation of proposed mitigation measure and landscaping, the residual visual impact is considered negligible.

VSR3 (VPT3.2 & 3.3) - Hiker to the hillside trail west of site

8.32 This group of visual receivers will only have glimpse view of the new canteen block and dormitory. The visual impact caused during operation stage is considered slight. With the incorporation of proposed mitigation measure and landscaping, the residual visual impact is considered negligible. Photomontage of views from along the hillside trail west of site towards the proposed Project is shown in ***Figure 9.3.***

VSR3 (VPT3.4)- Visitors to the water channel between subject site and Yim Tin Tsai

8.33 The waterborne recreational visitors to the water channel between subject site and Yim Tin Tsai will have direct open view of the new canteen block and dormitory. As the natural scenic surrounding view plays an important part of their leisure activities, the visual impact caused during operation is considered substantial adverse due to the decrease of visual greenery behind the new dormitories. With the incorporation of the proposed mitigation measure of landscape treatment including screening tree planting along the site boundary and vertical green treatment in-between the building blocks, the blocky appearance of the building would be more softened visually. The residual visual impact is considered moderate. Photomontage of views from the water channel area towards the proposed Project is shown in ***Figure 9.4 and 9.5.***

VSR3 (VPT3.5)- Visitors at barbecue area 12

8.34 This group of visitors will only have partial view of the new dormitory. The visual impact caused during operation stage is considered moderate. With the incorporation of proposed mitigation measure and landscaping, the residual visual impact is considered slight. Photomontage of views from barbecue area 12 towards the proposed Project is shown in ***Figure 9.6.***

VSR3 (VPT3.6) - Visitors at barbecue area 13

8.35 This group of visitors will only have glimpse view of the new dormitory. The visual impact caused during operation stage is considered slight adverse. With the incorporation of proposed mitigation measure and landscaping, the residual visual impact is considered negligible.

Nighttime Glare Assessment

8.36 Nighttime glare is potentially a significant visual impact. Yet, permanent lighting of the proposed improvement works is required to meet the safety and security

requirement.

8.37 The impact of the nighttime glare for the proposed development will be similar to the existing lighting provision along the roadway.

8.38 No visual impact from nighttime glare is expected during the operation stage.

8.39 It is predicted that the magnitude of change will be negligible resulting in negligible impact.

Table 7
Summary of Visual Impact (Without Mitigation Measures)

Visual Impact (Without Mitigation Measures)							
VSRs	**Name of Location**	**Source of Visual Impact**	**Sensitivity to Change and Visual Intrusion**	**Construction Stage**		**Operation Stage**	
				Magnitude of Change	**Significance Threshold of Potential Visual Impact**	**Magnitude of Change**	**Significance Threshold of Potential Visual Impact**
VSR1	Travellers						
	VPT1.1 Passengers along Tai Mong Tsai Road	Site formation and construction of new canteen block	Low	Intermediate	Moderate	Intermediate	Moderate
VSR2	Residential						
	VPT2.1 Tai Mong Tsai Village	Nil	High	Negligible	Negligible	Negligible	Negligible
VSR3	Recreational						
	VPT3.1 Hiker to the south of Cheung Shan	Site formation and construction of new canteen block and dormitory	Medium	Small	Moderate	Small	Slight
	VPT3.2 & 3.3 Hiker to the hillside trail west of site	Site formation and construction of new dormitory	Medium	Small	Slight	Small	Slight
	VPT3.4 Visitors to the water channel between subject site and Yim Tin Tsai	Site formation and construction of new canteen block and dormitory	Medium	Large	Substantial	Large	Substantial
	VPT3.5 Visitors at barbecue area 12	Site formation and construction of new dormitory	Medium	Intermediate	Moderate	Intermediate	Slight
	VPT3.6 Visitors at barbecue area 13	Site formation and construction of new dormitory	Medium	Small	Moderate	Small	Slight

9. Recommended Landscape Mitigation Measures

Background

9.1 Alternative design and construction method that would avoid or reduce the identified impacts on landscape, or that would make the project visually more compatible with the surrounding setting has been examined. The identification of the landscape and visual impact will highlight those sources of conflict which require design solutions or modification to reduce impacts. Mitigation measures are proposed to absorb the proposed development and associated activities into the surrounding landscape.

9.2 The assessment in the previous section predicts that the visual impacts both during construction and initial operations stage are predicted as substantial to slight. The impact on landscape character is predicted as substantial to slight due to the disturbance to existing vegetated hill slopes and portion of the existing campsite facilities. Impact on the visual resources and VSRs are also predicted to be substantial to slight primarily because the location of the project is in an enclosed setting.

9.3 The key source landscape impact arises from removal of existing vegetation, construction activity, such as site formation, building material delivery and stockpiling. The key source of visual impact is the permanent intrusion of the new canteen block and dormitory.

9.4 To mitigate these impacts, an alternative design and construction method of the proposed canteen block and dormitory is developed to examine the possible way to reduce the anticipated landscape and visual impact. In comparing this alternative design and construction method with the original proposal, the number of dormitory blocks are reduce from 12nos. (2-storey) to 8nos. (2 to 3-storeys) following the existing site contours. With this arrangement, the new dormitory will be shifted further to the northwest towards the existing dormitory. This alternative arrangement is selected for the proposal with the following benefit in terms of landscape and visual quality.

Landscape

- Minimize the extent of site formation thus reduce the impact on the LCUs and LEs.
- Less tree are required to be removed during construction.

Visual

- Variation of building heights will help diluting the overwhelming effect which may be created by the proposed building block as well breaking visual monotony so to provide a more interesting view to the viewer.
- Shorter total length of the new dormitories thus toning down slightly the overall scale of the proposed works and in turn reducing the extent of landscape and visual impact.

9.5 A comprehensive range of landscape and visual mitigation measures (LMM) and landscape framework have been developed in conjunction with the site planning and phasing of the site works. These measures are described below and summarised in ***Table 8.***

9.6 Recommended landscape and visual mitigation measures are indicated in ***Figure 8*** and ***Figure 9.1 to 9.5*** with their specific locations and types of mitigation measures for specific impact identified. Mitigation measures recommended at construction stage are as follows:

LMM1 - Minimizing construction area and contractor's temporary works area to avoid unnecessary impacts to landscape resources and minimize visual intrusion.

LMM2 - Sensitively designed site hoarding in both color and form to screen view to the construction works.

LMM3 - Preservation of existing tree to be retain on area not affected by the proposed development.

LMM4 - Demarcation of the tree protection zone for retain trees

LMM5 - Operational time restrictions to limit after dark welding and lighting.

9.7 To minimize the impact on landscape and visual features, proper provision of mitigation measures during the design stage would result in a visually more compatible design when viewed at adjacent environment. Subject to the detailed design, possible mitigation measures to be considered during design stage should include:

LMM6 - Selection of fast growing native trees and shrubs mix at in compensation for the removal / disturbance area.

LMM7 - Landscape treatment such as green roof and screen planting including climber plants to screen and soften surface of built structures and mitigate the landscape and visual impact.

LMM8 - Staggered built form with variation of building height to complement the sloping landform and to enhance visual quality.

LMM9 - Sensitive treatment and design to external finishes of the built structure to ensure element with colour, texture and tonal quality being compatible to the existing landscape context.

LMM10 - Maintenance of planting works upon completion.

9.8 To mitigate the loss of 238 trees, 150 nos. of standard size trees and 125 nos. of whip trees shall be planted within site. Therefore, the number of loss tree will be compensated with a ratio of not less than 1:1. In addition, 4000 nos. of tree whip shall be planted within nearby AFCD Country Park area as off-site compensatory planting. The proposed trees would include native species such as *Aquilaria sinensis, Bischofia javanica, Cratoxylum cochinchinense, Elaeocarpus chinensis, Hibiscus tiliaceus, Sapium discolor, Schefflera heptaphylla, Celtis sinensis, Cinnamomum parthenoxylon,* and whip species of *Castanopsis fissa, Litsea glutinosa, Reevesia thyrsoidea, Sterculia lanceolata, Machilus breviflora, Schefflera heptaphylla*.

9.9 ***Figure 8*** illustrates the preliminary landscape proposal layout plan of the Project. Generally, the recommended mitigation measures seek to minimize potential impacts of the new canteen block and dormitory, to soften and provide compensation in the form of environmental improvements to offset the adverse effects of the proposed Project.

9.10 As details of the proposed planting cannot be ascertain at the EIA stage, it is recommended that a detailed Landscape Plan be submitted before commencement of planting or landscape works of the Project. The Landscape Plan should include the locations, size, number and species of plantings, design details, implementation programme, maintenance and management schedules, and drawings in scale of 1:1000 showing the landscape and visual mitigation measures. The Landscape Plan should be certified by the ET Leader and verified by the Independent Environmental Checker (IEC) as conforming to the information, requirements and recommendations set out in the approved Project Profile before submission to the relevant authorities.

Table 8
Summary of Landscape and Visual Mitigation Measures

LMM	Recommended Landscape and Visual Mitigation Measures	Objectives of the Recommended Measures & Main Concerns	Location / Timing	What requirements or standards for the measure to achieve	Funding/ Implementation Agent	Management and Maintenance Agent
LMM1	Minimizing construction area and contractor's temporary works area to avoid unnecessary impacts to landscape resources and minimize visual intrusion.	Preservation of landscape resources and minimize visual intrusion	Project area / Commencement of construction	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM2	Sensitively designed site hoarding in both color and form to screen view to the construction works.	Visual enhancement	Project area / Commencement of construction	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM3	Preservation of existing tree to be retain on area not affected by the proposed development.	Conservation of existing trees; Visual screen	Project area not affected with tree surgery works / Commencement of construction	Comply to LAO PN No. 7/2007	Project Proponent / Contractor	Project Proponent / Contractor
LMM4	Demarcation of the tree protection zone for retain trees	Preservation of existing trees	Project area / Commencement of construction and throughout construction period	Demarcation of temporary protective fencing shall be agreed and erected before other works commence	Project Proponent / Contractor	Project Proponent / Contractor
LMM5	Operational time restrictions to limit after dark welding and lighting.	Limit night time glare	Project area / Throughout the construction period	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM6	Selection of fast growing native trees and shrubs mix at in compensation for the removal / disturbance area.	Visual screen; Landscape compensation	Project area / Construction period	Selection and agree on the specified plant species	Project Proponent / Contractor	Project Proponent / Contractor
LMM7	Landscape treatment such as green roof and screen planting including climber plants to screen and soften surface of built structures and mitigate the landscape and visual impact.	Visual enhancement	Project area / Construction period	Selection and agree on the specified plant species	Project Proponent / Contractor	Project Proponent / Contractor

LMM	Recommended Landscape and Visual Mitigation Measures	Objectives of the Recommended Measures & Main Concerns	Location / Timing	What requirements or standards for the measure to achieve	Funding/ Implementation Agent	Management and Maintenance Agent
LMM8	Staggered built form with variation of building height to complement the sloping landform and to enhance visual quality.	To provide an interesting view on the visual receiver and to lower the overwhelming effect as may be created by the proposed building blocks	Commencement of construction and throughout the construction period	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM9	Sensitive treatment and design to external finishes of the built structure to ensure element with colour, texture and tonal quality being compatible to the existing landscape context.	Visual enhancement	Commencement of construction and throughout the construction period	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM10	Maintenance of planting works upon completion.	Landscape compensation	Operation period	Agree on the maintenance requirement and programme	Project Proponent / Contractor	Project Proponent / Contractor

10. Residual Impacts and Acceptability of the Proposed Project

Residual Landscape Impact

10.1 A summary of residual landscape impact is shown in ***Table 9***. In general, the incorporation of mitigation measures into the proposed development in the following paragraph will be effective in reducing the 'substantial adverse' impact down to 'substantial/moderate adverse' impact at the construction stage and from 'substantial/moderate adverse' to 'moderate/slight adverse' at the operation stage.

The significance threshold of residual landscape impact during construction stage and operation stage on Landscape Character Units (LCUs) and Landscape Elements (LEs) are lists below.

LEs

- The removal of existing vegetation from the existing wooded slopes LE1 will create the most significant impacts during construction. Landscape mitigation measures LMM1 and LMM3 aimed at limiting the extent of the landscape impact area and preservation of landscape resources not affect by the proposed development. Unfortunately the impacts to the vegetation are irreversible. Therefore, the impact to the LE1 will remain substantial with mitigation measures. During operation stage, landscape mitigation measures LMM6, LMM7 and LMM10 aimed to compensate the loss of existing trees and some of the affected vegetated slopes. As the re-provided vegetation grows and is established, the residual impact will be reduced to moderate from Day 1 and Year 10.

- The impact to a small portion of the existing campsite LE3 by the proposed development during construction is irreversible and will remain moderate during construction stage. During operation stage, with the incorporation of landscape mitigation measures i.e. LMM6 to LMM7, the residual impact will be reduced to slight.

- The remaining LEs with no interruption will have negligible residual landscape impact during both construction and operation stages.

LCUs

- The existing water channel LCU1 with the incorporation of landscape mitigation measures i.e. LMM1 to LMM10 aimed at limiting the extent of construction area, preservation of existing vegetation, replanting and adopting sensitive treatment/design to the built forms and external finish of the built element to be compatible to the existing landscape context, will result in moderate residual landscape impact during construction stage and

slight residual landscape impact during operation stage.

- With incorporation of landscape mitigation measures i.e. LMM1 to LMM10, which aimed at limiting the extent of construction area, preservation of existing vegetation, replanting and adopting sensitive treatment/design such as staggered built form with variation of building heights and use of earth tone non-reflective external finish of the built element to be compatible to the existing landscape context, the Settled Valley Landscape LCU3 will have moderate impact during construction stage and slight residual landscape impact during operation stage.

- The remaining LCUs with no interruption will have negligible residual landscape impact during both construction and operation stages.

Residual Visual Impact

10.2 A summary of Residual Visual Impact in ***Table 10*** illustrates that the incorporation of mitigation measures in the proposed development will effectively reduce the 'substantial/moderate' impact down to 'substantial/moderate and slight' impact at the construction stage and from 'substantial/moderate and slightly adverse' to 'moderate and negligible' during operation stage.

Acceptability of the Proposed Improved Works

10.3 The residual impacts are evaluated as being acceptable with mitigation measures based on the following:

- The proposed development incorporates landscape and visual mitigation measures such as illustrated in the following paragraph will reduce the overall adverse level of visual impact to an acceptable level. The proposed staggered built forms and sensitive treatment and design to the external finish of the built element together with landscape treatment around the perimeter of the site including proposed green roof above the new canteen block will enhance the local visual quality for the visitors and traveller around the subject site. The adverse impact on the vegetated hill slopes will be less adverse due to the compensation-replanting scheme.

- The proposed development has been designed in consideration with the existing topography and in harmony with the natural setting of the surrounding areas. With the building height limited to below the eye-level of Tai Mong Tsai Road and set back from the natural shoreline, view towards the green ridgeline of Cheung Shan and the natural shoreline character are still retained in-situ. The proposed development is predicted to be acceptable with landscape and visual mitigation measure implemented.

Table 9 Summary of Residual Landscape Impacts (With Landscape Mitigation Measures)

Landscape Character Units (LCUs) / Landscape Elements (LEs)	Without Recommended Mitigation Measures		Recommended Mitigation Measures	With Recommended Mitigation Measures	
	Landscape Impact during Construction Stage	Landscape Impact during Operation Stage		Threshold of Residual Landscape Impact during Construction Stage	Threshold of Residual Landscape Impact during Operation Stage
Landscape Character Units (LCUs)					
LCU 1 – Strait Landscape	Moderate adverse	Moderate adverse	LMM1 to LMM10	Moderate adverse	Slight adverse
LCU 2 – In-shore Water Landscape	Negligible	Negligible	Nil	Negligible	Negligible
LCU 3 – Settled Valley Landscape	Substantial adverse	Substantial adverse	LMM1 to LMM10	Moderate adverse	Slight adverse
LCU 4 – Un-settled Valley Landscape	Negligible	Negligible	Nil	Negligible	Negligible
Landscape Elements (LEs)					
LE 1 – Woodland (including plantation)	Substantial adverse	Substantial adverse	LMM1, LMM3, LMM4, LMM6, LMM10	Substantial adverse	Moderate adverse
LE 2 – Existing Vehicle Corridor	Negligible	Negligible	Nil	Negligible	Negligible
LE 3 – Residential / Settlement Area	Moderate adverse	Slight adverse	LMM1, LMM7 to LMM9	Moderate adverse	Slight adverse
LE 4 – Stream Course	Negligible	Negligible	Nil	Negligible	Negligible
LE 5 – Abandon Agricultural Area	Negligible	Negligible	Nil	Negligible	Negligible
LE 6 –Barbecue Area, Picnic Area & Sitting-Out Area	Negligible	Negligible	Nil	Negligible	Negligible
LE 7 – Open Water	Negligible	Negligible	Nil	Negligible	Negligible
LE8 –Scrubland	Negligible	Negligible	Nil	Negligible	Negligible

Table 10 Summary of Residual Visual Impacts (With Landscape Mitigation Measures)

VSR Number	Without Recommended Mitigation Measures		Recommended Mitigation Measures	With Recommended Mitigation Measures	
	Visual Impact during Construction Stage	Visual Impact during Operation Stage		Significance Threshold of Residual Visual Impact during Construction	Significance Threshold of Residual Visual Impact during Operation
VSR1					
VPT1.1	Moderate	Moderate	LMM1 to LMM10	Moderate	Slight
VSR2					
VPT2.1	Negligible	Negligible	Nil	Negligible	Negligible
VSR3					
VPT3.1	Moderate	Slight	LMM1 to LMM10	Slight	Negligible
VPT3.2 & 3.3	Slight	Slight	LMM1 to LMM10	Slight	Negligible
VPT3.4	Substantial	Substantial	LMM1 to LMM10	Substantial	Moderate
VPT3.5	Moderate	Moderate	LMM1 to LMM10	Moderate	Slight
VPT6.6	Moderate	Slight	LMM1 to LMM10	Moderate	Negligible

LEGEND

SITE LOCATION

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By

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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

LOCATION PLAN
FIGURE 1

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/01
Scale 比例	1:6000(A3)		
Date 日期	MAR10		

size = A1 plot scale 1 : 1

LEGEND

SUBJECT SITE

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By

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Project Title 項目

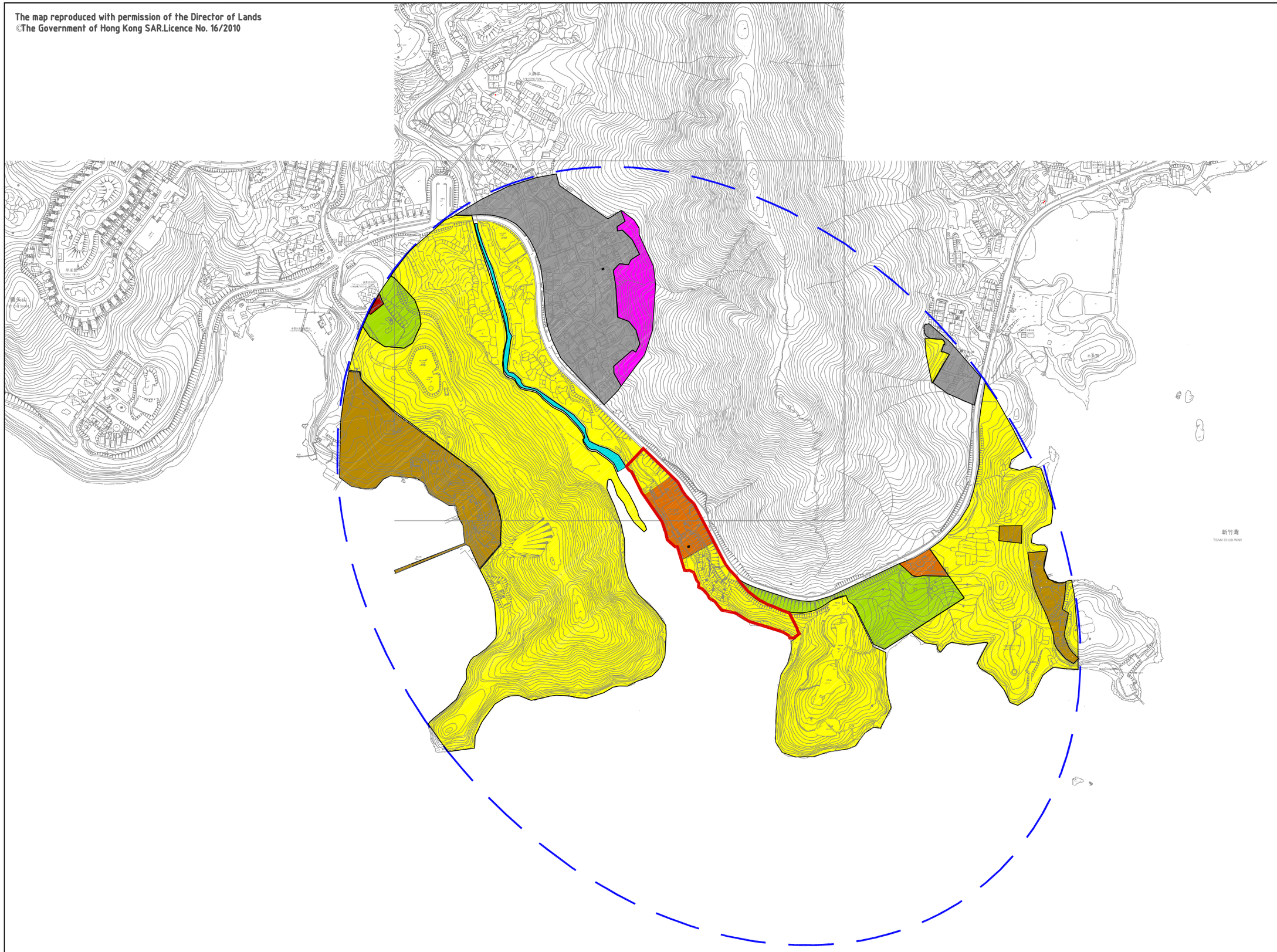
PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

AERIAL PHOTOGRAPH
FIGURE 2

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	KN	Drawing No. 圖號	AT3/LCP/02
Scale 比例	N.T.S.		
Date 日期	MAR10		

size = A1 plot scale 1 : 1



LEGEND

- SUBJECT SITE
- STUDY AREA BOUNDARY (500m AWAY FROM SUBJECT SITE)
- CONSERVATION AREA
- COUNTRY PARK
- COASTAL PROTECTION AREA
- GOVERNMENT/INSITUTION/COMMUNITY
- GREEN BELT
- RESIDENTIAL (GROUP C)
- VILLAGE TYPE DEVELOPMENT
- RECREATION

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By

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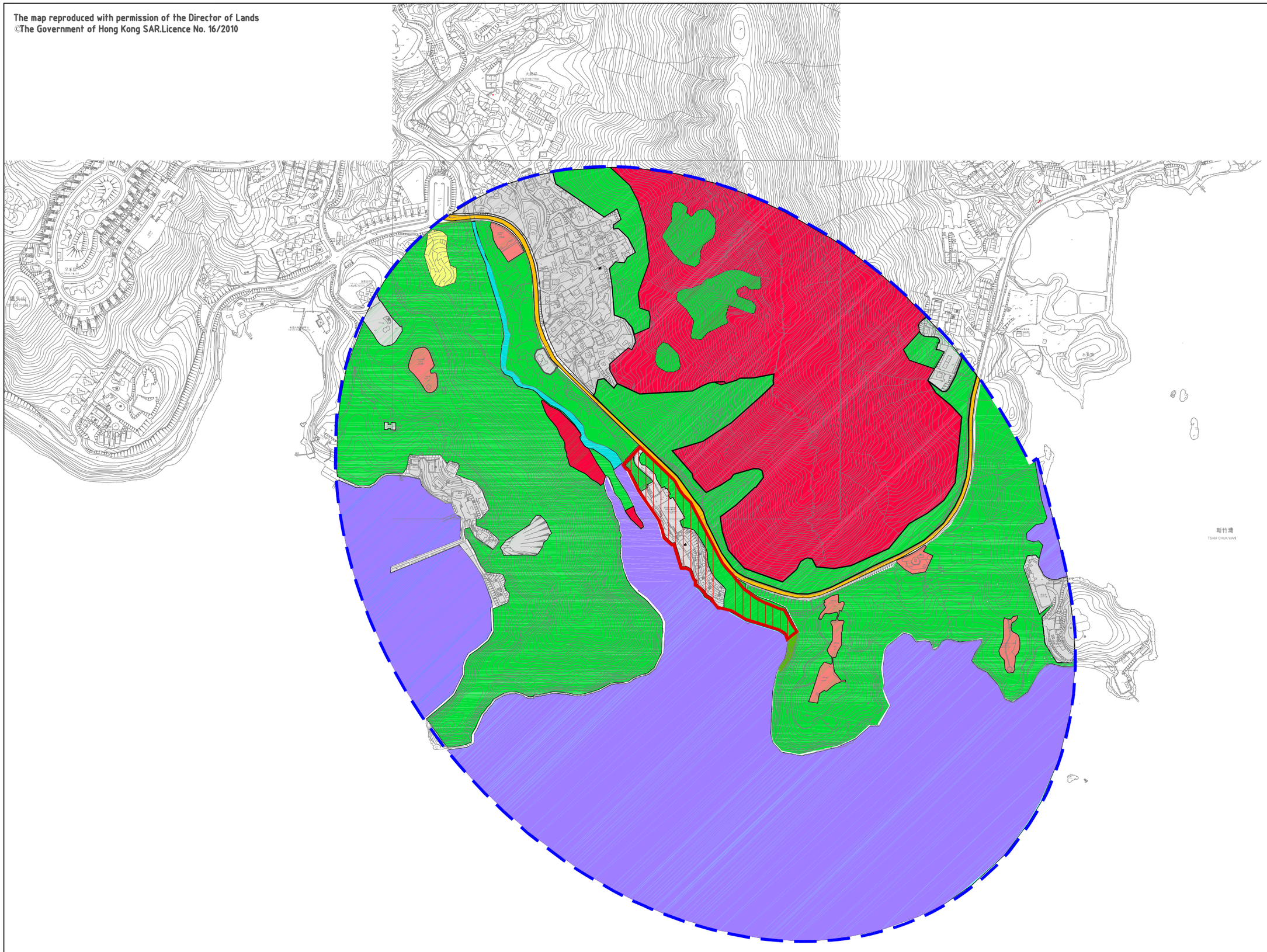
PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

PLANNING & DEVELOPMENT FRAMWORK(OZP) FIGURE 3

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/03
Scale 比例	1:6000(A3)		
Date 日期	MAR10		

size = A1 plot scale 1 : 1



LEGEND

- SUBJECT SITE
- STUDY AREA BOUNDARY (500m AWAY FROM SUBJECT SITE)
- LE1 – WOODLAND (INCLUDING PLANTATION)
- LE2 – EXISTING VEHICLE CORRIDOR
- LE3 – RESIDENTIAL & SETTLEMENT AREA
- LE4 – STREAM COURSE
- LE5 – ABANDON AGRICULTURAL AREA
- LE6 – BARBECUE AREA & PICNIC AREA & SITTING OUT AREA
- LE7 – OPEN WATER
- LE8 – SCRUBLAND

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By

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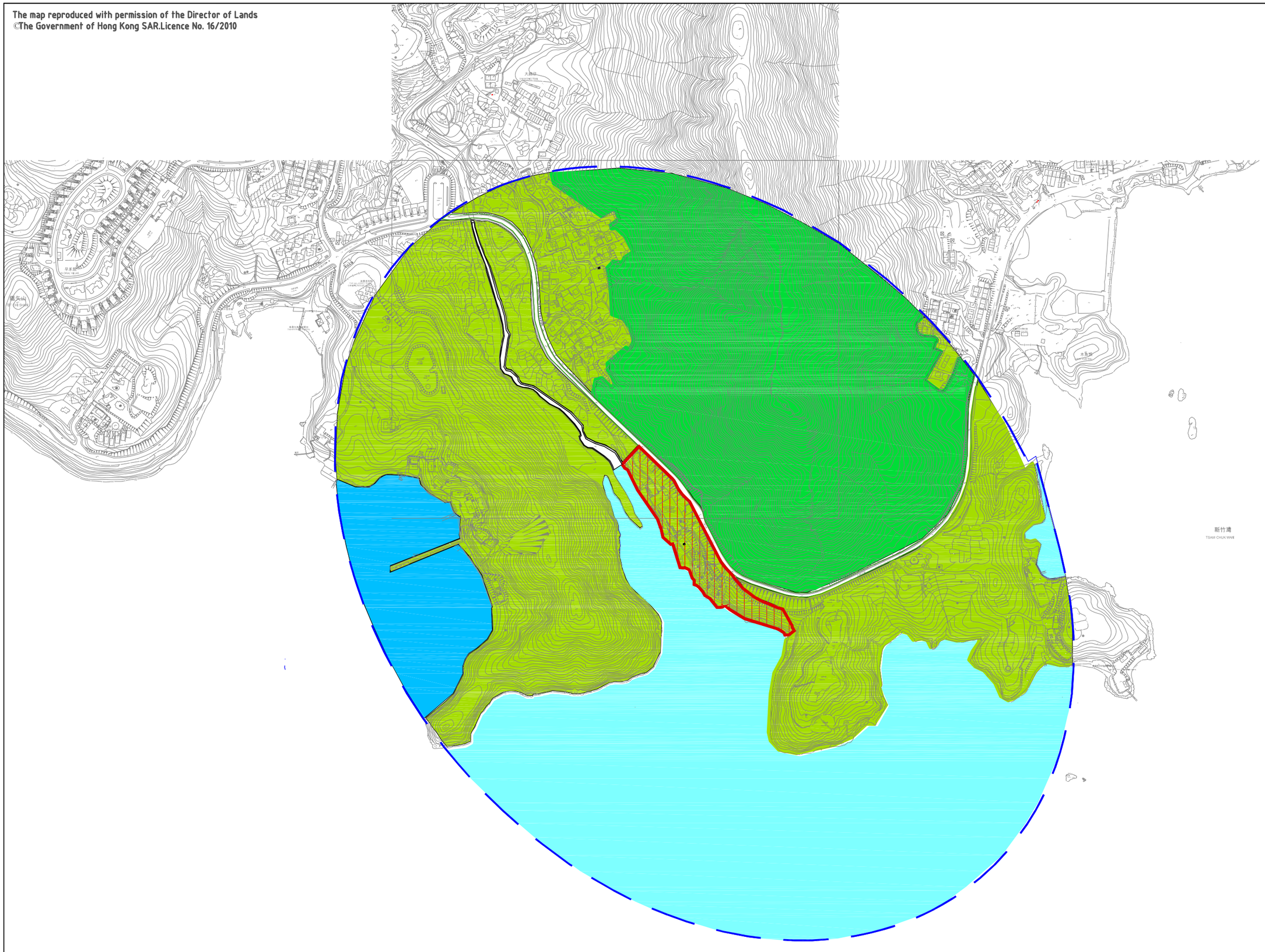
PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

LANDSCAPE ELEMENTS (LES)
FIGURE 4

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/04
Scale 比例	1:6000(A3)		
Date 日期	MAR10		

size = A1 plot scale 1 : 1



LEGEND

- SUBJECT SITE
- STUDY AREA BOUNDARY (500m AWAY FROM SUBJECT SITE
- LCU1 - STRAIT LANDSCAPE
- LCU2 - IN SHORE WATER LANDSCAPE
- LCU3 - SETTELED VALLEY LANDSCAPE
- LCU4 - UN-SETTELED VALLEY LANDSCAPE

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PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

LANDSCAPE CHARACTER UNITS (LCUS)
FIGURE 5

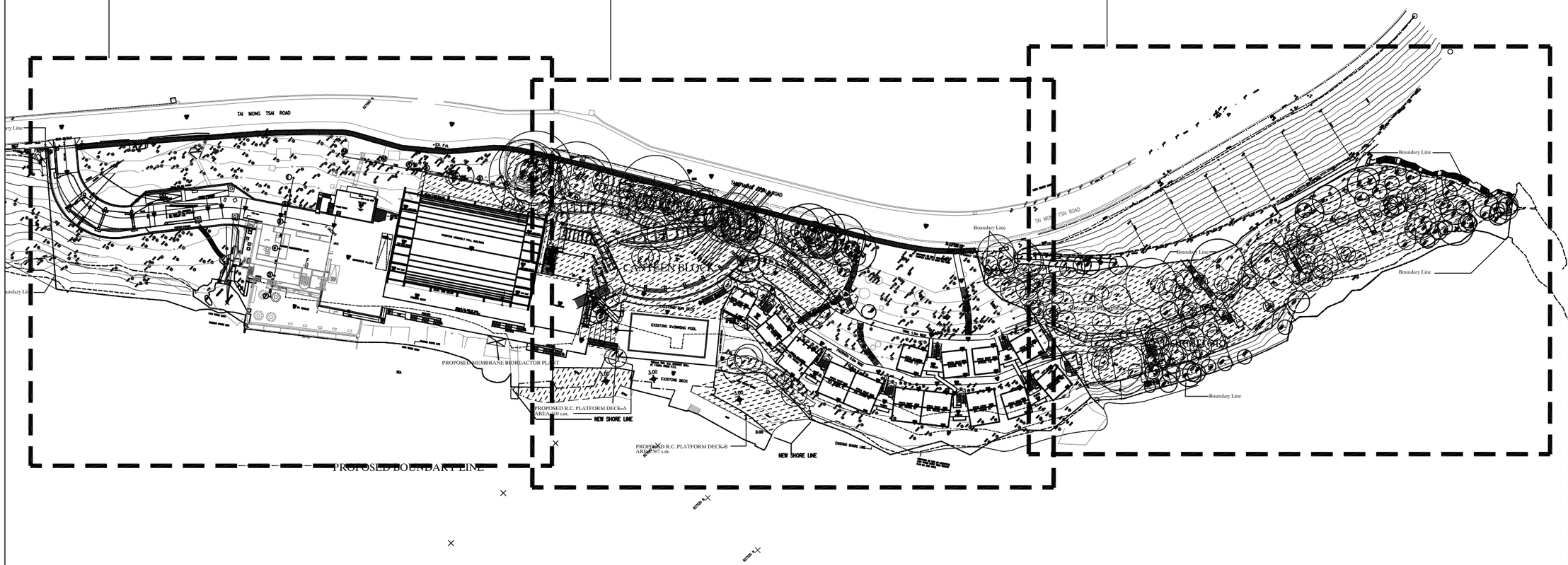
Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/05
Scale 比例	1:6000(A3)		
Date 日期	MAR10		

size = A1 plot scale 1 : 1

REFER TO DRAWING AT3-TFP-01.1

REFER TO DRAWING AT3-TFP-01.2

REFER TO DRAWING AT3-TFP-01.3



LEGEND

- EXTENT OF SITE FORMATION
- PROPOSED EXTENSION OF LOT BOUNDARY
- TR1090 — TREE TO BE RETAINED
- TR1193 — TREE TO BE FELLED
- TR766 — TREE TO BE TRANSPLATED
- TR723 — TREE OUTSIDE WORKS AREA
- TR1165 — DEAD TREE

No.	Date	Revisions	By
A	30JUN10	MINOR REVISION	IL

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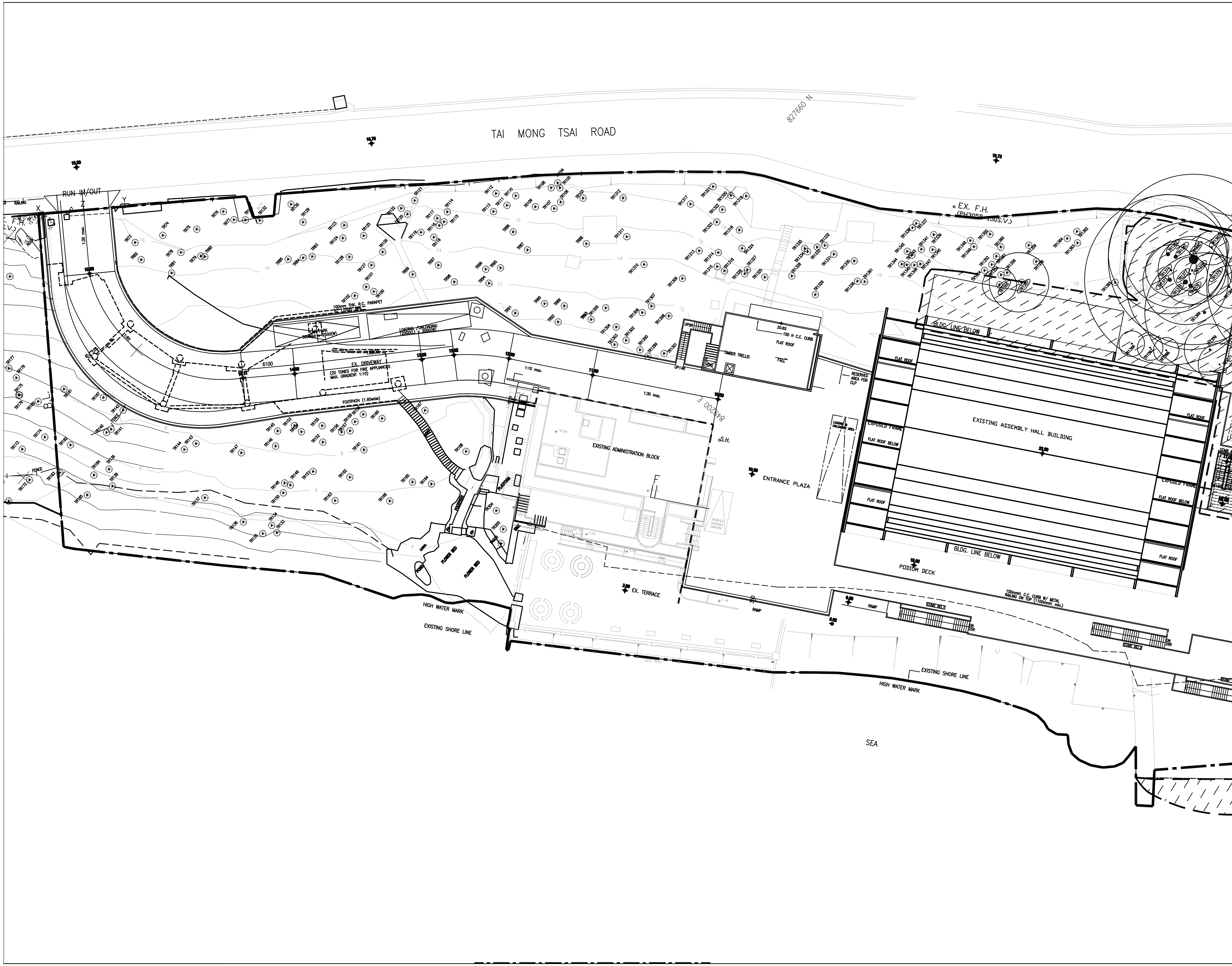
Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

TREE SURVEY PLAN
REFERENCE PLAN - FIGURE 6.1

Designed by 設計	MC	Approved by 審核	KN
Drawn by 繪圖	TT	Job No. 業務號	AT3
Checked by 校對	KN	Drawing No. 圖號	AT3-TFP-01A
Scale 比例	1:600(A1) 1:1200(A3)		
Date 日期	APR2010		



LEGEND

- SITE BOUNDARY
- PROPOSED EXTENSION OF LOT BOUNDARY
- EXTENT OF SITE FORMATION
- TREE TO BE RETAINED
- TREE TO BE FELLED
- TREE OUTSIDE WORKS AREA

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	30JUN10	MINOR REVISION	IL

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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

TREE SURVEY PLAN
FIGURE 6.2

Designed by 設計	MC	Approved by 審核	KN
Drawn by 繪圖	TT	Job No. 業務號	AT3
Checked by 校對	KN	Drawing No. 圖號	AT3-TFP-01.1A
Scale 比例	1:200(A1) 1:400(A3)		
Date 日期	APR2010		

LEGEND

- SITE BOUNDARY
- PROPOSED EXTENSION OF LOT BOUNDARY
- EXTENT OF SITE FORMATION
- TR1090 — TREE TO BE RETAINED
- TR1193 — TREE TO BE FELLED
- TR723 — TREE OUTSIDE WORKS AREA
- TR1165 — DEAD TREE

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	30JUN10	MINOR REVISION	IL

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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

TREE SURVEY PLAN
FIGURE 6.3

Designed by 設計	MC	Approved by 審核	KN
Drawn by 繪圖	TT	Job No. 業務號	AT3
Checked by 校對	KN	Drawing No. 圖號	AT3-TFP-01.2A
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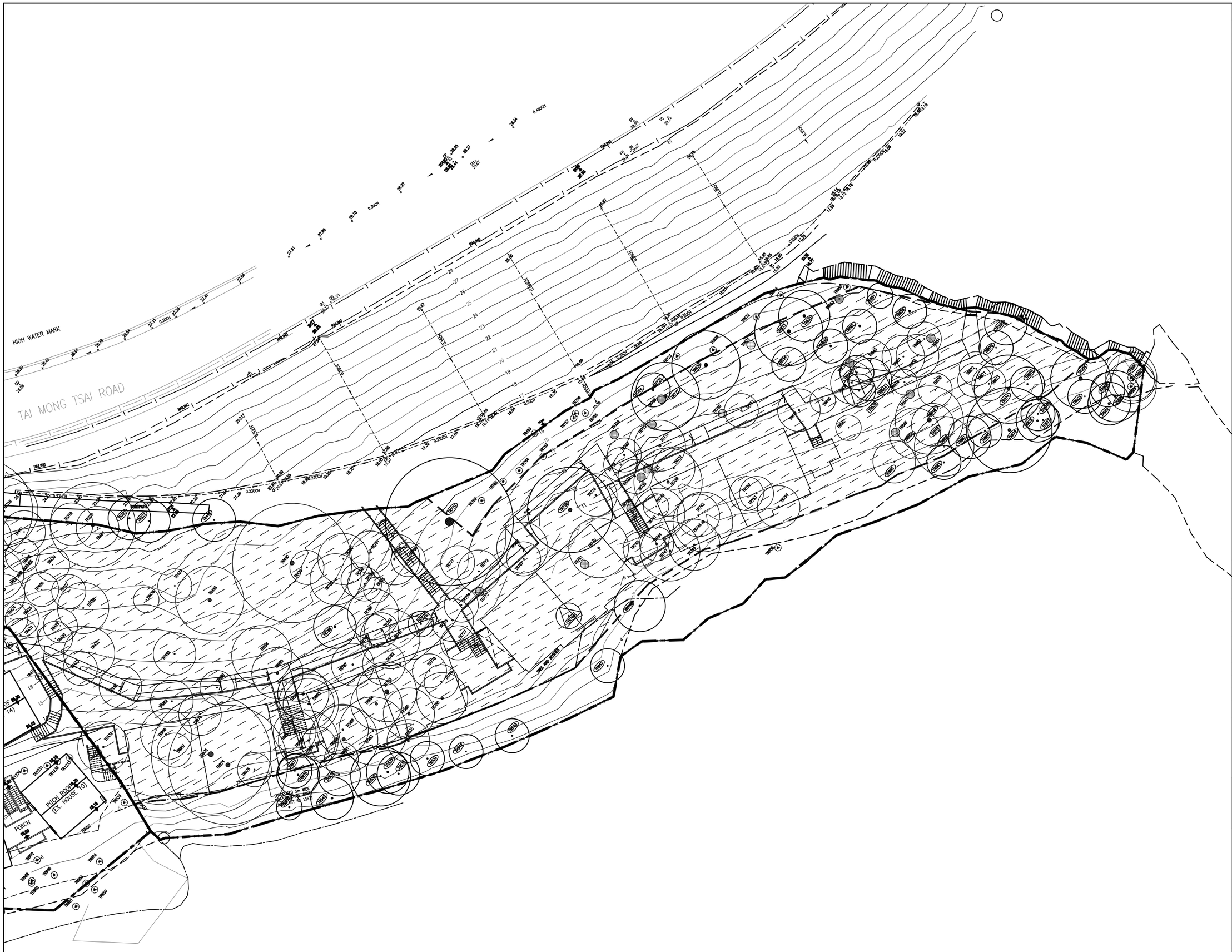
Date 日期	APR2010		



LEGEND

- SITE BOUNDARY
- PROPOSED EXTENSION OF LOT BOUNDARY
- EXTENT OF SITE FORMATION
- TR1080 — TREE TO BE RETAINED
- TR1193 — TREE TO BE FELLED
- TR766 — TREE TO BE TRANSPLATED
- TR723 — TREE OUTSIDE WORKS AREA
- TR1165 — DEAD TREE

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
B	06JUL10	MINOR REVISION	IL
A	30JUN10	MINOR REVISION	IL

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Project Title 項目

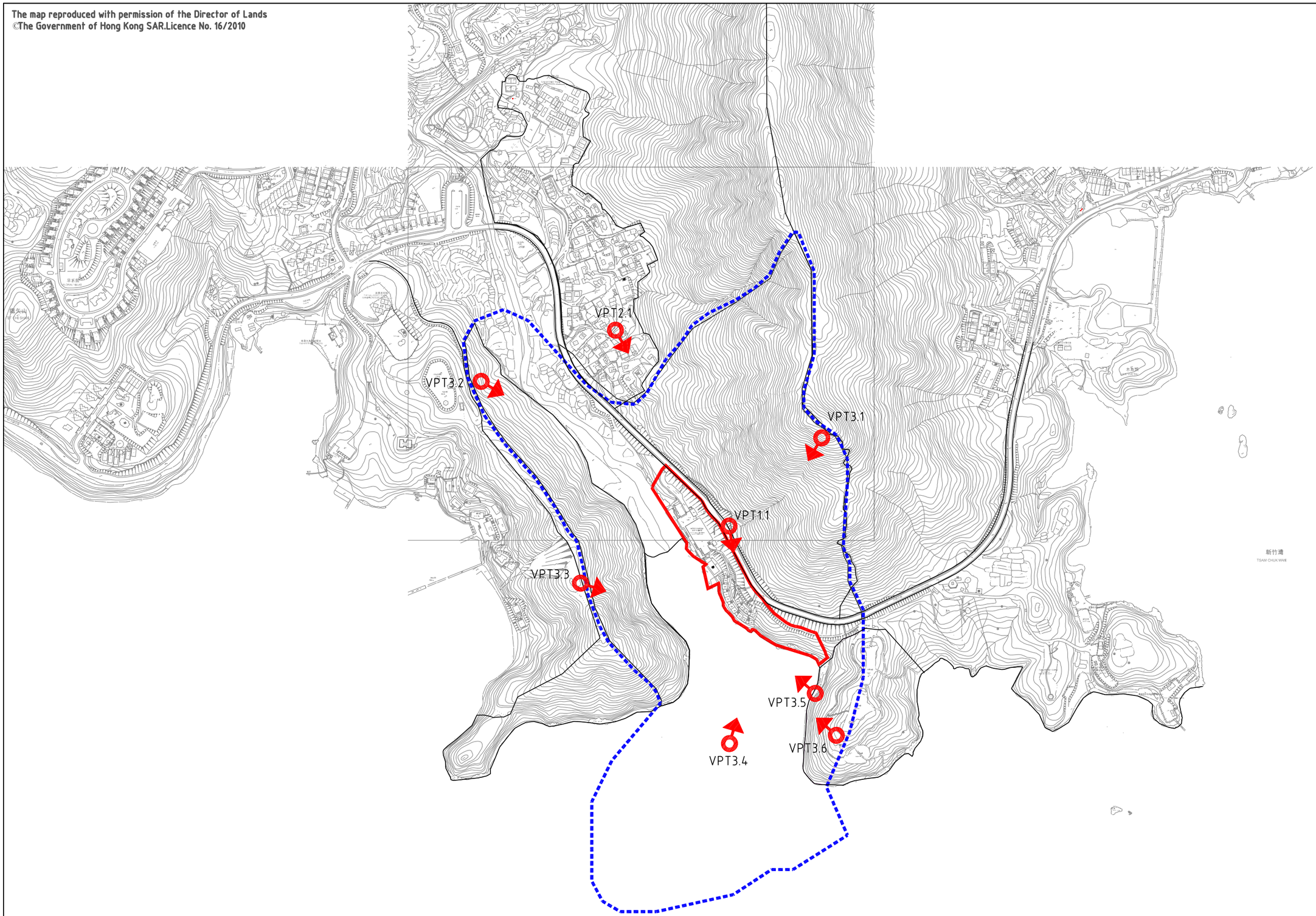
PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

TREE SURVEY PLAN
FIGURE 6.4

Designed by 設計	MC	Approved by 審核	KN
Drawn by 繪圖	TT	Job No. 業務號	AT3
Checked by 校對	KN	Drawing No. 圖號	AT3-TFP-01.3B
Scale 比例	1:200(A1) 1:400(A3)		
Date 日期	APR2010		

size = A1 plot scale 1 : 1



LEGEND

- SUBJECT SITE
- VISUAL ENVELOP
- VPT1 — VIEW OF VSR

VPT1.1 – VIEW SOUTHEAST FROM TAI MONG TSAI ROAD

VPT2.1 – VIEW SOUTHEAST FROM TAI MONG TSAI VILLAGE

VPT3.1 – VIEW SOUTHWEST FROM CHEUNG SHAN

VPT3.2 – VIEW SOUTHEAST FROM HILLSIDE TRAIL &3.3 WEST OF SITE

VPT3.4 – VIEW NORTH FROM WATER CHANNEL BETWEEN WORK SITE AND YIM TIN TSAI

VPT3.5 – VIEW NORTHWEST FROM BARBECUE AREA 12

VPT3.6 – VIEWNORTHWEST FROM BARBECUE AREA 13

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	30JUN10	MINOR REVISION	IL

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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

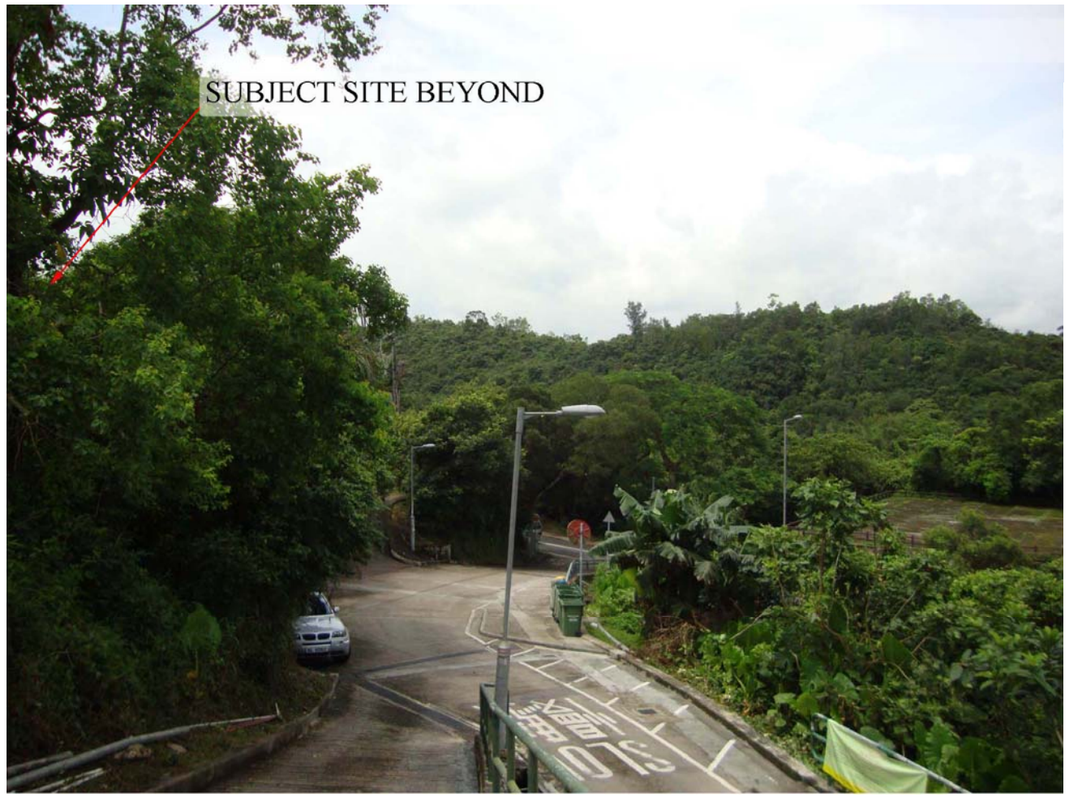
Drawing Title 標題

ZONE OF VISUALLY SENSITIVE RECEIVERS
FIGURE 7.1

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/07.1A
Scale 比例	1:6000(A3)		
Date 日期	MAR10		

size = A1 plot scale 1 : 1

VPT 1.1 - View southeast from Tai Mong Tsai Road



VPT 2.1 - View Southeast from Tai Mong Tsai Village

LEGEND

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	30JUN10	MINOR REVISION	IL

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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

VIEWS FOR VISUALLY SENSITIVE RECIEVERS-PART 1
FIGURE 7.2

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/07.2A
Scale 比例	N.T.S		
Date 日期	MAR10		

size = A1 plot scale 1 : 1

VPT 3.1 - View southwest from Cheung Shan

VPT 3.2 - View southeast from hillside trail west of site

LEGEND

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	30JUN10	MINOR REVISION	IL

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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

VIEWS FOR VISUALLY SENSITIVE RECIEVERS-PART 2
FIGURE 7.3

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 核對	AC	Drawing No. 圖號	AT3/LCP/07.3A
Scale 比例	N.T.S.		
Date 日期	MAR10		

size = A1 plot scale 1 : 1

VPT 3.3 - View Southeast from hillside trail west of site

VPT 3.4 - View north from water channel between work site and Yim Tin Tsai

LEGEND

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	30JUN10	MINOR REVISION	IL

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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

VIEWS FOR VISUALLY SENSITIVE RECIEVERS-PART 3
FIGURE 7.4

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/07.4A
Scale 比例	N.T.S.		
Date 日期	MAR10		

size = A1 plot scale 1 : 1

VPT 3.5 - View northwest from Barbecue Area 12

VPT 3.6 - View northwest from Barbecue Area 13

LEGEND

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By

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Project Title 項目

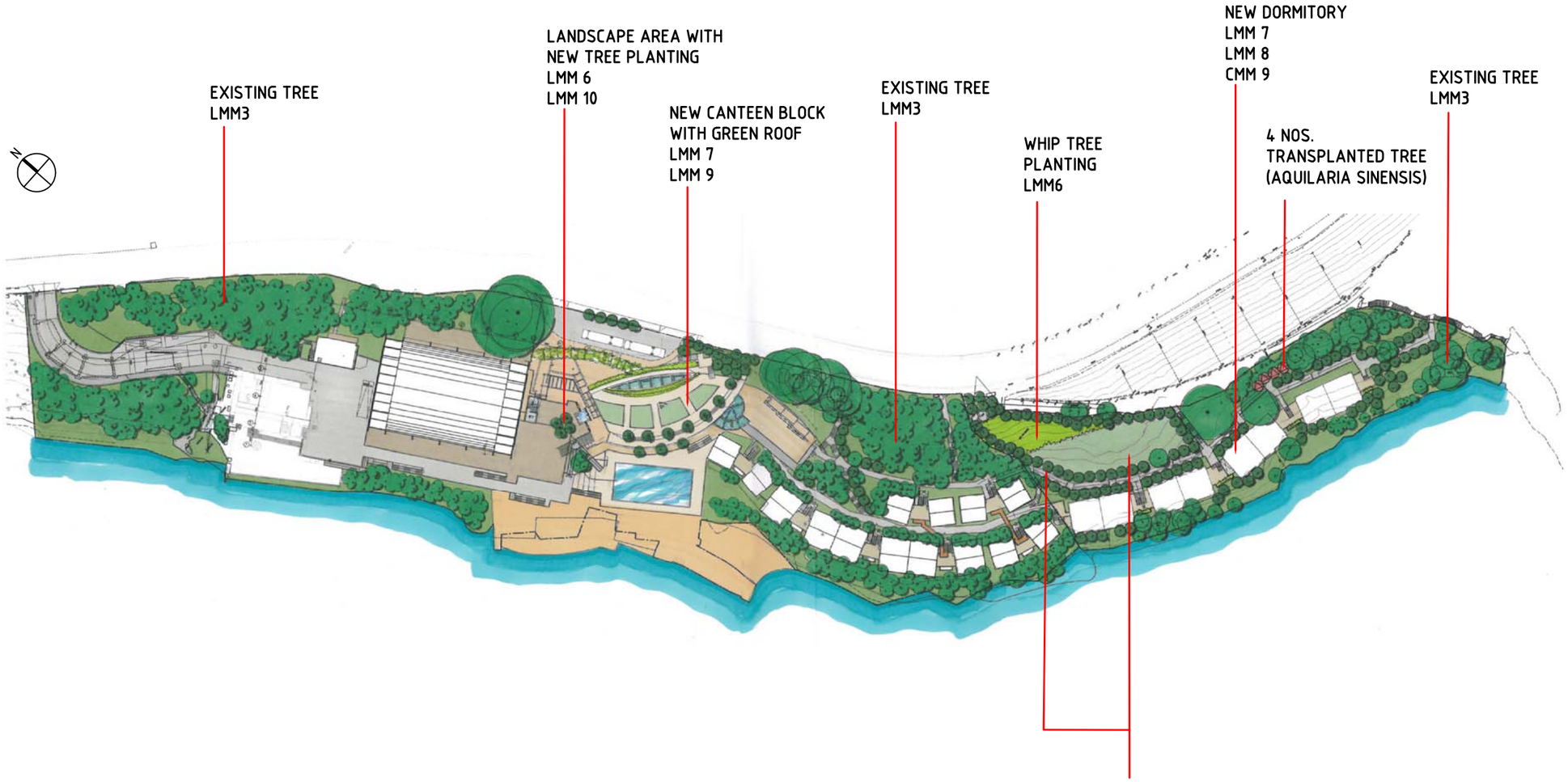
PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

VIEWS FOR VISUALLY SENSITIVE RECIEVERS-PART 4
FIGURE 7.5

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/07.5
Scale 比例	N.T.S.		
Date 日期	MAR10		

size = A1 plot scale 1 : 1



LEGEND

- SITE BOUNDARY
- EXISTING TREE
- TRANSPLANTED TREE
- NEW TREE
- LMM1 LANDSCAPE MITIGATION MEASURES

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
C	29.JUL.10	MINOR REVISION	HW
B	06.JUL.10	MINOR REVISION	IL
A	02.JUL.10	MAJOR REVISION	IL

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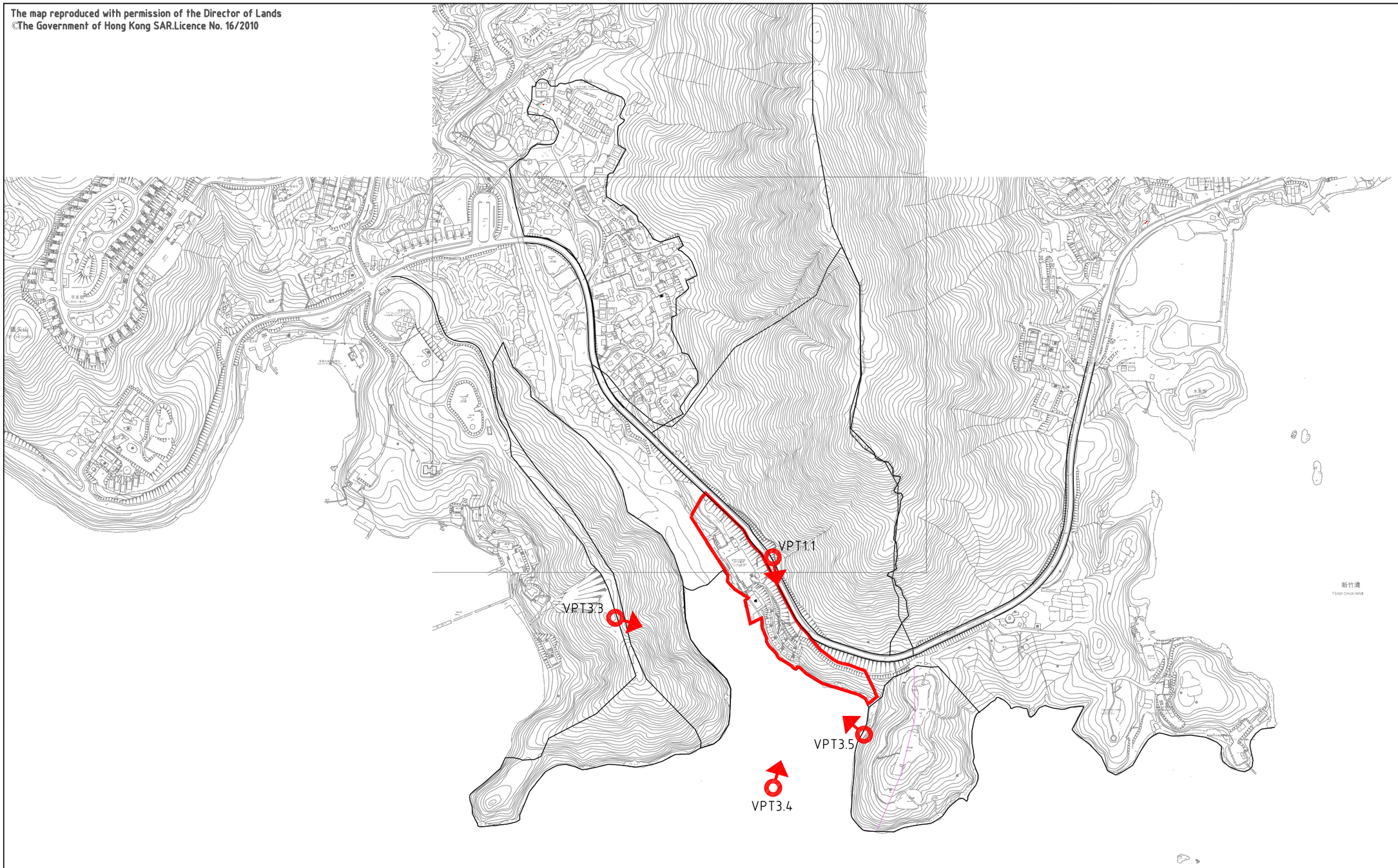
Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

LANDSCAPE LAYOUT PLAN
FIGURE 8

Designed by 設計	BEN	Approved by 審核	KN
Drawn by 繪圖	BEN	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/08.1C
Scale 比例	N.T.S.		
Date 日期	MAR10		



LEGEND

SUBJECT SITE

VPT1 PHOTOMONTAGE VIEWPOINT LOCATION

VPT1.1 – VIEW SOUTHEAST FROM TAI MONG TSAI ROAD

VPT3.3 – VIEW SOUTHEAST FROM HILLSIDE TRAIL WEST OF SITE

VPT3.4 – VIEW NORTH FROM WATER CHANNEL BETWEEN WORK SITE AND YIM TIN TSAI

VPT3.5 – VIEW NORTHWEST FROM BARBECUE AREA 12

A	30JUN10	LOCATION PLAN	IL
修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By

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PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

PHOTOMONTAGE VIEWPOINT LOCATION
FIGURE 9.1

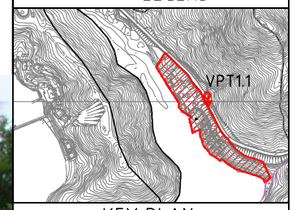
Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/09.1A
Scale 比例	1:6000(A3)		
Date 日期	MAR10		

size = A1 plot scale 1 : 1

EXISTING VIEW

DAY 1 WITHOUT MITIGATION

LEGEND



KEY PLAN

DAY 1 WITH MITIGATION

YEAR 10 WITH MITIGATION

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	27JUL10	KEY PLAN	IL

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PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

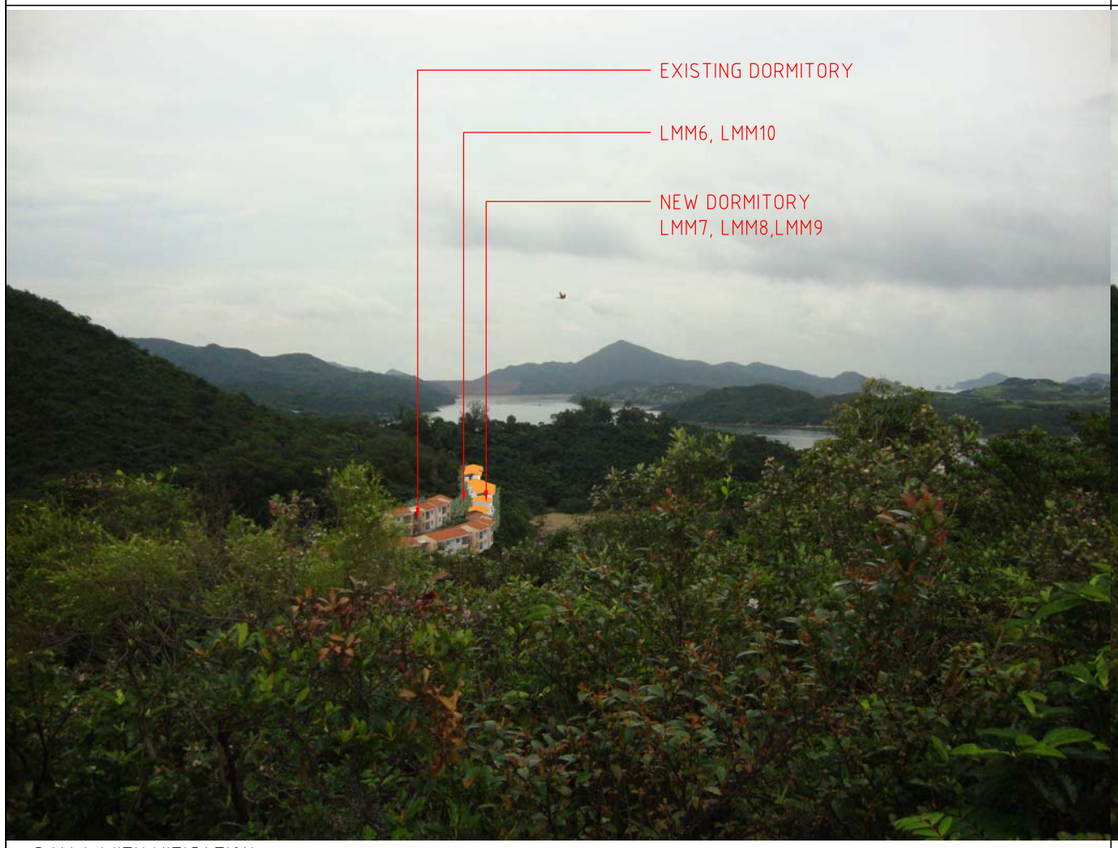
PHOTOMONTAGE VPT 1.1
(VIEW SOUTHEAST FROM TAI MONG TSAI ROAD)
FIGURE 9.2

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	TT	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/09.2A
Scale 比例	NTS (A3)		
Date 日期	JUN 2010		

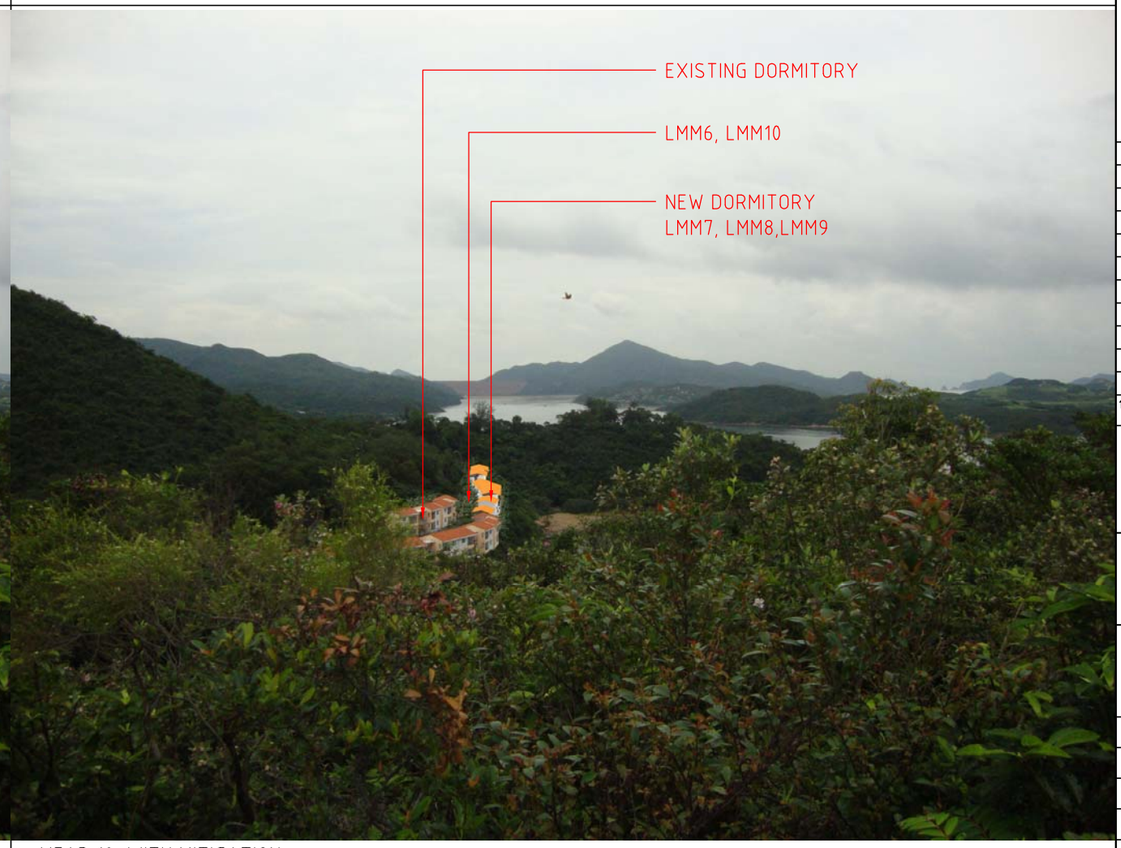
size = A1 plot scale 1 : 1

EXISTING VIEW

DAY 1 WITHOUT MITIGATION

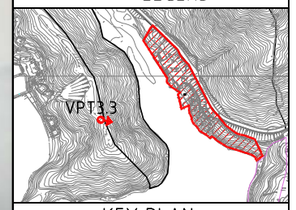


DAY 1 WITH MITIGATION



YEAR 10 WITH MITIGATION

LEGEND



KEY PLAN

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	27JUL10	KEY PLAN	IL

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PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

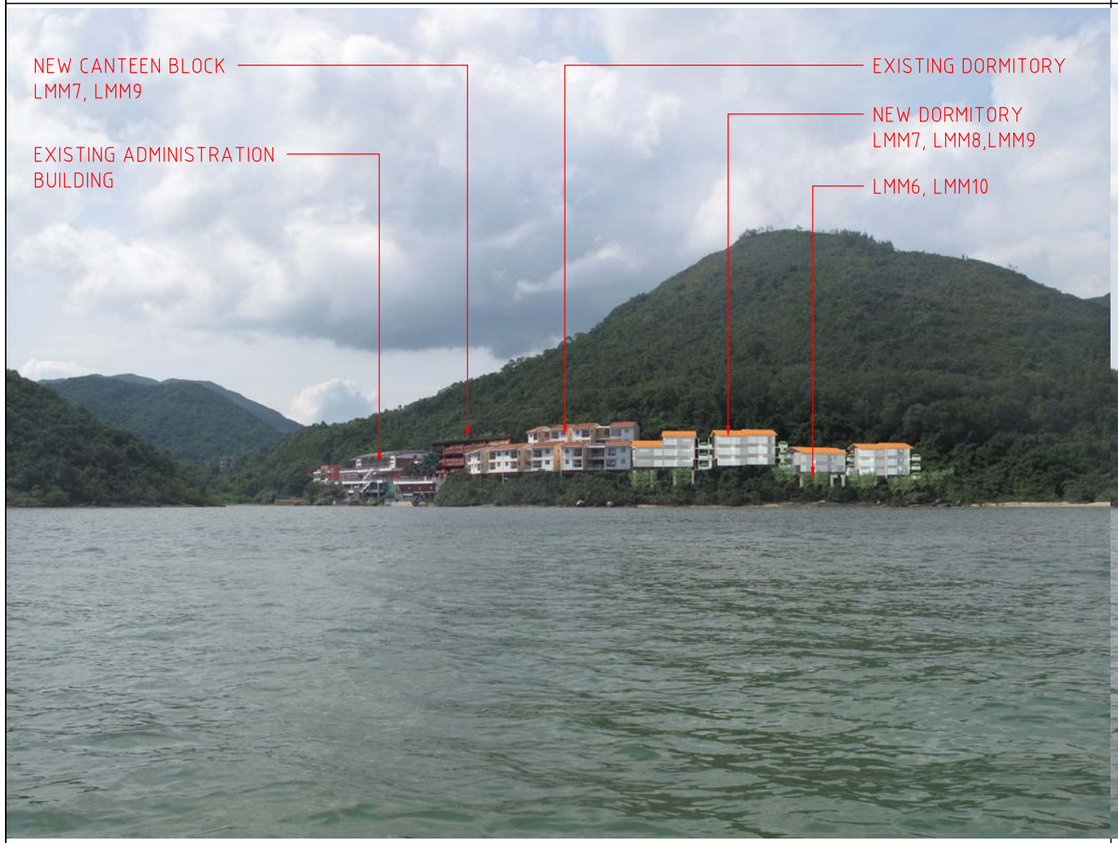
PHOTOMONTAGE VPT 3.3
(VIEW SOUTHEAST FROM HILLSIDE TRAIL WEST OF SITE)
FIGURE 9.3

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	TT	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/09.3A
Scale 比例	NTS (A3)		
Date 日期	JUN 2010		

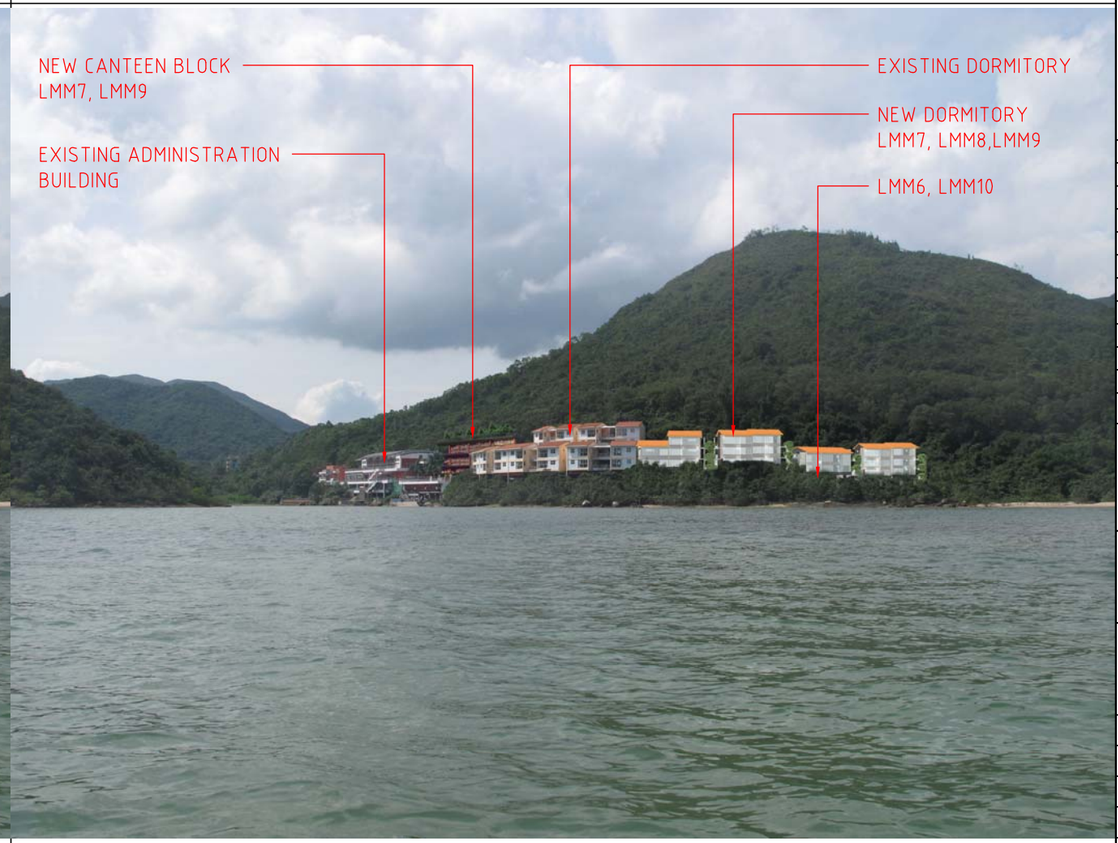
size = A1 plot scale 1 : 1

EXISTING VIEW

DAY 1 WITHOUT MITIGATION

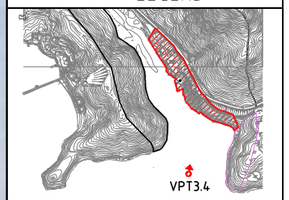


DAY 1 WITH MITIGATION



YEAR 10 WITH MITIGATION

LEGEND



KEY PLAN

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	27JUL10	KEY PLAN	IL

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PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

PHOTOMONTAGE VPT 3.4
(VIEW NORTH FROM WATER CHANNEL)
FIGURE 9.4

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	TT	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/09.4A
Scale 比例	NTS (A3)		
Date 日期	JUN 2010		

size = A1 plot scale 1 : 1

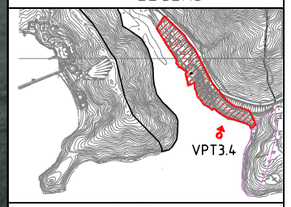
EXISTING VIEW (CLOSE-UP VIEW OF NEW DORMITORY)

DAY 1 WITHOUT MITIGATION (CLOSE - UP VIEW OF NEW DORMITORY)

DAY 1 WITH MITIGATION (CLOSE-UP VIEW OF NEW DORMITORY)

YEAR 10 WITH MITIGATION (CLOSE-UP VIEW OF NEW DORMITORY)

LEGEND



KEY PLAN

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By
A	27JUL10	KEY PLAN	IL

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PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

PHOTOMONTAGE VPT 3.4 - CLOSE-UP VIEW
(VIEW NORTH FROM WATER CHANNEL)
FIGURE 9.5

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	SK	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/09.5A
Scale 比例	NTS (A3)		
Date 日期	JUN 2010		

size = A1 plot scale 1 : 1

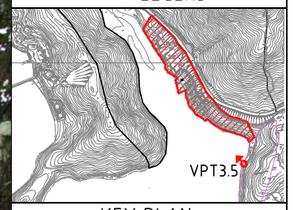
EXISTING VIEW

DAY 1 WITHOUT MITIGATION

DAY 1 WITH MITIGATION

YEAR 10 WITH MITIGATION

LEGEND



KEY PLAN

修訂編號 No.	日期 Date	修訂 Revisions	繪圖 By

吳振麒園境規劃師事務所有限公司
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Project Title 項目

PHASE III REDEVELOPMENT OF HONG KONG FEDERATION OF YOUTH GROUPS JOCKEY CLUB SAI KUNG OUTDOOR TRAINING CAMP

Drawing Title 標題

PHOTOMONTAGE VPT 3.5
(VIEW NORTHWEST FROM BARBECUE AREA 12)
FIGURE 9.6

Designed by 設計	ML	Approved by 審核	KN
Drawn by 繪圖	TT	Job No. 業務號	AT3
Checked by 校對	AC	Drawing No. 圖號	AT3/LCP/09.6
Scale 比例	NTS (A3)		
Date 日期	JUN 2010		

size = A1 plot scale 1 : 1

APPENDIX C
CALCULATIONS FOR NOISE IMPACT

HKFYG TMT OTC Phase III Expansion ~ Unmitigated Scenario

Piling Installation (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112			1	1	1	0	112	118	115	116	123	115
Air compressor	CNP003	104	2	1	1	1		0	104					
Piling, earth auger	CNP167	114	2	1	1	1		0	114					
Generator, Silenced	CNP102	100	1	1	1		1	0	100					
Grout Mixer	#	90		1				0	90					
Grout Pump	#	105		1				0	105					
Breaker, Excavator mounted	CNP027	122				1		0	122					
Lorry	CNP141	112				1	1	0	112					
Water Pump	CNP281	88	1		1			0	88					

Pile Cap Construction (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112		1				0	112	115	118	112		
Excavator/loader, wheeled/tracked	CNP081	112	1		1			0	112					
Lorry	CNP141	112	1					0	112					
Concrete Lorry Mixer	CNP044	109		1				0	109					
Concrete Poker	CNP170	113		2				0	113					
Water Pump	CNP281	88			1			0	88					

Superstructure Construction (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112	1	1				0	112	112	118			
Concrete Lorry Mixer	CNP044	109		1				0	109					
Concrete Poker	CNP170	113		2				0	113					

Piling Installation (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112			1	1	1	0	112	119	118	119	124	115
Air compressor	CNP003	104	3	2	2	2		0	104					
Piling, earth auger	CNP167	114	3	2	2	2		0	114					
Generator, Silenced	CNP102	100	1	1	1		1	0	100					
Grout Mixer	#	90		1				0	90					
Grout Pump	#	105		1				0	105					
Breaker, Excavator mounted	CNP027	122				1		0	122					
Lorry	CNP141	112				1	1	0	112					
Water Pump	CNP281	88	1		1			0	88					

Pile Cap Construction (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112		1				0	112	118	120	112		
Excavator/loader, wheeled/tracked	CNP081	112	2	1	1			0	112					
Lorry	CNP141	112	2	1				0	112					
Concrete Lorry Mixer	CNP044	109		1				0	109					
Concrete Poker	CNP170	113		2				0	113					
Water Pump	CNP281	88			1			0	88					

Superstructure Construction (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112	1	1				0	112	112	118			
Concrete Lorry Mixer	CNP044	109		1				0	109					
Concrete Poker	CNP170	113		2				0	113					

Piling Installation (For Platform Decks Beside Slipway in Area"A" or Area "B)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112		1	1	1		0	112	115	113	123	115	
Air compressor	CNP003	104	1		1			0	104					
Piling, earth auger	CNP167	114	1		1			0	114					
Generator, Silenced	CNP102	100	1	1	1	1		0	100					
Grout Mixer	#	90		1				0	90					
Grout Pump	#	105		1				0	105					
Breaker, Excavator mounted	CNP027	122			1			0	122					
Lorry	CNP141	112			1	1		0	112					
Water Pump	CNP281	88	1		1			0	88					

Piling Cap & Concrete Deck Construction (For Platform Decks Beside Slipway in Area"A" or Area "B)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112		1				0	112	115	118	112		
Excavator/loader, wheeled/tracked	CNP081	112	1		1			0	112					
Lorry	CNP141	112	1					0	112					
Concrete Lorry Mixer	CNP044	109		1				0	109					
Concrete Poker	CNP170	113		2				0	113					
Water Pump	CNP281	88			2			0	88					

Remarks: # - Sound power levels of other commonly used PME (EPD website : Guidance Notes for Licence Application under the NCO).
Com1 to Com 5 = Combination of PME during construction, i.e., different scenarios where the comibation of machinery would be operated simulataneously in actual situation.
Com highlighted in yellow = Selected noisiest PME combination used as worse case scenario for calculation

HKFYG TMT OTC Phase III Expansion ~ Mitigated Scenario (Quiet Plant)

Piling Installation (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112			1	1	1	0	112	117	115	116	121	113
Air compressor	CNP003	104	2	1	1	1		0	104					
Piling, earth auger	CNP167	114	2	1	1	1		0	114					
Generator [1]	CNP103	95	1	1	1		1	0	95					
Grout Mixer	#	90		1				0	90					
Grout Pump	#	105		1				0	105					
Breaker, excavator mounted [1]	C2/4	119				1		0	119					
Lorry [1]	C3/59	105				1	1	0	105					
Water Pump	CNP281	88	1		1			0	88					

Pile Cap Construction (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101		1				0	101	107	110	103		
Excavator/loader, wheeled/tracked [1]	C4/64	103	1		1			0	103					
Lorry [1]	C3/59	105	1					0	105					
Concrete Lorry Mixer	CNP044	109		1				0	109					
Vibratory Poker [1]	C6/32	100		2				0	100					
Water Pump	CNP281	88			1			0	88					

Superstructure Construction (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101	1	1				0	101	101	110			
Concrete Lorry Mixer	CNP044	109		1				0	109					
Vibratory Poker [1]	C6/32	100		2				0	100					

Piling Installation (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112			1	1	1	0	112	119	118	119	122	113
Air compressor	CNP003	104	3	2	2	2		0	104					
Piling, earth auger	CNP167	114	3	2	2	2		0	114					
Generator [1]	CNP103	95	1	1	1		1	0	95					
Grout Mixer	#	90		1				0	90					
Grout Pump	#	105		1				0	105					
Breaker, excavator mounted [1]	C2/4	119				1		0	119					
Lorry [1]	C3/59	105				1	1	0	105					
Water Pump	CNP281	88	1		1			0	88					

Pile Cap Construction (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101		1				0	101	110	112	103		
Excavator/loader, wheeled/tracked [1]	C4/64	103	2	1	1			0	103					
Lorry [1]	C3/59	105	2	1				0	105					
Concrete Lorry Mixer	CNP044	109		1				0	109					
Vibratory Poker [1]	C6/32	100		2				0	100					
Water Pump	CNP281	88			1			0	88					

Superstructure Construction (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101	1	1				0	101	101	110			
Concrete Lorry Mixer	CNP044	109		1				0	109					
Vibratory Poker [1]	C6/32	100		2				0	100					

Piling Installation (For Platform Decks Beside Slipway in Area"A" or Area "B)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	CNP048	101		1	1	1		0	101	114	107	120	107	
Air compressor	CNP003	104	1		1			0	104					
Piling, earth auger	CNP167	114	1		1			0	114					
Generator [1]	CNP103	95	1	1	1	1		0	95					
Grout Mixer	#	90		1				0	90					
Grout Pump	#	105		1				0	105					
Breaker, excavator mounted [1]	C2/4	119			1			0	119					
Lorry [1]	C3/59	105			1	1		0	105					
Water Pump	CNP281	88	1		1			0	88					

Piling Cap & Concrete Deck Construction (For Platform Decks Beside Slipway in Area"A" or Area "B)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Barrier Correction	Corrected SWL	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5			Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101		1				0	101	107	110	103		
Excavator/loader, wheeled/tracked [1]	C4/64	103	1		1			0	103					
Lorry [1]	C3/59	105	1					0	105					
Concrete Lorry Mixer	CNP044	109		1				0	109					
Vibratory Poker [1]	C6/32	100		2				0	100					
Water Pump	CNP281	88			2			0	88					

[1] Quiet Plant

Remarks: # - Sound power levels of other commonly used PME (EPD website : Guidance Notes for Licence Application under the NCO).

Com1 to Com 5 = Combination of PME during construction, i.e., different scenarios where the comibation of machinery would be operated simulataneously in actual situation.

Com highlighted in yellow = Selected noisiest PME combination used as worse case scenario for calculation

HKFYG TMT OTC Phase III Expansion ~ Mitigated Scenario (Quiet Plant + Temporary Barrier)

Piling Installation (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Summation of SWL					Barrier Correction	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5	Com1	Com2	Com3	Com4	Com5		Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112			1	1	1			112	112	112	-5	110	106	109	115	108
Air compressor	CNP003	104	2	1	1	1		107	104	104	104		-10					
Piling, earth auger	CNP167	114	2	1	1	1		117	114	114	114		-10					
Generator [1]	CNP103	95	1	1	1		1	95	95	95		95	-10					
Grout Mixer	#	90		1					90				-10					
Grout Pump	#	105		1					105				-5					
Breaker, excavator mounted [1]	C2/4	119				1					119		-5					
Lorry [1]	C3/59	105				1	1				105	105	-5					
Water Pump	CNP281	88	1		1			88		88			-10					

Pile Cap Construction (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Summation of SWL					Barrier Correction	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5	Com1	Com2	Com3	Com4	Com5		Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101		1					101				-5	102	106	98		
Excavator/loader, wheeled/tracked [1]	C4/64	103	1		1			103		103			-5					
Lorry [1]	C3/59	105	1					105					-5					
Concrete Lorry Mixer	CNP044	109		1					109				-5					
Vibratory Poker [1]	C6/32	100		2					103				-5					
Water Pump	CNP281	88			1					88			-10					

Superstructure Construction (Canteen Block)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Summation of SWL					Barrier Correction	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5	Com1	Com2	Com3	Com4	Com5		Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101	1	1				101	101				-5	96	106			
Concrete Lorry Mixer	CNP044	109		1					109				-5					
Vibratory Poker [1]	C6/32	100		2					103				-5					

Piling Installation (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Summation of SWL					Barrier Correction	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5	Com1	Com2	Com3	Com4	Com5		Com1	Com2	Com3	Com4	Com5
Crane, Mobile	CNP048	112			1	1	1			112	112	112	-5	114	111	112	116	108
Air compressor	CNP003	104	3	2	2	2		109	107	107	107		-10					
Piling, earth auger	CNP167	114	3	2	2	2		119	117	117	117		-10					
Generator [1]	CNP103	95	1	1	1		1	95	95	95		95	-10					
Grout Mixer	#	90		1					90				-10					
Grout Pump	#	105		1					105				-5					
Breaker, excavator mounted [1]	C2/4	119				1					119		-5					
Lorry [1]	C3/59	105				1	1				105	105	-5					
Water Pump	CNP281	88	1		1			88		88			-10					

Pile Cap Construction (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Summation of SWL					Barrier Correction	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5	Com1	Com2	Com3	Com4	Com5		Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101		1					101				-5	108	108	98		
Excavator/loader, wheeled/tracked [1]	C4/64	103	2	1	1			106	103	103			-5					
Lorry [1]	C3/59	105	2	1				108	105				-5					
Concrete Lorry Mixer	CNP044	109		1					109				-5					
Vibratory Poker [1]	C6/32	100		2					103				-5					
Water Pump	CNP281	88			1					88			-10					

Superstructure Construction (Dormitory Houses)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Summation of SWL					Barrier Correction	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5	Com1	Com2	Com3	Com4	Com5		Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101	1	1				101	101				-5	96	106			
Concrete Lorry Mixer	CNP044	109		1					109				-5					
Vibratory Poker [1]	C6/32	100		2					103				-5					

Piling Installation (For Platform Decks Beside Slipway in Area"A" or Area "B)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Summation of SWL					Barrier Correction	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5	Com1	Com2	Com3	Com4	Com5		Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	CNP048	112		1	1	1			112	112	112		-5	104	108	115	108	
Air compressor	CNP003	104	1		1			104		104			-10					
Piling, earth auger	CNP167	114	1		1			114		114			-10					
Generator [1]	CNP103	95	1	1	1	1		95	95	95	95		-10					
Grout Mixer	#	90		1					90				-10					
Grout Pump	#	105		1					105				-5					
Breaker, excavator mounted [1]	C2/4	119			1					119			-5					
Lorry [1]	C3/59	105			1	1				105	105		-5					
Water Pump	CNP281	88	1		1			88		88			-10					

Piling Cap & Concrete Deck Construction (For Platform Decks Beside Slipway in Area"A" or Area "B)

Powered Mechanical Equipment (PME)	TM Ref.	SWL - dB(A)	No. of Units					Summation of SWL					Barrier Correction	Total SWL - dB(A)				
			Com1	Com2	Com3	Com4	Com5	Com1	Com2	Com3	Com4	Com5		Com1	Com2	Com3	Com4	Com5
Mobile crane [1]	C7/114	101		1					101				-5	102	106	98		
Excavator/loader, wheeled/tracked [1]	C4/64	103	1		1			103		103			-5					
Lorry [1]	C3/59	105	1					105					-5					
Concrete Lorry Mixer	CNP044	109		1					109				-5					
Vibratory Poker [1]	C6/32	100		2					103				-5					
Water Pump	CNP281	88			2					91			-10					

[1] Quiet Plant

Com1 to Com 5 = Combination of PME during construction, i.e., different scenarios where the comibation of machinery would be operated simulataneously in actual situation.

Com highlighted in yellow = Selected noisiest PME combination used as worse case scenario for calculation

NSR	Distance to Building (m)*		Unmitigated SWL (dB(A))	PNL - unmitigated (dB(A))	Mitigated SWL ~ Silence Equipment (dB(A))	PNL - mitigated (dB(A))	Mitigated SWL ~ Silence Equip + Barrier (dB(A))	PNL - mitigated (dB(A))
NSR-V	Pilling Installation ~ Canteen (Com4)	269	**123**	70	**121**	67	**115**	62
NSR-V	Pilling Installation ~ Dormitory Houses Area (Com4)	410	**124**	67	**122**	65	**116**	59
NSR-V	Pilling Installation ~ Platform Area 1 (Com4)	289	**123**	69	**120**	66	**115**	61
NSR-V	Pilling Installation ~ Platform Area 2 (Com4)	340	**123**	68	**120**	65	**115**	60
NSR-V	Pile Cap Construction ~ Canteen (Com2)	269	**118**	64	**110**	57	**106**	53
NSR-V	Pile Cap Construction ~ Dormitory Houses Area (Com2)	410	**120**	63	**112**	55	**108**	50
NSR-V	Pile Cap Construction ~ Platform Area 1 (Com2)	289	**118**	64	**110**	56	**106**	52
NSR-V	Pile Cap Construction ~ Platform Area 2 (Com2)	340	**118**	62	**110**	55	**106**	51
NSR-V	Superstructure Construction ~ Canteen (Com 2)	269	**118**	64	**110**	57	**106**	53
NSR-V	Superstructure Construction ~ Dormitory Houses Area (Com 2)	410	**118**	61	**110**	53	**106**	49

SWL : Sound Power Level
PNL : Predicted Noise Level
+ 3 dB (A) façade correction included in the calculation

Residental Noise Limit Level < 75 dB(A) during daytime
*Distance corection based on worst case scenarios (Com# as shown)

Cumulative Construction Noise Impact

Canteen Block	Selected Worst Case*
Piling Installation	com4
Pile Cap Construction	com2
Superstructure	com2
Dormitory Houses Area	
Piling Installation	com4
Pile Cap Construction	com2
Superstructure	com2
Platform Decks Beside Slipway in Area "A"	
Piling Installation	com3
Pile Cap Construction	com2
Platform Decks Beside Slipway in Area "B"	
Piling Installation	com3
Pile Cap Construction	com2

	Construction Programme														
	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12
Canteen Block															
Piling Installation	62	62	62												
Pile Cap Construction				53	53	53									
Superstructure							53	53	53	53	53	53	53		
Dormitory Houses Area															
Piling Installation	59	59	59												
Pile Cap Construction				50	50	50									
Superstructure							49	49	49	49	49	49	49		
Platform Decks Beside Slipway in Area "A"															
Piling Installation										61	61				
Pile Cap Construction													52	52	
Platform Decks Beside Slipway in Area "B"															
Piling Installation										60	60				
Pile Cap Construction													51	51	
NSR-V (Village)	64	64	64	55	55	55	54	54	54	64	64	54	57	54	11

*Selected Worst Case = Selected noisiest PME combination used as worse case scenario for calculation