Works Division
Highways Department

New Wang Tong River Bridge

Environmental Impact Assessment Report

(Final)

July 2016

Joint Venture

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1. INTRODUCTION

1.1 Background

1.1.1 Silver Mine Bay is a popular bathing beach in Mui Wo, Lantau that attracted 4,550 visitors on a peak day and over 69,000 visitors utilized the beach in 2012.

1.1.2 In order to relieve the overcrowding problem and the road safety concern of Wang Tong Bridge (hereafter called "Old Bridge"), two bridges (pedestrian bridge and cycle bridge) are proposed to replace the Old Bridge. The new pedestrian bridge and the new cycle bridge (hereafter called "New Bridge") are also designed to align with the future amenity development on the northern side of the Old Bridge. The location of the project site is shown in **Figure 1.1**.

1.1.3 This Project mainly comprises the following works:

i. Construction of a new cycle bridge next to the existing bridge
ii. Demolition of the existing bridge
iii. Construction of a new pedestrian bridge on the same site of the existing bridge

1.1.4 Based on the current design, both New Bridges will be supported by columns outside the river. The preliminary layout of the New Bridges prepared by the Highways Department (HyD) is shown in **Figure 1.2**.

1.1.5 The Project consists of the following designated projects under Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO):

- Item C.12 – (a)…a dredging operation which is less than 500m from the nearest boundary of an existing…(iii) bathing beach…

1.1.6 A project profile (PP-478/2013) has been submitted to Environmental Protection Department in 28 January 2013 and a study brief (ESB- 256/2013) has been issued to HyD in March 2013.

1.1.7 As an environmental impact assessment (EIA) is required under the Environmental Impact Assessment Ordinance (EIAO), HyD appointed the Joint Venture of Maurice Lee and Associates Ltd. and Cinotech Consultants Ltd. (hereinafter called the JV) to perform the EIA study accordingly.

1.2 Objectives of the EIA Study

1.2.1 The key objectives of the EIA Study are to identify key environmental issues and constraints of the major elements of the Project and to consider possible environmental impact of the schemes and appropriate measures. The detailed objectives are listed as follows:-

(i) To describe the Project and associated works together with the requirements and environmental benefits for carrying out the Project and the types of designated projects to be covered by the Project;

(ii) To identify and describe elements of community and environment likely to be affected by the Project and/or likely to cause adverse impact to the Project, including natural and man-made environment and the associated environmental constraints;

(iii) To provide information on the consideration of alternatives design options of the Project including scale, extent, layout, configuration, design and type of design orientation and the construction methods with a view to avoiding and minimizing potential environmental impacts to environmentally sensitive areas and sensitive uses; to compare the environmental benefits and dis-benefits of different options; to provide reasons for selecting the preferred option(s) and to describe the part environmental factors played in the selection of preferred option(s);

(iv) To identify and quantify emission sources (including air quality, noise, water quality and waste, etc. as appropriate) and determine the significance of impact on sensitive receivers and potential affected uses;

(v) To identify and quantify any potential losses or damage and other potential impacts to ecology, flora, fauna and natural habitats and to propose measures to mitigate these impacts;

(vi) To identify any potential landscape and visual impacts and to propose measures to mitigate this impact;

(vii) To propose provision of infrastructure or mitigation measures so as to minimize pollution, environmental disturbance and nuisance during construction and operation of the Project;

(viii) To investigate the feasibility, practicability, effectiveness and implications of the proposed mitigation measures;

(ix) To identify, predict and evaluate the residual environmental impact (i.e. after practicable mitigation) and the cumulative effects expected to arise during

construction and operation phases of the Project in relation to the sensitive receivers and potential affected uses;

(x) To identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operation of the Project which are necessary to mitigate these environmental impacts and cumulative effects and reduce them to acceptable levels;

(xi) To investigate the extent of the secondary environmental impact that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as the provision of any necessary modification; and

(xii) To design and specify environmental monitoring and audit requirements to ensure the effective implementation of the recommended environmental protection and pollution control measures.

1.3 Structure of the EIA Report

1.3.1 The EIA report presents the environmental impact that may arise from the Project and the associated mitigation measures, as follows:-

- Chapter 1 (Introduction) – Introduces the background information and the layout of the EIA Report;
- Chapter 2 (General) – Project Description;
- Chapter 3 (Air Quality Impact) – Presents the legislation, methodology, assessment and recommendations for air quality impact;
- Chapter 4 (Noise Impact) – Presents the legislation, methodology, assessment and recommendations for noise impact;
- Chapter 5 (Water Quality Impact) – Presents the legislation, methodology, assessment and recommendations for water quality impact;
- Chapter 6 (Waste Management) –Presents the legislation, methodology, assessment and recommendations for waste management;
- Chapter 7 (Ecological Impact) – Presents the legislation, methodology, assessment and recommendations for ecological impact;
- Chapter 8 (Landscape and Visual Impact) – Presents the legislation, methodology, assessment and recommendations for landscape and visual impact;
- Chapter 9 (EM&A Requirements) – Presents the EM&A requirements; and
- Chapter 10 (Conclusion) – Summarizes the findings.

2. PROJECT DESCRIPTIONS

2.1 Need of the Project

2.1.1 Silver Mine Bay is a popular bathing beach in Mui Wo, Lantau. According to the EPD's "Beach Water Quality in Hong Kong 2012", the beach attracted 4,550 visitors on a peak day and over 69,000 visitors utilized the beach in 2012. The shortest route from the pier to this beach is by crossing the Wang Tong Bridge (hereafter called "Old Bridge").

2.1.2 During holidays, people enjoy cycling around Mui Wo for sightseeing. As the bridge is only about 1.5m wide, overcrowding problem occurs and pedestrians and cyclists are often crossing the bridge shoulder to shoulder. According to Civil Engineering Development Department (CEDD)'s "Improvement Works for Mui Wo Facelift – Feasibility Study" in 2007, the hourly peak flow of the Old Bridge was 650 pedestrians and 250 bikes. This also raises concern on the risk of accident caused by pedestrians being hit by bicycles.

2.1.3 Possibility of extending the existing bridge was explored in Technical Feasibility Study (TFS) for New Wang Tong River Bridge prepared in 2011. However, the Old Bridge was not constructed up to the current design standards. After its service for over 40 years, its condition is in general poor. Mere widening and upgrading of the Old Bridge are therefore not cost effective or technically practical. Therefore, the TFS proposed to replace the Old Bridge by a new bridge comprising 4m wide cycle track (inclusive of 0.5m verge), 2m footpath and 0.35m wide utility trough.

2.1.4 The purpose, objectives and benefits of project are as follows:

- Demolish the Old Bridge and construct a wider New Bridge (including deck, abutments and retaining walls) with segregation for pedestrians and cyclists to relieve overcrowding problem and road safety concern
- CEDD planned to improve the existing segregated cycle track and footpath on the southern side of the Old Bridge and provide cycle parking area on the northern side of the Old Bridge. The New Bridge design is also suggested to align with the future development on both sides of the bridge for continuity.
- Carry out associated works including drainage works (e.g. u channel & catch pit), traffic aids (e.g. road paint) and street lighting modification (e.g. lighting column & lighting meter cabinet), environmental mitigation measures and landscaping works.
- The ground level of the Old Bridge is about 3.5 mPD. The water level of the Wang Tong River under heavy rain and high tide is about 2.36 mPD. This raises safety concern to the pedestrians of the Old Bridge in case of extreme weather. Therefore, the deck level of New Bridge shall be raised.

2.1.5 Without the proposed New Bridge, the congestion problem and safety concern at the Old Bridge will remain unresolved, not to mention the increase in future traffic demand due to streetscape enhancement and the improvement works at Mui Wo and the promenade along the Silver Mine Bay Beach. The level of Old Bridge is equal to the maximum water level under 1 in 50 years event (+3.5mPD), posing danger to bridge users under heavy storm.

Therefore, it is favourable to replace the Old Bridge to alleviate these concerns.

2.2 Consideration of Alternative Design and Layout

Alternative Alignment

2.2.1 As mentioned in **Section 2.1.3** above, improving the existing bridge is not cost effective or technically practical due to its poor condition. Keeping the Old Bridge is also not preferred due to substandard design to cater for adverse drainage situation (see **Section 2.1.5**). Therefore, the Old Bridge shall be replaced by a new bridge.

2.2.2 In total, three New Bridge options were proposed:

- Alignment Option 1 – One Single Bridge with Intermediate Bridge Support below high water mark (Design in the TFS and used in Project Profile PP-478/2013) (**Figure 2.1**)
- Alignment Option 2 – One Single Bridge with no Intermediate Bridge Support (**Figure 2.2**)
- Alignment Option 3 – Two Separated Bridges with Intermediate Supports above high water mark (Preferred design in this EIA) (**Figure 1.2**)

2.2.3 **Option 1** is a design proposed in TFS, Project Profile and Study Brief. It consists of a single 6.35m wide bridge with approach footway and cycle track to replace the Old Bridge. The new bridge will be supported by one intermediate support below high water mark in Wang Tong River. This scheme satisfies the functional and layout requirements; however, some of the drawbacks are explained below:

- The structure is bulky and visually unattractive;
- Heavy foundation requires the use of large scale piling rigs, occupying more amenity area of the beach, requiring longer approach ramps at the north side and clashing more existing trees;
- The levels of the footpath and cycle track on both approaches are higher than the existing formation level with steep ramps and sharp bends. Substantial site formation works involving modification and strengthening of the existing seawalls and retaining walls are required.

2.2.4 In summary, this design has low structural efficiency with adverse implications on constructability, geotechnical, drainage and environmental impacts and cost. Furthermore, there is room for improvement in the functional and layout arrangement and landscape and visual impacts.

2.2.5 In **Option 2**, a single bridge with no intermediate support was proposed to replace the Old Bridge. The advantages of this Option will be reducing environmental and drainage

impacts by removing the need for channel dredging, reducing deck thickness, and increasing the freeboard below. However, this Option will require an increased deck span with implications for bridge structural form, support and foundations. The disadvantage of these will be result in a much larger visual profile than a concrete beam construction.

2.2.6 In **Option 3**, two separated bridges with intermediate support outside the river was proposed to replace the Old Bridge. The advantages of this Option include,

- providing complete separation of cycle track and footpath,
- providing an efficient and safe transition such that building lots abut on the footpath instead of bicycle rack and the cycle track,
- minimizing privacy and security concerns to Silver Mine Bay on the south side by designing the deck level below which bridge user can overlook the interior of hotel,
- providing slimmer New Bridge that reduces the extent of ramp modification and strengthening at both ends and provides adequate freeboard to Wang Tong River,
- avoiding substantial surcharge to existing seawalls and retaining walls,
- minimising construction and demolition works below high water mark (HWM) within Wang Tong River,
- improving drainage performance by eliminating pier of the Old Bridge and raising the soffit of the bridge further above water
- reducing the length of approach ramp which would be received better by the public.

2.2.7 A comparison table on the potential environmental impacts between the three options is shown below:

Table 2.1: Comparison of Bridge Designs

Considerations	Option 1	Option 2	Option 3
No. of Pier	1	0	1
Location of Pier	Center of River	**N/A**	Above high water mark
Dredging *	Yes	**No**	Yes, but less than Option 1
Blockage of River Flow	Permanent partial blockage by new pier	No central pier, **no additional permanent blockage of river flow**	New Pier above high water mark, **no additional permanent blockage of river flow**
Felling of Trees	More	**Fewer**	**Fewer**
Impact on Naturalness	- Minor loss in sandy shore - Minor permanent loss in river bed by new pier	- Minor loss in sandy shore **- No additional loss of river bed**	- Minor loss in sandy shore **- No additional loss of river bed**
Landscape and Visual Impact	Bulkier than Old Bridge	Bulkier than Old Bridge	**Each new bridge is of similar bulkiness as Old Bridge**

Note: * Exclude removal of Old Bridge pier

- Better options are bolded

2.2.8 **Table 2.1** shows that Option 1 is expected to bring the greatest impact out of the three options. Both Option 2 and 3 will not cause additional permanent blockage of Wang Tong River and river bed and fewer impact on trees. Although Option 2 does not involve dredging works for construction of new pier, the overall design is much bulkier than Option 3 (i.e. 1.4 m deck thickness in Option 2 comparing to 0.9 & 1.2 m deck thicknesses in Option 3) so that the bridge can sustain its structure without pier support. Adverse opposition from locals is expected due to significant visual impact. The pier of Option 3 is located above high water mark and thus only minor dredging works will be involved. Given Option 3 is more favourable than the other two, the New Bridge design with two separated bridges is therefore selected as being suitable to take forward.

2.3 Consideration of Alternative Construction Methods and Sequences of Works

2.3.1 Construction of New Bridge and demolition of Old Bridge involves the following major activities:

- Demolition works
- Piling
- Dredging/Excavation and backfilling
- Bridge building (formation of bridge structure and concreting)

<u>Alternative Construction Methods</u>

Consideration of "No-dredge Option"

2.3.2 Possibility of cutting the central pier of the Old Bridge down to the riverbed surface only has been explored. However, Drainage Services Department requested further cutting for better drainage performance. Therefore, removal of Old Bridge pier down to 300mm below riverbed requiring dredging works was proposed. This design received no further departmental comment.

Demolition of Central Pier of Old Bridge

2.3.3 Cutting and breaking are typical demolition methods. Alternative demolition method of the central pier of Old Bridge within the HWM is by application of strong acid solution, e.g. nitric acid, to dissolve the mild steel bars under seabed level. However, this raises concern on the potential leakage of strong acid into Wang Tong River, causing undesirable water quality impact on this ecologically sensitive habitat and the bathing beach downstream. Therefore, demolition of pier by cutting is adopted.

Piling

2.3.4 Bored piling is a common method in bridge pier construction. However, given the limited space at the river bank and popular usage of the gazetted beach, use of large bored piling machine is not preferred. Also, bored piling involves extensive excavation work before

placement of large diameter bored piles. Much dredged/excavated materials and wastewater will be generated.

2.3.5 A more environmentally friendly method minipiling is proposed. Minipiling machine is much smaller and thus less space demanding. It will be easier to be delivered to the Site as well. Only small scale excavation work will be needed for driving minipiles into soil, thus generating less excavated materials and wastewater.

Excavation Area of Abutment/Pier of New Bridge

2.3.6 In order to construct minipiles for the new bridges, fully enclosed cofferdam constructed from sheet piles will be installed around the pier with 1m clearance from pile cap. Excavation/dredging will be conducted within cofferdam. The works area of the southern abutment and central pier of the new bridges may fall within the HWM.

2.3.7 For new cycle bridge, the works area of the southern abutment and central pier of the will be within the HWM by 0.22 m^2 and 1.10 m^2 respectively.

2.3.8 For new pedestrian bridge, the existing abutments and pile caps will be demolished before construction of the new bridges at the same location. The works area of the southern abutment and central pier of the new cycle bridge will be within the HWM by 3.30 m^2 and 3.64 m^2 respectively.

2.3.9 While construction at the HWM is required, the water level may not always reach the work site depending on the tidal phase. Therefore, the excavation/dredging at the abutment within HWM during the construction period may be conducted in dry condition.

Bridge Construction

2.3.10 Sections of structural steel (7m x 1m) shall be delivered to the Site. The steel sections will be prefabricated in the northern part of works area. The bridge section will then be moved to the proposed bridge location for erection and concreting. This can minimize the activity above water and the chance of dropping debris into water.

Sequences of Works

2.3.11 To minimize the number of concurrent activities, construction and demolition works will be carried out in sequence:

(1) Construction of new cycle bridge

(2) Demolition of Old Bridge

(3) Construction of new pedestrian bridge

2.3.12 Although the duration of work will be prolonged, slow work process requires fewer plant equipment and thus produce less noise nuisance.

2.4 Selection of Preferred Scenario

Preferred Design and Layout

2.4.1 The preferred bridge layout is a twin bridges design having one supporting pier above high water mark (**Option 3**). This design is beneficial in terms of pedestrian/cyclist safety as well as overall smaller environmental impact:

- no permanent damage on riverbed or obstruction of river flow;
- fewer impact on trees during construction;
- smaller landscape and visual impact by having low profile and design that matches with surrounding rural environment.

2.4.2 The deck of the New Bridge is designed at about 5.40mPD highest with 0.3m freeboard, which is capable of passing 1 in 100 year flooding.

Preferred Construction Methods

2.4.3 Minipiling will be adopted for constructing foundation of the New Bridge, which requires smaller space for accommodating the piling machine and this method also generates fewer excavated materials than traditional bored piling.

2.4.4 Dredging/Excavating below high water mark cannot be avoided at the pier of Old Bridge in order to improve drainage performance of Wang Tong River. However, fully enclosed cofferdam will be installed around the piling and pier demolition works area to prevent dispersion of dredged/excavated materials into water.

2.4.5 Existing pile cap at southern abutment of pedestrian bridge is proposed to be demolished.

Detailed Construction Methods

2.4.6 The construction method of the Project can be divided into 3 major parts: 1.) construction of the new cycle bridge, 2.) demolition of old bridge, and 3.) construction of new pedestrian bridge.

Construction of New Bridge (Both cycle and pedestrian bridges)

2.4.7 Procedures for constructing the New Bridge would be as follow:

(1) Install mini-piles by boring machine with steel casing at abutments and column support above High Water Mark (HWM);

(2) Perform loading test for mini-piles;

(3) Install shoring work for excavation of pile cap;

(4) Construct pile cap, abutments and column;

(5) Remove temporary shoring works and backfilling;

(6) Erect structural steel truss / girder between column and abutment as temporary works for bridge construction;

(7) Erect steel beams and cast concrete deck; and

(8) Complete all finishes and street furniture.

Demolition of Old Bridge

2.4.8 Procedures for demolishing the Old Bridge would be as follow:

(1) Demolish spine beam by hand held tools;

(2) Install cofferdam around old pier (1m clearance from old pier, i.e. about 2.4 x 2.8m^2);

(3) Adjust working platform and demolish RC (reinforced concrete) column down to 300mm above river bed level by either hand held tools or saw cutting;

(4) Further cut the concrete down to 300mm below river bed level by hand held percussive pneumatic tools, cut the reinforcement and mild steel bars down to 300mm below river bed level by pneumatic saw;

(5) Fill the hole in the river bed with the demolished concrete;

(6) Remove cofferdam around old pier;

(7) Install cofferdam around existing abutments;

(8) Demolish the top level of existing abutments down to about 3.2mPD;

(9) Trim the existing abutments to act as seawall

(10) Remove cofferdam around abutment.

2.5 Designated Project

2.5.1 The Project consists of the following designated projects under Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO):

- Item C.12 – (a)…a dredging operation which is less than 500m from the nearest boundary of an existing…(iii) bathing beach…

2.5.2 Silver Mine Bay Beach is a gazetted bathing beach and just located next to the Project site. According to the construction method, the piers/abutments for the new bridges will be constructed within high water mark. Excavation area below high water mark (i.e. dredging operation) will be needed for the construction of these piers/abutments. The excavation area is hatched in cyan in **Figure 2.3** and intended quantity is approximately 323m^3.

2.6 EIA Study Brief

2.6.1 A project profile (PP-478/2013) has been submitted by Highways Department to Environmental Protection Department on 28 January 2013 and a study brief (ESB-256/2013) has been issued to HyD in March 2013.

2.7 Construction Programme

2.7.1 As access across Wang Tong River has to be maintained during construction period, the new cycle bridge will be constructed first before demolition of the Old Bridge and subsequent construction of new pedestrian bridge.

2.7.2 The construction work is expected to last for two years from mid-2017 to mid-2019. The proposed breakdown of programme can be found in **Appendix 2A**.

2.8 Concurrent Projects

2.8.1 Currently, there are one planned and one ongoing projects within the Study Area.

(1) Signature Project Scheme (Islands District) – Improvement Works at Silvermine Bay Beach, Mui Wo, Lantau Island by the Home Affairs Department (HAD); and

(2) Upgrading of Mui Wo Sewage Treatment Works and Village Sewerage at Wang Tong and Yue Kwong Chuen managed by the Drainage Services Department (DSD).

2.8.2 The latest status and activities that are predicted to overlap with the work programme of this Project have been sought from respective project engineers/architects. Details are attached in **Appendix 2B**.

2.8.3 The scope of HAD project is as follows:

(a) demolition of the existing beach service buildings;

(b) construction of new beach buildings and associated beach facilities with an approximate construction floor area of 938 m^2;

(c) construction of new barbeque pit area and sitting-out area; and

(d) construction of a viewing deck near the entrance to the beach.

2.8.4 The anticipated construction period is January 2016 – January 2017, which will not overlap with this Project (to be commenced in second half of 2017).

2.8.5 The scope of DSD project is as follows:

(a) upgrading of existing Mui Wo Sewage Treatment Works

(b) upgrading of truck sewers along Ngan Kwong Wan Road from 450mm dia. to 750mm

(c) village sewerage at Wang Tong village and Yue Kwong Chuen

2.8.6 Only Scope (c) is located in the vicinity of Wang Tong River Bridge. Sewer laying and manholes construction works were substantially completed and reinstatement works is in progress. The outstanding activities are as follows:

(i) Reinstatement of the roadside covered U-channel, cycle track and footpath pavements (to be completed by end of December 2015);

(ii) The pipe cleaning and CCTV;

(iii) Painting of manhole internal wall face with epoxy paint (will be carried out in mid-2017).

2.8.7 Activity (ii) and (iii) of the DSD project may overlap with this Project in mid-2017. Nevertheless, these are minor works that do not involve use of powered plant equipment or dusty works. No cumulative impact is expected.

2.8.8 In conclusion, no project that involves heavy construction or dust emitting activity is known to be carried out concurrently with the construction work of this Project.

3. AIR QUALITY IMPACT

3.1 Introduction

3.1.1 This Chapter assesses potential air quality impact arising from both construction and operation of the Project. Where necessary, mitigation measures have been proposed and their effectiveness has been evaluated.

3.2 Environmental Legislation, Standards and Guidelines

3.2.1 The Air Pollution Control Ordinance (Cap. 311) provides for the control of air pollutants from a variety of stationary and mobile sources through the establishment of a set of Air Quality Objectives (AQOs). Since 1st January 2014, a new set of air quality objectives which stipulates maximum concentrations for a range of pollutants, i.e. nitrogen dioxide (NO_2), sulphur dioxide (SO_2), respirable suspended particulates (RSP), fine suspended particulates, carbon monoxide (CO), photochemical oxidants (O_3) and lead (Pb), has been in force. Details of AQOs are listed in **Table 3.1**.

Table 3.1: Hong Kong Air Quality Objectives

Pollutant	Averaging time	Concentration limit [i] ($\mu g/m^3$)	Number of exceedances allowed
Sulphur dioxide	10-minute	500	3
	24-hour	125	3
Respirable suspended particulates (PM_{10}) [ii]	24-hour	100	9
	Annual	50	Not applicable
Fine suspended particulates ($PM_{2.5}$) [iii]	24-hour	75	9
	Annual	35	Not applicable
Nitrogen dioxide	1-hour	200	18
	Annual	40	Not applicable
Ozone	8-hour	160	9
Carbon monoxide	1-hour	30,000	0
	8-hour	10,000	0
Lead	Annual	0.5	Not applicable

Note:

[i] All measurements of the concentration of gaseous air pollutants, i.e. sulphur dioxide, nitrogen dioxide, ozone and carbon monoxide, are to be adjusted to a reference temperature of 293 Kelvin and a reference pressure of 101.325 kilopascal.

[ii] Respirable suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 10 μm or less.

[iii] Fine suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 2.5 μm or less.

3.2.2 Criteria and guidelines in Annex 4 and Annex 12 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) will be followed for evaluating air quality impacts. Annex 4 stipulates criteria for evaluating air quality impacts. This

includes compliance of the Air Quality Objectives (AQOs) and other standards established under the Air Pollution Control Ordinance, as well as meeting the hourly Total Suspended Particulate concentration of 500 μg/m^3 and the 5-second average odour concentration of 5 odour units (ou). Annex 12 provides guidelines for conducting air quality assessments under the EIA process, including determination of air sensitive receivers, assessment methodology and impact prediction and assessment.

3.2.3 For construction dust, Annex 4 of EIAO-TM specifies a TSP limit concentration averaged over a 1-hour period to be 500 μg/m^3. Mitigation measures for construction sites have been specified in the Air Pollution Control (Construction Dust) Regulation. It also requires Contractors and site agents to inform EPD and adopt dust reduction measures while carrying out "Notifiable Works" or "Regulatory Works" as defined under the regulation. Works relevant to this Project include both "Notifiable Works" (road construction) and "Regulatory Works" (dusty materials handling, excavation).

3.2.4 The Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation covers non-road mobile machinery (NRMMs) include a wide range of mobile machines (including transportable industrial equipment), or vehicles powered by internal combustion engines used primarily off-road. All regulated machines sold or leased for use in Hong Kong, except those exempted, are required to comply with the prescribed emission standards. Starting from 1 December 2015, only approved or exempted NRMMs with a proper label are allowed to be used in specified activities and locations including construction sites, container terminals and back up facilities, restricted areas of the airport, designated waste disposal facilities and specified processes.

3.3 Description of Environment

3.3.1 The bridge is located in a rural area to the south of Silver Mine Bay Beach and to the north of Mui Wo, Lantau. The bridge runs over Wang Tong River from north to south. To the west of the bridge is a woodland and the beach is located to the east. The immediate neighbour to the south is Silvermine Beach Resort and a village house with store to the north. Chung Hau and Wang Tong are the nearby villages. Its openness to Silver Mine Bay and the absence of industrial activities ensure good air quality in the Study Area.

3.3.2 The nearest EPD's air quality monitoring (AQM) station is located at Tung Chung. However, air quality data from this station is considered inappropriate as the station is located next to the Hong Kong International Airport. Air quality data collected from the Tap Mun AQM station is more appropriate than data collected from Tung Chung AQM station, because both Tap Mun and the Project Site are considered as rural area. Therefore, data of Tap Mun AQM station are used to describe the existing air quality in the Study Area. The 1-hour, 8-hour, 24-hour and/or annual average concentrations of pollutants in the latest 5 years are presented in **Table 3.2**.

Table 3.2: Annual Average Concentration of Pollutants from Year 2011 to 2015 at EPD's Air Quality Monitoring Station (Tap Mun)

Pollutant	Averaging Time	Concentration (μg/m^3)							No. of Exceedance Allowed
		Year 2011	Year 2012	Year 2013	Year 2014	Year 2015	5-year average	AQO	
RSP	Annual	47	38	49	44	35	**42.6**	**50**	-
	24-hour (10th High)	95	87	119	102	86	**97.8**	**100**	9
FSP	Annual	31	25	30	27	24	**27.4**	**35**	-
	24-hour (10th High)	66	58	84	65	66	**67.8**	**75**	9
SO_2	Annual	10	11	13	9	7	**10**	**N/A**	-
	24-hour (4th High)	32	21	29	24	14	**24**	**125**	3
	10-minute (4th High)*	-	-	-	46	50	**48**	**500**	3
NO_2	Annual	12	11	11	10	10	**10.8**	**40**	-
	1-hour (19th High)	58	56	79	61	51	**61**	**200**	18
O_3	Annual	71	71	75	72	73	**72.4**	**N/A**	-
	8-hour (10th High)	188	189	180	181	182	**184**	**160**	9
CO	Annual	752	697	664	589	657	**672**	**N/A**	-
	1-hour (1st High)	1,490	1,680	1,530	1,370	2,140	**1,642**	**30,000**	0
	8-hour (1st High)	1,459	1,608	1,441	1,329	1,351	**1,438**	**10,000**	0

Reference: http://epic.epd.gov.hk/EPICDI/air/station/?lang=en

http://www.aqhi.gov.hk/en/sub-download/sub-air-quality-reportse469.html?showall=&start=1

Exceeded values are underlined.

* AQO averaging time 10-minute data is not available in Years 2011 – 2013.

3.3.3 The 5-year average for all parameters complied with the respective AQO requirements except ozone (O_3). Ozone is a product of photochemical reactions of NOx and volatile organic compounds (VOCs) instead of being emitted directly from human activities. In the presence of NO_x (a common roadside pollutant), ozone will be broken down into oxygen. Since NO_x concentration in rural areas is low, ozone scavenging effect is small and results in generally high level.

3.3.4 Reference was also made from PATH data for the grid [22,28] that covers the area surrounding Wang Tong River Bridge (see **Table 3.3** below) to give an indication on the predicted air quality at the subject area. The predicted air pollutant levels are comparable to the monitoring results in **Table 3.2** except RSP and NO_2. The RSP level as shown in the PATH model is less than the recorded level in Tap Mun AQM station, whereas the NO_2 level shown in the PATH model is higher. Both predicted RSP and NO_2 values are well below AQO.

Table 3.3: Annual Average Concentration of Pollutants from Year 2016 to 2020 at Grid [22,28] from PATH model

Pollutant	Averaging Time	Concentration ($\mu g/m^3$)							No. of Exceedance Allowed
		Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	5-year average	AQO	
RSP	Annual	40	40	40	39	39	**40**	**50**	-
	24-hour (10^{th} High)	88	88	88	88	87	**88**	**100**	9
FSP*	Annual	28	28	28	28	28	**28**	**35**	-
	24-hour (10^{th} High)	66	66	66	66	65	**66**	**75**	9
SO_2	Annual	10	9	9	9	8	**9**	**N/A**	-
	24-hour (4^{th} High)	29	28	28	28	27	**28**	**125**	3
	10-minute (4^{th} High)**	114	114	114	114	113	**114**	**500**	3
NO_2	Annual	19	19	18	17	16	**18**	**40**	-
	1-hour (19^{th} High)	100	96	93	90	86	**93**	**200**	18
O_3	Annual	65	66	67	68	68	**67**	**N/A**	-
	8-hour (10^{th} High)	166	164	162	162	160	**163**	**160**	9
CO	Annual	224	222	219	217	214	**219**	**N/A**	-
	1-hour (1^{st} High)	997	995	994	993	992	**994**	**30,000**	0
	8-hour (1^{st} High)	829	820	817	816	814	**819**	**10,000**	0

Exceeded values are underlined.

* FSP was calculated based on RSP.

** 10 min (4^{th} High) SO_2 was calculated based on the 1 hour average SO_2 and stability class.

3.4 Air Sensitive Receivers

3.4.1 In accordance with Annex 12 of the EIAO-TM, any domestic premises, hotel, hostel, hospital, clinic, nursery, temporary housing accommodation, school, educational institution, office, factory, shop, shopping centre, place of public worship, library, court of law, sports stadium or performing arts centre are considered as air sensitive receivers (ASRs). Any other premises or places which, in terms of duration or number of people affected, with a similar sensitivity to the air pollutants as the aforementioned premises and places are also considered to be a sensitive receiver.

3.4.2 The Study Area for air quality impact assessment is defined by a distance of 500 meters from the boundary of the Project site, with consideration for extension to include major existing, planned and committed air pollutant emission sources identified to have a bearing on the environmental acceptability of the Project. A list of the identified ASR is tabulated in **Table 3.4**. Locations of the representative ASRs and the assessment points are shown in **Figure 3.1**.

Table 3.4: Representative Air Sensitive Receivers

ASR	Description	Land Use	Ground mPD	Shortest Horizontal Distance between ASR and the Boundary of the Project (m)	No. of Storey
ASR1	Silvermine Beach Resort	Hotel	4.2	5.5	3
ASR2	1 Tung Wan Tau Road	Village	3.7	5.5	2

3.5 Identification of Representative Air Pollutants

3.5.1 Air Pollutant Control Ordinance (APCO) (Cap 311) and EIAO-TM stipulate statutory Air Quality Objective (AQO) for 7 criteria air pollutants including NO_2, SO_2, FSP, RSP, CO, O_3 and lead.

Construction Phase

3.5.2 This Project involves demolition of an old bridge and construction of two new bridges. Works are planned to commence in July 2017 for completion by June 2019. Major potential air quality impacts during construction phase of the Project would be dust impact arising from:

- Materials handling;
- Dredging and disposal of excavated/dredged materials;
- Backfilling;
- Demolition;
- Bridge construction; &
- Wind erosion of open sites and stockpiling areas.

3.5.3 During the construction phase, dust would be generated inevitably from a number of construction activities such as excavation, backfilling, demolition and construction works. Since construction dust (i.e. TSP, RSP and FSP) will be generated by fore-mentioned works, TSP, RSP and FSP are considered as major air pollutants in construction phase. Unacceptable impacts from other criteria pollutants, i.e. NOx, SO_2, and CO, etc. are unlikely to occur as the number of diesel or petroleum fuelled machinery in the site shall be limited.

Operational Phase

3.5.4 Since proposed bridges are designed for pedestrians and cyclists instead of motorized vehicle, no traffic emission is expected during operation. Therefore, no air pollutants listed under the AQO shall be generated during the operational phase of the Project.

3.6 Assessment Methodology

3.6.1 This air quality impact assessment has included all proposed works and associated works mentioned in **Section 2.1.4**.

Construction Phase

3.6.2 Dust generation is the major air quality impact arising from the Project. Nevertheless, with proper implementation of mitigation measures, dust impact arising from the Project is considered insignificant due to the following:

- construction works will be confined in a small area;
- a slow work programme which avoid overlapping dust generating activities; &
- only 1-2 truck-trips per day would be sufficient for such small scale work and slow work programme (about 0.7m^3 daily C&D material production)

3.6.3 While the Project boundary covered 2,954m^2, the construction work will be carried out within hoarding area (totalled 1,178m^2) and at the proposed bridges, taking up around half of the project area in total (around 1,500m^2). It should be emphasized that construction of cycle/pedestrian bridges and demolition of Old Bridge will be carried out in different phases. The coverage of the hoardings in each phase is shown in **Figure 3.2**. Referring to **Appendix 2A**, dust emitting activities from these works (such as mini-piling, sheet piling, excavation, concreting) will not be conducted concurrently. Therefore, limited number of plant equipment will be operated at one time. Also, less heavy construction method (minipiling instead of bored piling) has been proposed so that smaller PME will be adopted.

3.6.4 With slow work programme, the quantity of construction waste generated daily will be small such that 1-2 truck-trips will be sufficient to remove the waste from the Site. Without frequent material handling and truck movement, dust emission is expected to be small. Since the impact is expected to be insignificant, the impact will not be assessed quantitatively.

Concurrent Projects

3.6.5 As mentioned in **Section 2.8.8**, no project that involves heavy construction or dust emitting activity is known to be carried out concurrently with the construction work of this Project. Therefore, no cumulative air quality impact is expected.

Operation Phase

3.6.6 Since proposed bridges are designed for pedestrians and cyclists instead of motorized vehicle, no traffic emission is expected during operation and thus no operational air quality impact is anticipated.

3.7 Evaluation of Environmental Impacts

3.7.1 The construction of the Project would commence in July 2017 for completion in June 2019. According to the current construction programme, no cumulative dust impact with concurrent project is anticipated. Given the small scale of the Project (works area confined in around 1,500 m^2), the amount of dust generated would not be significant. In addition, appropriate dust suppression measures as stipulated in "*The Air Pollution Control (Construction Dust) Regulation"* shall be implemented to minimize the impact. Details of mitigation measures recommended are summarized in **Section 3.8** below.

3.8 Mitigation of Adverse Environmental Impacts

Mitigation of Potential Construction Dust Impact

3.8.1 Due to the scale of works of the Project, construction works are unlikely to cause unacceptable dust impact on surrounding sensitive receivers if standard control measures are implemented. Dust control measures as part of good construction practice should be implemented to minimize dust nuisance within acceptable level.

3.8.2 Dust impact could be effectively mitigated by inclusion of clauses for dust minimisation in the works contract. These dust minimisation clauses should be based on the Air Pollution Control (Construction Dust) Regulation, including but not limited to the followings:

- All stockpile of dusty materials shall be either entirely covered by impervious sheeting or stored in a three-side and top enclosed area. Alternatively, it should be sprayed with water or a dust suppression chemical to maintain the entire surface wet;
- All dusty materials shall be sprayed with water or a dust suppression chemical immediately prior to any loading, unloading or transfer operation to maintain dusty materials wet;
- Similar to storage of dusty materials, debris shall be either entirely covered by impervious sheeting or stored in a three-side and top enclosed area.
- Using water spray to wet the remaining dusty materials on the floor after removing stockpile. The surface of roads or streets shall be free from dust;

- Water or a dust suppression chemical shall be continuously sprayed on the surface where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation is carried out, unless the process is accompanied by the operation of an effective dust extraction and filtering device;
- Dust suppression shall be applied to the working area immediately before, during and immediately after excavation or earth moving operation to keep the surface wet.
- Dust suppression shall be applied to the working area immediately before, during and immediately after site clearance (e.g. removal of trees, vegetation and structures) to keep the surface wet.
- All demolished items (e.g. trees, vegetation, structures, debris and rubbish) that may dislodge dust particles shall be covered entirely by impervious sheeting or placed in a three-side and top enclosed area within a day of demolition.
- Every stock of more than 20 bags of cement or dry pulverized fuel ash shall be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;
- Cement bag shall be debagged, batched and mixed in a three-side and top enclosed area;
- Hoarding of at least 2.4m in height shall be erected along the construction site boundary adjoining the street except the site entrance;
- Exposed earth shall be properly treated within 6 months from completion of construction activities, e.g. by compacting, turfing, hydroseeding, vegetation planting or paving.

3.8.3 Due to small work site, localized work and slow work programme to reduce concurrent dust emitting activities, the proposed dust suppression measures and good site practices are considered sufficient to minimize dust impact on nearby ASRs. The mitigated TSP levels during construction phase should comply with the EIAO-TM guideline limit for all air sensitive receivers.

3.8.4 A control programme can be instigated to monitor the construction process in order to enforce dust controls and modify methods of works to reduce the dust emission down to acceptable levels.

3.9 Environmental Monitoring and Audit Requirements

3.9.1 With the implementation of good site practices and proposed dust suppression measures as mentioned in **Section 3.8**, no unacceptable air quality impact in construction phase is expected. Nevertheless, dust monitoring and audit programme will be required in construction phase to ensure that air quality impact is within acceptable level.

3.9.2 Since no air quality impact is expected in operational phase, no air quality monitoring is required in operational phase.

3.9.3 General EM&A requirements are presented in **Chapter 9**, while details of EM&A requirements such as monitoring locations, frequency of baseline and impact monitoring are presented in a separate EM&A manual.

3.10 Conclusion

3.10.1 Potential air quality impacts from the construction works of the Project would mainly be related to construction dust from site clearance, excavation, foundation and site formation works. With proper implementation of the recommended mitigation measures, it is anticipated that the project will not give rise to significant construction dust impacts likely to exceed the recommended limits in the TM at all ASRs. Adverse construction dust impact would not be anticipated.

4. NOISE IMPACT

4.1 Introduction

4.1.1 This Chapter presents an assessment of the potential noise impact arising from the construction and operation of the Project. Mitigation measures have been proposed to alleviate the impact and their effectiveness has been evaluated.

4.2 Environmental Legislation, Standards and Guidelines

Construction Noise

4.2.1 This assessment is carried out according to criteria stipulated in Annexes 5 and 13 of Technical Memorandum on Environmental Impact Assessment Process (EIAO TM) for evaluating noise impacts.

4.2.2 The Noise Control Ordinance (NCO) (Cap. 400) provides the statutory framework for noise control in Hong Kong. Assessment procedures and standards are set out in the respective Technical Memoranda (TM) promulgated under the NCO. The following TMs are applicable to the assessment and control of construction noise.

- TM on Noise from Construction Work other than Percussive Piling (TM-GW);
- TM on Noise from Percussive Piling (TM-PP); and
- TM on Noise on Construction Work in Designated Areas (TM-DA)

4.2.3 Both percussive piling and construction work under restricted hours require a construction noise permit (CNP) in order to carry out such work. As the issuance of a CNP by the Noise Control Authority would depend on the compliance of percussive piling noise impact or construction noise impact with the limits set out within the TM-PP and TM-GW/TM-DA, the assessment of this type of noise would not be covered in the EIA report.

4.2.4 For construction, there is no statutory limit on daytime construction noise under the NCO and related TMs. Nevertheless, the EIAO-TM stipulates noise standards for daytime construction activities, as shown **Table 4.1**.

Table 4.1: Construction Noise Standards During Non-Restricted Hours

Uses	Noise Standards [1] , $L_{eq\ (30\ mins)}$ dB(A)	
	0700 to 1900 hours on any day not being a Sunday or general holiday	**1900 to 0700 hours or any time on Sundays or general holiday**
All domestic premises including temporary housing accommodation	75	(See Note 2)
Hotels and hostels	75	
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	70/ 65 (During examinations)	

Notes:

[1] The above standards apply to uses that rely on opened windows for ventilation.

[2] The criteria laid down in the relevant technical memoranda under the NCO for designated areas and construction works other than percussive piling may be used for planning purpose. A Construction Noise Permit (CNP) shall be required for the carrying out construction work during the period.

Construction Noise during Restricted Hours

4.2.5 The NCO provides statutory control on general construction works (excluding percussive piling) conducted during restricted hours (ie 1900 to 0700 hours (of the next day) from Monday to Saturday and at any time on Sundays or public holidays). A Construction Noise Permit (CNP) is required for carrying out of any general construction activities involving the use of any Powered Mechanical Equipment (PME) within restricted hours from the Authority under the NCO. The noise criteria and the assessment procedures for issuing a CNP are specified in the GW-TM under the NCO.

4.2.6 The use of Specified PME (SPME) and/or the undertaking of Prescribed Construction Work (PCW) within a Designated Area (DA) under the NCO during the restricted hours are controlled by the TM-DA. The relevant technical details in Technical Memorandum on Noise from Construction Work in Designated Areas (TM-DA) under NCO can be referred. The acceptable noise levels for construction during the restricted hours are summarized in **Table 4.2** below.

Table 4.2: Construction Noise Standards during Restricted Hours

Uses	Acceptable Noise Level for Area Sensitive Ratings, dB(A)		
	A	B	C
All weekdays during the evening (1900 to 2300 hours), and general holidays (including Sundays) during the day and evening (0700 to 2300 hours)	60	65	70
All days during the night-time (2300 to 0700 hours)	45	50	55

4.2.7 The Area Sensitive Rating depends on the type of area and the degree of impact that Influencing Factors (Ifs) have on the NSR and is determined from **Table 4.3** below. Industrial area, major road or the area within the boundary of Hong Kong International Airport shall be considered to be an IF.

Table 4.3: Area Sensitivity Ratings (ASRs)

Type of Area containing NSR	Degree to which NSR is affected by IF		
	Not Affected	Indirectly Affected	Directly Affected
(i) Rural area, including country parks or village type developments	A	B	B
(ii) Low density residential area consisting of low-rise or isolated high-rise developments	A	B	C
(iii) Urban area	B	C	C
(iv) Area other than those above	B	B	C

4.2.8 According to the preliminary construction programme, it is very likely that the proposed construction works would be carried out during non-restricted hours only. For carrying out any general construction activity involving the use of any Powered Mechanical Equipment (PME) within restricted hours, a Construction Noise Permit (CNP) is required from the authority under the NCO. The noise criteria and the assessment procedures for issuing the CNP are specified in the GW-TM under the NCO. There is no guarantee that a CNP will be issued for the project construction. The Noise Control Authority will consider a well justified CNP application, once filed, for construction work within restricted hours as guided by the relevant TMs issued under the NCO. It is the Contractor's responsibility to ensure compliance with the NCO and the relevant TMs in case of any construction activities during restricted hours.

4.2.9 Noise Control Ordinance (NCO) and *Technical Memorandum on Environmental Impact Assessment Process* have been followed for assessing the noise from powered mechanical equipment (PME) for different sensitive use.

Operational Noise

4.2.10 Since no fixed plant will be installed on the New Bridge which is for pedestrian and bicycle uses only, no operational noise is anticipated.

4.3 Description of Environment

4.3.1 The bridge is located in a rural area to the south of Silver Mine Bay Beach and to the north of Mui Wo, Lantau. The bridge runs over Wang Tong River from north to south. To the west of the bridge is a woodland and a beach is located to the east. The immediate neighbour to the south is Silvermine Beach Resort and a village house with store to the north. Chung Hau and Wang Tong are the nearby villages.

4.4 Identification of Potential Noise Impact

4.4.1 During the construction phase, use of powered mechanical equipment (PME) will inevitably generate construction noise and hence may cause noise nuisance to nearby residences. During operational phase, since no fixed plant will be installed and operated, no noise impact is anticipated.

4.5 Noise Sensitive Receivers

4.5.1 The Study Area covers 300m from the Project site. Given the proximity of the existing Wang Tong Bridge, noise sensitive receivers as defined in Annex 13 of EIAO-TM in the village are likely to be affected by the Project during its construction. Site visits have been carried out as part of the EIA to identify the NSR and representative worst impact point of the identified NSR. The location of the representative NSR is depicted in **Figure 4-1** and listed in **Table 4.4** below. Photographic record can be found in **Appendix 4I**.

Table 4.4: Representative Noise Sensitive Receiver

NSR	Description	Land Use	Ground mPD	Shortest Horizontal Distance between NSR (m)	No. of Storey
NSR1	1 Tung Wan Tau Road	Village	3.7	5.5	2

4.5.2 Silvermine Beach Resort uses central air-conditioning system for ventilation. Since it does not rely on opened window for ventilation, it is not considered as a noise sensitive receiver.

4.5.3 No planned or committed NSR is identified near the proposed New Bridge based on the best available information from Town Planning Board website (no Outline Zoning Plan (OZP), Development Permission Area Plans, Outline Development Plan, Layout Plan and any approved rezoning requests or section 16 applications for noise sensitive developments).

4.6 Assessment Methodology

Construction Schedule and Activities

4.6.1 The cycle bridge will be constructed first next to the Old Bridge. Then, the Old Bridge will be demolished. Finally, the pedestrian bridge will be constructed at the same location of the Old Bridge.

4.6.2 Phasing of the construction works has been identified. Works are categorized by construction methods. Both unmitigated and mitigated scenarios have been assessed for noise impact at the identified NSR.

Inventory of Noise Sources

4.6.3 Detailed construction method, sequence of work and the plant inventory in different work stages are proposed. Until a contractor is appointed, full details of the type and utilisation of construction plants will not be known exactly. Typical types and number of powered mechanical equipment (PME) needed for various construction activities for the construction of the Project have been assigned as shown in **Appendix 4A**. PME that will likely be used concurrently have been grouped within the same works stage.

4.6.4 Plant inventory and construction programme for the Project as in **Appendices 4A** and **4B** respectively for various construction activities were developed by the Project Engineer. It should be noted that not every PME will operate all the time when they are on site. Therefore a typical % on time is assumed for each PME based on experience in actual site practice, so that the noise prediction would be realistic. Consequently, the effective sound power levels for each construction activity can be quantified and listed in **Appendices 4A** and **4B**.

4.7 Evaluation of Environmental Impacts

Prediction of Construction Noise Impact

4.7.1 The impact of construction noise on the identified NSR has been assessed in accordance with the procedures laid down in *Technical Memorandum on Noise from Construction Work Other Than Percussive Piling*.

4.7.2 The Unmitigated Powered Mechanical Equipment (PMEs) and its Sound Power Level (SWL), Detailed Calculation and Summary of the Construction Noise of the Project are provided in **Appendices 4A** – **4D**. The location of NSR and notional noise sources of the Project can be found in **Figure 4.1**.

4.7.3 The unmitigated construction noise impact on the selected NSR is shown in **Table 4.5**. The unmitigated construction noise levels at NSR exceeds the noise criteria by 9 dB(A).

Table 4.5: Unmitigated Construction Noise Impact, dB(A)

NSR	Land Use	Predicted Maximum Noise Level from the Project, dB(A)	Noise Criteria, dB(A)	Exceedance, dB(A)
NSR1	Village	**84**	75	9

Bolded figures mean exceedance of relevant noise criteria

4.7.4 Based on the effective sound power level of the PMEs and the distance of works site to the noise sensitive receivers, unmitigated construction noise level for some work stages are likely to exceed the 75dB(A) guideline level for the non-restricted hours.

Cumulative Impact

4.7.5 According to **Section 2.8**, although there are one planned and one ongoing projects within the Study Area, no project that involves heavy construction activity is known to be carried out concurrently with the construction work of this Project. Therefore, no cumulative impact is expected.

4.7.6 Construction noise disturbance is temporary and the New Bridge will not cause operational noise impact. As there is no change of land use at the Site (bridge), no noise constraint will be incurred due to this Project.

4.8 Evaluation and Recommendation of Mitigation Measures for Noise

4.8.1 Mitigation at source or path should be the most effective way to reduce the impact. There are 3 ways in doing that viz: -

- by use of quiet plants and working methods to mitigate at source;
- by use of mobile noise barriers along the path of noise propagation;
- by good site practice to limit noise emissions at source;

4.8.2 Silenced plants or quality powered mechanical equipment (QPME) are quieter than those noise levels given in TM-GW for the equivalent type of equipment. These silenced equipment are known to be available in Hong Kong and should be adopted as far as possible.

4.8.3 Mobile noise barriers can effectively screen noise from reaching sensitive receivers, particularly for the low-rise houses in this case. 3m high mobile barriers with skid footing and a small cantilevered upper portion can be located within a few metres from stationary plants and about 5m from mobile plants such as hydraulic breaker. Since all PME involved in this Project are either slow moving or stationary during operation, frequent adjustment on the position of mobile barriers will not be required.

4.8.4 Good site practice and noise management can significantly reduce the construction noise impact on nearby NSR. Although the reduction in noise level is not readily predictable and quantified, the following measures should be useful during each phase of construction:

- Machines that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;
- Silencer and mufflers on construction equipment should be utilised and should be properly maintained during the construction programme;
- Noisy activities can be scheduled to minimise exposure of nearby NSR to high levels of construction noise. For example, noisy activities can be scheduled in midday;
- For the demolition of the existing bridge, hand-held breaker may be used to break the hard concrete layer. Manual equipment should be used as far as practicable to avoid using PME. If found necessary, the percentage on time should be limited as possible to avoid unnecessary disturbance;
- Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSR;
- Mobile plant should be sited as far away from NSR as possible; and
- Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

4.8.5 "Recommended Pollution Control Clauses for Construction Contracts" is available on EPD website. It contains recommended noise pollution control measures to be implemented by the contractor during construction.

4.8.6 With the use of quality PMEs and movable noise barriers, the predicted construction noise level at the representative NSR is shown in **Table 4.6** below. The mitigated powered mechanical equipment (PMEs) and its sound power level (SWL), detailed calculation and summary of the construction noise level of the Project are provided in **Appendices 4E** – **4H**. Results indicated that predicted construction noise levels at all NSR are complied with the recommended noise criteria in EIAO-TM.

Table 4.6: Mitigated Construction Noise Impact, dB(A)

NSR	Land Use	Predicted Maximum Noise Level from the Project, dB(A)	Noise Criteria, dB(A)	Exceedance, dB(A)
NSR1	Village	72	75	-

Bolded figures mean exceedance of relevant noise criteria

4.9 Evaluation of Residual Impacts

4.9.1 All practical and feasible mitigation measures have been proposed, such as adopting QPME, movable noise barriers and temporary noise barriers. According to **Table 4.6**, there is no exceedance of the mitigated construction noise of the Project on the NSR. No residual impact was anticipated during construction phase.

4.9.2 As there is no fixed plant operated, no unacceptable operational noise impact is anticipated.

4.10 Environmental Monitoring and Audit Requirements

4.10.1 With implementation of mitigation measures such as adoption of good site practice, use of quieter PMEs and mobile noise barrier, no unacceptable construction noise impact is anticipated. Regular noise monitoring will be proposed at representative NSR to ensure that relevant noise standard can be met. Details of monitoring requirements such as monitoring locations, frequency of baseline and impact monitoring shall be prepared in the form of EM&A manual as part of the EIA submission.

4.10.2 A hotline is proposed to set-up by the contractor(s) to service complaint from the NSR in the vicinity about the adverse construction noise produced from the Project.

4.10.3 As there is no fixed plant provided for the Project, no unacceptable operational noise impact is expected. Operational noise monitoring is considered unnecessary.

4.10.4 General EM&A requirements were presented in **Chapter 9**.

4.11 Conclusion

4.11.1 Typical types and number of powered mechanical equipment (PME) needed for various construction activities for the construction of bridges have been assessed. Based on the effective sound power level of the PMEs and the distance of work site to the noise sensitive receiver, unmitigated construction noise level would exceed the 75dB(A) guideline level for the non-restricted hours for the NSR. At source mitigation measures have been proposed including the use of quality plants, use of mobile noise barriers, and good site practice for implementation. With the proposed mitigation measures, construction noise impact on the representative noise sensitive receiver are predicted to comply with the criteria in “Construction Noise Standards During Non-Restricted Hours” stipulated in EIAO-TM.

4.11.2 With all the proposed mitigation measures, no residual construction noise impacts are anticipated. Moreover, regular noise monitoring should be carried out and a hotline to service any complaint should be set up in construction phase.

4.11.3 As no fixed plant will be installed and operated in operational phase, no unacceptable operational noise impact is anticipated.

5. WATER QUALITY IMPACT

5.1 Introduction

5.1.1 This Chapter presents an assessment of the potential water quality impact arising from the construction and operation of the Project. Mitigation measures have been identified to alleviate the impact and their effectiveness has been evaluated.

5.2 Environmental Legislation, Standards and Guidelines

Technical Memorandum on Environmental Impact Assessment Process:

5.2.1 This assessment is carried out according to criteria stipulated in Annexes 6 and 14 of Technical Memorandum on Environmental Impact Assessment Process (EIAO TM) for evaluating water quality impact.

Water Pollution Control Ordinance (Cap. 358):

5.2.2 The Water Pollution Control Ordinance (Cap. 358) is the major legislation relating to the protection and control of water quality in Hong Kong. According to the Ordinance and its subsidiary legislation, Hong Kong waters are divided into ten water control zones (WCZ). Corresponding statements of Water Quality Objectives (WQO) are stipulated for different water regimes (marine waters, inland waters, bathing beaches subzones, secondary contact recreation subzones and fish culture subzones) in each of the WCZ based on their beneficial uses. The assessment area in this Project covers the Southern WCZ. The corresponding WQOs are listed in **Table 5.1**.

Table 5.1: Summary of Water Quality Objectives for Southern WCZ

Parameter	Water Quality Objective	Sub-Zone
Aesthetic Appearance	✓ There should be no objectionable odours or discolouration of the water. ✓ Tarry residues, floating wood, articles made of glass, plastic, rubber or of any other substances should be absent. ✓ Mineral oil should not be visible on the surface. ✓ Surfactants should not give rise to a lasting foam. ✓ There should be no recognisable sewage-derived debris. ✓ Floating, submerged and semi-submerged objects of a size likely to interfere with the free movement of vessels, or cause damage to vessels, should be absent. ✓ The waters should not contain substances which settle to form objectionable deposits.	Whole zone

Parameter	Water Quality Objective	Sub-Zone
Bacteria	✓ Annual geometric mean level of *Escherichia coli* not to exceed 610 cfu/100mL for secondary contact recreation subzones and fish culture zones. ✓ Geometric mean level of *E. coli* of all samples collected from March to October exclusive not to exceed 180 per 100mL for bathing beaches.	✓ Secondary Contact Recreation Subzones & Fish Culture Zones ✓ Bathing Beach Subzones
Dissolved Oxygen (DO)	✓ Bottom dissolved oxygen not less than 2 mg/L for 90% of samples; ✓ Depth-averaged dissolved oxygen not less than 4 mg/L for 90% of samples.	Whole zone
pH	In the range 6.5 - 8.5, change due to waste discharge not to exceed 0.2.	Whole zone
Temperature	Change due to waste discharge not to exceed 2 ℃.	Whole zone
Salinity	Change due to waste discharge not to exceed 10% of natural ambient level.	Whole zone
Suspended solids (SS)	Waste discharge not to raise the natural ambient level by 30% nor cause the accumulation of suspended solids which may adversely affect aquatic communities.	Marine waters of the whole zone
Ammonia	Annual mean of un-ionized ammonia nitrogen not to exceed 0.021 mg/L, calculated as the arithmetic mean.	Whole zone
Nutrients	Annual mean depth-averaged total inorganic nitrogen (TIN) not to exceed 0.1mg/L.	Whole zone
Toxins	Not to be present at levels producing significant toxic effect.	Whole zone

Source: Statement of Water Quality Objectives (Southern Water Control Zone)

Practice Notes

5.2.3 A practice note (PN) for professional persons was issued by the EPD to provide environmental guidelines for the handling and disposal of construction site discharges. The Practice Note (PN) for Professional Persons on "Construction Site Drainage" (ProPECC PN 1/94) issued by EPD provides good practice guidelines for dealing with ten types of discharge from a construction site. These include surface runoff, groundwater, boring and drilling water, bentonite slurry, water for testing and sterilisation of water retaining structures and water pipes, wastewater from building constructions, acid cleaning, etching and pickling wastewater, and waste water from site facilities. Practices outlined in the ProPECC PN 1/94 should be followed as far as possible during construction to minimize the water quality impact due to construction site drainage.

5.2.4 Assessment criteria for Corals is also covered in this EIA. According to the study by Pastororok & Bilyard [1] and Hawker & Connel [2] on coral reef, the sedimentation rate

1 Pastorok, R.A. and Bilyard, G.R. (1985). "Effects of sewage pollution on coral-reef communities." Marine Ecology Progress Series 21: 175-189.

should be less than 0.1kg/m^2/day for avoiding unacceptable impact to coral. The WQO for SS (less than 30% of ambient baseline condition) is also valid to corals.

5.3 Description of the Environment

5.3.1 The project site is located within Southern Water Quality Control Zone (WCZ). The water quality in this WCZ was rated as "good" in 2013 for its high dissolved oxygen, low nutrients (total inorganic nitrogen) and *E. coli* levels [3]. The compliance rate of water quality objectives was reduced in 2012 due to exceedance in total inorganic nitrogen [4]. This was probably caused by higher background TIN level under the influence of Pearl River discharge [4]. The nearest water quality monitoring station maintained by EPD is SM11. It is located between Hei Ling Chau and Silver Mine Bay, about 3 km from Mui Wo. The latest 5 years water qualities at SM11 are summarized in the **Table 5.2**.

Table 5.2: Water Quality Monitoring Results at SM11 from 2009 to 2013

Parameters	2009	2010	2011	2012	2013	Mean
pH	8.1	7.9	7.9	7.9	8	8.0
	(7.9 - 8.4)	(7.7 - 8.3)	(7.6 - 8.4)	(7.6 - 8.2)	(7.7 - 8.4)	-
Salinity (psu)	30.6	30	31	29.3	29.6	30.1
	(26.0 - 33.3)	(24.7 - 33.1)	(26.5 - 32.9)	(23 - 32.6)	(23.9 - 33.4)	-
Turbidity (NTU)	6.9	5.1	5.7	5.6	3.8	5.42
	(1.6 - 13.1)	(2.1 - 11.2)	(2.1 - 11.7)	(1.1 - 12.3)	(1.1 - 8.1)	-
Temperature (℃)	24.3	23.8	23.3	23.9	23.9	23.8
	(16.6 - 28.9)	(16.9 - 28.6)	(16.5 - 29.3)	(16.4 - 29.8)	(18.1 - 28.6)	-
Suspended Solids	7.3	6.2	7.9	6.3	4.9	6.5
(mg/L)	(2.0 - 15.7)	(2 - 12.3)	(3.3 - 15.3)	(2.2 - 11.7)	(0.8 - 12)	-
DO (mg/L)	6.3	6.9	6.8	8.2	7.1	7.1
Depth Average	(5.0 - 7.8)	(3.4 - 9.2)	(3.1 - 9.1)	(6.4 - 11.6)	(5.2 - 9.4)	-
DO (mg/L)	6	5.9	6.5	7.8	6.5	6.5
Bottom	(4.5 - 7.8)	(0.5 – 7.9)	(3.2 – 9.2)	(6.3 - 10.1)	(4.2 - 8.0)	-
DO (%saturation)	89	97	94	114	100	99
Depth Average	(69 - 115)	(52 - 138)	(45 - 137)	(91 - 172)	(74 - 136)	-
DO (%saturation)	85	82	90	108	90	91

2 Hawker, D. W. and Connell, D. W. (1992). "Standards and Criteria for Pollution Control in Coral Reef Areas" in Connell, D. W and Hawker, D. W. (eds.), Pollution in Tropical Aquatic Systems, CRC Press, Inc.

3 EPD. 2012. Marine Water Quality in Hong Kong in 2011. [online] http://www.epd.gov.hk/epd/english/environmentinhk/water/marine_quality/files/2011Eng-2.pdf. Accessed: 17 May 2016.

4 EPD. 2013. Marine Water Quality in Hong Kong in 2012. [online] http://wqrc.epd.gov.hk/pdf/water-quality/annual-report/Report2012eng.pdf. Accessed: 17 May 2016.

Parameters	2009	2010	2011	2012	2013	Mean
Bottom	(67 - 116)	(8 - 109)	(46 - 133)	(91 - 145)	(62 - 108)	-
Total Inorganic Nitrogen (mg/L)	0.25	0.321	0.322	0.377	0.326	0.319
	(0.12 - 0.40)	(0.133 - 0.473)	(0.093 - 0.583)	(0.15 - 0.87)	(0.143 - 0.62)	-
Ammonia Nitrogen (mg/L)	0.068	0.086	0.104	0.081	0.064	0.081
	(0.03 - 0.113)	(0.035 - 0.187)	(0.03 - 0.193)	(0.023 - 0.177)	(0.029 - 0.1)	-
Unionised Ammonia (mg/L)	0.004	0.003	0.003	0.002	0.003	0.003
	(0.001 - 0.011)	(0.001 - 0.006)	(0.001 - 0.008)	(0.001 - 0.005)	(0.001 - 0.007)	-
Nitrite Nitrogen (mg/L)	0.033	0.043	0.032	0.045	0.046	0.040
	(0.014 - 0.110)	(0.008 - 0.085)	(0.006 - 0.075)	(0.007 - 0.092)	(0.009 - 0.107)	-
Nitrate Nitrogen (mg/L)	0.15	0.192	0.185	0.251	0.216	0.199
	(0.050 - 0.293)	(0.055 - 0.367)	(0.038 - 0.397)	(0.098 - 0.717)	(0.077 - 0.477)	-
Total Kjeldahl Nitrogen (mg/L)	0.23	0.25	0.246	0.291	0.238	0.251
	(0.17 - 0.35)	(0.19 - 0.347)	(0.103 - 0.313)	(0.213 - 0.38)	(0.15 - 0.343)	-
Total Nitrogen (mg/L)	0.42	0.486	0.464	0.587	0.501	0.492
	(0.25 - 0.57)	(0.25 - 0.733)	(0.163 - 0.723)	(0.367 - 1.057)	(0.237 - 0.917)	-
Orthophosphate Phosphorus (mg/L)	0.013	0.015	0.016	0.016	0.013	0.015
	(0.004 - 0.026)	(0.002 - 0.038)	(0.002 - 0.029)	(0.003 - 0.031)	(0.004 - 0.033)	-
Total Phosphorus (mg/L)	0.04	0.033	0.039	0.034	0.038	0.037
	(0.02 - 0.05)	(0.02 - 0.047)	(0.02 - 0.057)	(0.02 - 0.053)	(0.03 - 0.057)	-
Silica (mg/L)	0.92	0.9	1	1	1.2	1.00
	(0.58 - 1.63)	(0.5 - 1.8)	(0.1 - 2)	(0.1 - 1.4)	(0.4 - 2.2)	-
BOD5 (mg/L)	1.1	1.2	1	0.9	0.9	1.02
	(0.2 - 1.9)	(0.3 - 2.5)	(0.2 - 2.6)	(0.1 - 2.5)	(0.3 - 2.3)	-
Chlorophyll-a (μg/L)	5.9	9.9	5.7	8.8	7.2	7.5
	(1.9 - 16.7)	(1.1 - 33)	(1.6 - 21.7)	(0.7 - 28.3)	(1.3 - 25.7)	-
E. coli (cfu/100mL)	3	2	2	2	2	2.2
	(1 - 18)	(1 - 9)	(1 - 8)	(1 - 13)	(1 - 6)	-
Faecal Coliforms (cfu/100mL)	6	5	3	3	5	4.4
	(1 - 61)	(1 - 38)	(1 - 16)	(1 - 28)	(1 - 22)	-

Silvermine Bay Beach

5.3.2 As Silver Mine Bay Beach is located within the study area in this project, the baseline water quality review also covers the latest 5 years water quality of the beach monitored by EPD, which are shown in **Table 5.3**.

Table 5.3: Beach Water Quality Monitoring Results at Silver Mine Bay Beach from 2009 to 2013

Parameter	2009	2010	2011	2012	2013
pH	8.3	8.4	8.3	8.3	8.27
	(8.0 - 8.8)	(8.0 - 8.9)	(8.0 - 8.6)	(7.8 - 8.8)	(8.01 - 8.62)
Salinity (psu)	26.00	25.2	27.00	24.0	23.4
	(14.6 - 32.6)	(7.6 - 32.6)	(11.6 - 32.0)	(3.8 - 31.7)	(10.3 - 31.1)
Turbidity (NTU)	12.6	11.6	12.3	11.4	7.17
	(4.3 - 60.5)	(3.5 - 56.5)	(3.1 - 49.0)	(3.4 - 31.4)	(1.5 - 25.3)
Temperature (^{o}C)	27.7	27.5	27.2	27.7	27.4
	(19.5 - 34.0)	(18.5 - 32.5)	(16.9 - 33.0)	(16.9 - 33.2)	(19.0 - 33.1)
Dissolved Oxygen	6.7	6.6	6.6	6.8	6.9
	(3.9 -9.5)	(4.4 - 8.7)	(4.5 -8.0)	(4.2 - 9.8)	(5.0 - 8.3)
E.coli (no./100 ml)	45	31	28	38	39

5.3.3 Based on **Table 5.2**, the Geometric mean of *E. coli* at SM11 in the latest five years well complied with the WQO (180 cfu/100ml for bathing beach and 610 cfu/100ml for fish culture zone). It may be partially as a result of the location of the monitoring far away from the shoreline and therefore human impact source. Besides, the *E. coli* in the beach is also well below the criteria indicating the baseline water is generally low with *E. coli*.

5.3.4 For Silver Mine Bay Beach, the annual averaged DO level complies with the WQO (depth-average DO > 4 mg/l). On the other hand, at SM11, the depth averaged DO in 2010 and 2011 have been recorded lower than the WQO requirement even the annual average are in compliance with the WQO. The monitoring results show a wide variation in DO for each year.

5.3.5 For unionized ammonia, which is toxic to fishes, the monitoring results at SM11 are much lower than the WQO (0.021 mg/l).

5.3.6 The indicator of algae bloom, TIN level, has been recorded exceeding WQO (0.1 mg/l) at SM11 for 5 years. A high risk appears in the past few years and the minimum record are higher than WQO for four years.

Wang Tong River

5.3.7 EPD conducts monthly water quality monitoring at five river monitoring stations in Mui Wo, one of which is in the middle reach of Wang Tong River near human settlement (MW5). While the Water Quality Index grading of MW5 was in the range of Good to Excellent, the average *E. coli* levels was 3,900 cfu/100ml in 2013, showing pollution from domestic discharge. The latest 5 years key water quality parameters of MW5 monitored by EPD are shown in **Table 5.4** below.

Table 5.4: Summary of Water Quality Monitoring data for Middle Reach of Wang Tong River (MW5) from 2009 to 2013

Year	Key Water Quality Parameters				
	pH	5-Day BOD (mg/L)	COD (mg/L)	SS (mg/L)	DO (mg/L)
WQO Criteria	**6.0 - 9.0**	**<5**	**<30**	**<25**	**>4**
2009	7.1	2	9	7	7.1
	(6.9 - 7.6)	(<1 - 5)	(4 - 15)	(2 - 20)	(5.4 - 8.4)
2010	7.3	2	9	8	7.2
	(7.0 - 7.8)	(<1 - 5)	(4 - 15)	(2 - 36)	(5.9 - 8.8)
2011	7.3	2	11	7	7
	(7.0 - 8.2)	(<1 - 4)	(6 - 17)	(1 - 14)	(5.3 - 10.5)
2012	7.3	1	8	6	7.4
	(7.0 - 8.1)	(<1 - 5)	(3 - 19)	(2 - 27)	(5.4 - 8.3)
2013	7.2	1	7	4	7.6
	(6.9 - 9.8)	(<1 - 7)	(3 - 16)	(3 - 14)	(6.4 - 9.8)

Notes: 1. Data presented are in annual medians of monthly samples

2. Figures in brackets are annual ranges.

3. Values at or below laboratory reporting limits are presented as laboratory reporting limits

4. Equal values for annual medians (or geometric means) and ranges indicate that all data are the same as or below laboratory reporting limits

5.3.8 The average values of the key water quality parameters in the recent 5 years mostly complied. However, occasional exceedance of suspended solids was recorded in 2010 and 2012. Exceedance of pH and 5-day BOD was recorded in 2013.

5.4 Water Sensitive Receivers

5.4.1 Water sensitive receivers (WSR) likely to be affected by the Project within 500m study boundary were identified from on-site visits and surveys:

- Wang Tong River
- Silver Mine Bay Beach
- Silver Mine Bay
- River Silver
- Secondary contact recreation sub-zones

5.4.2 The locations of these sensitive receivers are shown in **Figure 5.1**.

5.5 Assessment Methodology

5.5.1 The construction sequence and method of the Project were reviewed to identify the potential water quality pollution source. Considering the direction of water flow in the region, the potential dispersion of pollutants was predicted and the degree of impact on the WSRs was evaluated. The bridge design was evaluated to identify any operational water quality impact in terms of hydrology. Mitigation measures were proposed to avoid and minimize the impact to acceptable level where necessary.

5.6 Identification, Prediction and Evaluation of Water Quality Impact

Construction Phase

5.6.1 The water quality in the receiving water bodies may be affected by:

- Construction and Demolition Works
- Surface runoff
- Accidental leakage/spillage
- Sewage from workforce

5.6.2 Given the small project scale, the amount of pollutants generated from above is expected to be limited. With great distance of River Silver from the Site, the suspended solids would have been well dispersed and no water quality impact on River Silver is expected.

Construction and Demolition Works

5.6.3 Excavation/dredging is required for establishing new bridges abutments and column along the high water mark, and demolishing existing bridge column within water. Without proper enclosure, excavated materials or sand may fall into the river and being carried into Silvermine Bay during low tide or being washed upstream of Wang Tong River. This may lead to increase in suspended solid level, turbidity and reduce dissolved oxygen level in water.

5.6.4 Cofferdam is proposed to fully surround the excavation/dredging location at the new and old pier and abutment that falls with high water mark. The cofferdam shall be installed by vibrating action to minimize disturbance to the sandy shore and riverbed. The cofferdam will act as a water-tight container to stop water from entering or leaving the work site. Wastewater shall be pumped out for treatment up to standard stipulated in the wastewater discharge license. The cofferdam can only be removed when the construction work is completed.

5.6.5 Since part of the working area will encroach Wang Tong River for establishing new bridges abutments and demolishing existing bridge column, the hydrodynamic in Wang Tong River might be changed. Nevertheless, the working area will not block the River in both low and high tide, and the working area will only impact on the river for short term (about 9 months for each bridge in construction phase only). Also, excavated area will be

backfilled to original level and thus there will be no alteration of bathymetry.

5.6.6 Similarly, debris generated from construction and demolition of bridges above water may pose risk to water deterioration. Therefore, a solid working platform with toe board would be erected above Wang Tong River underneath the working areas, in order to prevent construction material, waste and/or scraps dropping into the river.

5.6.7 By working within enclosed area and with temporary platform above water, potential of falling of objects into the river can be minimized. The proposed layout of cofferdam is shown in **Figure 2.4**. No unacceptable water quality impact is expected.

Surface Runoff

5.6.8 Exposed soil after earthworks and stockpiling of demolished, excavated and construction materials near waterfront may be blown away by wind or washed into the river under heavy rain. The good site practices in **Section 5.7** below (such as removal of unnecessary materials, provision of storage area away from the shore) shall be implemented to minimize potential surface runoff.

5.6.9 In addition, an impermeable cover (e.g. tarpaulin) shall be erected above the working platform of the bridges to prevent rainwater from falling into the working area. This can minimize surface runoff from the platform.

5.6.10 Also, various construction activities may generate wastewater directly. These include general cleaning and polishing and dust suppression. These types of wastewater would contain high concentration of suspended solids. The wastewater shall be effectively collected by designing drainage system around site boundary for treatment before discharge.

Accidental Leakage/Spillage

5.6.11 Chemicals (such as paint), fuel and lubricating oil for plant equipment may be stored and used onsite. Water deterioration may be resulted from accidental leakage/spillage during the demolition and construction of the bridges directly into the receiving water body or being carried down by construction site runoff. Nevertheless, there should be no immerse need for chemical or oil in this small scale project. The quantity stored or used onsite should be limited to exert a significant water quality impact in case of leakage. Good site practice in **Section 5.7** shall be implemented to minimize the chance of happening.

Sewage from Workforce

5.6.12 Uncontrolled sewage discharge from workers may also pollute the water in the river. Increased nutrient level from contaminated discharges and sewage from workforce could also lead to a number of secondary water quality impacts including localized increase in ammonia and nitrogen concentrations.

5.6.13 There are public toilets that can be used by the workers. Alternatively, portable chemical toilets shall be provided if necessary. It shall be placed away from water and maintained by registered waste collector. No significant water quality impact due to sewage from workforce is expected.

Cumulative Impact

5.6.14 According to **Section 2.8**, although there are one planned and one ongoing projects within the Study Area, no project that involves heavy construction activity is known to be carried out concurrently with the construction work of this Project. Therefore, no cumulative impact is expected.

Operational Phase

5.6.15 Since no new column will be established in the Wang Tong River, the flow of River will not be blocked by the Project. As the Old Pier is not wide, removal of the pier is not expected to bring significant change in hydrodynamics of the river. Besides, as the Project will not generate wastewater, no water quality impact is expected in operational phase.

5.7 Mitigation Measures

Construction Phase

Works in High Water Mark and above Water

5.7.1 Excavation/dredging works shall be carried out inside the watertight cofferdam, which should be formed by installing sheet piles by vibratory action. The cofferdam can only be removed after completion of work. Water removed from the cofferdam should be desilted before discharge back into the sea. Similar mitigation measure has been applied in dredging/excavation and seawall modification for the construction of piers/pier foundations of the railway bridge in Aberdeen Channel[5]. Based on the routine water quality monitoring record, no exceedance in action/limit level was found due to the project.

5.7.2 A solid working platform with toe board would be erected above Wang Tong River underneath the working areas, in order to prevent construction material, waste and/or scraps dropping into the River. In addition, an impermeable cover (e.g. tarpaulin) shall be erected above the working platform of the bridges to prevent rainwater from falling into the working area. This can minimize surface runoff from the platform.

5 Mott MacDonald. 2010. South Island Line (East) Ch. 5 Water Quality. [online] Available at: http://www.epd.gov.hk/eia/register/report/eiareport/eia_1852010/EIA/PDF/Text/Rev%20F_Sec%205.pdf. Last accessed: 17 May 2016.

Good Site Practices

5.7.3 Good practices should be followed as far as possible. The mitigation measures should include, but not limited to, the following measures:

- Perimeter channels and catchpits shall be constructed prior to commencement of site formation works and earthworks;
- Removal facilities (sand traps, silt traps and sediment basins) should be provided to collect the surface run-off from construction sites. Channel or earth bund or sand bag barriers should be provided to direct the stormwater to removal facilities;
- The silt removal facilities, channels and manholes should be maintained regularly;
- Works program should be designed to avoid demolishing the Old Bridge and to minimize the scale of soil/sand excavation during the rainy season (April to September) as far as possible;
- Works program should be well designed to minimize the work areas to minimize the soil exposure and site runoff;
- To avoid the surface runoff from the earthwork, the exposed soil area should be ensured to be installed with surface protection measure such as covering by tarpaulin before arrival of rainstorm;
- Minimize exposed earth after completion of work in a certain area by hydroseeding, vegetating, soil compacting or paving;
- Protect temporary access roads by crushed stone or gravel;
- Prevent rainwater from entering trenches. Excavation of trenches should be dug and backfilled in short sections during rainy seasons. Remove silt in rainwater collected from the trenches or foundation excavations prior to discharge to storm drains.
- Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on sites should be covered with tarpaulin or similar fabric during rainstorm;
- All plant and vehicles should be washed before they leave the site. The wash-water should have sand and silt settled out or removed before discharging into storm drain;
- Any wastewater generated from the construction works should undergo the removal of settleable solids in a silt removal facility;
- Remove waste from the site regularly to prevent waste accumulation and chance of wash-off.
- Provide sufficient chemical toilets with regular maintenance by licensed chemical waste collector where necessary

Prevention of Pollution from Chemicals

- Register as chemical waste producer if chemical waste will be generated.
- Perform maintenance of vehicles and equipment that have oil leakage and spillage potential on hard standings within a bunded area with sumps and oil interceptors.
- Dispose chemical waste in accordance to Waste Disposal Ordinance. Follow the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, examples as follows:

i. Store chemical wastes at designated safe location with adequate space

5.8 Evaluation of Residual Impacts

5.8.1 With proper implementation of mitigation measures, no unacceptable residual impact is anticipated during construction phase. No operational phase water quality impact is anticipated.

5.9 Environmental Monitoring and Audit Requirements

5.9.1 Regular monitoring of water quality should be carried out at water quality monitoring stations at impact stations downstream to the construction site and at control stations upstream of construction site before and throughout dredging work. Detailed EM&A requirement are provided in EM&A Manual.

5.10 Conclusion

5.10.1 Potential water quality impacts arising from the construction activities are expected from falling of debris above water and leakage of debris from cofferdam in water during demolition of Old Bridge and construction of New Bridge, site runoff of exposed soil, earthworks and stockpiles during rainstorms and sewage generated from construction workforce. These would be minimized by implementing appropriate mitigation measures and good site management practices. No unacceptable water quality impact is expected.

6. WASTE MANAGEMENT IMPLICATION AND LAND CONTAMINATION

6.1 Introduction

6.1.1 This Chapter identifies the types of wastes that are likely to be generated during the construction and operation of the Project, and evaluates the potential environmental impacts that may result from these wastes.

6.2 Relevant Legislations, Standards & Guidelines

6.2.1 Reference has been made to the following Ordinances and Regulations which are relevant to waste management and disposal:

- The Waste Disposal Ordinance (Cap. 354) and subsidiary legislation such as the Waste Disposal (Chemical Waste) (General) Regulation and Waste Disposal (Charges for Disposal of Construction Waste) Regulation that set out requirements for the storage, handling and transportation of all types of wastes.
- Environmental Impact Assessment Ordinance (Cap. 499), Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), Annexes 7 and 15;
- Public Health and Municipal Services Ordinance (Cap. 132) – Public Cleansing and Prevention of Nuisance Regulation – control of disposal of general refuse;
- Land (Miscellaneous Provisions) Ordinance (Cap. 28); and
- Dumping at Sea Ordinance (Cap. 466).

6.2.2 Other relevant documents and guidelines that are applicable to waste management and disposal in Hong Kong include:

- Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes (1992);
- Development Bureau Technical Circular (Works) (TC(W)) No. 6/2010, Trip Ticket System for Disposal of Construction & Demolition Materials;
- Development Bureau TC(W) No. 8/2010 Enhanced Specification for Site Cleanliness and Tidiness;
- ETWB TC(W) No. 19/2005, Environmental Management on Construction Sites;
- ETWB TC(W) Nos. 22/2003 and 22/2003A, Additional Measures to Improve Site Cleanliness and Control Mosquito Breeding on Construction Sites;
- ETWB TC(W) No. 33/2002, Management of Construction and Demolition Material Including Rock;
- ETWB TC(W) No. 34/2002, Management of Dredged / Excavated Sediment;

- Works Bureau TC No. 12/2002, Specification Facilitating the Use of Recycled Aggregates;
- Works Bureau TC Nos. 25/99, 25/99A and 25/99C, Incorporation of Information on Construction and Demolition Material Management in Public Works Sub-committee Papers; and
- Works Bureau TC No. 2/93, Public Dumps.

6.2.3 Legislations and guidelines related to land contamination are given below:

- Environmental Impact Assessment Ordinance (Cap. 499), Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), Annex 9;
- Waste Disposal (Chemical Waste) (General) Regulation (Cap 354C)
- Dangerous Goods Ordinance (Cap 295)
- Practice Guide for Investigation and Remediation of Contaminated Land;
- Guidance Note for Contaminated Land Assessment and Remediation; and
- Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management.

Waste Management

6.2.4 The Waste Disposal Ordinance (WDO) prohibits the unauthorised disposal of wastes. Construction waste is defined as any substance, matter or thing that is generated from construction work and abandoned, whether or not it has been processed or stockpiled before being abandoned, but does not include any sludge, screenings or matter removed in or generated from any desludging, desilting or dredging works. Under the WDO, wastes can be disposed of only at designated waste disposal facilities.

6.2.5 Under the WDO, the Chemical Waste (General) Regulation 1992 provides regulations for chemical waste control, and administers the possession, storage, collection, transport and disposal of chemical wastes. EPD has also issued a guideline document, the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes (1992), which details how the contractor should comply with the regulations on chemical wastes.

6.2.6 Public Cleansing and Prevention of Nuisance Regulation provides control on illegal tipping of wastes on unauthorised (unlicensed) sites.

6.2.7 The Land (Miscellaneous Provisions) Ordinance provides control on dumping of public fill. The inert portion of construction waste (also called public fill) may be taken to public fill reception facilities which are operated by the Civil Engineering and Development Department (CEDD). The Land (Miscellaneous Provisions) Ordinance requires that dumping licences be obtained by individuals or companies who deliver public fill to public filling areas. The CEDD issues the licences under delegated powers from the Director of Lands.

6.2.8 Under the licence conditions, public fill reception facilities will only accept inert earth, soil, sand, rock, boulder, rubble, brick, tile, concrete, asphalt, masonry or used bentonite. In addition, in accordance with Development Bureau Technical Circular (Works) (TC(W)) No. 6/2010, the Public Fill Committee will advise on the acceptance criteria (e.g. no mixing of construction waste, nominal size of the materials less than 250mm, etc.) for disposal of construction and demolition (C&D) materials at public fill facilities.

Construction and Demolition (C&D) Material

6.2.9 The current policy related to the disposal of C&D materials is documented in the Works Branch TC No. 2/93, 'Public Dumps'. Inert C&D materials such as soil, rock and concrete etc. could be reused onsite as filling materials or off-site as public fill at public fill reception facilities. The non-inert portion, such as timber, paper etc. namely non-inert C&D materials (i.e. C&D waste) should be reused or recycled as far as possible. Landfill disposal should be considered as the last resort for waste handling.

6.2.10 Under the Waste Disposal (Charges for Disposal of Construction Waste) Regulation, enacted in January 2006, construction waste delivered to a landfill for disposal must not contain more than 50% by weight of inert material. Construction waste delivered to a sorting facility for disposal must contain more than 50% by weight of inert material, and construction waste delivered to a public fill reception facility for disposal must consist entirely of inert materials.

6.2.11 The ETWB TC(W) No. 19/2005 "Environmental Management on Construction Sites" includes procedures on waste management requiring contractors to reduce the C&D materials to be disposed of during the course of construction. The ETWB TC(W) No. 33/2002, "Management of Construction and Demolition Material Including Rock" to enhance the management of C&D materials, and to minimize its generation at source, submission of C&D Material Management Plan (C&DMMP) is not required for less than 50,000 m^3 C&D materials from Designated Projects and less than 300,000 m^3 from non-Designated Projects. Under ETWB TC(W) No. 19/2005, the contractor is required to prepare and implement an Environmental Management Plan (EMP) and the Waste Management Plan becomes part of the EMP.

Chemical Waste

6.2.12 Under the Waste Disposal (Chemical Waste) (General) Regulations, all producers of chemical waste must register with EPD and treat their wastes, either utilising on-site plant licensed by EPD, or arranging for a licensed collector to transport the wastes to a licensed facility. The regulation also prescribes the storage facilities to be provided on site, including labelling and warning signs, and requires the preparation of written procedures and training to deal with emergencies such as spillages, leakages or accidents arising from the storage of chemical wastes.

Marine Sediment

6.2.13 *ETWB TC(W) No. 34/2002 Management of Dredged / Excavated Sediment* stipulates that marine sediment shall be disposed of at designated dumping ground in accordance to its contamination level. The contamination level of the sediment is classified into three categories (Cat. L, M, H) based on the Chemical Exceedance Levels (CEL) shown in **Table 6.1**, which determines the disposal method.

Table 6.1: Sediment Quality Criteria for the Classification of Sediment

Contaminants	**Lower Chemical Exceedance Level (LCEL)**	**Upper Chemical Exceedance Level (UCEL)**
Heavy Metal(mg/kg dry weight)		
Cadmium(Cd)	1.5	**4**
Chromium(Cr)	80	**160**
Copper(Cu)	65	**110**
Mercury(Hg)	0.5	**1**
Nickel(Ni)	40	**40**
Lead(Pb)	75	**110**
Silver(Ag)	1	**2**
Zinc(Zn)	200	**270**
Metalloid(mg/kg dry weight)		
Arsenic	12	42
Organic-PAHs(μg/kg dry weight)		
PAHs(Low Molecular Weight)	550	3160
PAHs(High Molecular Weight)	1700	9600
Organic-non-PAHs(μg/kg dry weight)		
Total PCBs	23	180
Organometallics(μg-TBT L-1 in interstitial water)		
Tributyltin*	0.15	0.15

* The contaminant level is considered to have exceeded the UCEL if it is greater than the value shown.

Category L: Sediment with all contaminant levels not exceeding the LCEL. The material must be dredged, transported and disposed of in a manner which minimizes the loss of contaminants either into solution or by resuspension.

Category M: Sediment with any one or more contaminant levels exceeding the LCEL and none exceeding the UCEL. The material must be dredged and transported with care, and must be effectively isolated from the environment upon final disposal unless appropriate biological tests demonstrate that the material will not adversely affect the marine environment.

Category H: Sediment with any one or more contaminant levels exceeding the UCEL. The material must be dredged and transported with great care, and must be effectively isolated from the environment upon final disposal.

6.3 Assessment Methodology

6.3.1 The assessment of potential waste management implications includes the following tasks in accordance with Annexes 7 and 15 of the EIAO-TM and EIA-SB:

- Estimation of the types and quantities of waste arising by reviewing the construction work activities;
- Evaluation of potential impacts from the handling, collection, transportation and disposal of waste; and
- Proposal of mitigation measures for the waste management.

6.3.2 Land contamination assessment shall include the following tasks:

- Identify any potentially contaminating activities at the site by reviewing historical and present land uses; site visit; and identify any accidents, fires, explosions, spillage and any pollution incidents at the site by reviewing records from Environmental Protection Department (EPD) and Fire Services Department (FSD)
- Review contamination potential
- Submit Contamination Assessment Plan for approval from EPD
- Analyse sampling and testing results and evaluate the impact
- Prepare Contamination Assessment Report and/or Remediation Action Plan for approval from EPD
- If necessary, carry out soil treatment and submit a Remediation Report (RR) to EPD for approval prior to the construction works

6.4 Estimation of Construction Waste Generation and Evaluation of Impact

6.4.1 Waste minimization is of top priority. The amount of waste has been minimized by designing the bridges with minimum land requirement and adopting suitable construction method summarized as follows:

- Adopt minipiling instead of traditional bored piling to minimize the excavation extent.
- Minimize amount of dredging by cutting the existing pier down to 300mm below riverbed. The existing pile cap and the piles will be retained so that no extensive excavation work is needed.
- Similarly, about 300 mm thick of the existing abutments will be demolished while the lower parts of the abutments will be retained as seawalls.
- The foundation for the end support of the pedestrian bridge will be constructed immediately behind the existing seawall.
- Construction of pedestrian bridge, cycle bridge and demolition of Old Bridge will be carried out in phases to minimize the amount of C&D materials generated at one time.
- Excavated materials will be backfilled onsite as far as possible.

6.4.2 The actual amount of waste generated will be dependent on the practice of the Contractor. The preliminary estimate will be given below.

6.4.3 Referring to the detailed construction method in **Chapter 2**, major construction waste will be:

- Construction and demolition materials
- Marine sediment
- Chemicals waste
- General refuse from workforce

Construction and Demolition Materials (C&D Materials)

6.4.4 C&D materials can be divided into two categories: (1) inert C&D materials, which are suitable for reuse in construction works and (2) non-inert C&D materials, those have to be either recycled, reused offsite or disposed of.

6.4.5 On average, the expected daily production of inert C&D materials is 2.47 m^3. Over the whole construction phase, 1,069 m^3 would be generated, which will comprise of the following:

- Excavated materials from demolition and construction of mini-piles, pile cap, abutment and pier;
- Broken concrete and metal bars from demolition of the Old Bridge (e.g. deck, abutment, pier & pile cap), modification works on seawall, slope and drainage works, retaining wall etc.; and
- Unused building materials, e.g. concrete.

6.4.6 About 82m^3 of non-inert C&D materials will be produced comprising the following:

- Plant materials from tree felling;
- Metal and timber formwork;
- Bamboo scaffolding; and

- Material packaging, e.g. plastic, paper wraps.

6.4.7 Designated area shall be provided for onsite stockpiling and sorting of C&D materials as far as possible, tentatively at the northeastern part of the hoarding area to the north. Sorted inert materials shall be sent to public fill reception facility for beneficial reuse, with the closest one in Mui Wo Temporary Public Fill Reception Facility.

6.4.8 Metal, paper and plastic should be recycled or reused as far as possible. Timber and dismantled bamboo scaffolding should be reused in other projects if the quality remains satisfactory. Other non-inert C&D materials should be disposed of at landfill, with the closest one in West New Territories (WENT) Landfill in Tuen Mun. The contractor shall enquire with the Environmental Protection Department on the availability of landfill and acceptability of the waste.

6.4.9 All waste shall be removed from the Site to public fill reception/sorting facility or landfill by land transport. No barging point or conveyor system will be involved. Given the small quantity of waste generated, one to two truck trips will be sufficient to handle the waste every day. Therefore, no significant air emission, noise nuisance or obstruction on public transport are expected from the limited transport trips.

Marine Sediment

6.4.10 Excavation below high water mark may be considered as dredging work. This will be required for two main purposes: (1) demolition of one of the existing piers down to 300mm below riverbed and (2) piling for construction of new piers. Excavation works will be conducted within enclosed cofferdams.

6.4.11 For (1), the disturbed materials (in the surface layer of Wang Tong River) will be sand and gravels based on site visits during the EIA study (see **Appendix 6B** for site photos). For (2), soil will be excavated down to 1m below the proposed pile cap (about 2m below ground level for the deepest pile cap). After that minipiles will be inserted into the ground. According to the ground investigation (GI) conducted next to the abutments of Old Bridge in 2013, the soil within 4m depth from the surface belonged to beach sand. Alluvium (comprising sand, clay, silt and cobble), saprolite (comprising sandy clayey silt or silty sand with gravel) and rock (comprising moderately and slightly decomposed granite) will be encountered further underground (see **Appendix 6D** for extracts of GI report). One of the new pedestrian bridge piers will be constructed at the same location of the other Old Bridge pier. Demolition of existing pile cap will also be required, which will be within 4m below surface. Therefore, beach sand be excavated and no sediment will be generated during excavation works.

6.4.12 Marine sediment will be encountered for works deep underground, i.e. piling works. About $87m^3$ of sediment will be extracted from minipiles. These will be treated by cement solidification and sent to laboratory for Toxicity Characteristics Leaching Procedure (TCLP) test according to USEPA Method 1311 and 6020. The results are considered satisfactory if Universal Treatment Standards (UTS) are being met as per Table 4.6 of Practice Guide of Investigation and Remediation of Contaminated Land. The Unconfined

Compressive Strength (UCS) of the solidified sediment shall also reach 1000kPa according to the above Practice Guide. If the TCLP and UCS testing results cannot meet the criteria, the sediment shall be retreated by cement solidification. After passing the tests, the solidified sediment shall be backfilled on land after the piling work (e.g. for construction of new piers and abutments). Alternatively, the solidified sediment shall be delivered to public fill reception facilities for beneficial reuse as the last resort. No disposal at sea is required.

Chemical Wastes

6.4.13 Chemical wastes that may arise during the construction of the Project include:

- Paint, solvents and detergents in fabricating the New Bridge;
- Cleansing fluid, lubricating oil, scrap batteries and fuel in maintaining and powering machinery; and
- Empty containers of the above substances.

6.4.14 The amount of chemical wastes generated will vary between Contractors based on the number of plant equipment to be employed and the maintenance frequency. However, it is expected to be limited (about $1m^3$) due to the small project scale.

6.4.15 Improper handling of the chemical wastes may pose health impact on workers (e.g. accidental ingestion), fire hazard and contamination of soil and water. The Contractor shall register with EPD as a chemical waste producer. All chemical wastes will be delivered to Chemical Waste Treatment Centre in Tsing Yi for treatment and disposal in strict compliance with the Waste Disposal (Chemical Waste) (General) Regulations.

General Refuse

6.4.16 General refuse refers to the waste generated by workers during daily operation, e.g. food waste and packaging, metal cans, plastic bottles and office waste. The estimated daily generation is about 0.0185 m^3 and the total quantity for this project is about 8 m^3.

6.4.17 Even though the quantity is small, sufficient rubbish bins or collection area should still be provided to maintain the hygiene and tidiness of the work site. Otherwise the waste may be blown away by wind or washed into Wang Tong River or Silvermine Bay. In addition to causing pollution problem, this may clog drainage system, resulting in flooding under heavy rain. Having rubbish around is also unpleasant and may attract pest and bring odour nuisance. The bins should always be covered by lids. Recycle bins should also be provided to encourage recycling paper, metal and plastic. The collected waste shall be removed at regular interval. No dropping of refuse into water that result in water pollution or accumulation is expected.

6.4.18 The proposed New Bridge will have piers above high water mark and the abutment will be either above high water mark or follow the original design of the Old Bridge. No additional trapping of floating refuse is expected during operational phase.

Other Wastes (Human Waste)

6.4.19 There is a public toilet in Silver Mine Bay Beach which the workers can use. Chemical toilets should be provided if necessary, which should be maintained regularly by registered waste collectors. They should be placed on stable, impermeable ground and kept away from the river bank and shore.

6.4.20 With proper implementation of mitigation measures in **Section 6.7**, no unacceptable waste management impact due to handling, collection, transportation and disposal of C&D materials, chemical wastes, marine sediment (if any) and general refuse is expected.

Table 6.2: Summary of Waste

Type of Waste		Quantity (m^3)				Handling and Disposal Options
		Onsite Reuse	Offsite Reuse (Public Fill)	Dispose (Landfill)	Total	
1	**Inert C&D Material**	**403**	**666**	**0**	**1069**	To be reused on-site for backfilling. Those cannot be reused on-site will be delivered to Mui Wo Temporary Public Fill Reception Facility.
	Site Clearance and Formation (inc. the demolition of Old Bridge)	203	100	0	303	
	Pile Cap, Pier & Abutment Construction	200	100	0	300	
	Superstructure construction & Finishes (inc. associated works e.g. drainage works)	0	466	0	466	
2	**Non-inert C&D Material**	**0**	**0**	**82**	**82**	To be disposed of at landfill (the closest landfill is West New Territories Landfill)
	Site Clearance and Formation (inc. the demolition of Old Bridge)	0	0	23	23	
	Pile Cap, Pier & Abutment Construction	0	0	23	23	
	Superstructure construction & Finishes (inc. associated works e.g. drainage works)	0	0	36	36	

Type of Waste		Quantity (m^3)			Handling and Disposal Options
		Reuse/ Recycle	Dispose	Total	
3	**Sediment extracted from Minipiles**	**87**	**0**	**87**	To be reused on-site for backfilling on land or delivered to public fill reception facilities for beneficial reuse after cement solidification
4	**Chemical Waste**	**0**	**1**	**1**	To be disposed to Chemical Waste Treatment Centre
5	**General Refuse**	**7**	**1**	**8**	To be disposed of at landfill

6.5 Land Contamination

Historical Land Uses

6.5.1 Historical aerial photographs covering the Study Area were reviewed to evaluate any land use changes associated with potential contamination implication within the assessment area. The oldest aerial photo available dated back to 1945. Changes of land use observed are shown in the following table:

Table 6.3: Historical Change in Wang Tong River and its vicinity

Year	Photo No.	Descriptions
1945	3079	- Very extensive agricultural land in Wang Tong, Tai Wai Yuen and land to the west of Butterfly Hill - Old bridges at mouth of River Silver & Wang Tong River - Both Wang Tong River and River Silver were untrained and had large mudflat at river mouth
1970	N/A	- Opening of bridge across Wang Tong River (Old Bridge of this project) according to the commemorative tablet of the bridge
1973	4026	- Shape of Wang Tong River as now - Houses built at Tung Wan Tau Road near Wang Tong River and along Wang Tong River at the foot of Butterfly Hill
1976	14915	- Road constructed along Silvermine Bay Beach - Structure at the now Silvermine Beach Resort demolished
1978	22450	- More houses in Tung Wan Tau along Silvermine Bay Beach

Year	Photo No.	Descriptions
1982	41929	- Construction of Silvermine Beach Resort (South Wing) - Houses started to build in Wang Tong - Reclamation of River Silver
1984	57313	- River Silver (Southern Side) as now - Construction of swimming pool in Silvermine Beach Resort
1986	A07830	- Channelization of River Silver completed
1988	A12490	- Development of land to the north of River Silver
1991	A29129	- More houses built in Wang Tong - Development of Silvermine Beach Resort (North Wing)
1992	CN03019	- Layout within 500m Study Area similar to now
1996	942353	- Channelization of upper reach of Wang Tong River in progress
2003	CN51918	- 7-shaped water channel observed in Tai Wai Yuen
2010	CS30503	- Barge berthed in waters in front of Silvermine Beach Resort, area of beach between front of Silvermine Beach Resort and Wang Tong River reduced
2011	CS33663	- Beach mentioned above was reinstated
2014	CS51073	- Clearing of trees along Wang Tong River at the foot of Butterfly Hill

6.5.2 Based on the aerial photos, area near Wang Tong River was historically used for residential (village) and agriculture. Population started to expand from 1970s as evident from conversion of agriculture land into houses. Construction of Silvermine Beach Resort in 1980s showed the growth of tourism in Mui Wo. Major reclamation took place in River Silver over 100m away to the south of the Site. No industrial activity was identified. Aerial photos showing major changes are shown in **Appendix 6A**.

Current Land Uses

6.5.3 Site visits were carried out during the EIA study period to identify the latest land use. There are village houses to the north of the Old Bridge, along upper reach of Wang Tong River and Mui Wo Committee Road. Some of the village houses are rented as resort. A hotel (Silver Beach Resort) is located to the south of the Old Bridge. Majority of the agriculture land in Tai Wai Yuen and Wang Tong have already been abandoned. Only small scale farming was practised at the door front of some of the village houses. Silvermine Bay Beach is a popular bathing beach and clam digging site. There is a restaurant to the north of the Old Bridge that has long been closed. In general, area within the Site Boundary did not experience major landscape alternation since the 1990s. Photographic records of existing land uses are shown in **Appendix 6B**.

Chemical Waste, Dangerous Goods and Spillage Records

6.5.4 No land contamination report was found in Mui Wo. Enquiry has been sought from EPD on any historic record on chemical waste spillage/leakage incidences in the vicinity of the

Project Site, and from FSD on dangerous goods licence and spillage/leakage of dangerous of goods. Both departments confirmed neither records were found (letter attached in **Appendix 6C**). No chemical waste producer record was found within the Project boundary in the EPD's Register.

Potential Land Contamination Impact

6.5.5 According to *Guidance Note for Contaminated Land Assessment and Remediation* and EIAO-TM Annex 19, the following industrial uses may result in land contamination:

- oil installations including oil depots and petrol filling stations
- gas works
- power plants
- shipyards/boatyards
- chemical manufacturing/processing plants
- steel mills/metal workshops
- car repairing and dismantling workshops
- dumping ground and landfill
- scrap yards

6.5.6 Construction of village houses and operation of restaurant to the north of Old Bridge, and conversion of agriculture land to village houses along Wang Tong River in the vicinity of the Site did not constitute land contamination potential. Therefore, no land contamination potential is expected in the northern bound of the Old Bridge.

6.5.7 There was a red-roofed, three parted structure at the now Silvermine Beach Resort (South Wing) between 1945 and 1976, which may possibly be a pig farm. There may be land contamination if chemical pig feed was being used. However, any contaminated soil in the area should have been excavated during construction of Silvermine Beach Resort and road surrounding the resort and associated utility in these decades. Also, there is also about 50m buffer distance from the location of potential contamination hotspot (Pig Farm/now Resort). The potential of land contamination impact during excavation work of this Project is low.

6.5.8 Based on the site appraisal, aerial photos and site visits showed that no industrial activity listed under the Guidance Notes or EIAO-TM (see **Section 6.5.5**) was conducted in the vicinity of Wang Tong Bridge. Records from EPD and FSD confirmed that there was no chemical waste producer, dangerous goods store nor chemical spillage record at the Project Site and in the vicinity of the site. As no land contamination within the Project Site is expected, no soil sampling, testing and analysis is required. No potential hazard is expected due to handling, collection, transportation and re-use/disposal of excavated soil is anticipated.

6.5.9 Should contaminated soil be found during the excavation work, the process should be terminated. Contamination Assessment Plan (CAP) shall be prepared in accordance with EPD's Guidance Note for Contaminated Land Assessment and Remediation for

identifying soil and groundwater sampling locations, followed by testing and remediation where necessary.

6.6 Estimation of Operational Waste Generation and Evaluation of Impact

6.6.1 During operational phase, no significant impact is expected due to operation of the Project.

6.7 Mitigation Measures

6.7.1 The Contractor should prepare a Waste Management Plan in accordance with ETWB TCW No. 19/2005 Waste Management on Construction Site, which details the expected amount of different types of wastes generated in the coming month and year and updates at regular intervals. The actual waste usage should be recorded monthly. Waste handling, storage and removal methods should also be proposed in the WMP and be reviewed the effectiveness at regular intervals. Training should be provided to all staff to ensure that they are aware of the practice, in particular in chemical waste handling (e.g. understanding of hazard labels and emergency procedures).

6.7.2 Careful planning before construction work and close monitoring will be crucial to prevent performing unnecessary works, resulting in extra waste.

C&D Waste

6.7.3 Handling, storage, collection and disposal of waste shall be proposed in accordance with Waste Disposal Ordinance. Good site practices shall be implemented to minimize undesirable nuisance:

- The Contractor shall identify suitable location for temporary stockpiling, tentatively on the northeastern part of the Project Boundary inside hoarding. The stockpile should be covered by tarpaulin or other water-resistant fabric. This can prevent the waste from being blown away by wind or washed into watercourses/sea/drainage system under heavy rain. No water pollution of watercourse and thus impact on ecology is expected.
- Waste sorting area should be provided as far as possible to separate out reusable, recyclable wastes and/or public fill. Dumping at landfill should be considered as last resort.
- Sorted waste should be stored separately at designated locations.
- If there is insufficient space for stockpiling the waste onsite before disposal offsite, the waste materials should be delivered offsite for storage/sorting or disposal upon generation.
- Dump trucks should be near fully loaded with excavated materials before departure from the Site. Frequent movement of traffic will be a source of annoyance and increase the chance of accidental leakage.

- However, the trucks should not be overloaded and the cover should be closed to enclose the excavated materials during movement.
- Adopt durable materials for formworks and scaffolding (e.g. steel) for future reuse.
- Works schedule will be well planned to minimize the excavation work area in any time.

Chemical Waste

- Chemical wastes should be stored at designated chemical waste storage area with bunds on impermeable ground. Roof and locks should be provided if stored outdoor. Alternatively, cabinet or cupboard with spill trays can be used if the quantity of waste is small.
- Chemical wastes should be labelled clearly in accordance with Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes to alert workers on hazard during handling and storing.
- Compatible containers should be used for storing specific chemical waste to prevent leakage/spillage (e.g. resistant to corrosive chemicals). Checking of the integrity of the containers before and during use is required.
- The Contractor should be registered as a Chemical Waste Producer with EPD and engage licensed chemical waste collectors for disposal under the Waste Disposal (Chemical Waste)(General) Regulation.

General

- Sufficient rubbish bins should be provided at regular interval for collection of general refuse.
- Recycle bins should be provided to encourage recycling of paper, plastic and metal cans.
- Collected waste should be removed from the site by registered collectors regularly.
- A trip ticket system should be implemented to monitor the flow of waste from the site to public fill reception facilities/landfill/chemical waste treatment facilities/recycler.

Marine Sediment

6.7.4 Marine sediment shall be treated by cement solidification and reused onsite by backfilling on land. Alternatively, the solidified sediment shall be delivered to public fill reception facilities for beneficial reuse as the last resort.

Land Contamination

6.7.5 Although no land contaminated site is identified, precautionary measures shall be carried out. In addition to proper waste management measures listed above, preventive measures are recommended to workers to minimize the chance of contact:

- Use plant equipment to perform excavation as far as possible;
- Wear protective glove and face mask during excavation work; and
- Prohibit eating and smoking.

6.8 Residual Impact

6.8.1 With proper implementation of the mitigation measures, no residual impact is anticipated for waste generated from construction and operation of the Project.

6.9 Environmental Monitoring and Audit

6.9.1 The Contractor should prepare a Waste Management Plan in accordance with ETWB TCW No. 19/2005 Waste Management on Construction Site, which details the expected amount of different types of wastes generated in the coming month and year and updates at regular intervals. The actual waste usage should be recorded monthly. Waste handling, storage and removal methods should also be proposed in the WMP and be reviewed the effectiveness at regular intervals. Training should be provided to all staff to ensure that they are aware of the practice, in particular in chemical waste handling (e.g. understanding of hazard labels and emergency procedures).

6.9.2 Regular site inspection shall be carried out during construction phase to check whether the proposed mitigation measures have been properly implemented and to evaluate the effectiveness.

6.9.3 No EM&A is proposed for Operational Phase.

6.10 Conclusion

6.10.1 During construction phase, major C&D waste will be composed of broken concrete, metal bar, sand and soil from demolition of Old Bridge. Other waste includes chemical waste from maintenance of plant equipment, general refuse from workforce, and marine sediment extracted from minipiles.

6.10.2 No waste generation activity is expected in operational phase.

6.10.3 The waste shall be handled and disposed of properly to prevent causing damage to the environment, e.g. water pollution, odour nuisance and hygiene issue. With implementation of the recommended measures and site practices, no unacceptable impact due to waste management is expected.

6.10.4 Based on historical aerial photos, site visit and government record, it is concluded that land contamination at the Site is unlikely.

7. ECOLOGICAL IMPACT

7.1 Introduction

7.1.1 This chapter presents the ecological baseline condition within and in the vicinity of Wang Tong through literature review and surveys. Potential construction and operational impacts on ecology caused by this Project have been identified and evaluated. Mitigation measures have been proposed to minimize potential impacts where necessary.

7.2 Relevant Legislations, Standards & Guidelines

7.2.1 Reference has been made to the Technical Memorandum on Environmental Impact Assessment Process of the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO-TM) for the criteria for evaluating ecological impacts, i.e.:

- Annex 8 stipulates criteria for evaluating ecological impacts
- Annex 16 sets out the general approach and methodology for the assessment of ecological impacts arising from a project or proposal.

7.2.2 The following EIAO guidance notes detail temporal considerations in arranging surveys, survey methodology at different habitat types, data collection and requirement of impact assessment:

- GN 6/2010 "Some Observations on Ecological Assessment from the Environmental Impact Assessment Ordinance Perspective"
- GN 7/2010 "Ecological Baseline Survey for Ecological Assessment"
- GN 10/2010 "Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys"

7.2.3 Other Hong Kong ordinances and guidelines relevant to this study for reference include:

- Forests and Countryside Ordinance (Cap. 96) and its subsidiary legislation in the Forestry Regulations, which prohibit destructive activities in the forest and trading or keeping of rare plants;
- Wild Animals Protection Ordinance (Cap. 170), which protects wild mammals, avifauna, reptiles, amphibians and insects under column 2 from hunting, possession, trading and disturbance;
- Country Parks Ordinance (Cap. 208), which designates, controls and manages country parks and special areas;
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586), which regulates trading and possession of endangered species in response to Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES);

- Town Planning Ordinance (Cap. 131), which stipulates the planning use of an area. Land uses related to this chapter are country parks, conservation areas, green belts, coastal protection areas, sites of special scientific interest and other specified uses that promote conservation or protection of the environment;
- Hong Kong Planning Standard and Guidelines (Chapter 10), which provides principles of conservation, policies to identify and conserve natural landscape and habitats through legislation and administrative controls and planning.

7.2.4 In addition, legislations, standards and guidelines in People's Republic of China (PRC) relevant to this assessment include:

- PRC Wild Animal Protection Law;
- List of State Protected Wild Animals;
- List of Wild Plants;
- China Red Data Book of Endangered Animals;
- China Plant Red Data Book; and
- China Species Red List

7.2.5 This assessment was also referenced to the following international conventions where appropriate:

- Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- IUCN Red List;
- United Nations Conventions on Biological Diversity (1992).

7.3 Study Area & Ecological Sensitive Receivers

7.3.1 The Study Area for terrestrial and aquatic ecological impact assessment covered 500m radius of the Project, as shown in **Figure 7.1**. The assessment area included Silver Mine Bay, Wang Tong River, Tai Wai Yuen and other areas that are possibly impacted by the Project. No recognized site of conservation importance as defined in Annex 16 of the EIAO-TM was identified within the Study Area.

7.3.2 Ecological impact assessment was carried out according to criteria and guidelines as stated in Annexes 8 and 16 of the EIAO-TM, and was followed the technical requirements given in Appendix E of the Study Brief (No. ESR-246/2013).

7.4 Literature Review

7.4.1 Baseline ecological information had been obtained through collection and review of past findings in relevant studies/surveys regarding the ecological characters of the assessment area. Examples of published reference and other environmental studies carried out in vicinity of the Project site include:

- Aerial photos

- Websites managed by AFCD, e.g. Hong Kong Biodiversity Database & Hong Kong Herbarium
- AFCD Newsletters
- Approved Mui Wo Fringe OZP S/I-MWF/10 from Town Planning Board
- Books and reports by Hong Kong Bird Watching Society, e.g. the Avifauna in Hong Kong
- Memoirs of Hong Kong
- Past EIA studies, e.g. Drainage Improvements in Southern Lantau
- Porcupine! by the University of Hong Kong
- Rare and Precious Plants of Hong Kong
- China Red Data Book (Aves and Pisces)
- Other related field books

Vegetation

7.4.2 According to M&EL (2005), 2 plant species with conservation importance, *Aquilaria sinensis* and *Diospyros vaccinioides*, were recorded in secondary woodland around the Butterfly Hill. Their locations were about 500m northwest from the Project Site, while their conservation statuses were summarized in **Table 7.1**.

Table 7.1: Plant species of conservation importance recorded in past studies within/near the Study Area (Hu et al. 2003; IUCN 2014)

Species Name (Chinese Name)	Origin	Conservation Status
Aquilaria sinensis (土沉香)	Native	1. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) 2. Listed as "Near Threatened" in Rare and Precious Plants of Hong Kong 3. Listed as "Vulnerable" in China Plant Red Data Book 4. Listed as "Vulnerable" by the IUCN Red List
Diospyros vaccinioides (小果柿)	Native	1. Listed as "Critically Endangered" by the IUCN Red List

Terrestrial Mammals

7.4.3 According to Shek (2006), Domestic Ox (*Bos taurus*) and 10 bat species were recorded

around the Study Area. Except the Short-nosed Fruit Bat (*Cynopterus sphinx*), all of the 9 bat species tend to roost in cave (i.e. the abandoned Silver Mine Cave which is more than 900 m away from the Project Site). Both Domestic Ox and Short-nosed Fruit Bat are common and widely distributed in Hong Kong (AFCD 2014). Domestic Ox has no conservation status while the Short-nosed Fruit Bat is protected under the Wild Animals Protection Ordinance (Cap. 170).

Avifauna

7.4.4 In Hong Kong, all wild birds are protected under the Wild Animals Protection Ordinance (Cap. 170).

7.4.5 According to M&EL (2005), 8 avifauna species with conservation importance – Great Egret (*Ardea alba*), Grey Heron (*Ardea cinerea*), Chinese Pond Heron (*Ardeola bacchus*), Eastern Cattle Egret (*Bubulcus coromandus*), Striated Heron (*Butorides striata*), Little Egret (*Egretta garzetta*), White-throated Kingfisher (*Halcyon smyrnensis*) and Black-crowned Night Heron (*Nycticorax nycticorax*) – were found within/near the Study Area. The closest record was near River Silver, which is about 500 m away from the Project Site. Their conservation statuses were summarized in **Table 7.2**.

7.4.6 According to a breeding bird survey conducted by the Hong Kong Bird Watching Society in 1993 – 1996 (Carey et al. 2001), 36 bird species were recorded to breed within/around the Study Area. Except 7 species are uncommon/scarce and/or having limited distribution, all of them are common and widespread in Hong Kong (AFCD 2014). 11 of the 36 species – Bonelli's Eagle (*Aquila fasciata*), Striated Heron (*Butorides striata*), Greater Coucal (*Centropus sinensis*), Little Egret (*Egretta garzetta*), Slaty-breasted Rail (*Gallirallus striatus*), White-throated Kingfisher (*Halcyon smyrnensis*), White-bellied Sea Eagle (*Haliaeetus leucogaster*), Cinnamon Bittern (*Ixobrychus cinnamomeus*), Black-crowned Night Heron (*Nycticorax nycticorax*), Collared Scops Owl (*Otus lettia*) and White-shouldered Starling (*Sturnia sinensis*) – are species with conservation importance. Their conservation statuses were summarized in **Table 7.2**.

Table 7.2: Avifauna species of conservation importance recorded in past studies within/near the Study Area (Zheng & Wang 1998; Carey et al. 2001; Fellowes et al. 2002; M&EL 2005)

Common Name (Species Name)	Conservation Status
Bonelli's Eagle (*Aquila fasciata*)	1. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586); 2. Listed as "Rare" in China Red Data Book Status (Zheng & Wang 1998); 3. Listed as "Regional Concern" by Fellowes et al. (2002)
Great Egret (*Ardea alba*)	1. Listed as "Regional Concern" by Fellowes et al. (2002)

Common Name (Species Name)	Conservation Status
Grey Heron (*Ardea cinerea*)	1. Listed as "Potential Regional Concern" by Fellowes et al. (2002)
Chinese Pond Heron (*Ardeola bacchus*)	1. Listed as "Regional Concern" by Fellowes et al. (2002)
Eastern Cattle Egret (*Bubulcus coromandus*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
Striated Heron (*Butorides striata*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
Greater Coucal (*Centropus sinensis*)	1. Listed as "Vulnerable" in China Red Data Book Status (Zheng & Wang 1998)
Little Egret (*Egretta garzetta*)	1. Listed as "Regional Concern" by Fellowes et al. (2002)
Slaty-breasted Rail (*Gallirallus striatus*)	1. Listed as "Rare" in China Red Data Book Status (Zheng & Wang 1998); 2. Listed as "Regional Concern" by Fellowes et al. (2002)
White-throated Kingfisher (*Halcyon smyrnensis*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
White-bellied Sea Eagle (*Haliaeetus leucogaster*)	1. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586); 2. Listed as "Indeterminate" in China Red Data Book Status; 3. Listed as "Regional Concern" by Fellowes et al. (2002)
Cinnamon Bittern (*Ixobrychus cinnamomeus*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
Black-crowned Night Heron (*Nycticorax nycticorax*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
Collared Scops Owl (*Otus lettia*)	1. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)

Common Name (Species Name)	Conservation Status
White-shouldered Starling (*Sturnia sinensis*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
*All birds are protected under the Wild Animals Protection Ordinance (Cap. 170). ** Species listed as "Least Concern" by IUCN Red List were not included	

7.4.7 Despite the breeding bird survey conducted by the Hong Kong Bird Watching Society (Carey et al. 2001) in 1993 – 1996 recorded breeding White-bellied Sea Eagle (*Haliaeetus leucogaster*) within/around the Study Area, a breeding White-bellied Sea Eagle survey carried out by Agriculture, Fisheries and Conservation Department (So & Lee 2011) from 2002/03 to 2008/09 recorded that no bird nest was close to the Study Area. The nearest nests were in Shek Kwu Chau and Penny's Bay, which were about 8 km far away from the Study Area.

Herpetofauna

7.4.8 According to Lau & Dudgeon (1999) and Chan et al. (2005), a total of 11 amphibian species (including Asian Common Toad *Duttaphrynus melanostictus*, Brown Tree Frog *Polypedates megacephalus* and Gunther's Frog *Rana guentheri*) were recorded in/near the Study Area. Three species – Chinese Bullfrog (*Hoplobatrachus rugulosus*), Three-striped Grass Frog (*Hylarana macrodactyla*) and Romer's Tree Frog (*Liuixalus romeri*) – have restricted distribution in Hong Kong, while three species – Chinese Bullfrog (*Hoplobatrachus rugulosus*), Romer's Tree Frog (*Liuixalus romeri*) and Short-legged Toad (*Xenophrys brachykolos*) – are listed as having conservation importance. Their distribution in Hong Kong and conservation status were presented in **Table 7.3**.

Table 7.3: Amphibian species of conservation importance recorded in past study in/near the Study Area and their distributions in Hong Kong (Fellowes et al. 2002; Chan et al. 2005; AFCD 2014)

Common Name (Species Name)	Distribution in Hong Kong	Conservation Status
Chinese Bullfrog (*Hoplobatrachus rugulosus*)	Widely distributed in Lantau Island and New Territories	1. Listed as "Potential Regional Concern" by Fellowes et al. (2002)
Three-striped Grass Frog (*Hylarana macrodactyla*)	Distributed in marshy areas on Lantau Island and New Territories	N.I.L.

Common Name (Species Name)	Distribution in Hong Kong	Conservation Status
Romer's Tree Frog (*Liuixalus romeri*)	Distributed in woodlands on Lantau Island, Po Toi Island, Lamma Island, Hong Kong Island and New Territories	1. Protected under the Wild Animals Protection Ordinance (Cap. 170) 2. Listed as "Endangered" by the IUCN Red List 3. Listed as "Potential Global Concern" by Fellowes et al. (2002)
Short-legged Toad (*Xenophrys brachykolos*)	Widely distributed in upland forest streams throughout Hong Kong	1. Listed as "Endangered" by the IUCN Red List 2. Listed as "Potential Global Concern" by Fellowes et al. (2002)

Freshwater Fish

7.4.9 According to M&EL (2005), a total of 19 fish species were recorded in 3 watercourses which all converge into River Silver (about 200m south from Wang Tong River). 10 of the 19 species recorded in tributaries of River Silver are capable of migrating from freshwater to sea (or vice versa), either with or without breeding purpose (e.g. Grey mullet *Mugil cephalus*, Common mudskipper *Periophthalmus modestus* and Jarbua terapon *Terapon jarbua*). Although River Silver and Wang Tong River have no connection, they might also be present in Wang Tong River via the Silver Mine Bay. Among these 10 migratory species, Dark-margined Flagtail *Kuhlia marginata* is listed as "Regional Concern" by Fellowes et al. (2002). This species is catadromous, which stays entirely in freshwater and migrates downstream to breed.

7.4.10 According to Chong & Dudgeon (1992), a total of 11 fish species were recorded in Mui Wo. 4 of the 11 species that migrate from freshwater to sea (or vice versa) either with or without purpose of breeding recorded in Mui Wo (e.g. Spinecheek Gudgeon *Eleotris acanthopoma* and Estuarine goby *Mugilogobius abei*) might also present in Wang Tong River via the Silver Mine Bay. None of the 4 migratory species has conservation status.

Freshwater Invertebrates

7.4.11 According to M&EL (2005), a total of 35 taxa were recorded in 3 watercourses which all converge into the River Silver (about 200m south from Wang Tong River). Estuarine species such as crabs (e.g. *Hemigrapsus penicillatus* and *Varuna litterata*) and polychaete worms dominated in downstream, while freshwater insect (e.g. Ephemeroptera and Anisoptera) dominated the upstream. No taxa with conservation importance was recorded.

Marine Mammals

7.4.12 According to Hung (2015), Chinese White Dolphin (*Sousa chinensis*) mainly concentrates in West coast of Lantau, while Indo-Pacific finless porpoise (*Neophocaena phocaenoides*) mainly concentrates between Soko Island and Shek Kwu Chau. Their distributions near

Lantau Island are presented in **Appendix 7E**. No marine mammal was recorded at the Eastern Region of Lantau (i.e. near the Study Area). The closest record of both species are about 7 km away from the Study Area (Hung 2015).

7.4.13 Information collected from literature review was evaluated to identify any data gap. Since the literature was only able to provide limited baseline ecological information, detailed ecological surveys were conducted to obtain a comprehensive and updated baseline ecological condition of the Study Area.

7.5 Methodology for Ecological Surveys

7.5.1 Covering both wet and dry seasons, ecological surveys were carried out at representative habitats that are likely to be affected by this Project in June, August to November 2014 and February 2015. Survey plan for systematic surveys (i.e. survey transect, point count locations & sampling point for freshwater communities) is presented in **Figure 7.1**. Opportunistic observations of wildlife outside systematic survey had also been recorded.

7.5.2 Terrestrial and freshwater surveys had been conducted according to the Environmental Impact Assessment Ordinance, Cap.499, GN No. 10/2010 Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys.

Habitat Survey

7.5.3 Aerial photos of the proposed site and its surrounding had been interpreted to identify types of habitat found within the Study Area. This had been verified and updated by ground-truthing.

Vegetation Survey

7.5.4 Vegetation surveys had been conducted to identify key vegetation communities and dominant species within the proposed site area. These were followed by plant species surveys which recorded plant species found in different habitats within the survey area. A pair of binoculars were used to aid observation where the area is inaccessible. Any rare, protected and threatened plant species and other species of conservation importance had been identified with their location marked.

Terrestrial Mammal Survey

7.5.5 Terrestrial mammals had been actively searched along a designed transect and identified by direct observation. Any traits observed, such as dung, feeding signs, footprints, burrows and dens were recorded, and tracks that were left by mammals were identified as far as possible.

Avifauna Survey

7.5.6 Transect survey and point count had been adopted to record bird species in early morning when they are most active and in night time. For point count, counts had been made within

fixed time period (around 5 minutes) using a pair of binoculars. Any birds presented within observable distance along the transect and from the counting point were recorded and identified. Identification was also made from bird calls. In addition, any feeding, nesting and breeding behaviours were noted.

Herpetofauna Survey

7.5.7 Active searching had been carried out to look for amphibians and reptiles along the transect during both day- and night-time. Potential breeding ground and microhabitats, such as pools, water channels, crevices and fallen leaves, had been searched. Any eggs and tadpoles found were also recorded. Mating calls of frogs and toads were assisted in species identification as well.

Butterflies and Odonates Survey

7.5.8 Butterflies and odonates surveys had been conducted during daytime and under fine weather when these insects are active. Transect survey and point count had been carried out. For point count, counts had been made within fixed time period (around 5 minutes). Any butterflies and odonates observed along the transect and from the counting point were counted and identified by naked eyes. A pair of binoculars were used for assisting species identification and counting when necessary.

Freshwater Survey

7.5.9 Bankside counting had been carried out on selected locations. A pair of 8x binoculars had been used to search and observe active swimming fish and crustacean from bankside. Both species and number of fish and crustacean observed had been recorded. Active searching for freshwater fauna with a D-framed hand net had also been carried out.

7.5.10 Trapping had been carried out on selected sampling locations for fish survey. Pot traps of about 0.5-cm and 1-cm mesh size with baits were used. Pots traps had been placed at sampling site for around 20-30 minutes. During this period, disturbance to the water body was avoided. Both species and number of fish trapped had been recorded.

Inter-tidal Survey

7.5.11 Walk-through survey had been carried out at random locations in the inter-tidal zone during low tide. Species found (e.g. crustacean & mollusca) were recorded.

7.5.12 Both general ecological condition and distribution of wildlife in inter-tidal zone can be obtained through walk-through survey. Species were mostly found in low tidal zone (i.e. far from shore). Due to the small project scale, localized project footprint at the existing Wang Tong Bridge and the project site is far away from marine waters, the impact on inter-tidal habitat is expected to be limited. Therefore, no quantitative survey was conducted.

Nomenclature

7.5.13 Nomenclature of species was referenced from the followings:

- Plants were referenced from "Check List of Hong Kong Plants 2012" (Hong Kong Herbarium 2012),
- Terrestrial mammals were referenced from "A Field Guide to the Terrestrial Mammals in Hong Kong" (Shek 2006);
- Avifauna were referenced from "List of HK Birds" (HKBWS 2015);
- Herpetofauna (i.e. amphibian and reptile) were referenced from "Images of Amphibians of Hong Kong" (PE&B HKU 2010) and "Checklist of Reptiles in Hong Kong" (ERCL HKU 2012)
- Butterflies were referenced from "Encyclopaedia of Hong Kong Butterflies – Butterflies Identification (2nd Edition)" (Pun & Yeung 2012)
- Odonates were referenced from "The Dragonflies of Hong Kong" (Tam et al. 2011)

7.6 Survey Results – Habitats

7.6.1 Within the Study Area, habitats identified included watercourse, developed area, sandy shore, woodland, marsh, abandoned agricultural land, shrubland/grassland and marine water. Distribution and representative photo of each habitat were presented in **Figure 7.2** and **Appendix 7A** respectively.

Watercourse

7.6.2 Two main watercourses – Wang Tong River & River Silver – and several minor watercourses were identified in the Study Area.

Wang Tong River

7.6.3 Wang Tong River was semi-channelized and ran straight below the proposed bridge. No sailing on the Wang Tong River was observed.

7.6.4 The upper reach of the River (north of Tai Wai Yuen) was fully channelized with concrete streambed and banksides. Only a few vegetation (e.g. *Ficus subpisocarpa*) was found along the River. Besides, wastewater was discharged from several points on banksides. In this upper reach section, the water level was not influenced by the tidal action during the site visits.

7.6.5 The middle reach of the River (west of Tai Wai Yuen) was semi-channelized by concrete and/or boulder, with a natural streambed which consisted of sand and gravels. Vegetation composition on banksides was highly depended on the habitat (Woodland & Developed Area). Tree such as *Hibiscus tiliaceus* and *Litsea glutinosa* were found on the bankside in Woodland, while exotic landscape and fruit plants such as *Wedelia trilobata* and *Syzygium samarangense* were found on the bankside in Developed Area. In this middle reach

section, the water level was affected by the tidal action.

7.6.6 The lower reach of the River (south of Tai Wai Yuen) was semi-channelized by concrete and boulders, with a natural streambed which consisted of silt, sand and gravels, while mud accumulated at location with slower water flow (e.g. with wider width or at bend). The northern bank was a woodland which was dominated by *Hibiscus tiliaceus*, while the southern bank was an exposed artificial bank. Besides vegetation on bankside, true and associated mangrove species (*Aegiceras corniculatum* and *Acanthus ilicifolius*) were found in the River. In this lower reach section, the water level was strongly affected by tidal action. The streambed could be exposed during very low tide.

7.6.7 At the discharge point of the River, an alluvial fan was formed. The alluvial fan was consisted of sand and was not vegetated. The course running on the alluvial fan changed over time (e.g. changing from a straight course in wet season 2014 to a winding course in dry season 2014/2015).

7.6.8 2 fish species (Predaceous chub *Parazacco spilurus* and Indo-Pacific tropical sand goby *Favonigobius reichei*) and 2 avifauna species with conservation importance (Little Egret *Egretta garzetta* & White-throated Kingfisher *Halcyon smyrnensis*) were recorded in Wang Tong River.

River Silver

7.6.9 The River Silver was channelized and was about 200m south from the Project site. Although its water level was affected by tidal action, its stream-bed was not visible even in low tide. Sampans were sailed on the River.

7.6.10 1 avifauna species with conservation importance – Little Egret (*Egretta garzetta*) – was recorded on the bankside of River Silver.

Minor watercourses

7.6.11 Several minor watercourses were identified in the Study Area. Most of them were located in/around Tai Wai Yuen and converge to the Wang Tong River. Some of them had only seasonal water flow.

7.6.12 1 fish species with conservation importance – Small Snakehead (*Channa asiatica*) – was recorded in these minor watercourses.

<u>Developed Area</u>

7.6.13 The Study Area was dominated by Developed Area. Areas of disturbed habitat found within the Study Area, such as residential areas and recreational grounds, were regarded as Developed Area. Vegetation and trees found in this habitat were mostly exotic and cultivated (e.g. *Aglaia odorata* var. *microphyllina*, *Duranta erecta* & *Terminalia catappa*).

7.6.14 2 uncommon butterfly species (Plain Tiger *Danaus chrysippus chrysippus* and Common Redeye *Matapa aria*) were found in Developed Area.

Sandy Shore

7.6.15 Sandy Shores in the Study Area were located in both the intertidal zone and area above high water mark. Most Sandy Shore in the Study Area was not vegetated and was utilized for recreational use (i.e. the Silvermine Bay Beach). Only a few plant species (e.g. *Ipomoea pes-caprae*) and cultivated trees (e.g. *Terminalia catappa*) were found.

7.6.16 2 avifauna species with conservation importance – Little Egret (*Egretta garzetta*) & Pacific Reef Heron (*Egretta sacra*) – were recorded in Sandy Shore.

Woodland

7.6.17 Most of the undisturbed terrestrial area in the Study Area were Woodland. Nevertheless, the species composition of woodland was not consistent throughout the Study Area. For the woodland adjacent to the downstream Wang Tong River, it was dominated by *Hibiscus tiliaceus* with a 3 – 6 m canopy height. Trees *Microcos nervosa* and *Tarenna attenuate*, shrub *Sageretia thea* and climber *Morinda parvifolia* could be found further upstream. Regarding the woodland on the Butterfly Hill, its canopy was about 6 – 10 m in height and was not dominated by any species. Species included *Celtis sinensis*, *Ficus* spp. and *Schefflera heptaphylla* were found in canopy, while *Daphniphyllum calycinum*, *Ilex asprella* and *Litsea rotundifolia* var. *oblongifolia* were found in understorey.

7.6.18 1 plant and 1 avifauna species with conservation importance – *Aquilaria sinensis* & Greater Coucal (*Centropus sinensis*) respectively – were recorded in Woodland. A very rare butterfly (Metallic Cerulean *Jamides alecto alocina*) and an uncommon butterfly (Striped Blue Crow *Euploea mulciber mulciber*) were also recorded in this habitat.

Marsh

7.6.19 A single piece of Marsh was found in Tai Wai Yuen. It was a fairly flat ground historically used for agriculture, and was now overgrown with true mangrove species *Acrostichum aureum* and herbs such as *Cyperus involucratus*. It was surrounded by *Hibiscus tiliaceus* dominated woodland. Watercourses converged to the Wang Tong River. Presence of plant species that are adapted to salty environment demonstrated the tidal influence in Tai Wai Yuen. The degree of wetness varied upon seasons.

7.6.20 4 avifauna species – Eastern Cattle Egret (*Bubulcus coromandus*), Little Egret (*Egretta garzetta*), White-throated Kingfisher (*Halcyon smyrnensis*) & Black-crowned Night Heron (*Nycticorax nycticorax*) – with conservation importance were recorded in this habitat.

Abandoned Agricultural Land

7.6.21 Abandoned Agricultural Lands were found at the northern and western edges of the Study Area. They had fairly flat grounds, while some areas had water-bogged soil in wet season. Plants such as *Zingiber officinale* and *Ludwigia* spp. and *Azolla imbricata* were found. Presence of freshwater species demonstrated that the land might not experience tidal influence.

7.6.22 A very rare butterfly species – Metallic Cerulean (*Jamides alecto alocina*) – was recorded in Abandoned Agricultural Land.

Shrubland/Grassland

7.6.23 Patches of Shrubland/Grassland were recorded in the Study Area. A large piece was found on hillside near the northern edge of the Study Area. Small patches were also scattered within / adjacent to Woodland in the Study Area. Vegetation such as *Melastoma sanguineum* and *Mikania micrantha* were recorded in this habitat.

7.6.24 No species with conservation importance or rare species was found in this habitat.

Marine Water

7.6.25 Marine Water was found in the eastern part of the Study Area. It receives discharge of 2 watercourses – Wang Tong River & River Silver. This habitat was disturbed by human activities including marine traffic (i.e. sailing) and recreational uses (e.g. bathing beach).

The Project Site

7.6.26 The proposed twin bridges are located across the lower reach (very close to discharge point) of Wang Tong River. Instead of concrete, the streambed where bridges cross was natural and comprised by sand and gravels. The northern reach of bridges was sandy shore, while the southern reach was a mixture of sandy shore and artificial bank. Both reaches were mostly exposed with a few vegetation and cultivated trees (e.g. *Macaranga tanarius* var. *tomentosa* and *Terminalia catappa*). Since the water level of the downstream Wang Tong River was influenced by tidal action, the size of sandy shore and artificial bank were affected by tidal action. Representative photos of the Project Site are shown in **Appendix 7D**.

7.6.27 No species with conservation importance or rare species was found on the Project Site.

7.7 Survey Results – Flora and Fauna

7.7.1 This section summarizes flora and fauna recorded throughout the survey period. A species list with details on distribution, rarity and conservation status can be found in **Appendix 7B**. Locations of species with conservation importance and nesting sites of *Amaurornis phoenicurus*, *Gracupica nigricollis* and *Hirundo rustica* found in the Study Area are

presented in **Figure 7.2**. Photographic records of species with conservation importance were presented in **Appendix 7C**.

Vegetation

7.7.2 200 plant species were recorded in the Study Area. Both native and exotic species were recorded in the Study Area. 8 species recorded – 2 native and 6 exotic species – have conservation statuses, which were shown in **Table 7.4**. Nevertheless, only *Aquilaria sinensis* was considered to be a species with conservation importance. The rest are cultivated individuals and are common cultivated species in Hong Kong. Hence, they are not considered to be with conservation importance.

Table 7.4: Plant species with conservation statuses recorded within the Study Area in recent surveys (Hu et al. 2003; IUCN 2014)

Species Name (Chinese Name)	Origin	Conservation Status
Aquilaria sinensis (土沉香)	Native	1. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) 2. Listed as "Near Threatened" in Rare and Precious Plants of Hong Kong 3. Listed as "Vulnerable" in China Plant Red Data Book 4. Listed as "Vulnerable" by the IUCN Red List
Araucaria heterophylla (異葉南洋杉)	Exotic	1. Listed as "Vulnerable" by the IUCN Red List
Dimocarpus longan (龍眼)	Exotic	1. Listed as "Near Threatened" by the IUCN Red List
Dypsis lutescen (散尾葵)	Exotic	1. Listed as "Near Threatened" by the IUCN Red List
Lagerstroemia speciosa (大花紫薇)	Exotic	1. Protected under the Forests and Countryside Ordinance (Cap. 96)
Platycladus orientalis (側柏)	Exotic	1. Listed as "Near Threatened" by the IUCN Red List
Rhododendron pulchrum (錦繡杜鵑)	Exotic	1. Protected under the Forests and Countryside Ordinance (Cap. 96)
Rhododendron simsii (紅杜鵑)	Native	1. Protected under the Forests and Countryside Ordinance (Cap. 96)

Terrestrial Mammal

7.7.3 2 terrestrial mammal species – Domestic Ox (*Bos taurus*) & Domestic Water Buffalo (*Bubalus bubalis*) – were recorded in the Study Area. A herd of 14 individuals of Domestic Ox marched from Developed Area and rest on beach. This species is widely distributed and common in Hong Kong. One individual of Domestic Water Buffalo was found in Tai Wai Yuen. It has restricted distributed and is locally uncommon (AFCD 2014**)**.

7.7.4 Although no breeding behaviour was observed, juveniles of Domestic Ox were found in the herd.

Avifauna

7.7.5 37 avifauna species were recorded in the Study Area. Except the Pacific Reef Heron (*Egretta sacra*) is uncommon, all species recorded – including Crested Myna (*Acridotheres cristatellus*) and Eurasian Tree Sparrow (*Passer montanus*) – are common in Hong Kong (AFCD 2014**)**. Except the Grey Heron (*Ardea cinerea*) has restricted distribution, all species recorded – such as Black-collared Starling (*Gracupica nigricollis*) and Common Tailorbird (*Orthotomus sutorius*) – are widely distributed in Hong Kong.

7.7.6 All wild birds are protected under the Wild Animals Protection Ordinance (Cap. 170). Besides being protected under Cap. 170, 9 species recorded – Great Egret (*Ardea alba*), Grey Heron (*A. cinerea*), Eastern Cattle Egret (*Bubulcus coromandus*), Greater Coucal (*Centropus sinensis*), Little Egret (*Egretta garzetta*), Pacific Reef Heron (*E. sacra*), White-throated Kingfisher (*Halcyon smyrnensis*), Black Kite (*Milvus migrans*) and Black-crowned Night Heron (*Nycticorax nycticorax*) – are considered as species with conservation importance. Their conservation statuses were presented in **Table 7.5**.

Table 7.5: Avifauna species of conservation importance recorded within the Study Area in recent surveys (Fellowes et al. 2002; Zheng & Wang 1998)

Common Name (Species Name)	Conservation Status
Great Egret (*Ardea alba*)	1. Listed as "Regional Concern" by Fellowes et al. (2002)
Grey Heron (*Ardea cinerea*)	1. Listed as "Potential Regional Concern" by Fellowes et al. (2002)
Eastern Cattle Egret (*Bubulcus coromandus*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
Greater Coucal (*Centropus sinensis*)	1. Listed as "Vulnerable" in China Red Data Book Status by Zheng & Wang (1998)
Little Egret (*Egretta garzetta*)	1. Listed as "Regional Concern" by Fellowes et al. (2002)

Common Name (Species Name)	Conservation Status
Pacific Reef Heron (*Egretta sacra*)	1. Listed as "Rare" in China Red Data Book Status by Zheng & Wang (1998) 2. Listed as "Local Concern" by Fellowes et al. (2002)
White-throated Kingfisher (*Halcyon smyrnensis*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
Black Kite (Milvus *migrans*)	1. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) 2. Listed as "Regional Concern" by Fellowes et al. (2002)
Black-crowned Night Heron (*Nycticorax nycticorax*)	1. Listed as "Local Concern" by Fellowes et al. (2002)
*All birds are protected under the Wild Animals Protection Ordinance (Cap. 170). ** Species listed as "Least Concern" by IUCN Red List were not included	

7.7.7 Active nest of White-breasted Waterhen (*Amaurornis phoenicurus*) was found in Woodland adjacent to Wang Tong River, while active nests of Black-collared Starling (*Gracupica nigricollis*) and Barn Swallow (*Hirundo rustica*) were found in Developed Area. Immature individuals of Crested Myna (*Acridotheres cristatellus*), Barn Swallow (*Hirundo rustica*) and Eurasian Tree Sparrow (*Passer montanus*) were recorded in Developed Area, while immature individuals of Oriental Magpie Robin (*Copsychus saularis*) were recorded on Sandy Shore and Wang Tong River.

Herpetofauna

7.7.8 1 amphibian species (Gunther's Frog *Hylarana guentheri*) was heard in Tai Wai Yuen, and 2 reptile species – Changeable Lizard *Calotes versicolor* & Bowring's Gecko *Hemidactylus bowringii* – were recorded in Developed Area in the Study Area. All of them are distributed throughout Hong Kong. No species with conservation importance was recorded.

7.7.9 Although no breeding behaviour was recorded, immature individuals of Changeable Lizard (*Calotes versicolor*) were found in Developed Area.

Butterfly

7.7.10 30 butterfly species were recorded in the Study Area, over half of which were found in Developed Area. 26 species, including Large Faun (*Faunis eumeus eumeus*) & Common Mormon (*Papilio polytes polytes*), are widespread and are either very common or common in Hong Kong (AFCD 2014**)**. 3 species – Plain Tiger (*Danaus chrysippus chrysippus*), Striped Blue Crow (*Euploea mulciber mulciber*) & Common Redeye (*Matapa aria*) – are uncommon in Hong Kong. Common Redeye is widespread in Hong Kong, while Plain Tiger and Striped Blue Crow have limited distribution in Hong Kong. One very rare butterfly species, Metallic Cerulean (*Jamides alecto alocina*), was also recorded in Woodland and Abandoned Agriculture Land. It has limited distribution in Hong Kong.

7.7.11 Metallic Cerulean is considered as species with conservation importance because of its rarity in Hong Kong.

7.7.12 Angled Castor (*Ariadne ariadne alterna*) was recorded laying eggs on *Ricinus communis* in Developed Area. Larvae of Angled Castor were also found on *Ricinus communis* in Developed Area.

Odonate

7.7.13 8 odonate species, including Yellow Featherlegs (*Copera marginipes*) & Wandering Glider (*Pantala flavescens*), were recorded in the Study Area. All of them are widely distributed and are abundant in Hong Kong (AFCD 2014**)**. All species recorded are not considered as species with conservation importance.

7.7.14 No breeding behaviour and no immature individual were recorded.

Freshwater Fish

7.7.15 13 fish species were recorded in the Study Area. Except the Small Snakehead (*Channa asiatica*) is uncommon and has restricted distribution, all species – including Grey mullet (*Mugil cephalus*), Common Mudskipper (*Periophthalmus modestus*) and Jarbua Terapon (*Terapon jarbua*) – are common and widespread in Hong Kong (AFCD 2014**)**.

7.7.16 3 recorded species – Small Snakehead (*Channa asiatica*), Indo-Pacific tropical sand goby (*Favonigobius reichei*) and Predaceous chub (*Parazacco spilurus*) – are considered as species with conservation importance. Status of each species is presented in **Table 7.6**.

Table 7.6: Fish Species of Conservation Importance Recorded Within the Study Area in Recent Surveys (Wang, Yue & Chen 1998; Fellowes et al. 2002; IUCN 2014)

Common Name (Species Name)	Conservation Status
Small snakehead (*Channa asiatica*)	● Listed as "Local Concern" by Fellowes et al. (2002)
Indo-Pacific tropical sand goby (*Favonigobius reichei*)	● Listed as "Near Threatened" by the IUCN Red List
Predaceous chub (*Parazacco spilurus*)	● Listed as "Vulnerable" by the China Red Data Book Status (Wang, Yue & Chen 1998)

7.7.17 Although no breeding behaviour was recorded, immature individuals of Goby (Gobiidae), Mangrove snapper (*Lutjanus argentimaculatus*), Grey mullet (*Mugil cephalus*), Predaceous chub (*Parazacco spilurus*), Spotted scat (*Scatophagus argus*), White-spotted rabbit fish (*Siganus canaliculatus*) and Jarbua terapon (*Terapon jarbua*) were found in Wang Tong River, demonstrating its importance as fish nursery ground.

Crustacean

7.7.18 3 crustacean species – *Ligia exotica*, *Ocypode ceratophthalma* & *Uca crassipes* – were recorded in the Study Area. No species with conservation importance was recorded.

7.7.19 Although no breeding behaviour or berried individual was recorded, immature individuals of *Ocypode ceratophthalma* were recorded on Sandy Shore.

Mollusca

7.7.20 3 mollusca species – *Anomalocardia* sp., *Batillaria zonalis* & *Meretrix meretrix* – were recorded on Sandy Shore. All of them are not considered as species with conservation importance.

7.8 Evaluation of Habitat

7.8.1 The ecological value of habitats have been evaluated according to EIAO-TM Annex 8 Table 2.

Table 7.7: Ecological Value of Watercourse – Wang Tong River

Criteria	Watercourse – Wang Tong River
Naturalness	Semi-artificial
Size (Length)	~ 660 m
Diversity	Low to moderate flora & fauna diversity
Rarity	Habitat: Common in Hong Kong Species: 2 avifauna species – Little Egret & White-throated Kingfisher – and 2 fish species – Indo-Pacific tropical sand goby & Predaceous chub – with conservation importance were recorded in recent surveys.
Recreatability	Difficult to Recreate
Fragmentation	Very Minor
Ecological linkage	Linked with woodland on bankside, marsh, sandy shore & marine water.
Potential value	Moderate, if all domestic discharge points are removed
Nursery / breeding ground	Nursery ground of 1 avifauna (Oriental Magpie Robin) and 7 fish species (Goby, Mangrove snapper, Grey mullet, Predaceous chub, Spotted scat, White-spotted rabbit fish & Jarbua terapon)
Age	N.A.
Abundance/ Richness of Wildlife	Low – Moderate
Ecological value	**Low – Moderate**

Table 7.8: Ecological Value of Watercourse – River Silver & Minor Watercourses

Criteria	Watercourse	
	River Silver	**Minor Watercourses**
Naturalness	Artificial	Natural or Semi-artificial
Size (Length)	~ 430 m	N.A.
Diversity	Low flora & fauna diversity	
Rarity	Habitat: Common in Hong Kong Species: 8 avifauna species having conservation importance – Great Egret, Grey Heron, Chinese Pond Heron, Eastern Cattle Egret, Striated Heron, Little Egret, White-throated Kingfisher & Black-crowned Night Heron – were recorded in past study, while 1 avifauna species with conservation importance – Little Egret – was recorded in recent surveys.	Habitat: Common in Hong Kong Species: 1 fish species with conservation importance – Small snakehead – was recorded in recent surveys.
Recreatability	Difficult to Recreate	Difficult to Recreate
Fragmentation	Un-fragmented	
Ecological linkage	Linked with marine water and three major tributaries in Pak Ngan Heung, Luk Tei Tong and Tai Tei Tong	Linked with Wang Tong River
Potential value	Low	
Nursery / breeding ground	No nursery or breeding ground identified	
Age	N.A.	
Abundance/ Richness of Wildlife	Very Low	
Ecological value	**Low**	**Low**

Table 7.9: Ecological Value of Developed Area and Sandy Shore

Criteria	Developed Area	Sandy Shore
Naturalness	Artificial	Naturally formed, and utilized for recreational use
Size / Length	~ 22.2 ha	~ 670 m
Diversity	Low to moderate flora & fauna diversity, but largely exotic	Low flora & fauna diversity
Rarity	Habitat: Common in Hong Kong Species: 2 uncommon butterfly species were recorded in recent surveys	Habitat: Common in Hong Kong Species: 2 avifauna species with conservation importance – Little Egret & Pacific Reef Heron – were recorded in recent surveys
Recreatability	Recreateable	Difficult to Recreate
Fragmentation	Minor	Fragmented by Wang Tong River
Ecological linkage	No significant ecological linkage to surrounding was identified	Linked with Wang Tong River & marine water
Potential value	Low	
Nursery / breeding ground	Nursery ground of 3 avifauna (Crested Myna, Barn Swallow & Eurasian Tree Sparrow), 1 lizard (Changeable Lizard) and 1 butterfly species (Angled Castor). Breeding ground of 2 avifauna (Black-collared Starling & Barn Swallow) and 1 butterfly species (Angled Castor).	Nursery ground of 1 mammal (Domestic Ox), 1 avifauna (Oriental Magpie Robin) and 1 crustacean species (*Ocypode ceratophthalma*)
Age	Major development within 40 years	N.A.
Abundance/ Richness of Wildlife	Low to moderate	Very Low
Ecological value	**Low**	**Low**

Table 7.10:Ecological Value of Woodland and Marsh

Criteria	Woodland	Marsh
Naturalness	Natural	Natural
Size	~ 21.4 ha	~ 1.9 ha
Diversity	Low flora & fauna diversity	
Rarity	Habitat: Common in Hong Kong Species: 2 plant species with conservation importance – *Aquilaria sinensis* & *Diospyros vaccinioides* – were recorded in past study. 1 plant species (*Aquilaria sinensis*), 1 avifauna (Greater Coucal) & 1 butterfly (Metallic Cerulean) species with conservation importance were recorded in recent surveys. 1 uncommon butterfly species was also recorded in recent surveys.	Habitat: Uncommon in Hong Kong Species: 4 avifauna species with conservation importance – Eastern Cattle Egret, Little Egret, White-throated Kingfisher & Black-crowned Night Heron – were recorded in recent surveys 1 uncommon mammal species was found in recent surveys.
Recreatability	Difficult to Recreate	Difficult to Recreate
Fragmentation	Minor	Un-fragmented
Ecological linkage	Linked with Wang Tong River	
Potential value	Low	
Nursery / breeding ground	Breeding ground of 1 avifauna species (White-breasted Waterhen)	No nursery or breeding ground identified
Age	N.A.	N.A.
Abundance/ Richness of Wildlife	Low	Low
Ecological value	**Low - Moderate**	**Low**

Table 7.11: Ecological Value of Abandoned Agricultural Land and Shrubland/Grassland

Criteria	Abandoned Agricultural Land	Shrubland/Grassland
Naturalness	Semi-artificial	Natural
Size	~ 2.1 ha	~ 2.9 ha
Diversity	Very low flora & fauna diversity	
Rarity	Habitat: Common in Hong Kong Species: 1 butterfly (Metallic Cerulean) species with conservation importance was recorded in recent surveys	Habitat: Common in Hong Kong Species: No species with conservation importance was recorded
Recreatability	Recreateable	Recreateable
Fragmentation	Minor – Moderate	
Ecological linkage	Near woodland in Butterfly Hill	No significant ecological linkage to surrounding was identified
Potential value	Low	
Nursery / breeding ground	No nursery or breeding ground identified	No nursery or breeding ground identified
Age	10 - 20 years	N.A.
Abundance/ Richness of Wildlife	Low	Very Low
Ecological value	**Low**	**Very Low**

Table 7.12:Ecological Value of Marine Water

Criteria	Marine Water
Naturalness	Natural
Size	~ 23.5ha
Diversity	Low
Rarity	Habitat: Common in Hong Kong Species: No species with conservation importance was recorded
Recreatability	Difficult to Recreate
Fragmentation	Not fragmented
Ecological linkage	Linked with Wang Tong River and River Silver
Potential value	Low
Nursery / breeding ground	No nursery or breeding ground identified
Age	N.A.
Abundance/ Richness of Wildlife	Low
Ecological value	**Low**

7.9 Identification of Ecological Impacts

7.9.1 The Project could be divided into 3 major parts: 1.) construction of the new cycle bridge, 2.) demolition of the Old Bridge, and 3.) re-construction of pedestrian bridge. Habitats where bridges connected and where supporting piers were/will be located would be impacted directly. Surrounding habitats and their associated communities would be impacted indirectly by liquid contamination (water quality impact) and noise in construction and/or operational phases. No direct impact on intertidal / marine water habitats and their associated fauna is expected, as no marine works will be involved in this Project and construction equipment will be delivered to the Site on land after unloading at Mui Wo Pier.

7.9.2 Besides the breeding ground of Black-collared Starling (see **Section 7.9.4** for details) and the nursery ground of Oriental Magpie Robin (see **Section 7.9.5** for details) and 7 fish species (see **Section 7.9.6** for details), no species of conservation importance and breeding/nursery ground would be impacted directly by the Project.

Construction Phase

Direct Impact

7.9.3 Twin bridges will be constructed in sequence in order to maintain access across Wang Tong River. Each bridge will take around nine months to complete. The temporary work boundary of the Project would take up about 902m^2 of Sandy Shore (in which 226m^2 will be lost permanently as new abutments and columns, see **Section 7.9.13** & **Figure 7.3** for details), 204m^2 of Developed Area, and 91m^2 of Wang Tong River (see **Figure 7.3**). Affected Sandy Shore and Developed Area were mostly exposed with sand and concrete respectively. Vegetation found was limited, and was mainly ruderal species (e.g. *Cenchrus echinatus* and *Melinis repens*) with some cultivated trees (e.g. *Casuarina equisetifolia* and *Terminalia catappa*). No species with conservation importance was recorded in the directly affected area. 7 cultivated trees (2 individuals of *Casuarina equisetifolia*, 3 individuals of *Macaranga tanarius* var. *tomentosa* and 2 individuals of *Terminalia catappa*) on Sandy Shore and Developed Area encroached the Project alignment, hence they would be removed by either tree felling or transplantation.

7.9.4 Although a nest of Black-collared Starling (*Gracupica nigricollis*) was recorded on a *Casuarina equisetifolia* in the proposed works area, the individual of *C. equisetifolia* with bird nest would be retained. Also, as the breeding activity of Black-collared Starling does not rely on specific species and similar habitat (i.e. tall tree canopy) can easily be found in the surrounding, impact on the breeding activity of Black-collared Starling would be minor if the proposed mitigation measure (see **Section 7.11** for details) is implemented properly.

7.9.5 Although Wang Tong River and Sandy Shore (i.e. nursery grounds of Oriental Magpie Robin) would be impacted directly, the impacted area will be small (see **Table 7.13**). In addition, much of these habitats will remain unaffected. Therefore, the direct impact on nursery grounds of Oriental Magpie Robin would be insignificant.

7.9.6 Although the working area would encroach upon Wang Tong River, the River will only be narrowed by the cofferdam at the high water mark and the pier of Old Bridge in water. The water flow will not be completely blocked. No species with conservation importance was recorded in the directly affected area. Although the Wang Tong River was a nursery ground of 7 fish species (Goby, Mangrove snapper, Grey mullet, Predaceous chub, Spotted scat, White-spotted rabbit fish & Jarbua terapon), the impacted area would be small and the impact would only be short term. Therefore, direct impact on the fish nursery ground would be minor and reversible.

7.9.7 Despite there will be 971 m^2 temporary and 226 m^2 permanent (see **Section 7.9.13**) loss due to the new bridge construction (breakdown of each habitat is shown on **Table 7.13**), the affected area is relatively small in size, and hence the direct impact caused by the Project in construction phase will be minor.

Table 7.13: Summary of Habitat Loss

Habitats	Directly Impacted Area		
	Permanent	**Temporary**	**Total**
Watercourse – Wang Tong River	-	91 m^2	91 m^2
Developed Area	-	204 m^2	204 m^2
Sandy Shore	226 m^2	676 m^2	902 m^2
Total	**226 m^2**	**971 m^2**	**1197 m^2**

Indirect Impact – Water Quality

7.9.8 Although part of the working area will encroach Wang Tong River for establishing new bridges abutments, it will only occupy a small area along the edge of high water mark. No significant change in hydrodynamic in Wang Tong River is expected. Also, the working area will only impact on the River for short term (about 9 months for each bridge in construction phase only). During demolishing existing bridge column, a cofferdam extending 1m from the existing pier will be erected in the center of the river. Nevertheless, the working area will not block the river flow in both low and high tide, and the pier removal work is expected to last for a week only. Also, there will be minor improvement in water flow after removal of the pier. The construction impact on hydrodynamic will be small and temporary while the overall impact will be positive.

7.9.9 As the working area will encroach and close to Wang Tong River, if excavation is carried out within the course of the River without protection measures, surface runoff during heavy rain and accidental discharge of silty wastewater may increase suspended solids level in water. Accidental spillage of chemicals and untreated sewage could contaminate the River and cause water quality impact if uncontrolled. Water pollution in large quantity may affect the health and survival of wildlife in intertidal and marine water habitats as they are sensitive to water quality.

7.9.10 Nevertheless, the amount of water pollution will not be significant due to small project scale. Also, with proper implementation of water quality mitigation measures detailed in **Section 7.11**, the overall water quality impact on water courses and marine habitats during construction phase will be minor. Some of the mitigation measures are listed below:

- establishment of water-tight cofferdam around excavation area
- provision of working platform above water that can prevent falling of objects into water
- encourage workers to use nearby public toilets in Chung Hau Village and in Silvermine Bay Beach by placing signs onsite to direct their locations
- position chemical toilet away from waterbodies as far as possible and on stable, impermeable surface to minimize accidental leakage of sewage into waterbodies (i.e. placing chemical toilet with a drip tray underneath near the northern boundary of the

working area on the northern shore, which is of the greatest distance from Wang Tong River)

Indirect Impact – Noise

7.9.11 Noise produced in construction phase can be a nuisance to wildlife. The major noise sources would be the use of powered mechanical equipment (PME). While mitigation measures proposed in **Chapter 4 – Noise Impact Assessment** (e.g. use of silenced plants or quality powered mechanical equipment (QPME) and erection of noise barrier) shall be implemented to minimize the noise transmission, the residual noise would inevitably deter wildlife to utilize the nearby areas. Nevertheless, since the construction works would be localized the noise impact would be short term (about 9 months for each bridge), the overall noise impact in construction phase will be acceptable.

Cumulative Impact

7.9.12 Referring to **Section 2.8**, there are one planned and one ongoing projects within the Study Area: (1) Signature Project Scheme (Islands District) – Improvement Works at Silvermine Bay Beach, Mui Wo, Lantau Island by the Home Affairs Department (HAD) ; and (2) Upgrading of Mui Wo Sewage Treatment Works and Village Sewerage at Wang Tong and Yue Kwong Chuen managed by the DSD (Drainage Services Department). The programme of the former project will not overlap with that of this Project. The latter project involves minor works that do not require use of powered plant equipment or dusty works (e.g. painting works). No cumulative impact is expected.

Operational Phase

Direct Impact

7.9.13 About 226m^2 of Sandy Shore in total (i.e. about 222m^2 for abutments and about 4m^2 for columns, see **Figure 7.3** for details) will be permanently lost due to the Project , which is currently grown with cultivated trees. Nevertheless, as the existing bridge column in Wang Tong River will be demolished and no column or abutment will locate or encroach the Wang Tong River, the Project will permanently release about 0.18m^2 (or 0.35m in width) of the River. Since the ecological value of Sandy Shore is low and the permanently lost habitat is small in area, the direct impact caused by the Project in operational phase will be very minor.

Indirect Impact – Water Quality

7.9.14 Since no new column will be established in the River, the flow of River will not be blocked by the Project. As the Old Pier is not wide, removal of the pier is not expected to bring significant change in hydrodynamics of the river. Besides, as the Project will not generate wastewater, no water quality impact is expected in operational phase.

Indirect Impact – Noise

7.9.15 The New Bridge will replace the Old Bridge to serve as cycle track and footpath, no noise impact is expected in operational phase.

7.10 Evaluation of Ecological Impacts

7.10.1 The significance of ecological impact have been evaluated according to EIAO-TM Annex 8 Table 1 and Table 3.

Table 7.14: Evaluation of the significance of ecological impact on Watercourse – Wang Tong River

Criteria	Watercourse – Wang Tong River
Habitat quality	Low – Moderate
Species	2 avifauna & 2 fish species with conservation importance were found in recent surveys Overall low to moderate diversity & abundance
Impact Size / Abundance	Very small in size (i.e. ≈ 91 m^2) would be impacted directly Low to moderate number of fauna.
Impact Duration	Temporary loss as work area (≈ 91 m^2) in construction phase, but permanent release of existing bridge column in Wang Tong River (0.18m^2 in area or 0.35m in width). Indirect impact only in construction phase
Impact Reversibility	Reversible
Impact Magnitude	Habitat Loss: Minor Water Quality: Minor Noise: Minor
Overall Impact	**Minor**

Table 7.15: Evaluation of the significance of ecological impact on Watercourse – River Silver & Minor Watercourses

Criteria	Watercourse	
	River Silver	**Minor Watercourses**
Habitat quality	Low	Low
Species	8 avifauna species having conservation importance were recorded in past study, while 1 avifauna species with conservation importance was recorded in recent surveys. Overall low diversity & very low abundance	1 fish species with conservation importance was recorded in recent surveys. Overall low diversity & very low abundance
Impact Size / Abundance	Not directly affected	

Criteria	Watercourse	
	River Silver	**Minor Watercourses**
Impact Duration	Indirect water quality impact only in construction phase	
Impact Reversibility	Reversible	
Impact Magnitude	Habitat Loss: N.A. Water Quality: Insignificant Noise: Insignificant	
Overall Impact	**Insignificant**	**Insignificant**

Table 7.16:Evaluation of the significance of ecological impact on Developed Area and Sandy Shore

Criteria	Developed Area	Sandy Shore
Habitat quality	Low	Low
Species	2 uncommon butterfly species were recorded in recent surveys Overall low to moderate diversity & low abundance	2 avifauna species with conservation importance – Little Egret & Pacific Reef Heron – were recorded in recent surveys Overall low diversity & very low abundance
Impact Size / Abundance	Very small in size within the Study Area (i.e. ≈ 204 m^2). Very low number of fauna and flora.	Very small in size within the Study Area (i.e. ≈ 902 m^2). Very low number of fauna and flora.
Impact Duration	Temporary loss as work area (≈ 204 m^2) in construction phase	Permanently loss of ≈ 226 m^2 for bridge abutments and columns Temporary loss as work area (≈ 676 m^2) in construction phase
Impact Reversibility	Reversible	Irreversible for the bridge abutments and columns, reversible for temporary work area
Impact Magnitude	Habitat Loss: Minor Water Quality: Minor Noise: Minor	
Overall Impact	**Minor**	**Minor**

Table 7.17: Evaluation of the significance of ecological impact on Woodland & Marsh

Criteria	Woodland	Marsh
Habitat quality	Low - Moderate	Low
Species	2 plant species with conservation importance were recorded in past study. 1 plant, 1 avifauna & 1 butterfly species with conservation importance were recorded in recent surveys. 1 uncommon butterfly species was also recorded in recent surveys. Overall low diversity & low abundance	4 avifauna species with conservation importance were recorded in recent surveys. 1 uncommon mammal species was also recorded in recent surveys. Overall low diversity & low abundance
Impact Size / Abundance	Not affected directly	
Impact Duration	Indirect noise and water quality impact only in construction phase	Indirect noise and water quality impact only in construction phase
Impact Reversibility	Reversible	
Impact Magnitude	Habitat Loss: N.A. Water Quality: Insignificant Noise: Minor	
Overall Impact	**Minor**	**Minor**

Table 7.18: Evaluation of the significance of ecological impact on Abandoned Agricultural Land & Shrubland/Grassland

Criteria	Abandoned Agricultural Land	Shrubland/Grassland
Habitat quality	Low	Very Low
Species	1 butterfly species with conservation importance was recorded in recent surveys Overall very low diversity & low abundance	No species with conservation importance was recorded Overall very low diversity & very low abundance
Impact Size / Abundance	Not expected	
Impact Duration	Not expected	
Impact Reversibility	N.A.	
Impact Magnitude	Habitat Loss: N.A. Water Quality: N.A. Noise: N.A.	
Overall Impact	**N.A.**	**N.A.**

Table 7.19: Evaluation of the significance of ecological impact on Marine Water

Criteria	Marine Water
Habitat quality	Low
Species	No species with conservation importance was recorded
Impact Size / Abundance	Not affected directly
Impact Duration	Indirect water quality impact only in construction phase
Impact Reversibility	Reversible
Impact Magnitude	Habitat Loss: N.A. Water Quality: Minor Noise: N.A.
Overall Impact	**Very Minor**

Table 7.20:Evaluation of the significance of ecological impact on faunal and floral species with conservation importance

Species	Habitat Recorded	Habitat Use*	Protection status	Distribution	Rarity	Impact**
Plants						
Aquilaria sinensis (土沉香)	Woodland	-	1. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) 2. Listed as "Near Threatened" in Rare and Precious Plants of Hong Kong 3. Listed as "Vulnerable" in China Plant Red Data Book 4. Listed as "Vulnerable" by the IUCN Red List	Hainan, Guangdong, Guangxi, Taiwan, Yunnan	Common in Hong Kong	No impact expected
Avifauna* **						
Great Egret (*Ardea alba*)	Marine Water	Foraging	1. Listed as "Regional Concern" by Fellowes et al. (2002)	Widely distributed in Hong Kong	Common resident and winter visitor	W.Q.: Minor N.: Minor
Grey Heron (*Ardea cinerea*)	Marine Water	Foraging	1. Listed as "Potential Regional Concern" by Fellowes et al. (2002)	Found in Deep Bay area, Starling Inlet, Kowloon Park, Cape D'Aguilar	Common winter visitor	W.Q.: Minor N.: Minor
Eastern Cattle Egret (*Bubulcus coromandus*)	Marsh	Foraging	1. Listed as "Local Concern" by Fellowes et al. (2002)	Widely distributed in Hong Kong	Resident and common passage migrant	W.Q.: Minor N.: Minor
Greater Coucal (*Centropus sinensis*)	Woodland	NIL.	1. Listed as "Vulnerable" in China Red Data Book Status by Zheng & Wang (1998)	Widely distributed in Hong Kong	Common resident	N.: Minor
Little Egret (*Egretta garzetta*)	Sandy Shore, Marsh, Watercourse & Marine Water	Foraging	1. Listed as "Regional Concern" by Fellowes et al. (2002)	Widely distributed in coastal area throughout Hong Kong	Common resident	H.L.: Minor W.Q.: Minor N.: Minor
Pacific Reef Heron (*Egretta sacra*)	Sandy Shore & Marine Water	Foraging	1. Listed as "Rare" in China Red Data Book Status by Zheng & Wang (1998); 2. Listed as "Local Concern" by Fellowes et al. (2002)	Widely distributed in coastal area throughout Hong Kong	Uncommon resident	H.L.: Insignificant W.Q.: Minor N.: Minor
White-throated Kingfisher (*Halcyon smyrnensis*)	Marsh & Watercourse	NIL.	1. Listed as "Local Concern" by Fellowes et al. (2002)	Widely distributed in coastal areas throughout Hong Kong	Common resident	W.Q.: Minor N.: Minor

Species	Habitat Recorded	Habitat Use*	Protection status	Distribution	Rarity	Impact**
Black Kite (*Milvus migrans*)	Marine Water	NIL.	1. Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586); 2. Listed as "Regional Concern" by Fellowes et al. (2002)	Widely distributed in Hong Kong	Common resident and winter visitor	N.: Minor
Black-crowned Night Heron (*Nycticorax nycticorax*)	Marsh	NIL.	1. Listed as "Local Concern" by Fellowes et al. (2002)	Widely distributed in Hong Kong	Common resident and winter visitor	N.: Minor
Butterfly						
Metallic Cerulean (*Jamides alecto alocina*)	Woodland & Abandoned Agricultural Land	NIL.	-	Victoria Peak, Fung Yuen, Chuen Lung, Mui Wo	Very Rare	No impact expected
Fish						
Small snakehead (*Channa asiatica*)	Watercourse	NIL.	1. Listed as "Local Concern" by Fellowes et al. (2002)	Uncommon in the wild. Records from a few streams in North district and on Lantau Island. The fish is also cultivated in some fish farms and are available from fish market	Uncommon	No impact expected
Indo-Pacific tropical sand goby (*Favonigobius reichei*)	Watercourse	NIL.	1. Listed as "Near Threatened" by the IUCN Red List	Found in intertidal waters throughout Hong Kong	Common	H.L.: Minor W.Q.: Minor
Predaceous chub (*Parazacco spilurus*)	Watercourse	NIL.	1. Listed as "Vulnerable" by the China Red Data Book Status (Wang, Yue & Chen 1998)	A widespread species occurring in most unpolluted hill streams in both upper and lower courses	Common	W.Q.: Minor

* Only special behavior recorded, e.g. breeding, will be presented in "Habitat Use"
** H.L. = Habitat Loss; W.Q. = Water Quality Impact; N. = Noise Impact
*** All wild birds are protected under the Wild Animals Protection Ordinance (Cap. 170)

7.11 Recommendations & Mitigation Measures

7.11.1 Locations of abutments and columns of new bridges, and the method had undergone several rounds of selection to minimize ecological impacts as detailed in **Chapter 2**. Recommendations and mitigation measures have been proposed to minimize the ecological impact to acceptable levels based on the following hierarchy: avoidance, minimization and compensation.

7.11.2 Avoidance

- To avoid permanent impact on Wang Tong River, no abutment or support column will be located below high water mark

7.11.3 Minimization

- To minimize impact on the breeding activity of Black-collared Starling, before site clearance, the works area should be inspected by ecologist to confirm no active bird nest is present. If any active bird nest is identified, suitable size of buffer area should be established until the nest is abandoned.
- Erection of hoarding, fencing or provision of clear demarcation of work zones to remind workers not to damage area outside the work boundary
- Designate areas for placement of equipment, materials and wastes away from Wang Tong River and Silver Mine Bay
- To minimize water quality impact, all wastewater would be collected and treated up to standard stipulated in the discharge license before discharge
- To minimize water quality impact, all working areas encroaching Wang Tong River would be enclosed by cofferdam. All water found in the enclosed working areas would be treated as wastewater
- To minimize water quality impact, a solid working platform with toe board would be erected above Wang Tong River underneath the working areas, in order to prevent construction material, waste and/or scraps dropping into the River.
- Impermeable cover (e.g. tarpaulin) shall be erected above the working platform to prevent rainwater from falling into the working area. This can minimize surface runoff from the platform.
- Encourage workers to use nearby public toilets in Chung Hau Village and in Silvermine Bay Beach by placing signs onsite to direct their locations
- Position chemical toilet away from waterbodies as far as possible and on stable, impermeable surface to minimize accidental leakage of sewage into waterbodies (i.e. placing chemical toilet with a drip tray underneath near the northern boundary of the working area on the northern shore, which is of the greatest distance from Wang Tong River)

- Adopt good site practices, adopt QPME (Quality Powered Mechanical Equipment) and install noise barrier with cantilever to minimize noise emission and transmission, see **Chapter 4 – Noise Impact Assessment** for details).

7.12 Evaluation of Residual Impacts

7.12.1 About 226 m^2 of Sandy Shore will be permanently lost due to the new bridge construction. The loss of small area of low ecological value habitat is considered acceptable. With proper implementation of mitigation measures, no unacceptable residual impact is anticipated during construction and operational phases.

7.13 Environmental Monitoring and Audit Programme

7.13.1 Regular site audit shall be carried out in construction phase to ensure that the proposed mitigation measures are implemented properly. No monitoring and auditing programme would be required in operational phase.

7.14 Conclusion

7.14.1 Ecological sensitive areas recorded in the Study Area include Wang Tong River and Marsh in Tai Wai Yuen. 2 plants, 1 terrestrial mammal, 15 avifauna, 3 amphibians and 1 freshwater fish species with conservation importance were recorded in past studies, while 1 plant, 9 avifauna, 1 butterfly and 3 fish species with conservation importance were recorded in recent surveys.

7.14.2 Due to the construction of new twin bridges and the demolition of old bridge, small area of Sandy Shore (902 m^2 in total, in which 226 m^2 will be lost permanently), Developed Area (204 m^2 in total temporarily) and Wang Tong River (91 m^2 in total temporarily) will be impacted directly. No species of conservation importance is expected to be impacted directly. Furthermore, the Project will permanently release about 0.18 m^2 (or 0.35m in width) of Wang Tong River due to the demolition of the existing supporting column. Since the ecological value of each directly impacted habitat is low or low to moderate and the habitat loss is small in size, the impact due to habitat loss is considered to be minor.

7.14.3 Except Abandoned Agricultural Land & Shrubland/Grassland are not expected to be impacted, other habitats and fauna species in the Study Area are expected to be impacted indirectly by water quality and/or noise impacts in construction phase. Nevertheless, these indirectly impacts will be minor. No indirect impact is expected in operational phase.

7.14.4 With proper implementation of mitigation measures, un-acceptable residual impact is not expected. Regular site audit would only be required in construction phase.

7.14.5 The overall impact on terrestrial and aquatic ecology is considered as acceptable.

7.15 References

Agriculture, Fisheries and Conservation Department (AFCD). (2014). Hong Kong Biodiversity Online. [online] http://www.afcd.gov.hk/english/conservation/hkbiodiversity/database/search.asp. Accessed: 30 October 2014.

Carey G.J., Chalmers M.L., Diskin D.A., Kennerley P.R., Leader P.J., Leven M.R., Lewthwaite R.W., Melville D.S., Turnbull M. & Yong L. (2001): *The Avifauna of Hong Kong*. Hong Kong Bird Watching Society, Hong Kong SAR.

Chan S.F.K., Cheung K.S., Ho C.Y., Lam F.N. & Tang W.S. (2005): *A Field Guide to the Amphibians of Hong Kong*. Friends of Country Parks, Cosmos Books Ltd, Hong Kong SAR.

Chong D.H. & Dudgeon D. (1992). Hong Kong stream fishes: an annotated checklist with remarks on conservation status. *Memoirs of the Hong Kong Natural History Society* 19: 79-112.

ERCL HKU (Ecological Restoration and Conservation Laboratory, The University of Hong Kong) (2012). Reptiles of Hong Kong. [online] http://www.biosch.hku.hk/ecology/hkreptiles/index.html. Accessed: 24 August 2015.

Hong Kong Bird Watching Society (HKBWS). (2015). List of HK Birds. [online] http://www.hkbws.org.hk/BBS/attachment.php?aid=21769. Accessed: 24 August 2015.

Hong Kong Herbarium (2012). *Check List of Hong Kong Plants 2012*, Agriculture Fisheries and Conservation Department, Hong Kong SAR.

Hu Q., Wu T., Xia N., Xing F., Lai P.C.C. & Yip K. (2003), *Rare and Precious Plants of Hong Kong.* Agriculture, Fisheries and Conservation Department, Friends of the Country Parks, Cosmos Books Ltd, Hong Kong SAR.

Hung, S.K.Y. (2015). *Monitoring of Marine Mammals in Hong Kong Waters (2014-15) Final Report*. Hong Kong Cetacean Research Project [online] https://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/files/Final_Report_201415.pdf. Accessed: 27 July 2015.

IUCN. (2014). IUCN Red List of Threatened Species Version 2014.2. [online] www.iucnredlist.org. Accessed: 31 October 2014.

Lau M.W.N. & Dudgeon D. (1999). Composition and distribution of Hong Kong amphibian fauna. *Memoirs of the Hong Kong Natural History Society* 22: 1-80.

Metcalf & Eddy Limited (M&EL), (2005). Application No. EIA-110/2005 Drainage Improvements in Southern Lantau. Drainage Services Department, Hong Kong SAR.

Shek C.T. (2006): *A Field Guide to the Terrestrial Mammals of Hong Kong*. Friends of Country Parks, Cosmos Books Ltd, Hong Kong SAR.

PE&B HKU (Programmes of Ecology & Biodiversity, The University of Hong Kong). (2010). Images of Amphibians of Hong Kong. [online] http://www.biosch.hku.hk/ecology/hkamphibians/index.htm. Accessed: 24 August 2015.

Pun P.S.F. & Yeung K.Y.H. (2012). *Encyclopedia of Hong Kong Butterflies: Butterfly Identification*, 2nd Edition (in Chinese). Hong Kong Lepidopterists' Society, Hong Kong SAR.

So W.Y. & Lee W.H. (2010). Breeding ecology of White-bellied Sea Eagle (*Haliaeetus leucogaster*, 白腹海鵰) in Hong Kong – A Review and Update. *Hong Kong Biodiversity* 18: 1-8.

Tam T.W., Leung K.K., Kwan B.S.P., Wu K.K.Y., Tang S.S.H., So I.W.Y., Cheng J.C.Y., Yuen E.F.M., Tsang Y.M. & Hui W.L. (2011). The Dragonflies of Hong Kong. Friends of Country Parks, Cosmos Books Ltd, Hong Kong SAR.

Wang S., Yue P.Q. & Chen Y. Y. (1998). *China Red Data Book of Endangered Animals - Pisces* (in Chinese). Science Press, Beijing.

Zheng G. & Wang Q. (1998). *China Red Data Book of Endangered Animals - Aves*. Science Press, Beijing.

8. LANDSCAPE AND VISUAL IMPACTS

8.1 Introduction

8.1.1 This chapter of the report presents an assessment of the potential landscape and visual impacts associated with the New Wang Tong River Bridge, Mui Wo in accordance with the Environmental Impact Assessment Ordinance (EIAO) and the requirements of the EIA Study Brief (ESB- 256/2013) issued to HyD in March 2013. Both construction and operation impacts are assessed. The project boundary is illustrated in **Figure No. 8.1.**

8.1.2 The assessment includes:

- A listing of the relevant environmental legislation and guidelines;
- A definition of the scope and contents of the study, including a description of the assessment methodology;
- A review of the relevant planning and development control framework;
- A baseline study providing a comprehensive and accurate description of the baseline landscape resources, landscape character areas, zone of visual influence and key groups of existing and planned visually sensitive receivers (VSRs);
- Identification of the source of landscape and visual impacts;
- Recommendation of appropriate mitigation measures and associated implementation programmes;
- Assessment of the potential landscape and visual impacts, by taking into account the sensitivity of receivers, prediction of the magnitude of change experienced by the receivers and resulting potential impact significance, before and after the mitigation measures; and
- Clear evaluations and explanation with supportive arguments of all relevant factors considered in arriving at the significance thresholds of the landscape and visual impacts.

8.1.3 Colour photographs showing baseline conditions, and photomontages and illustrative materials supporting conclusions are provided and the locations of all viewpoints are clearly mapped. Photomontages at representative locations provide comparison between existing views; proposals on Day 1 after completion without mitigation; on Day 1 after mitigation, and in Year 10 after mitigation.

8.2 Scope and Content of Study

8.2.1 Preliminary Engineering Design Drawings of the proposed bridge construction are provided in **Figure 1.1**.

8.2.2 Major Work Components generating landscape and visual impacts include the following (refer to Chapter 2 for a more detailed description of the project components and the rationale behind the selected preliminary design):

(i) Demolition of existing footbridge deck and approach ramp to north;

(ii) Demolition of existing footbridge pier;

(iii) Modification of existing waterfront to north and south of bridge;

(iv) Felling of existing trees in vicinity of existing bridge;

(v) Construction of replacement twin bridges (pedestrian and cycle);

(vi) Construction of associated bridge lighting.

8.2.3 The exact layouts, designs and construction methods for individual components are subject to review during the ongoing detailed design stage of the project.

8.2.4 Consideration of Alternative Options

The alternative design options and opportunities available for the scheme in terms of the new bridge alignment, level, structural form, layout and construction methods have been considered and elaborated in **Chapter 2** of the EIA.

8.2.5 Limits of Study Area

The limit of the landscape impact study is 500 m beyond the boundary of the works (as stated in the EIA Study Brief), which is shown in **Figure 8.1**). The limit of the visual impact study is the Zone of Visual Influence (ZVI) of the works during the construction and operation phases (as stated in the EIA study brief, which is illustrated on **Figure No. 8.7.2**).

The scope of this assessment is be the temporary and permanent landscape and visual impacts resulting from the demolition of the existing footbridge and the construction and operation of the new twin pedestrian and cycle bridges.

8.3 Relevant Legislations, Standards & Guidelines

8.3.1 The following environmental legislation, standards and guidelines are applicable to the evaluation of landscape and visual impacts associated with the construction and operation of the project. Relevant guidelines and practices on tree management

published by Greening, Landscape and Tree Management Section (GLTM) of the DEVB are also listed.

(i) Environmental Impact Assessment Ordinance (Cap 499) and the Technical Memorandum on EIA Process (TM-EIAO), particularly Annexes 3, 10, 11, 18, 20 and 21;

- An Ordinance to provide for assessing the impact on the environment of certain projects and proposals, for protecting the environment and for incidental matters.
- The Technical Memorandum sets out the principles, procedures, guidelines, requirements and criteria for the technical content of an environmental impact assessment study brief or environmental impact assessment report.

(ii) Hong Kong Planning Standards and Guidelines;

- The Hong Kong Planning Standards and Guidelines (HKPSG) is a Government manual of criteria for determining the scale, location and site requirements of various land uses and facilities. Relevant chapters include Chapter 4: Recreation, Open Space and Greening; Chapter 10: Conservation and Chapter 11: Urban Design Guidelines.

(iii) Landscape Value Mapping of Hong Kong;

- Essential landscape baseline information to provide a systematic reference framework to facilitate landscape assessment and broad environmental assessment of major projects at territorial level.

(iv) EIAO Guidance Note No. 8/2010;

- The Environmental Impact Assessment Ordinance, (Cap 499) Guidance Note advises on the requirements in vetting Landscape and Visual Impact Assessment of designated projects under the Technical Memorandum on EIA Process for the Environmental Impact Assessment Ordinance.

(v) Town Planning Ordinance (Cap 131) and Town Planning (Amendment) Ordinance 2004;

- To promote the health, safety, convenience and general welfare of the community by making provision for the systematic preparation and approval of plans for the lay-out of areas of Hong Kong as well as for the types of building suitable for erection therein and for the preparation and approval of plans for areas within which permission is required for development.

(vi) Foreshore and Sea-bed (reclamations) Ordinance (Cap 127);

- To provide for the publication of proposals in respect of reclamations over and upon any foreshore and sea-bed; to make provision in respect of objections to the

proposals, the payment of compensation and connected matters; and to repeal the Public Reclamations and Works Ordinance (Cap 113, 1984 Ed.) and the Foreshores and Sea Bed Ordinance (Cap 127, 1984 Ed.).

(vii) Forests and Countryside Ordinance (Cap 96) and its subsidiary legislation the Forestry Regulations;

- To consolidate and amend the law relating to forests and plants, and to provide for the protection of the countryside.

(viii) Country Parks Ordinance (Cap 208);

- To provide for the designation, control and management of country parks and special areas.

(ix) Marine Parks Ordinance (Cap 476) and associated subsidiary legislation;

- To provide for the designation, control and management of Marine Parks and Marine Reserves.

(x) Protection of Endangered Species of Animals And Plants Ordinance (Cap. 586);

- To regulate the import, introduction from the sea, export, re-export, and possession or control of certain endangered species of animals and plants and parts and derivatives of those species; and to provide for incidental and connected matters.

(xi) SILTech Publication (1991) – Tree Planting and Maintenance in Hong Kong (Standing Interdepartmental Landscape Technical Group) [11-23];

(xii) GEO publication (1/2009) – Prescriptive Measures for Man-made Slopes and Retaining Walls;

(xiii) GEO 1/2011 – Technical Guidelines on Landscape Treatment for Slopes;

- This publication presents guidance on good practice for landscape treatments for man-made slopes and engineering works on natural terrain in Hong Kong.

(xiv) DEVB TC(W) No. 6/2015 – Maintenance of Vegetation and Hard Landscape Features;

- This circular sets out the departmental responsibilities for maintenance of vegetation and hard landscape features.

(xv) ETWB TCW No. 29/2004 – Registration of Old and Valuable Trees, and Guidelines for their Preservation;

- This circular sets out the procedures for registration of Old and Valuable Trees on unleased Government land within built-up areas and tourist attraction spots in village areas.

(xvi) ETWB TCW No. 5/2005 – Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works;

- This circular provides an administrative framework to better protect all natural streams/rivers from the impacts of construction works. The procedures promulgated under this Circular aim to clarify and strengthen existing measures for protection of natural streams/rivers from government projects and private developments.

(xvii) DEVB TC(W) No. 7/2015 - Tree Preservation;

- This circular sets out the policy on tree preservation, and the procedures for control of tree felling, transplanting and pruning in Government projects.

(xviii) WBTC No. 25/93 – Control of Visual Impact of Slopes;

- This circular outlines the design principles recommended to be used in designing manmade slopes for Public Works projects in order to reduce their adverse visual impact.

(xix) WBTC No. 17/2000 – Improvement to the Appearance of slopes in connection with WBTC 25/93;

- This circular outlines the principles and procedures recommended for all departments involved in new slope formation and in upgrading and maintenance of existing slopes for reducing the aesthetic and environmental impact of slope works.

(xx) WBTC No. 7/2002 – Tree Planting in Public Works;

- This circular affirms the advocated policy on tree planting which adopts a flexible and balanced approach in the planning and design of tree planting for public works projects.

(xxi) Latest Proper Planting Practices and other relevant guidelines issued by DevB (GLTM).

(xxii) DEVB TC(W) No. 2/2013 – Greening on Footbridges and Flyovers

- This Circular updates the policy and requirements for greening on new footbridges and flyovers in built up areas (including metro areas and new towns but excluding country parks).

8.3.2 Review of Relevant Planning and Development Control Framework

- A review will be undertaken of the relevant planning and development control framework for the landscape study area (500 m beyond the limit of the works). This is provided under Section 8.5.2.

8.4 Landscape and Visual Impact Assessment Methodology

8.4.1 General Approach

Landscape and visual impacts shall be assessed separately for the construction and operation phases. The assessment of landscape impacts shall involve the following procedures.

8.4.2 Landscape Impact Methodology

(i) Identification of the baseline Landscape Resources (LRs) and Landscape Character Areas (LCAs) found within the study area. This is achieved by site visits and desk-top studies of topographical maps, information databases and photographs. Reference is also made to the 'Landscape Value Mapping of Hong Kong' study.

(ii) Assessment of the degree of sensitivity to change of the LRs and LCAs. This is influenced by a number of factors including whether the resource/character is common or rare, whether it is considered to be of local, regional, national or global importance, whether there are any statutory or regulatory limitations / requirements relating to the resource, the quality of the resource / character, the maturity of the resource, and the ability of the resource/character to accommodate change. The sensitivity of each landscape feature and character area is classified as follows:

High:	Important landscape or landscape resource of particularly distinctive character or high importance, sensitive to relatively small changes
Medium:	Landscape or landscape resource of moderately valued landscape characteristics reasonably tolerant to change
Low:	Landscape or landscape resource, the nature of which is largely tolerant to change

(iii) Identification of potential sources of landscape change. These are the various elements of the construction works and operational procedures that would generate landscape change.

(iv) Identification of the magnitude of landscape change. The magnitude of the change depends on a number of factors including the physical extent of the change, the landscape and visual context of the change – i.e. a set circumstance/facts surrounding the change, the compatibility of the project with the surrounding landscape; and the time-scale of the change - i.e. whether it is temporary (short, medium or long term), permanent but potentially reversible, or permanent and irreversible. Landscape changes have been quantified wherever possible. The magnitude of landscape change is classified as follows:

Large:	The landscape or landscape resource would suffer a major change
Intermediate:	The landscape or landscape resource would suffer a moderate change
Small:	The landscape or landscape resource would suffer slight or barely perceptible changes
Negligible:	The landscape or landscape resource would suffer no discernible change
None:	The landscape or landscape resource would suffer absolutely no impact

(v) Identification of potential landscape mitigation measures. These may take the form of adopting alternative designs or revisions to the basic engineering and architectural design to prevent and/or minimise adverse impacts; remedial measures such as colour and textural treatment of building features; and compensatory measures such as the implementation of landscape design measures (e.g. tree planting, creation of new open space etc.) to compensate for unavoidable adverse impacts and to attempt to generate potentially beneficial long term impacts. A programme for the mitigation measures is provided. The agencies responsible for the funding, implementation, management and maintenance of the mitigation measures are identified and their approvals-in-principle are being sought.

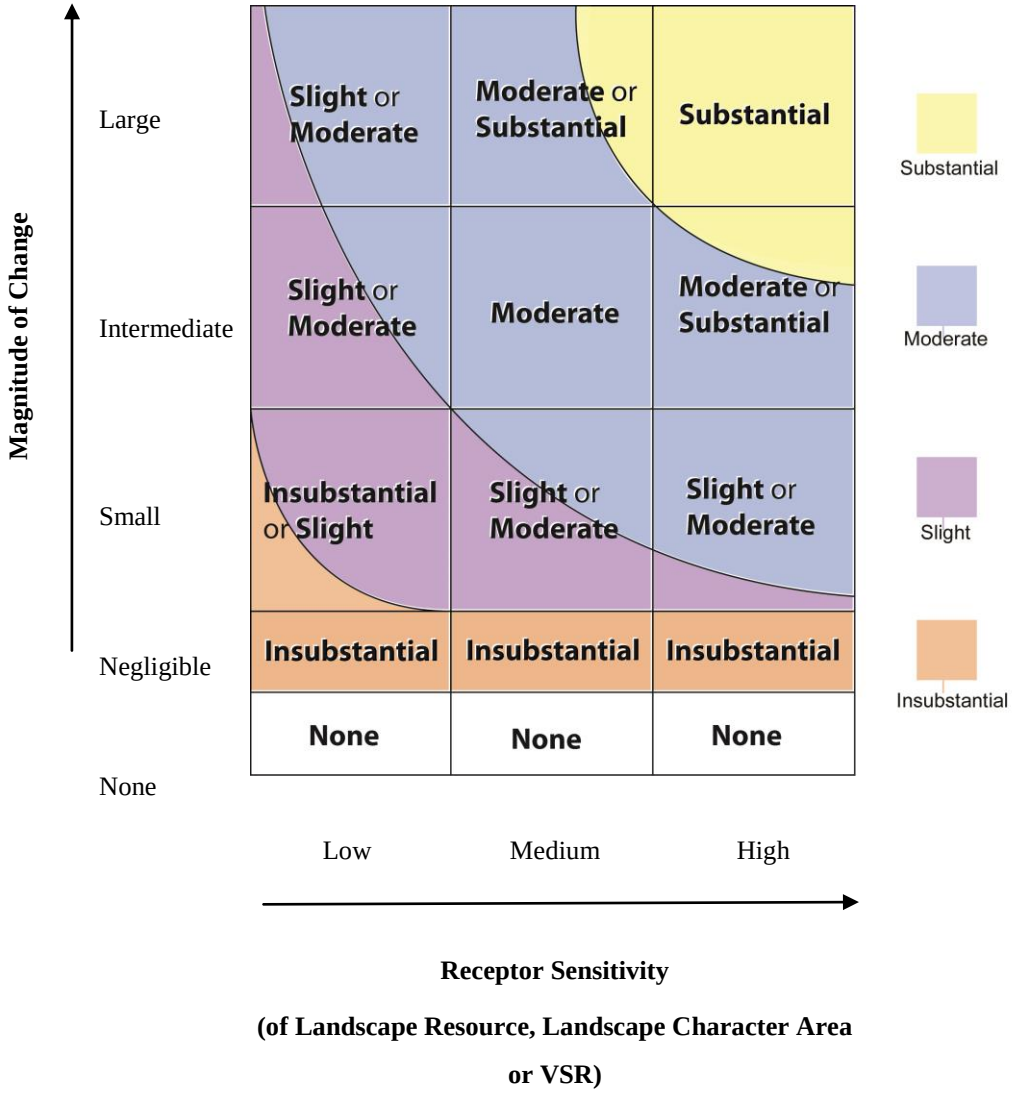
(vi) Prediction of the significance of landscape impacts before and after the implementation of the mitigation measures. By synthesising the magnitude of the various changes and the sensitivity of the various landscape resources it is possible to categorise impacts in a logical, well-reasoned and consistent fashion.

Table 8.1 shows the rationale for dividing the degree of significance into four thresholds, namely insubstantial, slight, moderate, and substantial, depending on the combination of a negligible-small-intermediate-large magnitude of change and a low-medium-high degree of sensitivity of the LRs / LCAs. The significance thresholds are defined as follows:

Substantial:	Adverse / beneficial impact where the proposal would cause significant deterioration or improvement in existing landscape quality
Moderate:	Adverse / beneficial impact where the proposal would cause a noticeable deterioration or improvement in existing landscape quality
Slight:	Adverse / beneficial impact where the proposal would cause a barely perceptible deterioration or improvement in existing

	landscape quality
Insubstantial:	No discernible change in the existing landscape quality
None	Absolutely no change in the existing landscape quality

Table 8.1: Relationship between Receptor Sensitivity and Magnitude of Change in Defining Impact Significance



Note:

The colours in the above table categorise the total spectrum of impacts rising from the lowest value at the bottom left corner to the highest value at the top right corner. It may be seen that for some combination of classification levels of Magnitude of Change and Receptor Sensitivity, there are 2 possible impact significance thresholds. When the Magnitude of Change and Receptor Sensitivity are assessed to be towards the higher ends of each classification level the resultant impact significance would be deemed to be the higher of the two impact significance thresholds.

(vii) Prediction of Acceptability of Impacts. An overall assessment of the acceptability, or otherwise, of the impacts according to the five levels of significance set out in Annex

10 of the EIAO-TM is stated in the conclusion in Section (iv). According to Annex 10, the evaluation of landscape and visual impacts may be classified into five levels of significance based on type and extent of the effects concluded in the EIA study:

- The impact is **beneficial** if the project will complement the landscape and visual character of its setting, will follow the relevant planning objectives and will improve overall and visual quality;
- The impact is **acceptable** if 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;
- The impact is **acceptable with mitigation measures** if there will be some adverse effects, but these can be eliminated, reduced or offset to a large extent by specific measures;
- The impact is **unacceptable** if the adverse effects are considered too excessive and are unable to mitigate practically;
- The impact is **undetermined** if 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.

8.4.3 Visual Impact Methodology

(i) Landscape and visual impacts are assessed separately for the construction and operation phases. The assessment of visual impacts has involved the following procedures.

(ii) **Identification of the Visual Envelope and Zones of Visual Influence (ZVI) during the construction and operation phases.** The visual envelope is the area from which any part of the proposed project can be seen and may contain areas, which are fully visible, partly visible and non-visible from the project. The ZVI is the portion of the visual envelope that is within 10 km from the proposed project. Identification of the visual envelope and ZVI is achieved by site visits and desk-top studies of topographic maps and photographs to determine the visibility of the project from various locations. Given the effects of distance and the panoramic qualities of many views, VSRs beyond 10 km from the project will scarcely notice it (and will find it very difficult to distinguish) in their wider views. At these distances, the proposed project will not form a feature of any significance in the VSR's frame of view and consequently will not influence the visual experience of the VSR. Hence 10 km is considered the ultimate limit of the Zone of Visual Influence.

(iii) **Identification of the Visually Sensitive Receivers (VSRs) within the ZVI at construction and operation phases.** These are the people who would reside within,

work within, play within, or travel through, the ZVI. VSRs at both existing and committed developments will be considered in this assessment.

(iv) **Assessment of the degree of sensitivity to change of the VSRs.** Factors considered include:

- The type of VSRs, classified according to whether the person is at home, at work, at play, or travelling. Those who view the impact from their homes are considered to be highly sensitive as the attractiveness or otherwise of the outlook from their home will have a substantial effect on their perception of the quality and acceptability of their home environment and their general quality of life. Those who view the impact from their workplace are considered to be only moderately sensitive as the attractiveness or otherwise of the outlook will have a less important, although still material, effect on their perception of their quality of life. The degree to which this applies depends on whether the workplace is industrial, retail or commercial. Those who view the impact while taking part in an outdoor leisure activity may display varying sensitivity depending on the type of leisure activity. Those who view the impact while travelling on a public thoroughfare will also display varying sensitivity depending on the speed of travel.
- Other factors which are considered (as required by EIAO GN 8/2010) include the value and quality of existing views and views from planned developments, the availability and amenity of alternative views, the duration or frequency of view, and the degree of visibility.

(v) The sensitivity of VSRs is classified as follows:

High: The VSR is highly sensitive to any change in their viewing experience

Medium: The VSR is moderately sensitive to any change in their viewing experience

Low: The VSR is only slightly sensitive to any change in their viewing experience

(vi) **Identification of the relative numbers of VSRs.** This is expressed in terms of whether there are very few, few, many or very many VSRs in any one category of VSR.

(vii) **Identification of potential sources of visual impacts.** These are the various elements of the construction works and operational procedures that would generate visual impacts.

(viii) **Assessment of the potential magnitude of visual change.** Factors considered include:

Duration and Frequency of the impact:	Temporary / Permanent: This refers to the long term presence of the visual change – whether it is experienced by the VSR for the whole duration of the construction phase or operation phase, or only part thereof. Intermittent / Continuous: This refers to short term frequency of the visual change - is it always visible (continuous) or only at certain times (intermittent). For example, travelling VSRs may only see the source intermittently as they travel along their journey, whereas residential VSRs may have continuous views from their living room.
Reversibility of the impact:	Reversible / Irreversible
Compatibility of the project with the Visual Backdrop:	High / Medium / Low
Distance of the source of impact from the viewer:	Shortest distance measured in metres (m) between the VSR and the source.
Degree of visibility of Source(s) of Visual Impact:	Full: virtually full uninterrupted view of the source of impact Partial: partial view of the source of impact which is slightly hidden by intervening elements such as buildings, vegetation etc. Obscured: partial view of the source of impact which is largely hidden by intervening elements such as buildings, vegetation etc.
Scale of the development	Small / Medium / Large
Potential Blockage of Existing Views	Full / Partial / Slight / Negligible: The degree to which the source of the impact blocks existing open views currently experienced by the VSR.

(ix) The magnitude of visual change is classified as follows:

Large:	The VSRs would suffer a major change in their viewing experience;
Intermediate:	The VSRs would suffer a moderate change in their viewing experience;
Small:	The VSRs would suffer a small change in their viewing experience;
Negligible:	The VSRs would suffer no discernible change in their viewing experience;
None	The VSRs would suffer absolutely no change in their viewing experience.

(x) **Identification of potential visual mitigation measures.** These may take the form of adopting alternative designs or revisions to the basic engineering and architectural design to prevent and/or minimise adverse impacts; remedial measures such as colour and finishing treatment of building features; and compensatory measures such as the implementation of landscape design measures (e.g. tree planting, creation of new open space etc.) to compensate for unavoidable adverse impacts and to attempt to generate potentially beneficial long term impacts. A programme for the mitigation measures shall be provided. The agencies responsible for the funding, implementation, management and maintenance of the mitigation measures shall be identified and their approval-in-principle shall be sought.

(xi) **Prediction of the significance of visual impacts before and after the implementation of the mitigation measures.** By synthesising the magnitude of the various visual changes and the sensitivity of the VSR, and the number of individuals in the VSR that are affected, it is possible to categorise the degree of significance of the impacts in a logical, well-reasoned and consistent fashion.

Table 8.1 shows the rationale for dividing the degree of significance into four thresholds, namely, insubstantial, slight, moderate and substantial, depending on the combination of a negligible / small / intermediate / large magnitude of change and a low / medium / high degree of sensitivity of VSRs. Consideration is also given to the relative numbers of individuals in the VSRs in predicting the final impact significance - exceptionally low or high numbers of individuals in a VSR may change the result that might otherwise be concluded from a consideration of the type of the VSRs alone.

Table 8.1 The significance of the visual impacts is categorised as follows:

Substantial:	Adverse / beneficial impact where the proposal would cause significant deterioration or improvement in existing visual quality perceived by the general population;
Moderate:	Adverse / beneficial impact where the proposal would cause a noticeable deterioration or improvement in existing visual quality perceived by the general population;
Slight:	Adverse / beneficial impact where the proposal would cause a barely perceptible deterioration or improvement in existing visual quality perceived by the general population;
Insubstantial:	No discernible change in the existing visual quality perceived by the general population;
None	Absolutely no change in the existing visual quality perceived by the general population.

(xii) **Prediction of Acceptability of Residual Impacts.** An overall assessment of the acceptability or otherwise of the residual impacts 10 to 15 years after implementation of visual mitigation measures, according to the five criteria set out in Annex 10 of the EIAO TM is provided.

8.4.4 Other Considerations

(i) In accordance with EIAO Guidance Note 8/2010 (paragraph 3.7(a)) approved projects should form part of the baseline conditions. Therefore, the landscape and visual outcomes (including proposed landscape and visual mitigation measures) of approved projects currently under construction, should be included as part of the baseline. Details of relevant concurrent projects are provided in **Section 8.5.2.**

(ii) All mitigation proposals in the EIA report shall be practical and achievable within the known parameters of funding, implementation, management and maintenance. The suggested agents for the funding and implementation (and subsequent management and maintenance, if applicable) are indicated in the EIA report. Approvals-in-principle to the implementation, management and maintenance of the proposed mitigation measures in **Tables 8.6** and **8.7** have been sought and obtained from the appropriate authorities.

8.4.5 Photomontages

(i) Representative views from various locations have been selected to illustrate the effectiveness of the proposed impact mitigation proposals and residual impacts of the

development in both the short and long term. Photomontages illustrating the proposed works and the recommended mitigation measures are listed in **Section 8.7.4**. The locations of the selected viewpoints are indicated on **Figure 8.7.2** with the views and photomontages illustrated on **Figures 8.12.1** to **8.16**. The photomontages illustrate the proposed development under the following scenarios:

- Existing Baseline Conditions;
- Day 1 of completed works without mitigation measures;
- Day 1 of the completed works with mitigation measures; and
- The completed works with mitigation after 10 years.

8.5 Baseline Conditions

8.5.1 Landscape Study Area

The landscape impact study area is 500m from the works boundary surrounding the existing Wang Tong River Bridge and is illustrated on **Figure 8.1**. To the north the Study Area includes Silver Mine Bay Beach, the flat lowland Wang Tong valley and the coastal upland hills which form part of the Lantau North Country Park Extension. To the east, the Study Area includes the sea area of Silver Mine Bay. To the south lies the peripheral residential areas of Mui Wo and to the west lies Chung Hau, Ling Tsui Tau and the vegetated Butterfly Hill.

8.5.2 Committed and Approved Projects under Construction

In accordance with EIAO Guidance Note 8/2010 (paragraph 3.7(a)) approved projects to be completed before commencement of this project, should form part of the baseline conditions. The following approved projects have been identified within the vicinity of the project site.

(a) ***Improvement Works at Mui Wo:*** Following public consultation and a feasibility study to enhance the environment and attractiveness of Mui Wo and explore the recreational potential of Mui Wo, the Islands District Council endorsed the implementation of a number of improvement works. CEDD is implementing the works by phases in the town centre of Mui Wo, particularly from the ferry pier leading to Silvermine Bay Beach. Phase 1 of the works started in July 2014 with a target completion date of 2016. The current works do not have a direct interface with the New Wang Tong River Bridge.

(b) ***Improvement Works at Silvermine Bay Beach:*** The Islands District Council proposes to undertake improvement works under the Signature Projects Scheme to rejuvenate Silvermine Bay Beach and achieve synergy with the CEDD project. The proposed works include:

- Demolition of the existing beach service buildings;
- Construction of new beach buildings and associated beach facilities;
- Construction of new barbeque pit area and sitting-out area; and
- Construction of a viewing deck near the entrance to the beach.

A plan of the proposed improvement works is provided in **Appendix 8B.** The works are intended to commence in January 2016 and be completed in 2018 (as per programme stated in Legco Paper, however the latest programme from the Project Architect is completion on 1 January 2017). The project will adopt a modern design for the beach facilities and buildings. There is no direct interface between the proposals and those of the New Wang Tong River Bridge and there appears to be no conflict in the proposed preliminary design for the New Wang Tong River Bridge which also adopts a contemporary style. However, any unforeseen interface requirements can be addressed at the Detail Design Stage of the project.

(c) ***Contract No. DC/2012/02 – Upgrading of Mui Wo Sewage Treatment Works and Village Sewerage at Wang Tong and Yue Kwong Tsuen:*** these DSD works include the construction of a section of sewer in the vicinity of the existing Wang Tong River Bridge. These works are substantially complete and reinstatement of road, cycle track and footpath surfaces is anticipated to be completed before commencement of the New Wang Tong River Bridge construction works.

8.5.3 Review of Current Land Uses

A review of the current land-uses within the study area is provided below. The existing LRs and LCAs within the study area have been identified and are described in Sections **8.5.4** and **8.5.5**. The sensitivities of the LRs and LCAs have been summarised in **Table 8.2** and **Table 8.3**.

(i) The study area lies within Mui Wo Layout Plan No. L/I-MWN/IB and L/I-MWC/1F. The land use planning control of the Ferry Pier Area, Mui Wo Town Centre and Silver Mine Bay Beach waterfront area etc. are governed by the above mentioned Layout Plans.

(ii) The western edge of the study area falls within the Mui Wo Fringe Outline Zoning Plan (OZP) No. S/I – MWF/10, an extract of which is shown on **Figure 8.2.**

(iii) The objective of the plan is to specify the broad land use zonings and major transport network so that any development will be under statutory planning control.

(iv) The following land use zonings fall within the western edge of the Study Boundary and the planning intention is described below:

- **Agriculture ("AGR"):** This zoning is intended to retain and safeguard good

quality existing agricultural land/farm/fish ponds for agricultural purposes and fallow arable land with good potential for rehabilitation for cultivation and other agricultural purposes.

- **Open Space ("O"):** the planning intention of this zone is to provide outdoor open-air space for active and/or passive recreation uses serving the needs of local residents as well as the general public.
- **Residential (Group A) "R(A)":** this zone is primarily intended for medium density residential developments. Commercial uses are always permitted on the ground floor of a building or in the purpose-designed non-residential portion of an existing building.
- **Green Belt ("GB"):** This zone is intended primarily to define the limits of urban and sub-urban development areas by natural features and to protect natural landscape as well as to provide passive recreational outlets for local population and visitors. There is a general presumption against development within this zone.
- **Government, Institution or Community (G/IC"):** This zone is intended primarily for the provision of government, institution or community facilities serving the needs of the local residents and a wider district. It is also intended to provide land for uses directly related to or in support of the work of the government organisations providing social services to meet community needs, and other institutional establishments.
- **Recreation ("REC"):** This zone is intended primarily for the use of the general public. It encourages the development of active and/or passive recreation and tourism/eco-tourism. Uses in support of the recreational developments may be permitted subject to planning permission.

Designated Country Park

Lantau Country Park lies to the west of Mui Wo and the limit of the Mui Wo Fringe OZP No. S/I – MWF/10. The Lantau North (Eastern Extension) Country Park eastern extension encompasses the vegetated hills to the north and east. The proposed project does not physically impact either of the Country Park areas.

Bridge Environs

The northern edge of the built-up area of Mui Wo is delineated by the Wang Tong River and this marks the transition to smaller scale village type development, flat river valley and beach frontage. The existing Wang Tong River Bridge spans the Wang Tong River where it meets Silver Mine Bay Beach. The Large Silver Mine Bay Beach Resort Hotel and a formal tree lined beach promenade lies to the south and village type development lies to the west with the steep, densely vegetated slopes of Butterfly Hill behind. To the north, semi natural lowland vegetation (former agricultural land) lies behind the beach with the village of Wang Tong beyond. The bridge connects the promenade to the south with Silver Mine Bay Beach to the north which forms a broad sandy crescent curving to the north east. The back of the beach is defined by a recently upgraded promenade which is used by unsegregated pedestrians, cyclists and small village powered vehicles. A mixture of residential, commercial and municipal buildings lie behind the promenade including small shops, hotels, life guard and public beach changing facilities. Silver Mine Bay lies to the east.

Conclusion

The proposed project is for the replacement and upgrading of an existing community facility, and it is therefore considered that there is no conflict with the relevant planning and development control framework, as it is consistent with the planning intention of "Footbridge" as stipulated on Mui Wo Layout Plan No. L/I-MWN/1B.

8.5.4 Landscape Resources (LRs)

(i) The baseline LRs that fall within the landscape impact study area during the construction phase and operation phase, together with their sensitivity to change, are described below and tabulated in **Table 8.2**. The locations of the LRs are mapped on **Figure No. 8.3**. Photo-views illustrating the LRs within the study area are illustrated on **Figure No. 8.4.1** to **8.4.5**. For ease of reference and co-ordination between text, tables and drawings, each LR is given an identity number. Roads and pavement are not considered as Landscape Resources and have not been included in the mapping of resources. **Figure No. 8.3** attempts to formalize boundaries between distinct areas of Landscape Resources for the purpose of impact assessment, and should not be construed as reflecting every variable on the ground.

LR1 –Coastal Waters

(ii) This landscape resource consists of the sea area within the enclosed tidal bay of Silver Mine Bay. The approximate area is 28 ha. Given the uniqueness of the bay marine environment, the scenic value and the resource's low tolerance to change, the sensitivity is assessed as ***High***.

LR2a – Wang Tong River

(iii) The Wang Tong River flows though the Study Area from the north west to south east, passing under the existing Wang Tong Bridge and continuing across Silver Mine Bay Beach to the sea. The River is shallow and non-navigable, and the lower reaches are tidal. Although it flows through the agricultural Wang Tong Valley, the river channel is largely natural and provides a habitat and breeding ground for avifauna and fish (refer to Ecological Assessment chapter). The approximate length within the study area is 700 m. The northern bank is lined with small trees and shrubs, primarily *Hibiscus tiliaceus* with smaller numbers of *Ficus subpisocarpa, Litsea glutinosa, Macaranga tanarius* var. *tomentosa, Melia azardarach, Pandanus tectorius, Syzygium samaragense and Wedelia trilobata*. Mangrove species (*Aegiceras corniculatum* and *Acanthus ilicifolius*) are also found in the River. Whilst the value of the ecological habitats within this resource have been rated as low, given that natural rivers are under threat and a disappearing resource in Hong Kong and that this resource is difficult to recreate the sensitivity is assessed as ***High***.

LR2b – River Silver

(iv) The River Silver flows from the west through the town area of Ling Tsui Tau until it meets the sea of Silver Mine Bay. The river has been largely channelized with engineered banks to control flooding and the lower reaches have been widened to create a broad, sheltered navigable mooring area for fishing and pleasure boats. The approximate length of the River Silver is 800m. Whilst the river is an attractive and well-used resource, given the high degree of intervention along this channel, the tolerance to further change is considered high and the sensitivity is assessed as *Medium*.

LR4 – Upland Streams

(v) Several upland streams drain off the natural vegetated slopes in the north of the Study Area and into the Wang Tong River. They have a combined approximate length of 850m. Given their scenic and ecological value and low tolerance to change their sensitivity is assessed as ***High***.

LR5 – Natural Rocky Coastline

(vi) The coast within the study Area consists largely of engineered stone-clad revetments and natural sandy shoreline. There is an outcrop of natural granite at the northern end of Silver Mine Bay Beach which forms an attractive small headland. The approximate area is 530 sq.m. Given its scenic value and that this is the only remaining natural rocky coast within the Study Area, the sensitivity is assessed as ***High***.

LR6 – Silver Mine Bay Beach

(vii) Silver Mine Bay Beach stretches from the River Silver in the south all the way to the northern corner of Silver Mine Bay and is a popular, highly used recreational resource. The sand is clean and fine and an ideal surface for relaxation and recreation. In addition, it provides a valuable marine habitat for flora and fauna. Floral species include *Casuarina equisitifolia*, *Hibiscus tiliaceus*, *Ipomoea pes-caprae*, *Macaranga tanarius* var. *tormentosa, Terminalia catappa and Wedelia trilobata.* The approximate area within the Study Boundary is 1.6 ha. Given that this resource is both a valuable ecosystem has a heavily-used recreational venue and cannot be replaced, the sensitivity is assessed as *High*.

LR7– Natural Upland Vegetation

(viii) The natural slopes of the surrounding hills support scrubby woodland vegetation. The area within the Study Boundary is approximately 30 ha. Species composition varies greatly and is primarily native with some exotic species and includes *Celtis sinensis, Ficus spp., Schefflera heptaphylla* forming the canopy with *Daphniphyllum calycinum, Ilex asprella and Litsea rotundifolia* var. *oblongifolia* found in the understory. The rare and precious plant *Aquilaria sinensis* was identified in woodland area by the ecological survey. However overall, given that this resource is relatively common and widespread and can be regenerated, the sensitivity is assessed as *Medium*.

LR8 - Semi-Natural Lowland Vegetation

(ix) The Wang Tong River Valley is an area of abandoned agricultural land and now supports areas of regenerated marsh (species including *Acrostichum aureum, Cyperus involucratus*), grassland/shrubland (*Melastoma sanguneum, Mikania micrantha*) and woodland habitats (*Hibiscus tiliaceus, Microcos nervosa, Tarenna attenuata*). Herb species include *Azolla imbricata, Ludwigia* spp. and *Zingiber officinale*. The approximate area is 6.9ha. Given its relatively disturbed nature and that the ecological assessment of value is generally low for the habitats within this Landscape Resource, the sensitivity is assessed as *Medium*.

LR9 - Urban/Domestic Amenity Planting

(x) The urban and village areas of Mui Wo include approximately 5ha of amenity planting including trees and shrubs planted by local councils on government land and/or private individuals in private lots. Tree and shrub species include typical street and park species including *Aglaia odorata* var. *microphyllina, Araucaria heterophlylla, Archontophoenix alexandrae, Bauhinia blakeana, Dimocarpus longan, Duranta erecta, Dypsis lutescens, Ficus microcarpa, Hibiscus tileaceus, Lagerstroemia speciosa, Mangifera indica, Playcladus orientalis, Rhododendron pulchrum, Rhododendron simsii, Terminalia catappa, Roystonea regia*. Two trees within this area are listed as

Old and Valuable Trees on the LCSD OVT Register: LCSD IS/2 – *Casuarina equisetifolia* (in the barbecue pits on the Silvermine Bay Beach promenade); LCSD IS/3 – *Ficus microcarpa* (on Chung Hau Street). Neither of these trees will be impacted. Whilst this planting contributes directly to the amenity of the town and village areas, it is generally exotic and non-native and does not generally consist of rare or precious species (OVTs exempted) and is replaceable. It is therefore assessed as having *Medium* sensitivity.

LR10 - Existing Trees in Vicinity of Wang Tong River Bridge

(xi) There are a number of existing trees in the immediate vicinity of the Wang Tong River Bridge growing either in the waterfront paved areas or Silver Mine Bay Beach. As they may be potentially impacted, a detailed tree survey has been undertaken in accordance with DEVB TC(W) 7/2015 (refer **Appendix 8A**). Surveyed trees total 19 no. and comprise the following species *Casuarina equisetifolia, Celtis sinensis, Ficus microcarpa, Hibiscus tiliaceus, Macaranga tanarius, Terminalia catappa.* Whilst the trees are neither registered Old and Valuable Trees nor rare or precious species, the trees are mature and do contribute to the immediate setting of the bridge and provide a positive visual backdrop to the back of the beach. Their health and amenity value is generally Fair to Good and their overall sensitivity is assessed as *Medium*.

Table 8.2: Landscape Resources

Ref. ID.	Description	Sensitivity to Change (Low, Medium, High)
LR1	Coastal waters Baseline: approx. 28ha	High
LR2a	Wang Tong River Baseline: approx.700 m	High
LR2b	River Silver Baseline: approx. 800m	Medium
LR4	Upland Streams Baseline: approx. 850m	High
LR5	Natural Rocky Coastline Baseline: approx. 530 m	High
LR6	Silvermine Bay Beach Baseline: approx. 1.6ha	High
LR7	Natural Upland Vegetation Baseline: approx. 30 ha	Medium
LR8	Semi-Natural Lowland Vegetation Baseline:: approx. 6.9ha	Medium

Ref. ID.	Description	Sensitivity to Change (Low, Medium, High)
LR9	Urban/Domestic Amenity Tree & Shrub Planting Baseline: approx. 5 ha	Medium
LR10	Existing Trees in vicinity of Wang Tong Bridge Baseline: 19 No.	Medium

8.5.5 Landscape Character Areas (LCAs)

Several LCAs have been identified within the study area with reference to the 'Landscape Value Map of Hong Kong' and refined with reference to existing conditions. These areas, and their sensitivity to change, are described below and tabulated in **Table 8.3**. The locations of the LCAs are indicated on **Figure 8.5.** Photographic views illustrating the LCAs within the study area are illustrated on Figure **8.6**. For ease of reference and co-ordination between text, tables and drawings each LCA is given an identity number. The below listed LCA's represent the baseline condition after completion of the approved committed projects.

LCA1 – Coastal Upland and Hillside Landscape

(i) This area is characterised by steeply sloping vegetated slopes comprising a mixture of woodland and scrub. Its approximate area is 28.9 ha. The northern portion of this LCA lies outside but on the fringe of the Lantau North (Extension) Country Park, the western portion covers Butterfly Hill and has no statutory protection and the southern portion lies in Greenbelt which has a general presumption against development (refer Section 8.5.3 (iv), 4th bullet) above. The LCA is a mature, relatively undisturbed environment where vegetation, primarily native species, has naturally colonised and therefore has a low tolerance to change. This landscape character is relatively common on Lantau but in the local context of the urban area of Mui Wo, its preservation is important as the vegetated hills and slopes form a green backdrop to Mui Wo and provide a degree of enclosure that enhances the setting and preserves the rural fringe character of the town. Given its relatively natural condition and low tolerance of change, the sensitivity is of this LCA is assessed as ***High***.

LCA2- Bay Landscape

(ii) This LCA comprises part of the open water of Silver Mine Bay and the bay edge including Silver Mine Bay Beach. Its approximate area is 29.7 ha. Bay landscape is common on the south side of Lantau but is under increasing pressure from development. Its value is recognised by recent government initiatives to promote leisure and tourism on South Lantau. The waters and beach forming this LCA are relatively natural and undisturbed and of high environmental and scenic quality. The bay waters are highly

frequented by leisure and fishing craft and swimmers and the beach is a popular public facility. As its landscape value lies in its intrinsic natural beauty, this LCA has a low ability to accommodate change. Given all the factors above, the sensitivity of LCA2 is assessed as ***High***.

LCA3 – Rural Township Landscape

(iii) This LCA comprises the collection of villages and the urban areas that make up Mui Wo and is approximately 25.4 ha in area. It occupies the flat land between the wooded knoll in the south of the Study Area and Butterfly Hill in the west. The LCA also stretches along the back of Silver Mine Bay Beach and includes a strip of hotels, small shops, public beach facilities and private residences. The settlement of Mui Wo has developed relatively slowly and remained at a rural township scale due to the lack of easy access by road. The scale of the residential buildings is generally small and restricted to 3 storeys or less and there are a number of larger municipal and commercial buildings and hotels. The style and type of development is unremarkable and commonly found throughout the urban fringes of Hong Kong. Whilst the overall scene has a certain attractiveness (due largely to the natural setting), the visual and historic quality of the individual structures is generally low. This LCA has a reasonable tolerance to change as it is in a constant cycle of renewal as evidenced by recent Government improvement works. Given the above, the sensitivity of this LCA is assessed as ***Medium***.

LCA4 – Settled Valley Landscape

(iv) This LCA comprises the flat floor of the Wang Tong River Valley and includes Wang Tong River, both active and abandoned agricultural fields, marsh, grassland/shrubland, lowland woodland areas and village type settlements. Its approximate area is 10.2 ha. It lies on the fringes of the Lantau North (Extension) Country Park and Greenbelt areas of Mui Wo. This LCA has an attractive outlook due to the overall greenness and small scale of development (primarily village houses of maximum 3 storeys) which imparts a relaxed, rural atmosphere. The area has evolved relatively slowly although the size of Wang Tong village has increased in the last 10 to 20 years as demand for rural fringe lifestyle has increased. The built character of the village areas is unremarkable and representative of post war rural village development throughout Hong Kong. The vegetated portion of this LCA comprises cultivated and abandoned land supporting a mixture of native and exotic species. Overall, the scenic quality of this LCA is high and it contributes to the general attractiveness of the Mui Wo locality. It is viewed from public footpaths passing through it and on the surrounding hills. Due to the mixture of land-uses and on-going piecemeal development this LCA has a reasonable tolerance to change and the sensitivity is assessed as ***Medium***.

Table 8.3: Landscape Character Areas

Ref. ID.	Description	Sensitivity to Change (Low, Medium, High)
LCA1	Coastal Upland and Hillside Landscape Baseline: 28.9 ha	High
LCA2	Bay Landscape Baseline: 29.7 ha	High
LCA3	Rural Township Baseline: 25.4 ha	Medium
LCA4	Settled Valley Baseline: 10.2 ha	Medium

8.5.6 Visual Study Area/Zone of Visual Influence (ZVI)

(i) The Key Visual Elements of the visual study area have been mapped on **Figure 8.7.1**. Silver Mine Bay is a large seawater bay enclosed by steeply rising topography to the north and south. The ridge lines of the vegetated hills provide a dramatic backdrop to the bay. Silver Mine Bay Beach forms the western edge of the bay. The bay overlooks Hei Ling Chau to the east. The key built-up areas and settlements that contribute to the visual context include Mui Wo Town Centre to the south of the project site and the village settlements of Chung Hau, Wang Tong and Tung Wan Tau to the west, north and north east respectively. The proposed project site is at the back of Silver Mine Bay Beach on the edge of the urban area of Mui Wo. Key view points within the study area are identified on **Figure 8.7.1**. These include:

- Views from inter-island ferries and recreational craft within Silver Mine Bay;
- Views from the Mui Wo Waterfront from the ferry pier to the River Silver;
- Views from Silver Mine Bay Beach;
- Views from Tung Wan Tau south across Silver Mine Bay;
- Elevated views from hiking trails from Mui Wo to the Trappist Monastery and Discovery Bay south across Silver Mine Bay.

(ii) The ZVI for the Construction and Operation Phases of the project has been mapped based on the exposure of the proposed development to the surrounding environment and is illustrated on **Figure 8.7.2**. In accordance with EIAO GN 8/2010 the ZVI may

contain areas which are fully visible, partly visible, and non-visible from the project. Areas of visual shadow may occur within the ZVI due to intervening topography, dense vegetation and man-made structures.

(iii) The ZVI during the Construction and Operation Phases will be the same. The bridge is a low structure and views of it are predominantly from the east across the unobstructed expanse of the bay. To the west, the bridge is largely screened by exiting trees at the back of Silver Mine Bay Beach and the buildings forming Silver Mine Bay Hotel.

(iv) To the west the ZVI is demarcated by the buildings and trees at the back of Silver Mine Bay Beach. There is a limited view corridor up the Wang Tong River but access is limited to the south bank of the river along a road with footpath. There will be Views from the upper storeys of the Silver Mine Bay Hotel but these are largely screened out by a large existing tree on the hotel boundary. The north bank is heavily wooded and unoccupied. Some dwellings on the rising slopes of Butterfly Hill to the west may have views down the river corridor to the bridge. Views from the hills to the west are screened out by the heavily wooded Butterfly Hill, existing trees and the Silver Mine Bay Hotel along the back of Silver Mine Bay Beach (refer photos of views from the hills to the west of Silver Mine Bay Beach on **Figure 8.8.3** which indicate that the bridge cannot be seen from the west due to topographic and existing tree screens).

(v) To the north, the ZVI follows the residences at Tung Wan Tau and is punctuated by viewpoints from the elevated footpath leading to the Trappist Monastery and Discovery Bay. Trees on the natural slopes to the north prevent views from much of the footpath. There are several isolated residences along the northern coast of Silver Mine Bay with views to the south west towards the bridge. However, apart from these, viewpoints from above coast level are largely blocked by dense woodland alongside footpaths.

(vi) To the east, the ZVI is defined by the western coast of Hei Ling Chau. Staff and inmates at the Addiction Treatment Centre will have distant views north west towards Silver Mine Bay. The typhoon shelter breakwater defines the ZVI edge to the south of the island.

(vii) To the south of the Wang Tong River Bridge, the ZVI is defined by the Silver Mine Bay Hotel and the waterfront from the River Silver to the Mui Wo Ferry Pier.

8.5.7 Visually Sensitive Receivers (VSRs)

(i) Within the ZVI, a number of key VSRs have been identified. These VSRs are mapped on **Figure No. 8.7.2** and are listed in **Table 8.4**.

(ii) For ease of reference, each VSR is given an identity number, which is used in the text, tables and drawings.

Table 8.4: Key Visually Sensitive Receivers (VSRs)

VSR ID.	Key VSR	**Value and Quality of Existing View** (Poor, Fair , Good)	**Availability of Alternative Views** (Yes, No)	**Number of Individuals** (Very Few, Many, Very Many)		**Sensitivity to Change** (Low, Medium, High)	
				Construction	**Operation**	**Construction**	**Operation**
Residential VSRs							
RES-1	Residents in Chung Hau	Good	Yes	Few	Few	High	High
RES -2	Residents at Tung Wan Tau	Good	Yes	Few	Few	High	High
RES-3	Inmates at Hei Ling Chau Addiction Treatment Centre	Good	Yes	Few	Few	Medium	Medium
RES-4	Residents along North-East Coast of Silver Mine Bay	Good	Yes	Few	Few	High	High
Recreational VSRs							
REC-1	Users of Silver Mine Bay Beach	Good	Yes	Very Many	Very Many	High	High
REC-2	Hikers on Footpath to Trappist Monastery	Good	Yes	Many	Many	High	High
REC-3	Users of Silver Mine Bay waterfront	Good	Yes	Very Many	Very Many	High	High
REC-4	Guests at Silver Mine Bay Beach Hotel (north Block)	Good	Yes	Few	Few	Medium	Medium
REC-5	Recreational Craft in Silver Mine Bay	Good	Yes	Few	Few	High	High
REC6	Visitors to Seafood Restaurants along Silver Mine Bay Waterfront	Good	Yes	Many	Many	Low	Low
Travelling VSRs							
T-1	Passengers on Inter-Island Ferries	Good	Yes	Very Many	Very Many	Low	Low
T-2	Drivers/Passengers along Ngan Kwong Wan Road	Good	Yes	Very Many	Very Many	Medium	Medium
T-3	Drivers, Cyclists and Pedestrians along Tung Wan Tau Road	Good	Yes	Very Many	Very Many	Medium	Medium

VSR ID.	Key VSR	Value and Quality of Existing View (Poor, Fair , Good)	Availability of Alternative Views (Yes, No)	Number of Individuals (Very Few, Many, Very Many)		Sensitivity to Change (Low, Medium, High)	
				Construction	Operation	Construction	Operation
Occupational VSRs							
O-1	Workers in Seafood Restaurants along Silver Mine Bay Waterfront	Good	Yes	Few	Few	Low	Low
O2	Fishermen in Silver Mine Bay	Good	Yes	Few	Few	Low	Low
O3	Workers in Commercial Outlets along Silver Mine Bay Beach	Good	Yes	Few	Few	Low	Low

Note: '**Duration and Frequency of Views**' and '**Degree of Visibility**' have been taken into account in assessing the magnitude of change in view experience by the VSRs and cannot be double counted in determining the sensitivity of the VSR.

8.6 Landscape Impact Assessment

8.6.1 Potential Sources of Impacts

(i) The nature and scope of the works has been described in **Section 8.2**.

(ii) The Proposed Project would create varying levels of landscape and visual impacts on the surrounding areas during the Construction Phase. Potential impacts would result from the following sources:

- Bridge and ramp demolitions works and modification of existing waterfronts;
- Removal of 5 no. existing trees;
- Haulage off-site of excavated materials;
- Stockpiling of materials for construction of new bridge;
- Dust and construction debris;
- Construction of on-site offices and working areas;
- Construction night lighting; and
- Presence of temporary construction hoardings, plant, platforms, structures, construction machinery and construction vehicle traffic.

(iii) The Proposed Project would create varying levels of landscape and visual impacts on the surrounding areas during the Operation Phase. Potential impacts would result from the following sources:

- Presence of new twin bridges and associated bicycle parking area;
- Additional night lighting of bridge decks.

8.6.2 Landscape Change before Mitigation in Construction Phase

(i) The magnitude of change, before implementation of mitigation measures, on the landscape resources and landscape character areas that would occur in the Construction Phase is summarised below and tabulated in **Table 8.5**. All impacts are adverse unless otherwise stated.

Landscape Resources

(ii) **LR1- Coastal Waters:** the dredging works for the removal of the existing bridge pier during the construction phase will result in a ***Small*** magnitude of change to the coastal waters during the construction period due to sediment flowing to the sea.

(iii) **LR2a – Wang Tong River:** the dredging works for the removal of the existing bridge pier during the construction phase will result in a ***Small*** magnitude of change to

the river waters and possibly indirect impacts to coastal plants lining the river during the construction period.

(iv) **LR2b – River Silver:** there will be no impacts on the River Silver during the construction stage and the magnitude of change is therefore assessed as *None*.

(v) **LR4 – Upland Streams:** there will be no impacts on the upland streams during the construction stage and the magnitude of change is therefore assessed as *None*.

(vi) **LR5 - Natural Rocky Coastline:** there will be no impacts on the natural rocky coastline during the construction stage and the magnitude of change is therefore assessed as *None*.

(vii) **LR6 - Silver Mine Bay Beach:** during the construction stage approximately 950 sq.m of the beach will be occupied by temporary construction hoardings, plant, platforms, structures, construction machinery and construction vehicle traffic. The magnitude of change is assessed as *Small*.

(viii) **LR7 – Natural Upland Vegetation:** there will be no impacts on the natural upland vegetation during the construction stage and the magnitude of change is therefore assessed as *None*.

(ix) **LR8 – Semi-natural Lowland Vegetation:** there will be no impacts on the semi-natural lowland vegetation during the construction stage and the magnitude of change is therefore assessed as *None*.

(x) **LR9 – Urban Domestic Amenity Planting:** there will be no impacts on existing urban domestic amenity planting and the magnitude of change is therefore assessed as *None*.

(xi) **LR10 – Existing Trees in Vicinity of Wang Tong Bridge:** A total of 7 no. of the 19 no. existing trees are anticipated to be impacted in order to construct the new Wang Tong River Bridges. Of these, 2 no. will be transplanted and 5 no. will be felled. Details of the trees and their locations are provided in the Tree Assessment Schedule and Tree Survey Plan in **Appendix 8A** and photographs of the existing trees are provided on **Figures 8.4.3** to **8.4.5**. As 7 out of the 19 surveyed trees are affected, the magnitude of change is assessed as *Intermediate*.

Landscape Character Areas

(xii) **LCA1 - Coastal Upland and Hillside Landscape:** There will be no impacts to this LCA during the Construction Stage and the magnitude of change is therefore assessed as *None.*

(xiii) **LCA2 – Bay Landscape:** during the Construction Stage, this LCA will experience temporary impacts to the beach due to construction hoardings, site offices, plant and materials. However, as the area affected is very minor (approximately 950 sq.m) in

relation to the total area of the LCA (29.7 ha), the magnitude of change is assessed as *Small*.

(xiv) **LCA3 – Rural Township Landscape:** during the Construction Stage, this LCA will experience temporary impacts due to bridge and ramp demolition works, modification of existing waterfronts, materials, construction hoardings and traffic. However, as the area affected is very minor (approximately 260 sq.m) in relation to the total area of the LCA (25.4 ha), the magnitude of change is assessed as *Small*.

(xv) **LCA4 – Settled Valley Landscape:** there will be no impacts to this LCA during the Construction Stage and the magnitude of change is therefore assessed as *None*.

8.6.3 Landscape Change Before Mitigation in Operation Phase

(i) The magnitude of change, before implementation of mitigation measures, on the landscape resources and landscape character areas that would occur in the operation phase is described below and tabulated in **Table 8.5**. All impacts are adverse unless otherwise stated.

Landscape Resources

(ii) **LR1- Coastal Waters:** the temporary dredging works for the removal of the existing bridge pier will be absent during the operation phase and the resulting magnitude of change to the coastal waters will be *None.*

(iii) **LR2a – Wang Tong River:** the temporary dredging works for the removal of the existing bridge pier will be absent during the operation phase and the resulting magnitude of change to the coastal waters will be *None*.

(iv) **LR2b – River Silver:** there will be no impacts on the River Silver during the operation phase and the magnitude of change is therefore assessed as *None.*

(v) **LR4 – Upland Streams:** there will be no impacts on the upland streams during the operation phase and the magnitude of change is therefore assessed as *None*.

(vi) **LR5 - Natural Rocky Coastline:** there will be no impacts on the natural rocky coastline during the operation phase and the magnitude of change is therefore assessed as *None*.

(vii) **LR6 - Silver Mine Bay Beach:** during the operation stage approximately 395 sq.m of the beach will be occupied or overhung by the additional area of the permanent structures of the new twin bridges. As this area is very small in relation to that of the beach (1.6 ha) the magnitude of change is assessed as *Negligible*.

(viii) **LR7 – Natural Upland Vegetation:** there will be no impacts on the natural upland vegetation during the operation phase and the magnitude of change is therefore assessed as *None*.

(ix) **LR8 – Semi-natural Lowland Vegetation:** there will be no impacts on the semi-natural lowland vegetation during the operation phase and the magnitude of change is therefore assessed as None.

(x) **LR9 – Urban Domestic Amenity Planting:** there will be no impacts on existing urban domestic amenity planting during the operation phase and the magnitude of change is therefore assessed as None.

(xi) **LR10 – Existing Trees in Vicinity of Wang Tong Bridge:** before mitigation, the 7 no. existing trees impacted in order to construct the new Wang Tong River Bridge will have been felled or transplanted at the operation phase. The magnitude of change will remain as *Intermediate*.

Landscape Character Areas

(xii) **LCA1 - Coastal Upland and Hillside Landscape:** There will be no impacts to this LCA during the operation phase and the magnitude of change is therefore assessed as *None*.

(xiii) **LCA2 – Bay Landscape:** during the operation phase, this LCA will experience permanent impacts to the beach due to the additional area of the new twin bridges. However, as the area affected is very minor (approximately 300 sq.m) in relation to the total area of the LCA (29.7 ha), the magnitude of change is assessed as *Negligible*.

(xiv) **LCA3 – Rural Township Landscape:** during the operation phase, this LCA will experience permanent impacts due to presence of the new bridges, ramps and modified promenades. However, as the area affected is very minor (approximately 95 sq.m) in relation to the total area of the LCA (25.4 ha), the magnitude of change is assessed as *Negligible*.

(xv) **LCA4 – Settled Valley Landscape:** there will be no impacts to this LCA during the operation phase and the magnitude of change is therefore assessed as *None*.

Table 8.5: Magnitude of Landscape Change during the Construction and Operation Phases before Mitigation

ID No.	Landscape Resources/ Landscape Character Areas	Source of Impact	Description of Impacts	Magnitude of Change before Mitigation
LR1	Coastal Waters	Construction - Removal of the existing bridge pier.	Construction - Minimal amounts of sediment from the dredging works to remove the existing bridge pier	Small
		Operation - None	Operation - None	None
LR2a	Wang Tong River	Construction - Removal of the existing bridge pier.	Construction - Minimal amounts of sediment from the dredging works to remove the existing bridge pier	Small
		Operation - None	Operation - None	None
LR2b	River Silver	Construction - None	Construction - None	None
		Operation - None	Operation - None	None
LR4	Upland Streams	Construction - None	Construction - None	None
		Operation - None	Operation - None	None
LR5	Natural Rocky Coastline	Construction - -None	Construction - None	None

ID No.	Landscape Resources/ Landscape Character Areas	Source of Impact	Description of Impacts	Magnitude of Change before Mitigation
		Operation - -None	Operation - None	None
LR6	Silver Mine Bay Beach	Construction - Bridge and ramp demolitions works and modification of existing waterfronts; - Stockpiling of materials for construction of new bridge; - Dust and construction debris; - Construction of on-site offices and working areas; and - Presence of temporary construction hoardings, plant, platforms, structures, construction machinery and construction vehicle traffic.	Construction - Temporary loss of beach areas (approximately 950 sq.m) due to presence of temporary construction hoardings, plant, platforms, structures, construction machinery and construction vehicle traffic. - Baseline area: 1.6 ha	Small
		Operation - New twin bridges	Operation - Additional footprint of new twin bridges (approximately 300 sq.m) - Baseline area: 1.6ha	Negligible
LR7	Natural Upland Vegetation	Construction - None	Construction - None	None
		Operation - None	Operation - None	None
LR8	Semi-natural Lowland Vegetation	Construction - None	Construction - None	None
		Operation - None	Operation - None	None

ID No.	Landscape Resources/ Landscape Character Areas	Source of Impact	Description of Impacts	Magnitude of Change before Mitigation
LR9	Urban/Domestic Amenity Planting	Construction - None	Construction - None	None
		Operation - None	Operation - None	None
LR10	Existing Trees in Vicinity of Wang Tong Bridge	Construction - Bridge and ramp demolitions works and modification of existing waterfronts	Construction - Felling of 5 no. existing trees - Transplanting of 2 no. existing trees - Baseline no: 19	Intermediate
		Operation - Footprint of new twin bridges	Operation - Absence of 5 no. existing trees - Baseline no: 19	Intermediate
LCA1	Coastal Upland and Hillside Landscape	Construction - None	Construction - None	None
		Operation - None	Operation - None	None
LCA2	Bay Landscape	Construction - Bridge and ramp demolitions works and modification of existing waterfronts; - Stockpiling of materials for construction of new bridge; - Dust and construction debris; - Construction of on-site offices and working areas; and - Presence of temporary construction hoardings, plant, platforms, structures, construction machinery and construction vehicle traffic.	Construction - Temporary loss of beach area (approximately 950 sq.m) - Baseline area: 29.7 ha	Small

ID No.	Landscape Resources/ Landscape Character Areas	Source of Impact	Description of Impacts	Magnitude of Change before Mitigation
		Operation - New twin bridges	Operation - Footprint of new twin bridges (approximately 300 sq.m) - Baseline area: 29.7 ha	Negligible
LCA3	Rural Township	Construction - Bridge and ramp demolitions works and modification of existing waterfronts; - Stockpiling of materials for construction of new bridge; - Dust and construction debris; - Temporary traffic management; - Construction of on-site offices and working areas; and - Presence of temporary construction hoardings, plant, platforms, structures, construction machinery and construction vehicle traffic.	Construction - Temporary loss of area (approximately 260 sq.m) - Baseline area: 25.4 ha	Small
		Operation - New twin bridges	Operation - Additional footprint of new twin bridges (approximately 95 sq.m) - Baseline area: 25.4ha	Negligible
LCA4	Settled Valley Landscape	- None	Construction - None	None
		- None	Operation - None	None

8.6.4 Landscape & Visual Mitigation Measures

Review of Planning Principles and Architectural Design

The application of the following principles in the planning and design of the new bridge(s) has contributed to a reduction in the landscape and visual impacts:

(i) Minimisation of the contractor's temporary works area, reduction of height and bulk of construction buildings and structures, the erection of decorative screens and hoardings, the control of night time lighting, the minimisation of construction traffic and the construction period.

(ii) Protection of existing trees and minimisation of felling or transplanting works.

(iii) Minimisation of dredging impacts during bridge pier demolition and construction.

(iv) Sensitive design of the new bridge in terms of scale, height and bulk, in particular adopting similar visual forms to the previous bridge design. The proposed new bridges are very similar in outlook to the Old Bridge and will not appear significantly different in scale or form.

(v) Minimising the bridge visual "weight" by reducing the deck sections as far as possible within structural constraints and creating shadow lines.

(vi) Provision of tapered piers with surface textures to reduce their visual weight and create a more elegant outlook.

(vii) Maintaining visual transparency of parapet by using metal railings rather than solid parapets. Railings create a lighter, visually more transparent effect enhancing visibility and the perception of a lighter bridge structure.

(viii) Physical and visual integration of bridge with abutments and adjacent promenades through form, shape and materials. Streetscape shall be sensitively designed in a manner that responds to the existing village context, and minimises potential adverse landscape and visual impacts.

(ix) Use of bridge lighting to strengthen bridge composition. The bridge decks can be lit from 2 no. light columns on either side of the bridge which can be positioned symmetrically at either end of the bridge to appear as an integrated design feature. Lighting units to be directional (downward focused) to minimise light spill and glare.

(x) Careful selection of colours for bridge deck and abutments to highlight certain bridge elements and downplay others.

(xi) Framing of Bridge elevation and screening of abutments with compensatory tree planting. Tree preservation and compensatory tree planting will be carried out in accordance with DEVB TC(W) No. 7/2015 Tree Preservation. This requires a

compensatory planting ratio of a minimum 1:1 by number. A minimum of 6 no. heavy standard trees are proposed to be planted on the beach on the eastern side of the new Wang Tong River Bridges. In addition, 2 no. existing trees will be transplanted to locations nearby locations. Provisional locations for the compensatory trees are illustrated on the Compensatory Planting Plan in **Appendix 8A** and on the Landscape and visual Mitigation Plan, **Figure 8.17**.

(xii) The proposed landscape and visual mitigation measures for potential impacts generated during the construction and operation phases together with the associated funding, implementation, management and maintenance agencies are described below in **Table 8.6** and **Table 8.7** and are illustrated on **Figure 8.17**.

Table 8.6: Proposed Construction Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure	Landscape measure	Visual measure	Funding Agency	Implementation Agency
CM1	The construction area and contractor's temporary works areas should be minimised to avoid impacts on adjacent landscape.	✓	✓	HyD	Contractor
CM2	Reduction of construction period to practical minimum.		✓	HyD	Contractor
CM3	Construction traffic (land and sea) including construction plant, construction vessels and barges should be kept to a practical minimum.		✓	HyD	Contractor
CM4	Erection of decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours.		✓	HyD	Contractor
CM5	Avoidance of excessive height and bulk of site buildings and structures.		✓	HyD	Contractor
CM6	Control of night-time lighting by hooding all lights and through minimisation of night working periods.		✓	HyD	Contractor
CM7	All existing trees shall be carefully protected before, during construction and after construction. A Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit a detailed working method statement for the protection of trees prior to undertaking any works adjacent to	✓		HyD	Contractor

ID No.	Landscape and Visual Mitigation Measure	Landscape measure	Visual measure	Funding Agency	Implementation Agency
	all retained trees or trees to be transplanted, including trees in contractor's works areas for approval by the Registered Landscape Architect (RLA). This method statement for tree protection and transplanting shall make reference to "Guidelines on Tree Preservation during Construction" and "Guidelines on Tree Transplanting" published by GLTM of the DEVB. Early preparation of trees to be transplanted shall be undertaken to increase their likely survival rate following transplanting.				
CM8	Minimisation of Impacts to Wang Tong River through minimised and carefully controlled dredging for pile/abutment removal/construction works	✓		HyD	Contractor

Table 8.7: Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure	Landscape Measure	Visual Measure	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
OM1	Sensitive design of bridge in terms of scale, height and bulk (visual weight).		✓	HyD	Design Architect/ Engineer	HyD	HyD
OM2	Use of appropriate building materials and colours for bridge to complement surroundings.		✓	HyD	Design Architect/ Engineer	HyD	HyD

ID No.	Landscape and Visual Mitigation Measure	Landscape Measure	Visual Measure	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
OM3	Lighting units to be directional and minimise unnecessary light spill and glare.		✓	HyD	Design Architect/ Engineer	HyD	HyD
OM4	Integration of bridge with existing abutments and promenades.		✓	HyD	Design Architect/ Engineer	HyD	HyD
OM5	Compensatory tree planting for all felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under the relevant technical circulars.	✓	✓	HyD	Contractor	HyD, until such time the trees are successfully handed over to LCSD	HyD, until such time the trees are successfully handed over to LCSD

ID No.	Landscape and Visual Mitigation Measure	Landscape Measure	Visual Measure	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
OM6	Streetscape (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the existing village context, and minimises potential adverse landscape and visual impacts.	✓	✓	HyD	Design Architect/ Engineer	HyD	HyD

Programme of Implementation of Landscape and Visual Mitigation Measures

(xiii) The construction phase measures listed above shall be adopted from the commencement of construction and shall be in place throughout the entire construction period. The operation phase measures listed above shall be adopted during the detailed design, and be built as part of the construction works so that they are in place at the date of commissioning of the Proposed Project. However, it should be noted that the full effect of the soft landscape mitigation measures would not be appreciated for several years.

8.6.5 Prediction of Significance of Landscape Impacts

(i) The potential significance of the landscape impacts during the construction and operation phases, before and after mitigation, are provided below in **Table 8.8** and the residual impact significance after 10 years is mapped on **Figure 8.9** and **8.10.** This assessment follows the methodology outlined in **Section 8.4** above and assumes that the appropriate mitigation measures identified in **Table 8.6 and Table 8.7** above will be implemented, and that the full effect of the soft landscape mitigation measures will be realised after 10 years. Photomontages of the proposed works before and after mitigation are provided in **Figures 8.12.1 to 8.16** inclusive.

Construction Phase before Mitigation

(ii) During the construction phase, before the implementation of the proposed mitigation measures, there will be some adverse landscape impacts as summarised below and identified in **Table 8.8.**

Landscape Resources

(iii) **LR1, (Coastal Waters)** would experience impacts of **Slight** significance before mitigation due to the dredging works associated with the removal of the existing bridge pier.

(iv) **LR2a, (Wang Tong River)** would experience an impact significance of **Slight** before mitigation due to the dredging works associated with the removal of the existing bridge pier.

(v) **LR2b, (River Silver)** would experience an impact significance of **None** due to the absence of any impacts.

(vi) **LR4, (Upland Streams)** would experience an impact significance of **None** due to the absence of any impacts.

(vii) **LR5, (Natural Rocky Coastline)** would experience an impact significance of **None** due to the absence of any impacts.

(viii) **LR6, Silver Mine Bay Beach)** would experience an impact significance of **Slight** due to temporary loss of 950 sq.m. (out of a total area of 1.6ha) due to bridge construction activities, plant and materials.

(ix) **LR7, (Natural Upland Vegetation)** would experience an impact significance of **None** due to the absence of any impacts.

(x) **LR8, (Semi-natural Lowland Vegetation)** would experience an impact significance of **None** due to the absence of any impacts.

(xi) **LR9, (Urban/Domestic Amenity Planting)** would experience an impact significance of **None** due to the absence of any impacts.

(xii) **LR10, (Existing Trees in the Vicinity of Wang Tong River Bridge)** would experience an impact significance of **Moderate** due to the loss of 7 no. existing trees out of a total of 19 trees.

Landscape Character Areas

(xiii) **LCA1 (Coastal Upland and Hillside Landscape)** would experience an impact significance of **None** due to the absence of any impacts.

(xiv) **LCA2 (Bay Landscape)** would experience an impact significance of **Slight** due to the loss of approximately 950 sq.m of beach area (out of a total area of 29.7 ha) due to temporary bridge construction activities, plant and materials.

(xv) **LCA3 (Rural Township Landscape)** would experience an impact significance of **Slight** due to the temporary loss of approximately 260 sq.m. of seafront promenade (out of a total area of 25.4 ha) due to bridge construction activities..

(xvi) **LCA4 (Settled Valley Landscape)** would experience an impact significance of **None** due to the absence of any impacts.

Construction Phase After Mitigation

During the construction phase after mitigation, the landscape impacts would be as follows:

Landscape Resources

(xvii) **LR1, (Coastal Waters) and LR2a, (Wang Tong River)** would experience a reduction in temporary landscape from **Slight** (before mitigation) to **Insubstantial** after mitigation. The degree of siltation caused by the dredging works is impossible to quantify but working practices to reduce siltation such as the use of silk curtains can significantly reduce the potential impacts.

(xviii) **LR6, (Silver Mine Bay Beach) and LR10, (Existing Trees in the Vicinity of Wang Tong River Bridge)** would continue to experience an impact significance of **Slight** and **Moderate** respectively as mitigation measures would not be sufficient to reduce the impact significance threshold.

(xix) All other Landscape Resources **(LR1 to LR5, LR7 to LR9)** would continue to experience an impact significance of **None** following the implementation of mitigation measures due to an absence of impacts.

Landscape Character Areas

(xx) **LCA2 (Bay Landscape)** and **LCA3 (Rural Township Landscape)** would continue to experience temporary landscape impacts of **Insubstantial** significance as the mitigation measures would not be sufficient to reduce the impact significance threshold.

(xxi) **LCA1, (Coastal Upland and Hillside Landscape)** and **LCA4 (Settled Valley Landscape)** would continue to experience an impact significance of None following the implementation of mitigation measures due to an absence of impacts.

Operation Phase before Mitigation

(xxii) In the operation phase, before the implementation of the proposed mitigation measures, there would be some adverse landscape impacts as summarised below and identified in **Table 8.8.**

Landscape Resources

(xxiii) **LR1 (Coastal Waters)** would experience an impact significance of **None** due to the absence of any impact.

(xxiv) **LR2a (Wang Tong River)** would experience an impact significance of **None** due to the absence of any impact.

(xxv) **LR2b (River Silver)** would experience an impact significance of **None** due to the absence of any impacts.

(xxvi) **LR4 (Upland Streams)** would experience an impact significance of **None** due to the absence of any impact

(xxvii) **LR5, (Natural Rocky Coastline)** would experience an impact significance of **None** due to the absence of any impact.

(xxviii) **LR6, (Silver Mine Bay Beach)** would experience an impact significance of **Insubstantial** due to the permanent presence of the new bridge (approximately 300 sq.m. out of a total area of 1.6ha).

(xxix) **LR7, (Natural Upland Vegetation)** would experience an inpact significance of **None** due to the absence of any impact.

(xxx) **LR8, (Semi- natural Lowland Vegetation** would experience an impact significance of **None** due to the absence of any impact.

(xxxi) **LR9, (Urban/Domestic Amenity Planting)** would experience an impact significance of **None** due to the absence of any impacts.

(xxxii) **LR10 (Trees in the vicinity of Wang Tong River Bridge)** would continue to experience an impact significance of **Moderate** before mitigation in the operation phase due to the remaining loss of 5 no. existing trees.

Landscape Character Areas

(xxxiii) **LCA1 (Coastal Upland and Hillside Landscape)** would experience an impact significance of **None** due to the absence of any impacts.

(xxxiv) **LCA2 (Bay Landscape)** would experience and impact significance of **Insubstantial** during the operation stage before mitigation due to minor loss of beach area due to the permanent footprint of the new bridge (approximately 300 sq.m. out of a total beach LCA area of 29.7ha).

(xxxv) **LCA3 (Rural Township Landscape)** would experience and impact significance of **Insubstantial** during the operation stage before mitigation due to the permanent footprint of the new bridge and promenade ramps (approximately 95 sq.m. out of a total LCA area of 25.4ha).

(xxxvi) **LCA4 (Settled Valley Landscape)** would experience an impact significance of **None** due to an absence of any impacts.

Operation Phase after Mitigation

(xxxvii) In the operation phase, after the implementation of the proposed mitigation measures, there will be some adverse residual landscape impacts as summarised below and identified in **Table 8.8.**

(xxxviii) Implementation of the recommended mitigation measures will reduce the magnitude of the residual landscape impacts during the operation phase, although this does not generally reduce the overall significance thresholds described above for the before mitigation scenario.

Landscape Resources

(xxxix) For **LR6** (**Silver Mine Bay Beach**) the impact significance would remain as **Insubstantial** at Day 1 and Year 10 as mitigation measures would not materially reduce the area of beach affected by the new bridge.

(xl) For **LR10, (Existing Trees in the Vicinity of Wang Tong River Bridge)** the impact significance would be reduced from Moderate to **Slight** at Day 1 due to the transplanting of 2 no. existing trees and the planting of 6 no. compensatory trees on the beach on the eastern side of the bridge. This would be further reduced to Insubstantial at Year 10 once the compensatory planting has matured.

(xli) For all the remaining LRs, (**LR1** to **LR5** and **LR7** to **LR9**) the impact significance will remain as **None** during the operation stage after mitigation due to the absence of any impacts.

Landscape Character Areas

(xlii) For **LCA2, (Bay Landscape**) and **LCA3 (Rural Township Landscape)** the impact significance during the operation phase after mitigation would remain as **Insubstantial** at Day1 and Year 10.

(xliii) For **LCA1, (Coastal Upland and Hillside Landscape)** and **LCA4 (Settled Valley Landscape)** the impact significance during the operation phase after mitigation would remain as **None** due to the absence of any impacts.

Table 8.8: Significance of Landscape Impacts in Construction and Operation Phases (Adverse Impacts unless otherwise stated)

Id. No.	**Landscape Resource / Landscape Character**	**Sensitivity to Change during Construction and Operation Phases** (Low, Medium, High)	**Magnitude of Change before Mitigation** (None, Negligible, Small, Intermediate, Large)		**Impact Significance Threshold BEFORE Mitigation** (None, Insubstantial, Slight, Moderate, Substantial)		**Recommended Mitigation Measures**	**Residual Impact Significance Threshold AFTER Mitigation** (None, Insubstantial, Slight, Moderate, Substantial)		
								Construction	Operation	
			Construction	Operation	Construction	Operation			**DAY 1**	**YEAR 10**
Landscape Resources										
LR1	Coastal Waters	High	Small	None	Slight	None	CM1,8	Insubstantial	None	None
LR2a	Wang Tong River	High	Small	None	Slight	None	CM1,8	Insubstantial	None	None
LR2b	River Silver	Medium	None	None	None	None	N/A	None	None	None
LR4	Upland Streams	High	None	None	None	None	N/A	None	None	None
LR5	Natural Rocky Coastline	High	None	None	None	None	N/A	None	None	None
LR6	Silver Mine Bay Beach	High	Small	Negligible	Slight	Insubstantial	CM1,7 OM5	Slight	Insubstantial	Insubstantial
LR7	Natural Upland Vegetation	Medium	None	None	None	None	N/A	None	None	None
LR8	Semi-natural Lowland Vegetation	Medium	None	None	None	None	N/A	None	None	None
LR9	Urban/Domestic Amenity Planting	Medium	None	None	None	None	N/A	None	None	None
LR10	Existing Trees in vicinity of Wang Tong River Bridge	Medium	Intermediate	Intermediate	Moderate	Moderate	CM1, 7 OM5	Moderate	Slight	Insubstantial

Id. No.	Landscape Resource / Landscape Character	Sensitivity to Change during Construction and Operation Phases (Low, Medium, High)	Magnitude of Change before Mitigation (None, Negligible, Small, Intermediate, Large)		Impact Significance Threshold BEFORE Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		
								Construction	Operation	
			Construction	Operation	Construction	Operation			**DAY 1**	**YEAR 10**
Landscape Character Areas										
LCA1	Coastal Upland and Hillside Landscape	High	None	None	None	None	N/A	None	None	None
LCA2	Bay Landscape	High	Small	Negligible	Slight	Insubstantial	CM1,7,8 OM5	Insubstantial	Insubstantial	Insubstantial
LCA3	Rural Township Landscape	Medium	Small	Negligible	Slight	Insubstantial	CM1,7,8 OM6	Insubstantial	Insubstantial	Insubstantial
LCA4	Settled Valley Landscape	Medium	None	None	None	None	N/A	None	None	None

8.7 Visual Impact Assessment

8.7.1 Potential Sources of Visual Impacts

The sources of visual impacts of the project during construction and operation phases have been described in **Section 8.6.1**.

8.7.2 Visual Change Before Mitigation in the Construction and Operation Phases

The magnitude of visual change resulting from the construction and operation phases of the Proposed Project is presented in **Table 8.9**.

8.7.3 Proposed Visual Mitigation Measures

The proposed visual mitigation measures for impacts from the construction and operation phases are described previously in **Table 8.6** and **Table 8.7**, together with the associated funding, implementation, management and maintenance agencies and the proposed implementation programme. Please refer to **Figure 8.17** for the Landscape and Visual Mitigation Measures plan.

8.7.4 Photomontage Viewpoints

(i) The photomontage viewpoints were selected as representative examples of the visual impacts of the project. Viewpoints have been selected to provide close, medium and long range views of the project. The locations of the viewpoints are indicated on **Figure 8.7.2**. The photomontages showing the proposed development at 'Existing Baseline Conditions' on 'Day 1 of completed works without mitigation measures', 'Day 1 of the completed works with mitigation measures' and 'Year 10 of the completed works with mitigation measures' are illustrated on **Figures 8.12.1 to 8.16**.

- **P1 - View East from Chung Hau (RES-1):** this viewpoint was selected as representative of views from residents at Chung Hau (RES-1) as it provides direct views of the bridge from the west. The viewpoint is on the footpath north of the Silver Mine Bay Beach Hotel at an elevation of approximately 4.10 mPD.
- **P2 – View West from Silver Mine Bay Beach (REC-1):** this viewpoint was selected as representative of views from users of Silver Mine Bay Beach, (VSR REC-1) as it provides direct low level views towards the bridge from the east. The viewpoint is located at an elevation of approximately 1.00 mPD.
- **P3 – View North West from Silver Mine Bay Waterfront (REC-3):** this viewpoint was selected as representative of views from diners at the seafood restaurants along the Silver Mine Bay Waterfront (REC-3) as it provides direct low level views across the bay towards the bridge. The viewpoint is located at an

elevation of approximately 4.00 mPD.

- **P4 – View North West from Silver Mine Bay (REC-5; T1; O3):** this viewpoint was selected as representative of views from recreational craft (REC-5), passengers on inter-island ferries (T-1) and fishermen in Silver Mine Bay and it provides low level direct views north west across Silver Mine Bay towards the bridge. The viewpoint is at an elevation of approximately 2.00 mPD
- **P5 – View South West from Tung Wan Tau (RES-2; T3):** this viewpoint was selected as representative of views from residents at Tung Wan Tau (RES-2) and drivers, cyclists and pedestrians using Tung Wan Tau Road and has low level views south west across the bay towards the bridge. The viewpoint is at an elevation of approximately 3.00 mPD.

Table 8.9: Magnitude of Visual Change during the Construction and Operation Phases before Mitigation

VSR ID	Key VSR	Compatibility of the Project with the Visual Backdrop (High/Medium /Low)	Duration and Frequency of Impacts (Temporary/Permanent & Intermittent/Continuous)		Scale of Development (Large/Medium/Small) & Reversibility of Change (Yes/No)	Degree of Visibility of Source(s) of Visual Impact (Full, Partial, Obscured) & Distance Between VSR & Nearest Source(s) of Impact		Potential Blockage of Existing View (Full/Partial/Slight/Negligible)		Magnitude of Visual Change BEFORE Mitigation (Large, Intermediate, Small, Negligible, None)	
			Construction	Operation		Construction	Operation	Construction	Operation	Construction	Operation
Residential VSRs											
RES-1	Residents in Chung Hau	Medium	Permanent, Continuous	Permanent, Continuous	Small, No	Partial, 200m	Partial, 200m	Negligible	Negligible	Intermediate	Intermediate
RES-2	Residents in Tung Wan Tau	Medium	Permanent, Continuous	Permanent, Continuous	Small, No	Full, 900m	Full, 900m	Negligible	Negligible	Negligible	Negligible
RES-3	Inmates at Hei Ling Chau Addiction Treatment Centre	Medium	Permanent, Continuous	Permanent, Continuous	Small, No	Full, 4,200m	Partial, 4,200m	Negligible	Negligible	Negligible	Negligible
RES-4	Residents along north east coast of Silver Mine Bay	Medium	Permanent, Continuous	Permanent, Continuous	Small, No	Full, 1000m	Full, 1000m	Negligible	Negligible	Negligible	Negligible
Recreational VSRs											
REC-1	Users of Silver Mine Bay Beach	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Full, 0m	Full, 0m	Negligible	Negligible	Large	Small
REC-2	Hikers on Footpath to Trappist Monastery	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Full, 1,200m	Full, 1,200m	Negligible	Negligible	Small	Small

VSR ID	**Key VSR**	**Compatibility of the Project with the Visual Backdrop** (High/Medium /Low)	**Duration and Frequency of Impacts** (Temporary/Permanent & Intermittent/Continuous)		**Scale of Development** (Large/Medium/Small) **& Reversibility of Change** (Yes/No)	**Degree of Visibility of Source(s) of Visual Impact** (Full, Partial, Obscured) **& Distance Between VSR & Nearest Source(s) of Impact**		**Potential Blockage of Existing View** (Full/Partial/Slight/Negligible)		**Magnitude of Visual Change BEFORE Mitigation** (Large, Intermediate, Small, Negligible, None)	
			Construction	Operation		Construction	Operation	Construction	Operation	Construction	Operation
REC-3	Users of Silver Mine Bay Waterfront	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Partial , 400m	Partial , 400m	Negligible	Negligible	Small	Small
REC-4	Guests at Silver Mine Beach Resort Hotel (north Block)	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Full , 30m	Full , 30m	Negligible	Negligible	Large	Intermediate
REC-5	Recreational Craft in Silver Mine Bay	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Full , 100m	Full , 100m	Negligible	Negligible	Small	Small
REC-6	Visitors to Seafood Restaurants along Silver Mine Bay Waterfront	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Partial, 400m	Partial, 400m	Negligible	Negligible	Small	Small
Travelling VSRs											
T-1	Passengers on Inter-Island Ferries	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Full, 600m	Full, 600m	Negligible	Negligible	Negligible	Negligible
T-2	Drivers & Passengers along Ngan Kwong Wan Road	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Partial, 300m	Partial, 300m	Negligible	Negligible	Small	Small

VSR ID	Key VSR	Compatibility of the Project with the Visual Backdrop (High/Medium /Low)	Duration and Frequency of Impacts (Temporary/Permanent & Intermittent/Continuous)		Scale of Development (Large/Medium/Small) & Reversibility of Change (Yes/No)	Degree of Visibility of Source(s) of Visual Impact (Full, Partial, Obscured) & Distance Between VSR & Nearest Source(s) of Impact		Potential Blockage of Existing View (Full/Partial/Slight/Negligible)		Magnitude of Visual Change BEFORE Mitigation (Large, Intermediate, Small, Negligible, None)	
			Construction	Operation		Construction	Operation	Construction	Operation	Construction	Operation
T-3	Drivers, Cyclists & Pedestrians along Tung Wan Tau Road	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Full, 0m	Full, 0m	Negligible	Negligible	Large	Intermediate
Occupational VSRs											
O-1	Workers in Seafood Restaurants along Silver Mine Bay Waterfront	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Partial, 400m	Partial, 400m	Negligible	Negligible	Small	Small
O-2	Fishermen in Silver Mine Bay	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Full, 400m	Full, 400m	Negligible	Negligible	Small	Small
O3	Workers in Commercial Outlets along Silver Mine Bay Beach	Medium	Temporary, Intermittent	Temporary, Intermittent	Small, No	Full, 10m	Full, 10m	Negligible	Negligible	Large	Large

Note:

(1) The closet viewing distance has been used to rate the worst case scenario

(2) 'Permanent' duration measurement refers to entire construction/operation phase

8.7.5 Prediction of Significance of Visual Impacts

An assessment of the significance of the potential visual impacts during the construction and operation phases, before and after mitigation, is briefly described, and listed in detail in **Table 8.10** (All impacts are adverse unless otherwise stated). This follows the methodology outlined in **Section 8.4** above and assumes that the appropriate mitigation measures identified in **Table 8.6** and **Table 8.7** would be implemented, and that the full effect of the soft landscape mitigation measures would be realised after 10 years.

8.7.6 Visual Impacts during the Construction and Operation Phase before and after Mitigation

(i) Due to the small scale and low profile of the bridge, the magnitude of visual change to the VSRs will only be perceived as 'Large' before mitigation by VSRs which are very close to the development. All other VSRs will perceive the magnitude of change as 'Small' or 'Negligible' before mitigation measures. Many of the VSRs are a long distance away and enjoy good quality panoramic views of the sea, beach, mountains and offshore islands and alternative views are available. The impact upon each VSR is described in greater detail below. The magnitude of impacts experienced by VSRs is generally greater in the construction phase than in the operation phase for most VSRs due to the presence of the construction activities and temporary disturbance to the landscape.

(ii) Photomontages illustrating the existing views and operation phase impacts before and after (Day 1 and Year 10) the implementation of mitigation measures are provided in **Figures 8.12.1 to 8.16** and their locations are illustrated on **Figure 8.7.2**. Mitigation measures are described in more detail in **Table 8.6 and Table 8.7**.

Residential VSRs

(iii) **Residents in Chung Hau (RES-1)** will have permanent and continuous full views east towards the new bridge. During the construction phase, the magnitude of visual change will be 'Intermediate', and this combined with their 'High' sensitivity will result in a visual impact of **Moderate** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase following the removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance is predicted to be reduced to **Slight** at Day 1 and at Year 10. The impact significance will not reduce over time as the proposed mitigation tree planting lies on the east side of the bridge and will not therefore provide any additional screening benefits for the Chung Hau residents as it matures.

(iv) **Residents at Tung Wan Tau (RES-2), Inmates at Hei Ling Chau Addiction Treatment Centre (RES-3), Residents along north east coast of Silver Mine Bay (RES-4)** will all experience a negligible magnitude of change due to their distance of view and this will result in Insubstantial visual impacts during construction and operation, both before and after the implementation of mitigation measures. Proposed tree mitigation planting will enhance screening of the new bridges from Day 1 to Year 10 as it matures.

Recreational VSRs

(v) **Users of Silver Mine Bay Beach (REC-1)** will have full views east towards the new bridge. During the construction phase, the magnitude of visual change will be 'Large', and this combined with their 'High' sensitivity will result in a visual impact of **Substantial** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold due to the scale of the works and the proximity of the VSRs who will still experience significant visual impacts). During the operation phase following the removal of sources of temporary construction impacts the predicted visual impact significance before mitigation is **Moderate**. After the implementation of visual mitigation measures, the predicted visual impact significance will be **Moderate** at Day 1 due to the provision of a visually integrated bridge design which is not significantly greater in scale or form than the existing bridge. Due to the low level view of beach users, the cycle bridge will largely screen out the pedestrian bridge behind, thus the twin bridges will be perceived as a single bridge of similar elevation to the old bridge. At Year 10 the visual impact significance will be further reduced to **Slight** due to the maturing of mitigation tree planting which will enhance visual framing and screening of the new bridges.

(vi) **Guests at Silver Mine Beach Resort Hotel (REC-4)** in upper rooms in the northern block overlooking the Wang Tong River will have elevated full views north-east towards the new bridge. During the construction phase, the magnitude of visual change will be 'Large', and this combined with their 'Medium' sensitivity will result in a visual impact of **Substantial** significance before and after mitigation. During the operation phase following the removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance will be reduced to **Moderate** at Day 1 due to the provision of a visually integrated bridge design. Due to their elevated viewpoint, guests will perceive both bridges (which will represent a relatively larger visual impact than the low level views experienced by beach users). At Year 10 the visual impact significance will not be reduced by the effects of maturing mitigation tree planting which lies on the eastern

side of the bridge and therefore the visual impact significance will remain as **Moderate**.

(vii) **Users of Silver Mine Bay Waterfront (REC-3)** between the seafood restaurants and the River Silver will have partial views north west towards the new bridge. During the construction phase, the magnitude of visual change will be 'Small' due to the distance of view (400m) and partial screening by existing trees, and this combined with their 'High' sensitivity will result in a visual impact of **Moderate** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase following the removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance will be reduced to **Slight** at Day 1 due to the provision of a visually integrated bridge design which is not significantly greater in scale or form than the existing bridge and compensatory tree planting. At Year 10 the visual impact significance will be further reduced to **Insubstantial** due to the maturing of mitigation tree planting which will enhance visual framing and screening of the new bridges.

(viii) **Hikers on Footpath to Trappist Monastery (REC-2)** will have full elevated views south west towards the new bridge. During the construction phase, the magnitude of visual change will be 'Small' due to the distance of view (minimum 1200m), and this combined with their 'High' sensitivity will result in a visual impact of **Slight** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase following the removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance will be **Insubstantial** at Day 1 due to the provision of a visually integrated bridge design which is not significantly greater in scale or form than the existing bridge and compensatory tree planting. At Year 10 the visual impact significance will remain as **Insubstantial** and the maturing of mitigation tree planting will further enhance the visual framing and screening of the new bridges.

(ix) **Recreational Craft in Silver Mine Bay (REC-5)** will have full views north towards the new bridge. During the construction phase, the magnitude of visual change will be 'Small' due to the distance of view (minimum 100m) and partial screening by existing trees, and this combined with their 'High' sensitivity will result in a visual impact of **Slight** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase following the

removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance will be **Slight** at Day 1 due to the provision of a visually integrated bridge design which is not significantly greater in scale or form than the existing bridge and compensatory tree planting. At Year 10 the visual impact significance will be further reduced to **Insubstantial** due to the maturing of mitigation tree planting which will enhance visual framing and screening of the new bridges.

(x) **Visitors to Seafood Restaurants along Silver Mine Bay Waterfront (REC-6)** between the ferry pier and the waterfront will have partial views north west towards the new bridge. During the construction phase, the magnitude of visual change will be 'Small' due to the distance of view (minimum 400m) and partial screening by existing trees, and this combined with their 'Low' sensitivity will result in a visual impact of **Slight** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase following the removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance will be **Slight** at Day 1 due to the provision of a visually integrated bridge design which is not significantly greater in scale or form than the existing bridge and compensatory tree planting. At Year 10 the visual impact significance will be further reduced to **Insubstantial** due to the maturing of mitigation tree planting which will enhance visual framing and screening of the new bridges.

Travelling VSRs

(xi) **Drivers, Cyclists and Pedestrians along Tung Wan Tau Road (T3)** will have full views of the new bridge as they approach and are diverted around it temporarily during the construction phase or cross it during the operational phase. During the construction phase, the magnitude of visual change will be 'Large', and this combined with their 'Medium' sensitivity will result in a visual impact of **Substantial** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase the magnitude of visual change will be reduced to Intermediate and combined with a Medium sensitivity to Change this will give a visual impact significance before mitigation of **Moderate** due to the increased visual impact of the twin bridges compared to the original single bridge. Following the implementation of visual mitigation measures, the predicted visual impact significance will be **Moderate** at Day 1 due to the provision of a visually integrated bridge design which is not significantly greater in scale or form than the existing bridge and compensatory tree planting. At Year 10 the visual impact significance will not be

reduced for this VSR by the effect of maturing mitigation tree planting on the eastern side of the new bridges and therefore the residual visual impact will remain as **Moderate**.

(xii) **Drivers and Passengers along Ngan Kwong Wan Road (T-2)** between the seafood restaurants and the River Silver will have partial views north west towards the new bridges. During the construction phase, the magnitude of visual change will be 'Small' due to the distance of view (400m) and partial screening by existing trees, and this combined with their 'Medium' sensitivity will result in a visual impact of **Slight** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase following the removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance will be **Slight** at Day 1 due to the provision a visually integrated bridge design which is not significantly greater in scale or form than the existing bridge and compensatory tree planting. At Year 10 the visual impact significance will be further reduced to **Insubstantial** due to the maturing of mitigation tree planting which will enhance visual framing and screening of the new bridges.

(xiii) **Passengers on Inter-island Ferries (T-1)** will experience a negligible magnitude of change due to their distance of view (minimum 600m) and combined with their low sensitivity this will result in **Insubstantial** visual impacts during construction and operation, both before and after the implementation of mitigation measures. Proposed tree mitigation planting will enhance screening of the new bridges from Day 1 to Year 10 as it matures.

Occupational VSRs

(xiv) **Workers in Commercial Outlets along Silver Mine Bay Beach (O-3)** will have full views south towards the new bridges. During the construction phase, the magnitude of visual change will be 'Large', and this combined with their 'Low' sensitivity will result in a visual impact of **Moderate** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase following the removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance will be reduced to **Slight** at Day 1 due to the provision a visually integrated bridge design. At Year 10 the visual impact significance will not be reduced by the effects of maturing mitigation tree planting which lies on the eastern side of the bridge and therefore the visual impact significance will remain as **Slight**.

(xv) **Workers in Seafood Restaurants along Silver Mine Bay Waterfront (O-1) and Fishermen in Silver Mine Bay (O-2)** will have views north west towards the new bridges. During the construction phase, the magnitude of visual change will be 'Small' due to the distance of view and partial screening by existing trees, and this combined with their 'Low' sensitivity will result in a visual impact of **Slight** significance both before and after mitigation (whilst the proposed construction phase mitigation measures will help reduce the visual impacts, the effects will not be enough to reduce the impact threshold). During the operation phase following the removal of sources of temporary construction impacts and the implementation of visual mitigation measures, the predicted visual impact significance will be **Slight** at Day 1 due to the provision a visually integrated bridge design which is not significantly greater in scale or form than the existing bridge and compensatory tree planting. At Year 10 the visual impact significance will be further reduced to **Insubstantial** due to the maturing of mitigation tree planting which will enhance visual framing and screening of the new bridges.

8.7.7 Residual Visual Impacts during the Construction Phase after Mitigation

Although implementation of the recommended mitigation measures should slightly reduce the magnitude of the residual visual impacts during the construction phase, this will not generally be sufficient to reduce the overall significance thresholds described above for the before mitigation scenario. The impacts will be temporary and will be reduced on completion of the construction phase.

8.7.8 Residual Visual Impacts during the Operation Phase after Mitigation

(i) The largest residual visual impacts during the operation phase will be **Slight** only as the new bridge form and profile is similar to the bridge which it is replacing. The new bridge will become an accepted element of the beach side promenades. Users of the bridge will tend to focus on views away from the bridge rather than the bridge itself. The key viewers to the bridge are the Silver Mine Bay Beach users and their view will be progressively mitigated as compensatory tree planting frames and screens the bridge abutments. The view of the Wang Tong River will actual provision of greater freeboard between the River water level and the bridge soffit. Guests in the Silver Mine Beach Resort Hotel with views to the bridge will be few in number with short duration stays and their views will be focused on the beach and Bay beyond rather than the bridge in the foreground.

Table 8.10: Significance of Visual Impacts in the Construction and Operation Phases

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Magnitude of Visual Change before Mitigation (None, Negligible, Small, Intermediate, Large)		Receptor Sensitivity & Number (Low, Medium, High) (Very Few, Few, Many, Very Many)		Impact Significance Threshold BEFORE Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
		Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
Residential VSRs											
RES-1	Residents in Chung Hau	Intermediate	Intermediate	High, Few	High, Few	Moderate	Slight	CM1,2,3,4,5,6 OM1,2,3,4,5,6	Moderate	Slight	Slight
RES-2	Residents in Tung wan Tau	Negligible	Negligible	High, Few	High, Few	Insubstantial	Insubstantial	CM1,2,3,4,5,6 OM1,2,3,4,5	Insubstantial	Insubstantial	Insubstantial
RES-3	Inmates at Hei Ling Chau Addiction Treatment Centre	Negligible	Negligible	Medium, Few	Medium, Few	Insubstantial	Insubstantial	CM1,2,3,4,5,6 OM1,2,3,4,5	Insubstantial	Insubstantial	Insubstantial
RES-4	Residents along north east coast of Silver Mine Bay	Negligible	Negligible	High, Very Few	High, Very Few	Insubstantial	Insubstantial	CM1,2,3,4,5,6 OM1,2,3,4,5	Insubstantial	Insubstantial	Insubstantial
Recreational VSRs											
REC-1	Users of Silver Mine Bay Beach	Large	Small	High, Very many	High, Very Many	Substantial	Moderate	CM1,2,3,4,5,6 OM1,2,3,4,5,6	Substantial	Moderate	Slight
REC-2	Hikers on Footpath to Trappist Monastery	Small	Small	High, Many	High, Many	Slight	Slight	CM1,2,3,4,5,6 OM1,2,3,4,5	Slight	Insubstantial	Insubstantial
REC-3	Users of Silver Mine Bay Waterfront	Small	Small	High, Very Many	High, Very Many	Moderate	Slight	CM1,2,3,4,5,6 OM1,2,3,4,5	Moderate	Slight	Insubstantial

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Magnitude of Visual Change before Mitigation (None, Negligible, Small, Intermediate, Large)		Receptor Sensitivity & Number (Low, Medium, High) (Very Few, Few, Many, Very Many)		Impact Significance Threshold BEFORE Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
		Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
REC-4	Guests at Silver Mine Beach Resort Hotel (north Block)	Large	Intermediate	Medium, Few	Medium, Few	Substantial	Moderate	CM1,2,3,4,5,6 OM1,2,3,4,5,6	Substantial	Moderate	Moderate
REC-5	Recreational Craft in Silver Mine Bay	Small	Small	High, Few	High, Few	Slight	Slight	CM1,2,3,4,5,6 OM1,2,3,4,5	Slight	Slight	Insubstantial
REC-6	Visitors to Seafood Restaurants along Silver Mine Bay	Small	Small	Low, Many	Low, Many	Slight	Slight	CM1,2,3,4,5,6 OM1,2,3,4,5	Slight	Slight	Insubstantial
Travelling VSRs											
T-1	Passengers on Inter-Island Ferries	Negligible	Negligible	Low, Very Many	Low, Very Many	Insubstantial	Insubstantial	CM1,2,3,4,5,6 OM1,2,3,4,5	Insubstantial	Insubstantial	Insubstantial
T-2	Drivers/Passengers along Ngan Kwong Wan Road	Small	Small	Medium, Very Many	Medium, Very Many	Slight	Slight	CM1,2,3,4,5,6 OM1,2,3,4,5	Slight	Slight	Insubstantial
T-3	Drivers, Cyclists and Pedestrians along Tung Wan Tau Road	Large	Intermediate	Medium, Very Many	Medium, Very Many	Substantial	Moderate	CM1,2,3,4,5,6 OM1,2,3,4,5	Substantial	Moderate	Moderate

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Magnitude of Visual Change before Mitigation (None, Negligible, Small, Intermediate, Large)		Receptor Sensitivity & Number (Low, Medium, High) (Very Few, Few, Many, Very Many)		Impact Significance Threshold BEFORE Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
		Construction	Operation	Construction	Operation	Construction	Operation			**DAY 1**	**YEAR 10**
Occupational VSRs											
O-1	Workers in Seafood Restaurants along Silver Mine Bay Waterfront	Small	Small	Low, Few	Low, Few	Slight	Slight	CM1,2,3,4,5,6 OM1,2,3,4,5,6	Slight	Slight	Insubstantial
O-2	Fishermen in Silver Mine Bay	Small	Small	Low, Few	Low, Few	Slight	Slight	CM1,2,3,4,5,6 OM1,2,3,4,5	Slight	Slight	Insubstantial
O-3	Workers in Commercial Outlets along Silver Mine Bay Beach	Large	Large	Low, Few	Low, Few	Moderate	Moderate	CM1,2,3,4,5,6 OM1,2,3,4,5	Moderate	Slight	Slight

8.8 Cumulative Impacts

8.8.1 Various improvement projects are currently underway or are about to commence as identified in **Section 8.5.2** above. The ongoing works may or may not be complete during the construction period of the New Wang Tong River Bridge which is anticipated to commence in 2017. The New Wang Tong River Bridge construction works will likely take place against a backdrop of other construction projects in various stages of completion. This will result in a greater cumulative visual impact than if the project is constructed as a single, standalone project. However, it is not anticipated that any of the concurrent upgrading works at Mui Wo, in particular the project Improvement Works at Silvermine Bay Beach would affect the findings of this assessment.

8.8.2 During the operation phase, the new bridge will form part of an upgraded beach promenade. Rather than appear as an isolated new element within an existing beachfront it will be perceived as one of several new elements contributing to an enhanced overall beachfront scene. Its integration with the existing and proposed landscape context is therefore anticipated to be positive.

8.9 Environmental Monitoring and Audit

8.9.1 Construction Phase

Monitoring of Design, Construction and Establishment Works

(i) The design, implementation and maintenance of landscape and visual mitigation measures (refer to **Table 8.6 and Table 8.7**) shall be checked to ensure that they are fully realised and that any potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest possible date and without compromise to the intention of the mitigation measures.

Design of Landscape and Visual Mitigation Measures

(ii) The detailed design of the landscape and visual mitigation measures shall be undertaken so as to ensure compliance with the measures described in **Section 8.6.4**.

Site Supervision of Landscape Works

(iii) The implementation of the landscape works during the construction phase and establishment works shall be inspected in accordance with the site audit program.

8.9.2 Operation Phase

Monitoring of Landscape Establishment

All landscape and visual mitigation measures shall be monitored during the landscape establishment period and the defects liability period by the Contractor to check that intended mitigation effects are realised. After handing over, the mitigation measures shall be checked by the future maintenance agents (HyD on hardworks elements and LCSD on trees subject to agreement with LCSD in the detailed design stage). No monitoring and audit under the EM&A programme is required.

8.10 Conclusion

8.10.1 Landscape Impacts

(i) **Silver Mine Bay Beach (LR6)** will experience **Slight** temporary impacts following mitigation during the construction phase due to the temporary works required to demolish and reconstruct the bridge, hoarding of site, site offices, storage of plant and materials. During the operation phase, impacts to the beach will be reduced to **Insubstantial** as the affected area will have been reinstated and the only impact will be a minor loss of area (approximately 300 sq.m.) occupied by the footprint of the new twin bridges.

(ii) **Existing Trees in the vicinity of Wang Tong River Bridge (LR10)** will experience **Moderate** temporary impacts following mitigation during the construction phase due to the need to remove 7 no. existing trees. During the operation phase, this impact will be reduced to **Slight** at Day 1 due to the transplanting of 2 no. of the trees and the planting of 6 no. compensatory trees. By Year 10, the impact significance will have reduced to **Insubstantial** as the trees mature.

(iii) **Coastal Waters (LR1) and the Wang Tong River (LR2a)** will experience **Insubstantial** impacts during the construction phase following mitigation due to possible minor sediment from dredging works associated with the removal of the existing bridge pile. During the operation phase, the level of impact will be **None**.

(iv) All other Landscape resources including **River Silver (LR2b), Upland Streams (LR4), Natural Rocky Coastline (LR5), Natural Upland Vegetation (LR7), Semi-natural Lowland Vegetation (LR8)** and **Urban Domestic Amenity Planting (LR9)** will experience no landscape impacts during the construction or operational stages.

(v) **Bay Landscape (LCA2)** and **Rural Township Landscape (LCA3)** will experience **Insubstantial** landscape impacts during the construction phase following mitigation due to the temporary impacts to the beach and existing promenades. During the

operation phase, the impact significance will remain as **Insubstantial** with the impact area further reduced and comprising only a minor loss of area due to the footprint of the new twin bridges.

(vi) **Coastal Upland and Hillside Landscape (LCA1) and Settled Valley Landscape (LR4)** will experience no landscape impacts during the construction or operational stages.

8.10.2 Visual Impacts

(i) The primary visual impact of the project would result from the demolition and construction works for the new twin bridges and the presence of the new enlarged bridge footprint. Due to its relatively low position on the edge Silver Mine Bay, visibility from the landward side is generally restricted by neighbouring buildings, hills and trees. VSRs are generally located around the edge of Silver Mine Bay with views across the open bay waters.

(ii) The greatest residual visual impacts will be experienced by **Users of Silver Mine Bay Beach (REC-1) and Guests at Silver Mine Bay Resort Hotel (north Block) (REC-4) and Drivers, Cyclists** and **Pedestrians along Tung Wan Tau Road (T3)** due to their proximity to the bridge site. **REC-4** will experience Substantial visual impacts during construction and **Moderate** visual impacts during operation at Day 1 and Year 10. **REC-1** will experience **Substantial** visual impacts during construction, **Moderate** visual impacts during operation at Day 1 and **Slight** visual impacts at Year 10 once compensatory tree planting has matured. T-3 will experience **Substantial** visual impacts during construction and **Moderate** visual impacts during operation at Day 1 and Year 10.

(iii) All the other identified VSRs will experience only **Moderate, Slight** or Insubstantial residual visual impacts during the construction phase and **Slight** or **Insubstantial** residual visual impacts during the operation phase following mitigation.

Overall Conclusion

(iv) The proposed development will generate some unavoidable landscape and visual impacts which are identified and addressed in this EIA with the aim of avoiding (where practicable) and at the very least, minimising such impacts to within acceptable levels. There are opportunities, during the project's design, construction and operation stages, for incorporating mitigation measures which will contribute to reducing landscape and visual impacts. These include reducing the scale of the construction phase impacts and designing and implementing a new bridge which is sensitively integrated into the existing environment.

(v) None of the LRs, LCAs or VSRs will experience substantial residual impacts following mitigation during the operation phase. The highest residual impact on a LR is Slight on Day 1 and Insubstantial at Year 10, the highest residual impact on an LCA is Insubstantial at Day 1 and Year 10 and the highest residual visual impact on VSRs is Moderate on Day 1 and Year 10. Moreover, the proposed development is replacing an existing and long established landscape element with one that is similar in form, profile and scale, thus the degree of visual compatibility with the existing landscape and visual context is high. It is therefore considered that in accordance with the criteria and guidelines for evaluating and assessing impacts as stated in Annex 10 and 18 of the TM- EIAO, the overall residual landscape and visual impacts of the proposed development are acceptable with mitigation during the construction and operation phases.

9. ENVIRONMENTAL MONITORING & AUDIT REQUIREMENTS

9.1 Introduction

9.1.1 In order to alleviate the environmental impacts, detailed EM&A requirements for air quality (dust), noise, water quality, ecology, landscape and visual and waste was formulated based on the assessment results. Project Implementation Schedule is prepared which lists out every mitigation measure and the proposed party responsible for implementation. Monitoring works during construction and operational phases are proposed if the assessment results conclude that significant impact is anticipated. Detailed monitoring requirements are provided in the separated Environmental Monitoring and Audit Manual and summarized below.

9.2 Air Quality

9.2.1 Major air quality impact in construction phase would arise from demolition of Old Bridge, excavation and concreting for construction of New Bridge. With implementation of dust suppression measures, it is anticipated that the dust impact would be minimal. Regular air quality monitoring should be conducted at representative ASRs to ensure that relevant air quality standard can be met.

9.2.2 In the operational phase, the bridges will serve as walkway and cycle track. No air pollution will be generated from these activities and therefore no operational phase air quality monitoring is required.

9.3 Noise

9.3.1 In the construction phase, the major noise impact will arise from the use of powered mechanical equipment. With the proposed mitigation measures, construction noise impact on the representative noise sensitive receiver is predicted to comply with the noise criteria. Regular monitoring of noise level should be carried out at noise monitoring station near representative sensitive receiver before and throughout construction work to ensure that relevant noise standard can be met.

9.3.2 In the operational phase, the New Bridge will serve as walkway and cycle bridge as the Old Bridge. No operational phase noise monitoring is required.

9.4 Water Quality

9.4.1 Potential water quality impacts arising from the construction activities are expected from falling of debris above water and leakage of debris from cofferdam in water during

demolition of Old Bridge and construction of New Bridge, site runoff of exposed soil, earthworks and stockpiles during rainstorms and sewage generated from construction workforce. These would be minimized by implementing appropriate mitigation measures and good site management practices.

9.4.2 Construction phase monitoring is proposed to keep track of the variation in water quality to identify any unacceptable impact at the sensitive receivers during demolition of Old Bridge and construction of New Bridge. Site audit shall be conducted regularly to ensure that the mitigation measures recommended in the EIA Report and EM&A Manual are fully implemented.

9.4.3 No water pollution is expected from the use of New Bridge as walkway and cycle track in the operational phase and therefore no water quality monitoring is required.

9.5 Waste Management

9.5.1 This project is expected to generate inert and non-inert construction and demolition (C&D) materials from demolition of Old Bridge, excavation/dredging for pile cap and unused construction materials; marine sediment extracted from piles; chemical waste from plant maintenance; and general refuse from workers.

9.5.2 The contractor should formulate, and review regularly, a Waste Management Plan (WMP) in accordance with ETWB TCW No. 19/2005 Waste Management on Construction Site. In addition, training should be provided to all staff to ensure that they are aware of the practice, in particular in chemical waste handling. No adverse waste impact is expected if the mitigation measures are implemented properly.

9.5.3 Regular site inspection shall be carried out during construction phase to check whether the proposed mitigation measures have been properly implemented and to evaluate the effectiveness.

9.5.4 Since no waste is expected to be generated in operational phase, no monitoring or auditing is required.

9.5.5 Land use in the vicinity of the Site includes residential, commercial (hotel) and bathing beach. Active agriculture in the past has now subsided. No industrial activity that may cause land contamination was identified. Previous land use as pig farm at the now Silvermine Beach Resort is evaluated to cause low contamination potential at the work site. No unacceptable land contamination impact is expected and no EM&A is proposed.

9.6 Ecology

9.6.1 The proposed Project will cause minor permanent habitat loss of sandy shore above high water mark. Indirect water quality impact may arise from falling of debris from demolition and construction work, surface runoff or chemical leakage in construction phase. Use of powered plant equipment may bring noise disturbance on wildlife. No

ecological impact is expected in the operational phase.

9.6.2 Construction noise and water quality mitigation measures proposed in the previous sections will be applicable to terrestrial and freshwater ecology. With proper implementation of mitigation measures, un-acceptable residual impact is not expected. Site audit shall be conducted regularly to ensure that the mitigation measures recommended in the EIA Report and EM&A Manual are fully implemented.

9.7 Landscape and Visual

9.7.1 The proposed development will generate some unavoidable landscape and visual impacts which are identified. Mitigation measures have been proposed to reduce the scale of the construction phase impacts and to design and implement new bridges which are sensitively integrated into the existing environment. None of the LRs, LCAs or VSRs will experience substantial residual impacts during the operation phase.

9.7.2 The implementation of the landscape works during the construction phase and establishment works shall be inspected in accordance with the site audit program.

9.8 Implementation Schedule

9.8.1 Recommended mitigation measures, their objectives and main concerns to address, their implementation agents, locations and durations of the measures, their implementation stages, and their relevant legislation and guidelines are detailed in **Appendix 9**.

10. CONCLUSION

10.1 Introduction

Air Quality

10.1.1 Potential air quality impacts from the construction works of the Project would mainly be related to construction dust from site clearance, excavation, foundation and site formation works. With proper implementation of the recommended mitigation measures, it is anticipated that the project will not give rise to significant construction dust impacts likely to exceed the recommended limits in the TM at all ASRs. Adverse construction dust impact would not be anticipated.

Noise

10.1.2 Typical types and number of powered mechanical equipment (PME) needed for various construction activities for the construction of bridges have been assessed. Based on the effective sound power level of the PMEs and the distance of work site to the noise sensitive receiver, unmitigated construction noise level would exceed the 75dB(A) guideline level for the non-restricted hours for the NSR. At source mitigation measures have been proposed including the use of quality plants, use of mobile noise barriers, and good site practice for implementation. With the proposed mitigation measures, construction noise impact on the representative noise sensitive receiver is predicted to comply with the criteria in "Construction Noise Standards During Non-Restricted Hours" stipulated in EIAO-TM.

10.1.3 With all the proposed mitigation measures, no residual construction noise impacts are anticipated. Moreover, regular noise monitoring should be carried out and a hotline to service any complaint should be set up in construction phase.

10.1.4 As there is no fixed plant operated, no unacceptable operational noise impact is anticipated.

Water Quality

10.1.5 Potential water quality impacts arising from the construction activities are expected from falling of debris above water and leakage of debris from cofferdam in water during demolition of Old Bridge and construction of New Bridge, site runoff of exposed soil, earthworks and stockpiles during rainstorms and sewage generated from construction workforce. These would be minimized by implementing appropriate mitigation measures and good site management practices. No unacceptable water quality impact is expected.

Waste Management

10.1.6 During construction phase, major C&D material will be composed of broken concrete, metal bar, sand and soil from demolition of Old Bridge. Other waste includes chemical waste from maintenance of plant equipment, general refuse from workforce, and marine sediment extracted from minipiles.

10.1.7 No waste generation activity is expected in operational phase.

10.1.8 The waste shall be handled and disposed of properly to prevent causing damage to the environment, e.g. water pollution, odour nuisance and hygiene issue. With implementation of the recommended measures and site practices, no unacceptable impact due to waste management is expected.

10.1.9 Based on historical aerial photos, land use history and site visit, it is concluded that land contamination at the Site is unlikely.

Ecology

10.1.10 Ecological sensitive areas recorded in the Study Area include Wang Tong River and Marsh in Tai Wai Yuen. 2 plants, 1 terrestrial mammal, 15 avifauna, 3 amphibians and 1 freshwater fish species with conservation importance were recorded in past studies, while 1 plant, 9 avifauna, 1 butterfly and 3 fish species with conservation importance were recorded in recent surveys.

10.1.11 Due to the construction of new twin bridges and the demolition of old bridge, small area of Sandy Shore (902 m^2 in total, in which 226 m^2 will be lost permanently), Developed Area (204 m^2 in total temporarily) and Wang Tong River (91 m^2 in total temporarily) will be impacted directly. No species of conservation importance is expected to be impacted directly. Furthermore, the Project will permanently release about 0.18 m^2 (or 0.35m in width) of Wang Tong River due to the demolition of the existing supporting column. Since the ecological value of each directly impacted habitat is low or low to moderate and the habitat loss is small in size, the impact due to habitat loss is considered to be minor.

10.1.12 Except Abandoned Agricultural Land & Shrubland/Grassland are not expected to be impacted, other habitats and fauna species in the Study Area are expected to be impacted indirectly by water quality and/or noise impacts in construction phase. Nevertheless, these indirectly impacts will be minor. No indirect impact is expected in operational phase.

10.1.13 With proper implementation of mitigation measures, un-acceptable residual impact is not expected. Regular site audit would only be required in construction phase.

10.1.14 The overall impact on terrestrial ecology is considered as acceptable.

Landscape and Visual

10.1.15 The proposed development will generate some unavoidable landscape and visual impacts which are identified and addressed in this EIA with the aim of avoiding (where practicable) and at the very least, minimising such impacts to within acceptable levels. There are opportunities, during the project's design, construction and operation stages, for incorporating mitigation measures which will contribute to reducing landscape and visual impacts. These include reducing the scale of the construction phase impacts and designing and implementing a new bridge which is sensitively integrated into the existing environment.

10.1.16 None of the LRs, LCAs or VSRs will experience substantial residual impacts following mitigation during the operation phase. The highest residual impact on a LR is **Slight** on Day 1 and Insubstantial at Year 10, the highest residual impact on an LCA is **Insubstantial** at Day 1 and Year 10 and the highest residual visual impact on VSRs is **Moderate** on Day 1 and Year 10. Moreover, the proposed development is replacing an existing and long established landscape element with one that is similar in form, profile and scale, thus the degree of visual compatibility with the existing landscape and visual context is high. It is therefore considered that in accordance with the criteria and guidelines for evaluating and assessing impacts as stated in Annex 10 and 18 of the TM-EIAO, the overall residual landscape and visual impacts of the proposed development are acceptable with mitigation during the construction and operation phases.

10.2 Summary of Environmental Outcomes

Environmentally Friendly Options Considered and Incorporated in the Preferred Option

10.2.1 The proposed New Wang Tong River Bridge option will improve traffic safety by providing segregated bridges for pedestrians and cyclist. The preferred option has adopted a number of green measures:

- The existing pier of the Old Bridge in the Wang Tong River will be removed
- The New Bridge will not have intermediate bridge support below high water mark
- The New Bridge will have a low profile and similar design as the Old Bridge
- The New Bridge is designed to align with the future amenity development on the northern side of the Old Bridge
- The New Bridge will have higher deck level that allows passing 1 in 100 year flooding

Environmental Designs Recommended and Key Environmental Problems Avoided

10.2.2 Construction method of the proposed New Bridge was carefully chosen to minimize environmental impacts:

- Adopt mini-piling for construction of bridge piers and abutment. This requires smaller land requirement, less excavation and generates less wastewater when compared to conventional bored piling.
- Construction of new pedestrian bridge, demolition of Old Bridge and construction of new cycle bridge will be carried out in different phases to avoid concurrent activities
- Removal of existing pier of Old Bridge and construction of new piers and abutments near the Wang Tong River will be conducted within watertight cofferdam
- A solid temporary working platform will be constructed above Wang Tong River to prevent falling of debris during demolition and construction works
- New Bridge will be constructed by precast structures as far as possible
- If active bird nest is found on trees within the works area, a buffer zone will be set around the tree until the nest is no longer in use

Environmental Benefits of Environmental Protection Measures Recommended

10.2.3 In summary, the preferred bridge design, proposed construction methods and mitigation measures will bring about the following environmental benefits:

- Improvement of Wang Tong River flow through removal of the existing pier in the river
- Prevention of permanent damage on riverbed or obstruction of river flow by designing no intermediate bridge support below high water mark
- Minimization of landscape and visual impact by having low profile and design that matches with surrounding rural environment and with additional tree planting
- Integration with the future landscape by aligning the design with the future amenity development on the northern side of the Old Bridge
- Reduction of flooding risk by designing sufficient deck height that is capable of passing 1 in 100 year flooding
- Reduction of the quantity of excavated materials and wastewater generated, risk of water quality deterioration due to earth handling, temporary loss of sandy shore habitat and the number of tree removed by adopting mini-piling instead of conventional bored piling
- Minimization of environmental impacts (e.g. dust and noise) by scheduling demolition and construction activities in separate phases
- Avoidance of release of suspended solids by enclosing piling area near the Wang Tong River within cofferdam
- Prevention of dropping of debris during demolition and construction works by constructing a solid temporary working platform above Wang Tong River
- Minimization of activities above Wang Tong River by building bridge using precast structures
- Minimization of disturbance on bird breeding activities by setting buffer zone around trees with active nest within the works area

Estimated Population Protected from Various Environmental Impacts, and Environmentally Sensitive Areas Protected

10.2.4 Through implementation of mitigation measures and good site practices, environmental impacts on sensitive receivers near the works area of the proposed New Bridge will be avoided or minimized:

- Protection of village house in Tung Wan Tau Road and Silvermine Beach Resort from construction dust impact by scheduling of demolition and construction works in different phases
- Protection of village house in Tung Wan Tau Road from construction noise impact by scheduling of demolition and construction works in different phases and adopting quality powered mechanical equipment
- Protection of Wang Tong River and Silvermine Bay Beach from water quality impact by enclosing dredging works and excavation works near the water bodies within cofferdam
- Protection of wildlife in Wang Tong River and Silvermine Bay Beach by implementing water quality mitigation measures, and prevention of impact on bird breeding activities by setting buffer zone around trees with active nest within the works area
- Protection of existing landscape and visual elements by having bridge design that matches with surrounding rural environment and planting trees

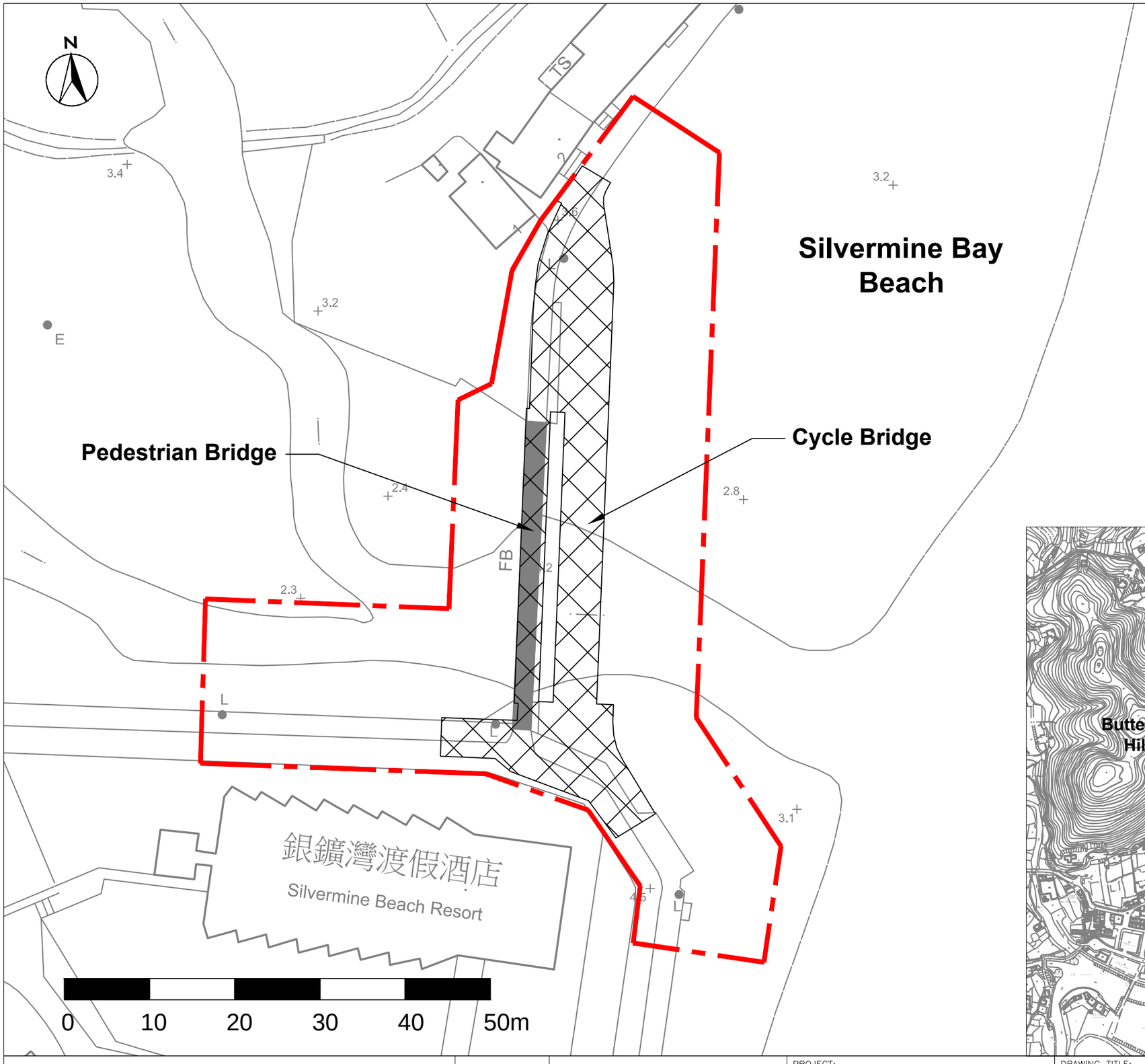
Compensation Areas Included

10.2.5 As five trees encroaching the works area have to be felled, this loss will be compensated through planting of six heavy standard trees onsite. As the trees mature, landscape impact in operational phase will be reduced from moderate to slight.

10.3 Summary of Environmental Impacts

10.3.1 A summary of environmental impacts associated with the Project for each environmental aspect is shown in **Appendix 10**.

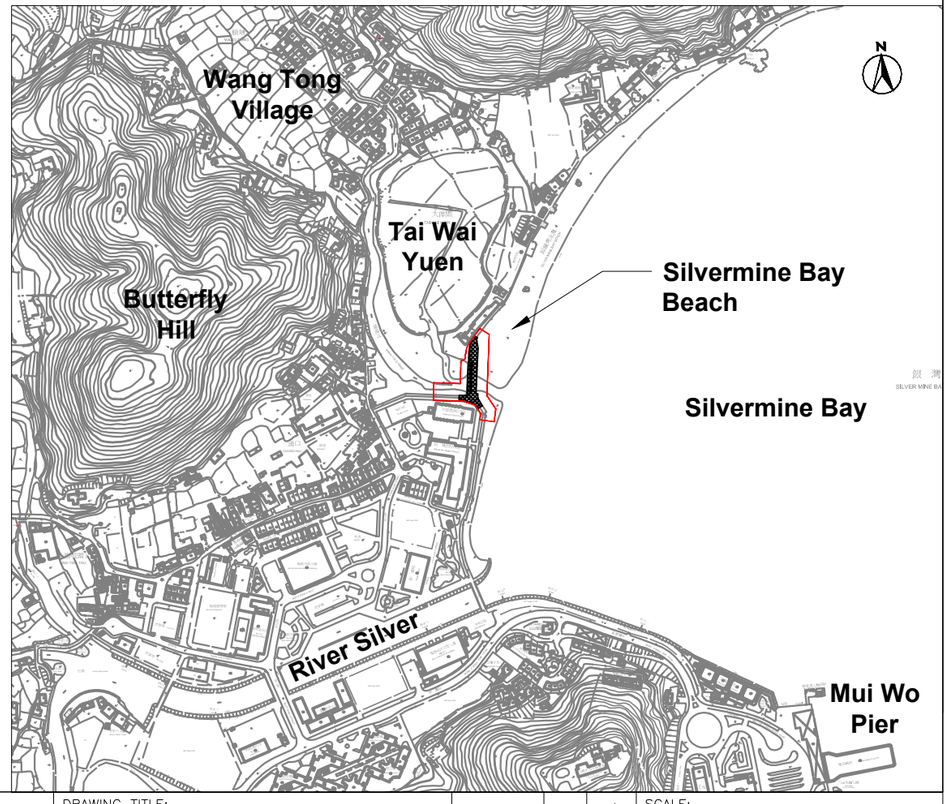
Figures



LEGEND

- Project Boundary
- Existing Wang Tong Bridge
- Proposed New Wang Tong Bridge

Silvermine Bay



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Highways Department

PROJECT:
AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI MO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

DRAWING TITLE:
Location of Project Site

Drafting by	KL	08/15
Designed by	–	08/15
Checked by	HT	08/15
Approved by	BC	08/15

SCALE: AS SHOWN

DRAWING NO: FIG 1.1

REV: –

817880 E

817860 E

817840 E

817820 E

814500 N

814480 N

814460 N

814440 N

GLA-TIS21/2010

APPROX. PROJECT BOUNDARY OF FUTURE PROMENADE

TUNG WAN TAU ROAD

SEA VIEW RESTAURANT

House No.2

House No.1

KOK CHUNG FUNG

Concrete Platform

Canopy

Temporary Structure

Sitting-Out Area

STT CX120

Beach

Dense Vegetation

WANG TONG RIVER

Armouring Rock

Boulder

Footpath

Cycle track

300mm Covered U-Channel

Dia. Iron Pipe

Manhole

Culvert

H.W.M.

L.W.M.

TREE FELLING

RETAINING WALL

Ø300 SEWER

LAMP POST & PILLAR BOX

TRANSITION

CATCHPIT

FOOTPATH

DROP CURB

MAX. 4% RAMP

CYCLE TRACK

BICYCLE RACK

FOOTPATH

4% RAMP

1:12 RAMP

2.5% FALL

2.8% FALL

NEW U-CHANNEL

END OF CYCLE TRACK

NEW U-CHANNL CONNECT TO CEDD CATCHPIT

CATCHPIT PROPOSED BY CEDD

34000

5100

2850

1700

5550

2000

2850 1700 5100

300 300 300 300

250 2000 FOOTPATH 300 500 3500 500 CLEARANCE CYCLE TRACK CLEARANCE

2.5% FALL +4.825 +4.845 2.5% FALL

UTILITY

5550

1 SECTION B 2

1:100

FOOTPATH BICYCLE RACK CYCLE TRACK

+4.300 +4.600

+4.050 NEW PROFILE

3.840

EX. BRIDGE

EX. PROFILE

+2.900

SECTION C

1:100

+3.680 +3.830 +3.900 NEW PROFILE

+3.560

+3.400

NEW U-CHANNEL

EX. PROFILE

SECTION D

1:100

GENERAL NOTES:

1. UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN MM AND ALL LEVELS ARE IN mPD.

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CINOTECH consultants limited

Urbis

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Highways Department

PROJECT:

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DRAWING TITLE:

Layout of Proposed New Bridges

Drafting by	YW	09/14	
Designed by	ML	09/14	
Checked by	ML	09/14	
Approved by	ML	09/14	

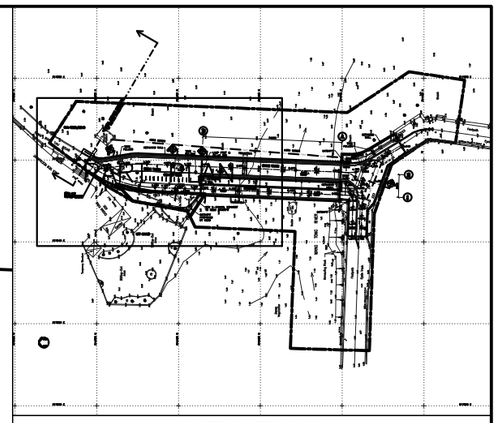
SCALE: 1 0 1 2 3 4 5m

1 : 300 @ A3 SIZE

DRAWING NO: FIG. 1-2

REV: -

MLAL\HA927 (PA3014) EIA & DIA -Wang Tong Bridge-Mui Wo\22-drg out\ACABAS\FIG 1.1~1.3-150312.DWG



KEY PLAN
(SCALE 1 : 1500)

GLA–TIS21/2010

APPROX. PROJECT BOUNDARY OF FUTURE PROMENADE

814500 N

814480 N

817860 E

WAN TAU ROAD

Beach

Concrete Platform

Ø300 SEWER

TREE FELLING

RETAINING WALL

TREE FELLING

LAMP POST & PILLAR BOX

TRANSITION

34000

Ø30

CYCLE TRACK

BICYCLE RACK

4% RAMP

2.5% FALL

5.265

5.185

4.845

4.825

4.700

4.500

4.300

4.100

3.900

3.700

3.650

3500

5100

2850

1700

RETAINING WALL

FOOTPATH

TRANSITION

NEW U–CHANNEL

NEW U–CHANNL CONNECT TO CEDD CATCHPIT

CATCHPIT PROPOSED BY CEDD

END OF CYCLE TRACK

SEA VIEW RE

House No.2

CHUNG FUNG KOK

House No.1

Canopy

Monument

00 Dia. iron pipe

FB

SH

T

Column

H W M

GENERAL NOTES:

1. UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN MM AND ALL LEVELS ARE IN mPD.

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DRAWING TITLE:
Layout of Proposed New Bridges

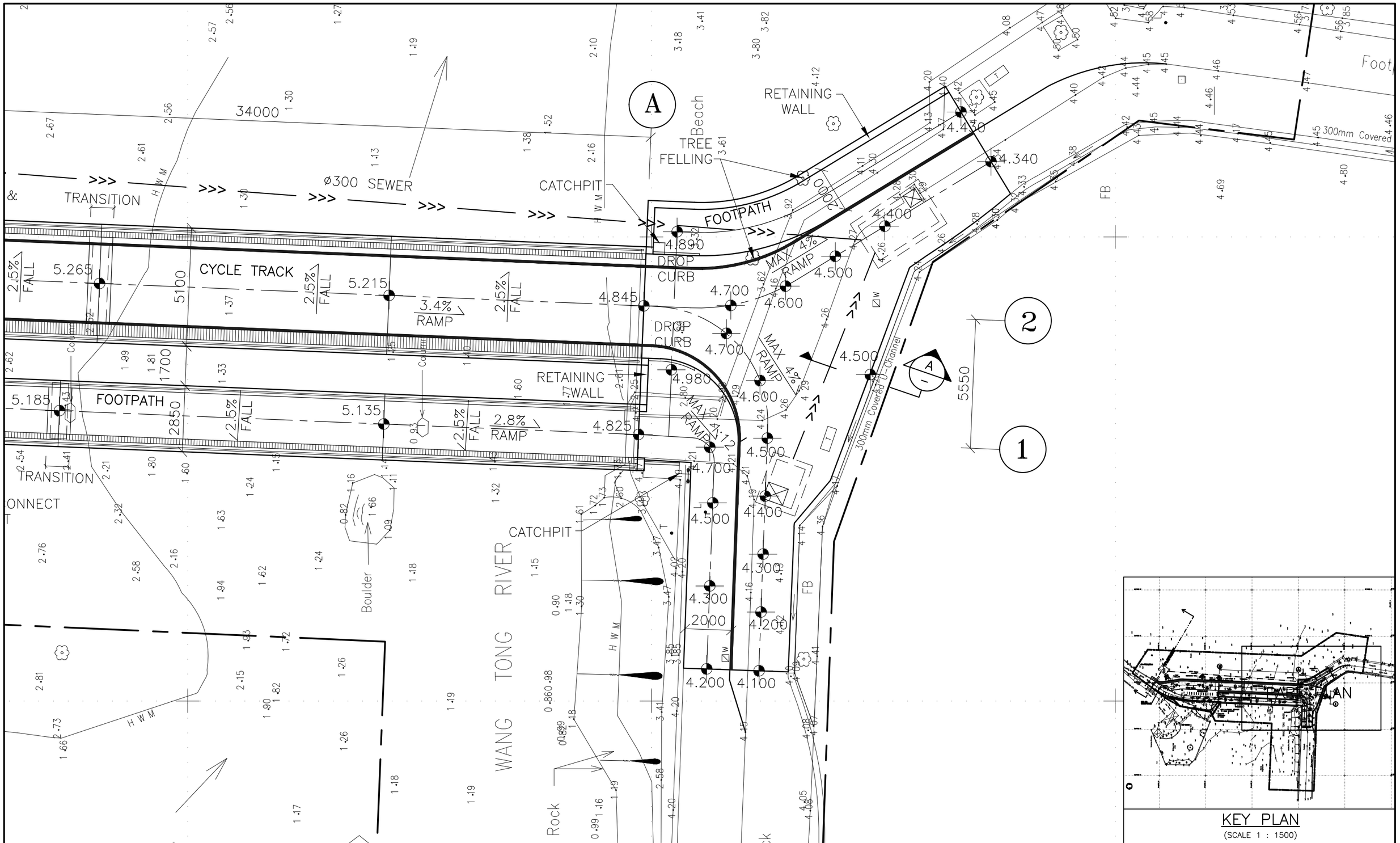
Drafting by	YW	09/14
Designed by	ML	09/14
Checked by	ML	09/14
Approved by	ML	09/14

SCALE: 1 0 1 2 3 4m
1 : 150 @ A3 SIZE

DRAWING NO: FIG. 1.2

REV: -

MLAL\HA927 (PA3014) EIA & DIA –Wang Tong Bridge–Mui Wo\22–drg out\ACABAS\FIG 1.1~1.3–150312.DWG



GENERAL NOTES:

1. UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN MM AND ALL LEVELS ARE IN mPD.

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PROJECT:
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DRAWING TITLE:
Layout of Proposed New Bridges

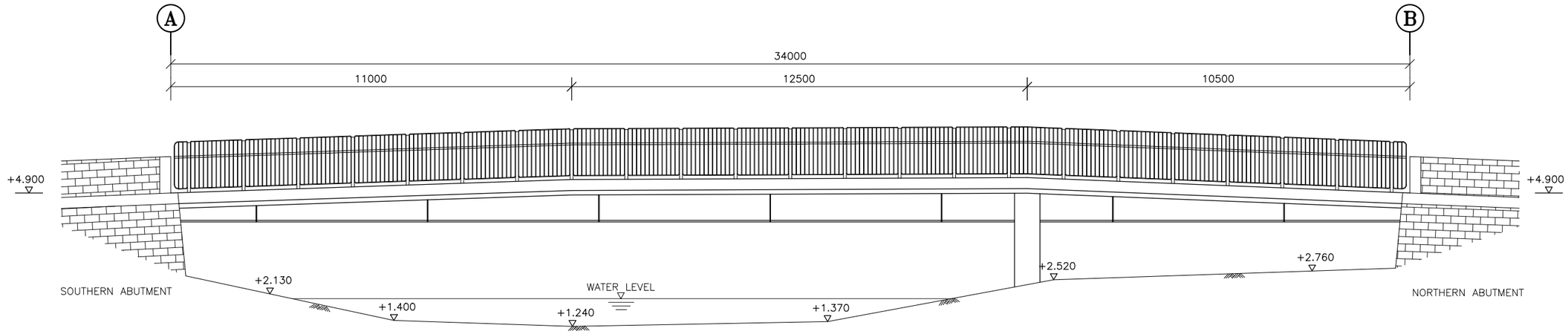
Drafting by	YW	09/14
Designed by	ML	09/14
Checked by	ML	09/14
Approved by	ML	09/14

SCALE: 1 0 1 2 3 4m
1 : 150 @ A3 SIZE

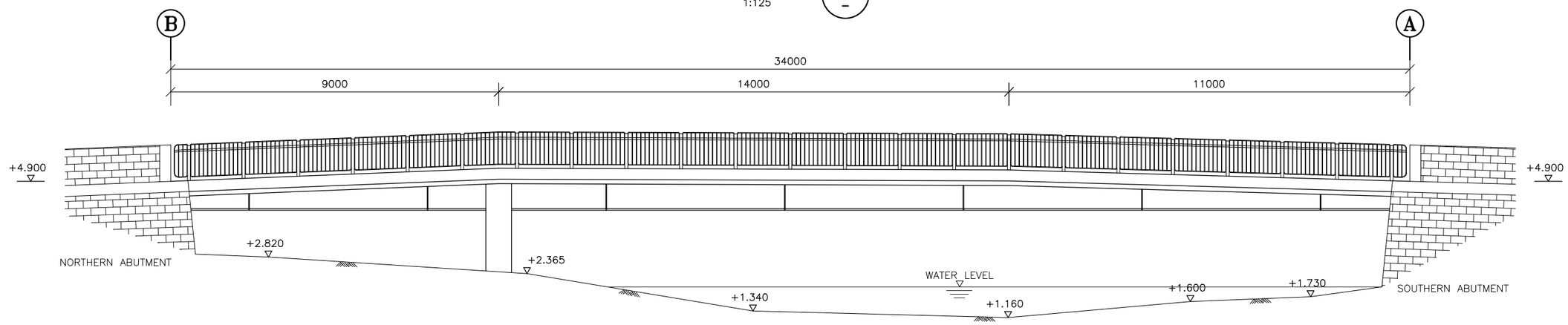
DRAWING NO: FIG. 1.2

REV: -

MLAL\HA927 (PA3014) EIA & DIA –Wang Tong Bridge–Mui Wo\22–drg out\ACABAS\FIG 1.1~1.3–150312.DWG



CYCLE TRACK BRIDGE ELEVATION (A / –)
1:125



PEDESTRIAN BRIDGE ELEVATION (B / –)
1:125

LEGEND

- FINISHING LEVEL
- STRUCTURAL LEVEL

GENERAL NOTES

1. UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN mm, ALL LEVELS ARE IN mPD.
2. UNLESS OTHERWISE STATED, ALL LEVELS ARE STRUCTURAL LEVELS.

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PROJECT:
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DRAWING TITLE:
Layout of Proposed New Bridges

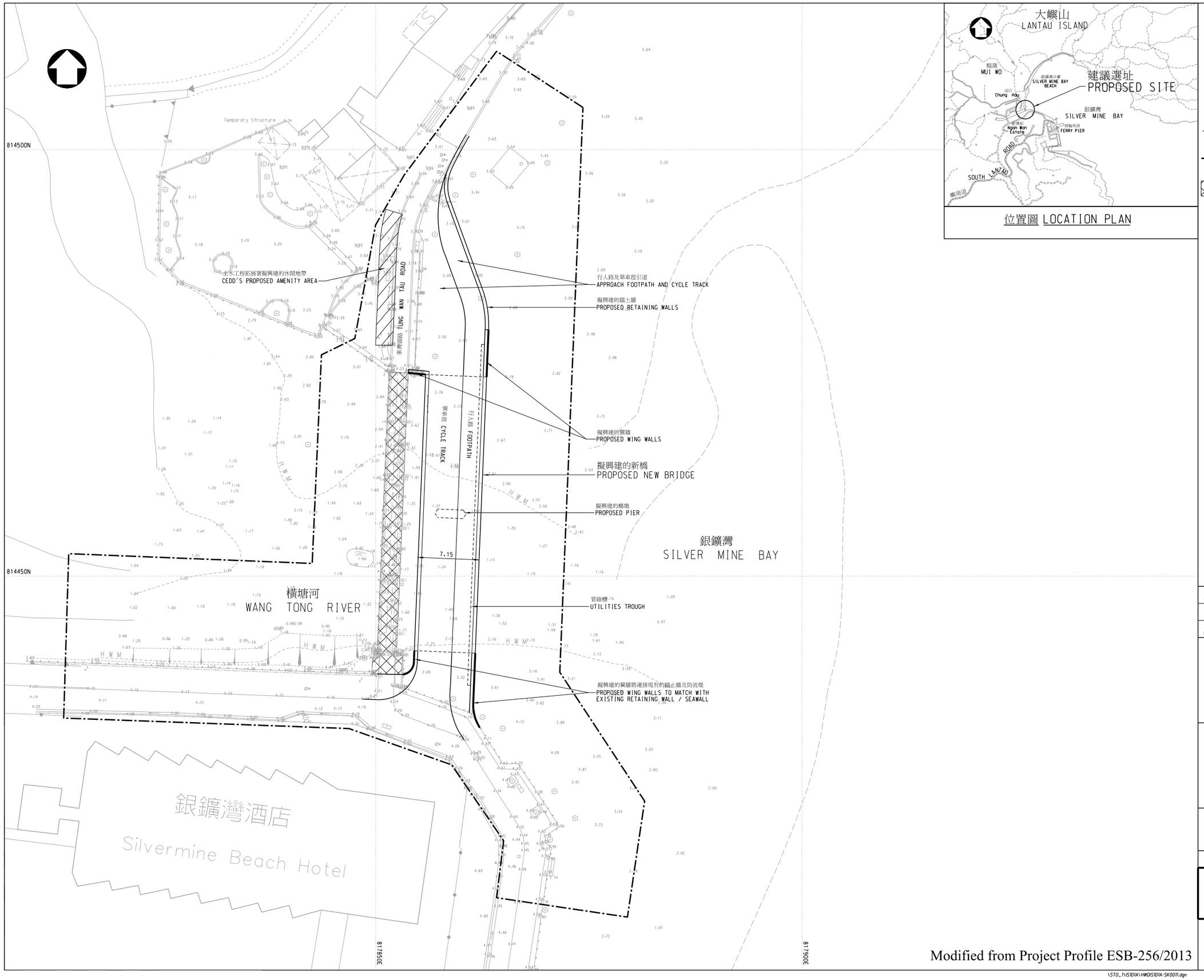
Drafting by	SING	09/14
Designed by	ML	09/14
Checked by	ML	09/14
Approved by	ML	09/14

SCALE: 1 0 1 2 3 4 5m
1 : 125 @ A3 SIZE

DRAWING NO: FIG. 1.2

REV: –

MLAL\HA927 (PA3014) EIA & DIA –Wang Tong Bridge–Mui Wo\22–drg out\ACABAS\FIG 2.1~2.5–150312.DWG



位置圖 LOCATION PLAN

Modified from Project Profile ESB-256/2013

\STO_TVS101A\HWDIS101A-SK0011.dgn

註 NOTES :

所有量度均以米為單位。
1. ALL DIMENSIONS ARE IN METRES.

所有水平均以米為單位並在香港主水平基準上。
2. ALL LEVELS ARE IN METRES ABOVE H.K.P.D.

圖例 LEGEND :

建議工作範圍
PROPOSED SITE BOUNDARY

將會拆卸的現有行人橋
EXISTING BRIDGE TO BE DEMOLISHED

H W M 高潮標
HIGH WATER MARK

合約編號 contract no.

檔案編號 file no. HCW/NF/56/L

工程編號 project no.

合約名稱 contract

新橫塘河橋
NEW WANG TONG RIVER BRIDGE

圖則名稱 drawing title

Layout of Proposed New Bridge in Project Profile

圖則編號 drawing no.

2.1

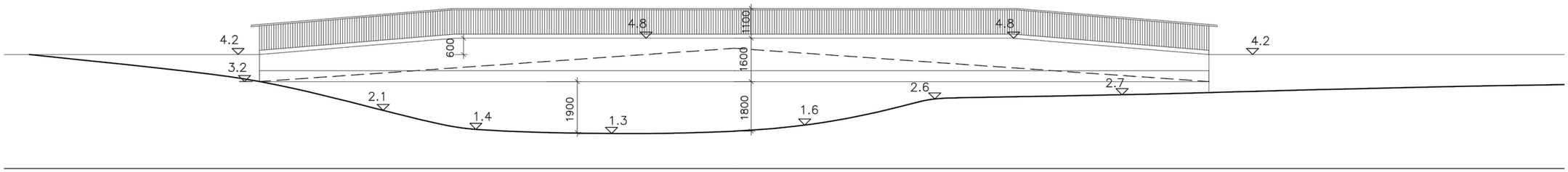
辦事處 office

工 程 部
WORKS DIVISION

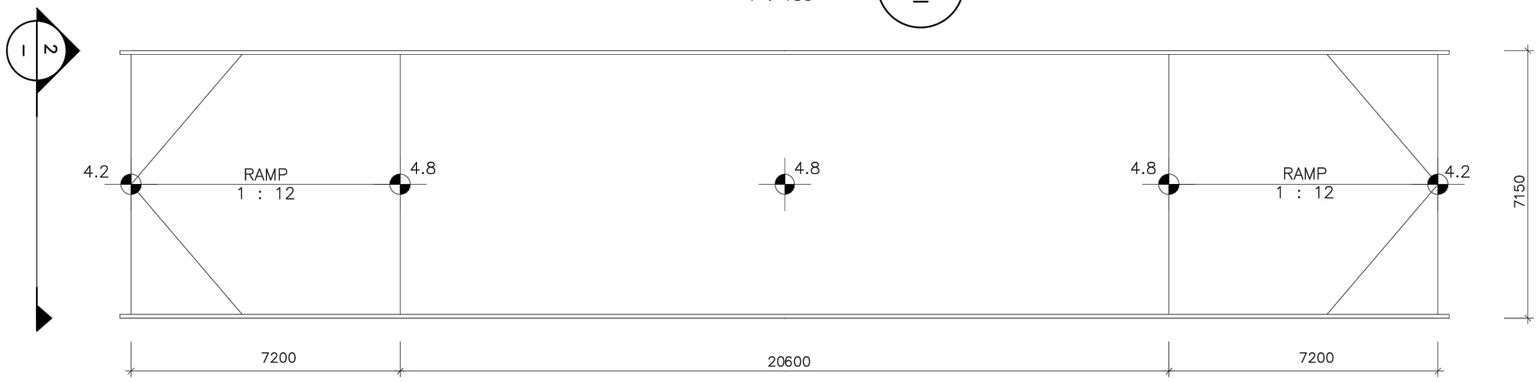
HIGHWAYS 路
DEPARTMENT 政
HONG KONG 署

GENERAL NOTES:

1. UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN MM AND ALL LEVELS ARE IN mPD.

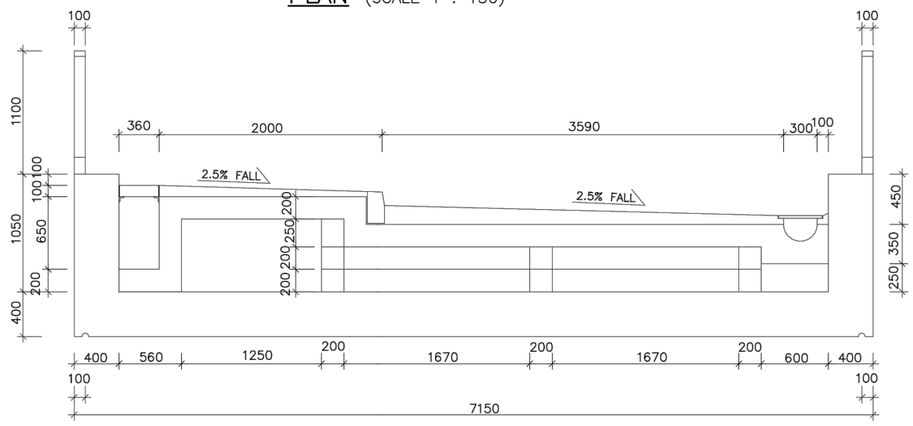


ELEVATION 1 / – (1 : 150)



ELEVATION 1 / –

PLAN (SCALE 1 : 150)



SECTION 2 / – (1 : 50)

Scale:

5 2.5 0 5 10m

1 : 150 @ A3 SIZE

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AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI MO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

DRAWING TITLE:

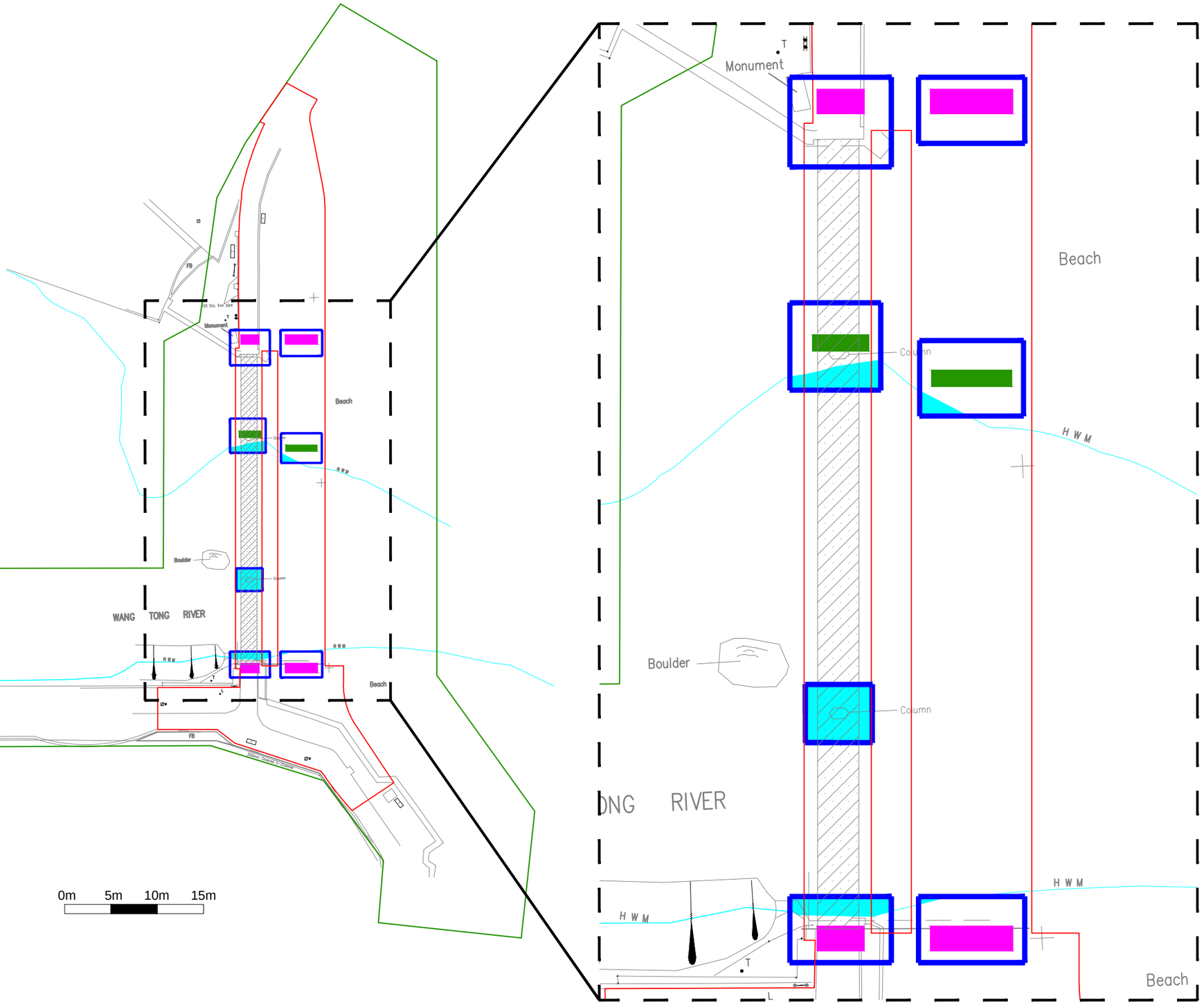
Layout of Alternative Bridge Design (Option 2)

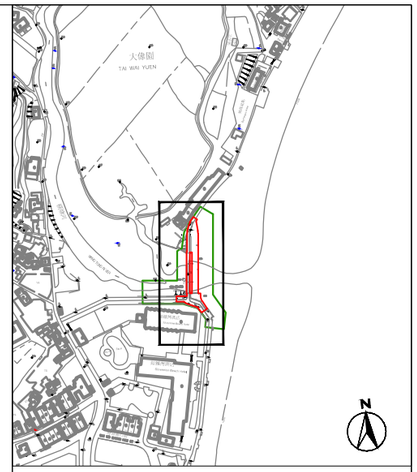
Drafting by	JM	06/16
Designed by	–	06/16
Checked by	HT	06/16
Approved by	BC	06/16

SCALE: AS SHOWN

DRAWING NO: FIG 2.2

REV: –





Legend

- Project Site
- Existing Bridge Alignment
- Proposed Bridge Alignment
- Excavation Areas within Cofferdam
- Excavation Areas below High Water Mark
- Proposed Bridge Columns
- Proposed Bridge Abutments within Cofferdam

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AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI MO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

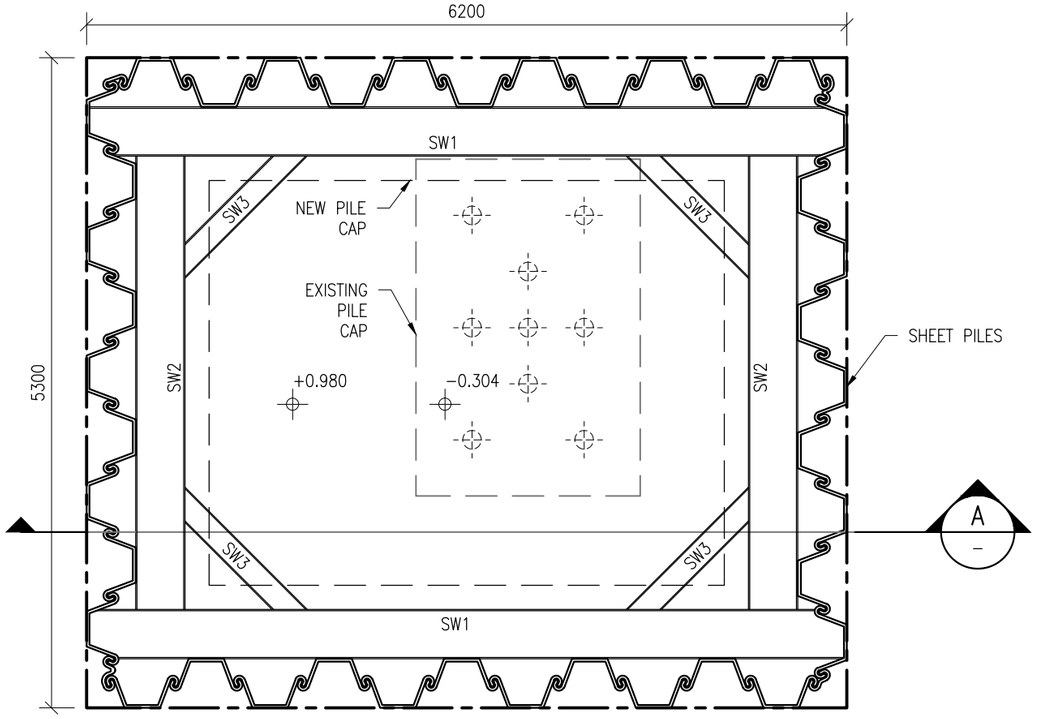
DRAWING TITLE:
Location of Excavation below High Water Mark

Drafting by	KL	08/15
Designed by	–	08/15
Checked by	HT	08/15
Approved by	BC	08/15

SCALE: AS SHOWN

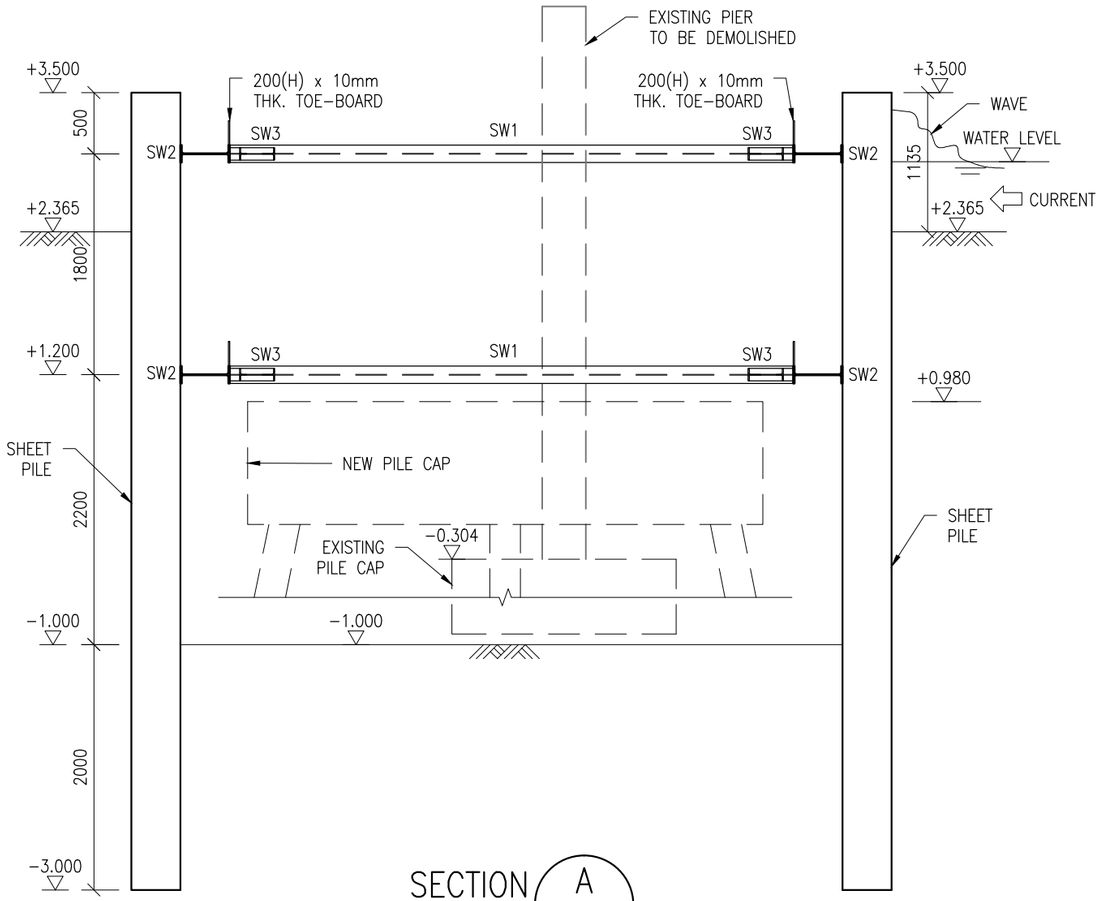
DRAWING NO: FIG 2.3

REV: 1



TYPICAL DETAIL FOR COFFERDAM

(1:50)



LEGEND

WORKING AREA

EXISTING PILE

SHEET PILES

GENERAL NOTES

1. UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN mm, ALL LEVELS ARE IN mPD.
2. UNLESS OTHERWISE STATED, ALL LEVELS ARE STRUCTURAL LEVELS.

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AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI WO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

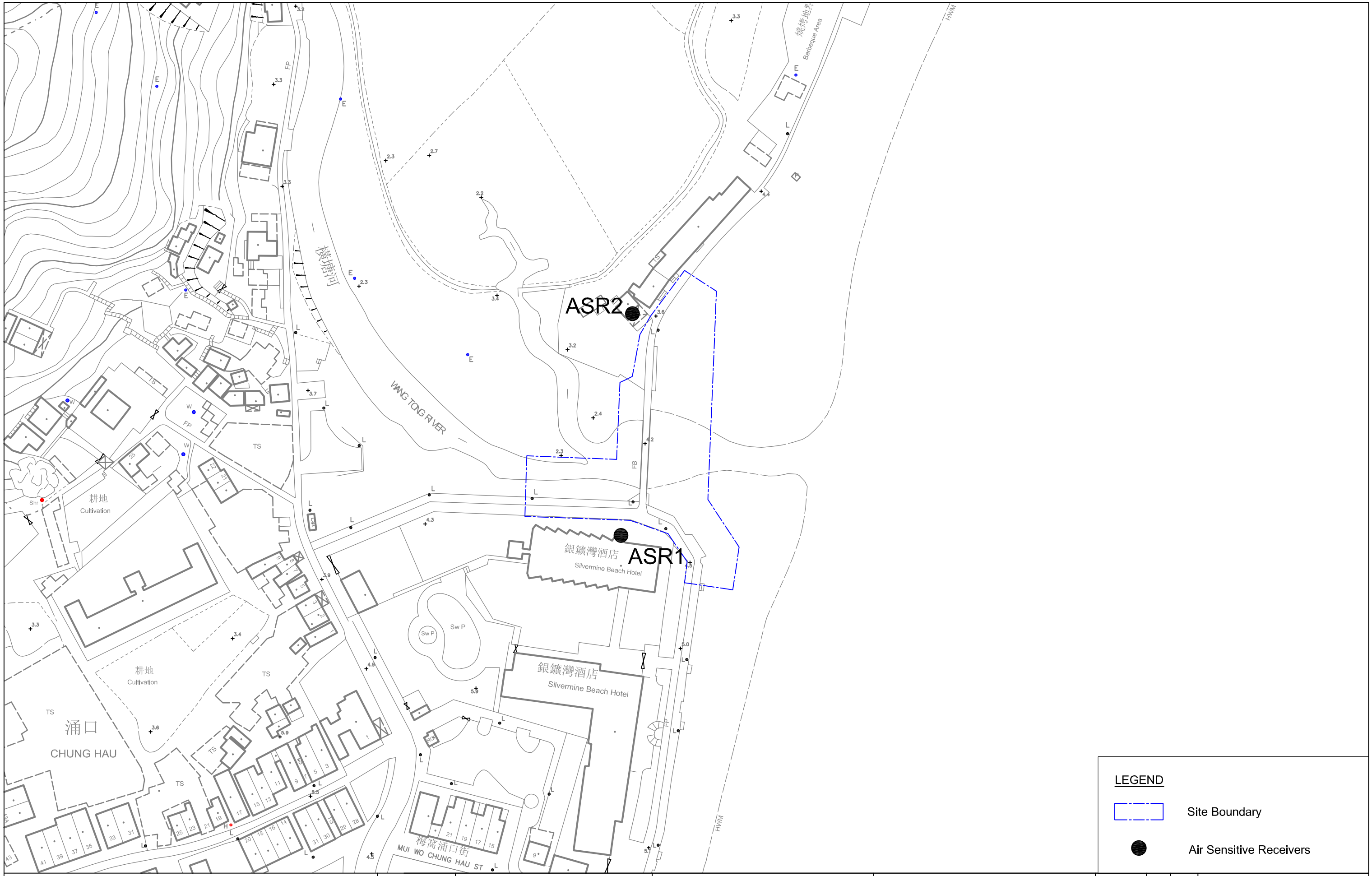
DRAWING TITLE:
Layout of Cofferdam

Drafting by	JC	15/11
Designed by	RT	15/11
Checked by	ML	15/11
Approved by	ML	15/11

SCALE: AS SHOWN

DRAWING NO: Fig 2.4

REV: –



LEGEND

Site Boundary

Air Sensitive Receivers

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Works Division
Highways Department

PROJECT:
AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI WO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

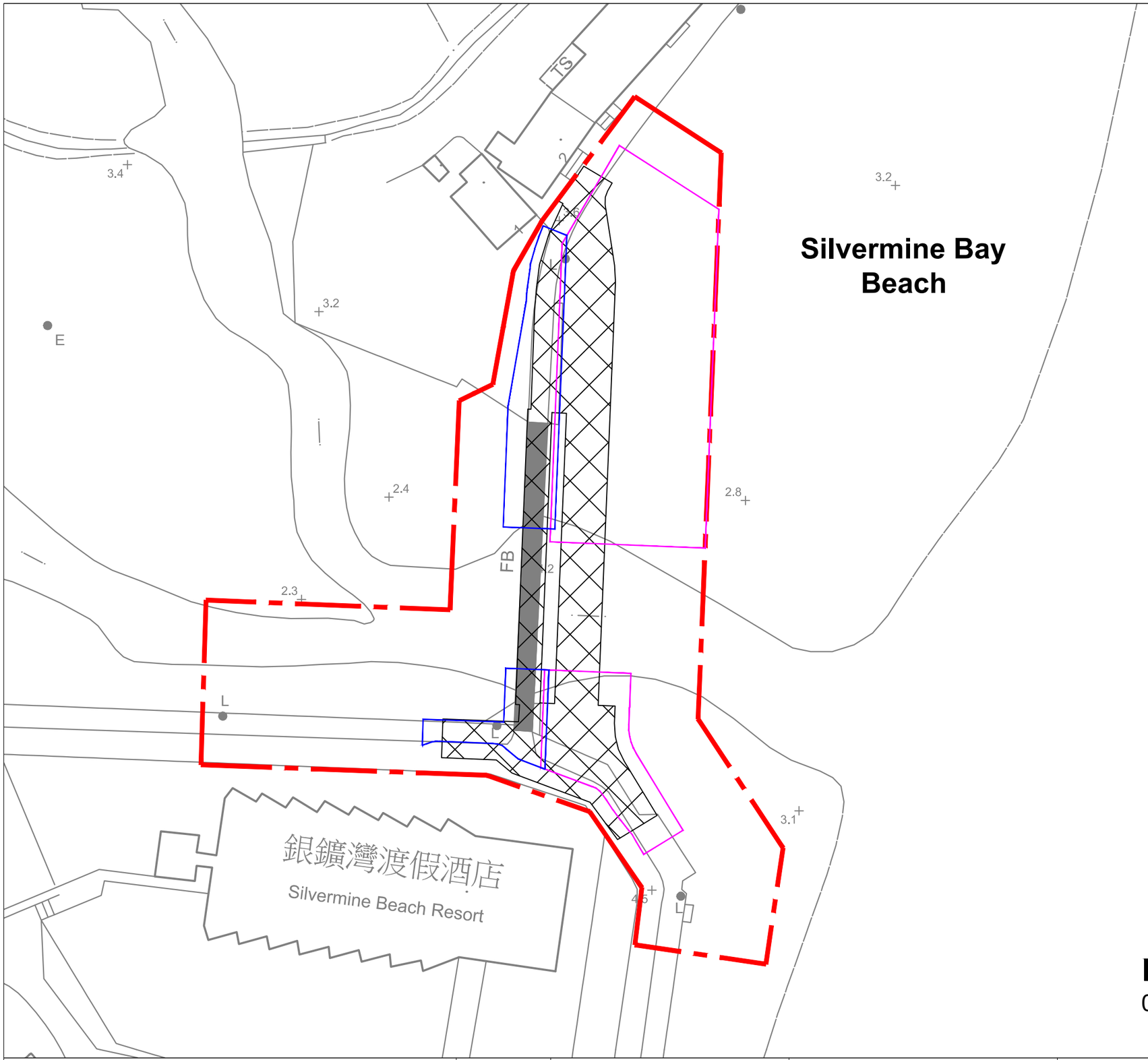
DRAWING TITLE:
LOCATIONS OF AIR SENSITIVE RECEIVERS

Drafting by	MC	04/15
Designed by	–	–
Checked by	HF	04/15
Approved by	HF	04/15

SCALE: AS SHOWN

DRAWING NO: FIG 3–1

REV: –



LEGEND

- Project Boundary
- Existing Wang Tong Bridge
- Proposed New Wang Tong Bridge
- Hoarding Area of Cycle Bridge
- Hoarding Area of Foot Bridge

Silvermine Bay

N

0 10 20 30 40 50m

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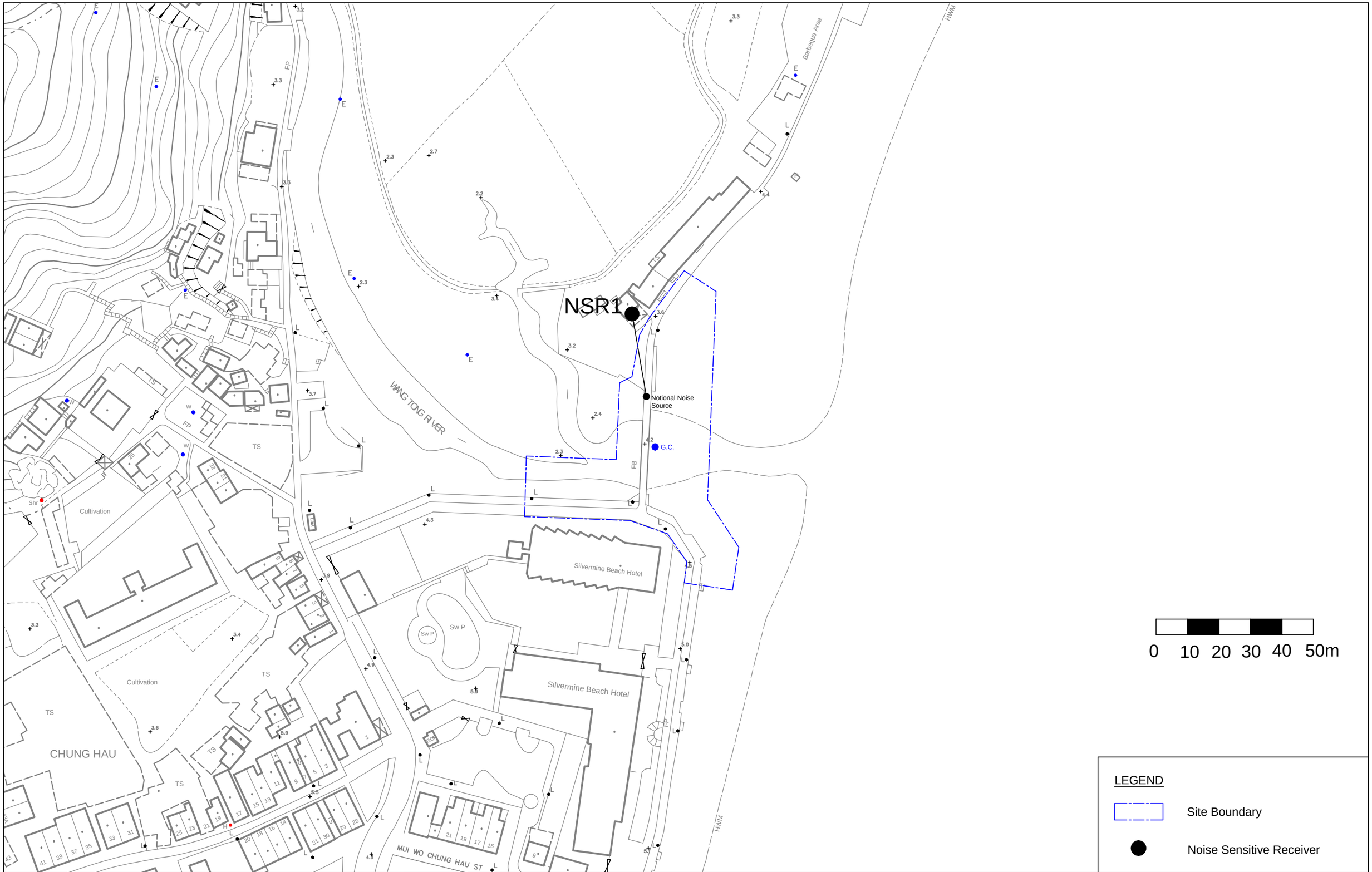
Works Division
Highways Department

PROJECT:
AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI MO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

DRAWING TITLE:
Hoarding Plan

Drafting by	KL	08/15	SCALE: AS SHOWN
Designed by	–	08/15	
Checked by	HT	08/15	DRAWING NO: FIG 3.2
Approved by	BC	08/15	REV: –



LEGEND

Site Boundary

Noise Sensitive Receiver

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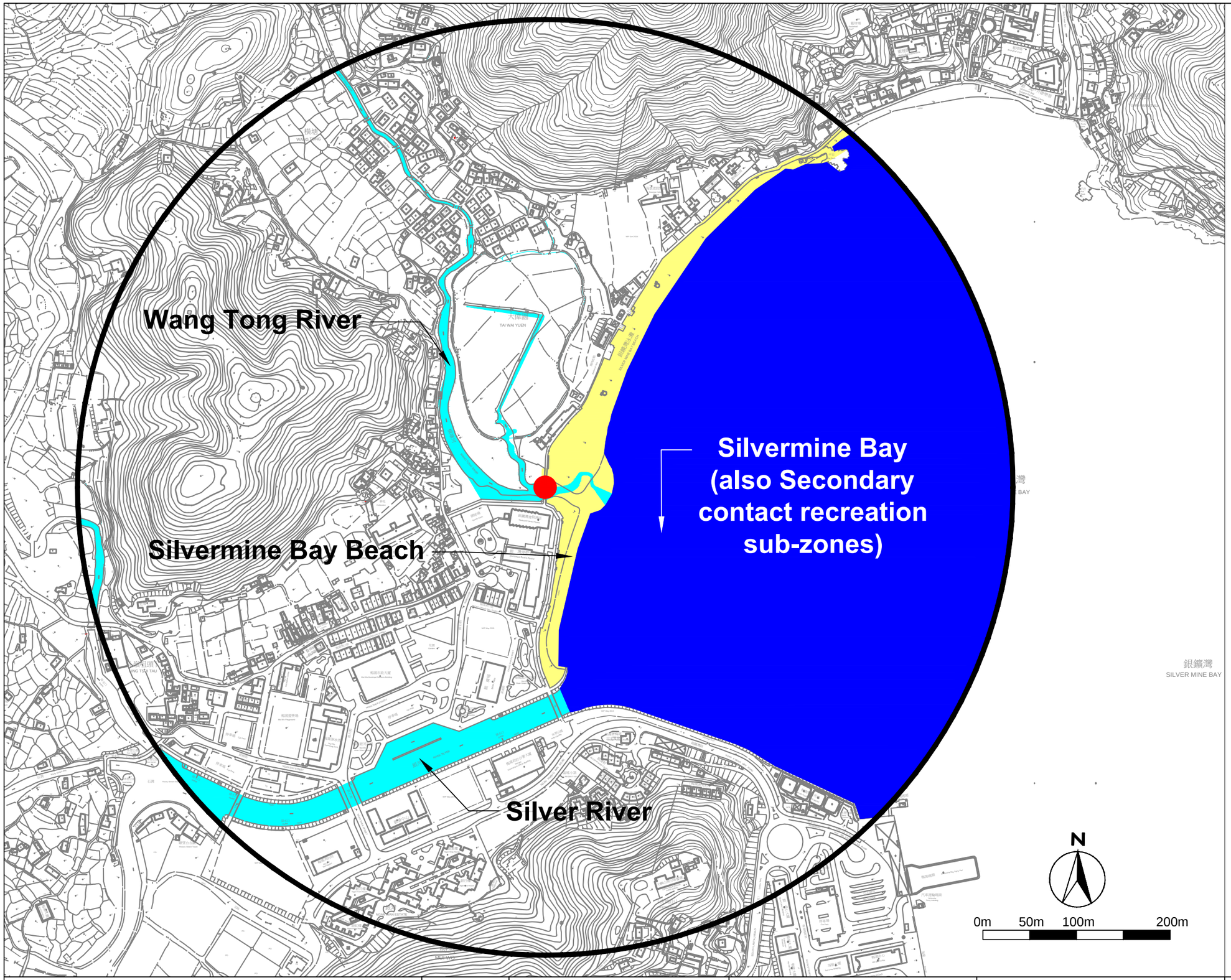
PROJECT:

AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI WO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

DRAWING TITLE:

LOCATIONS OF NOISE SENSITIVE RECEIVER

Drafting by	MC	04/15	SCALE: AS SHOWN
Designed by	–	–	
Checked by	HF	04/15	DRAWING NO: FIG 4–1
Approved by	HF	04/15	REV: –



Legend :

- Proposed Site
- 500m Study Area
- Watercourse
- Marine Water
- Silvermine Bay Beach

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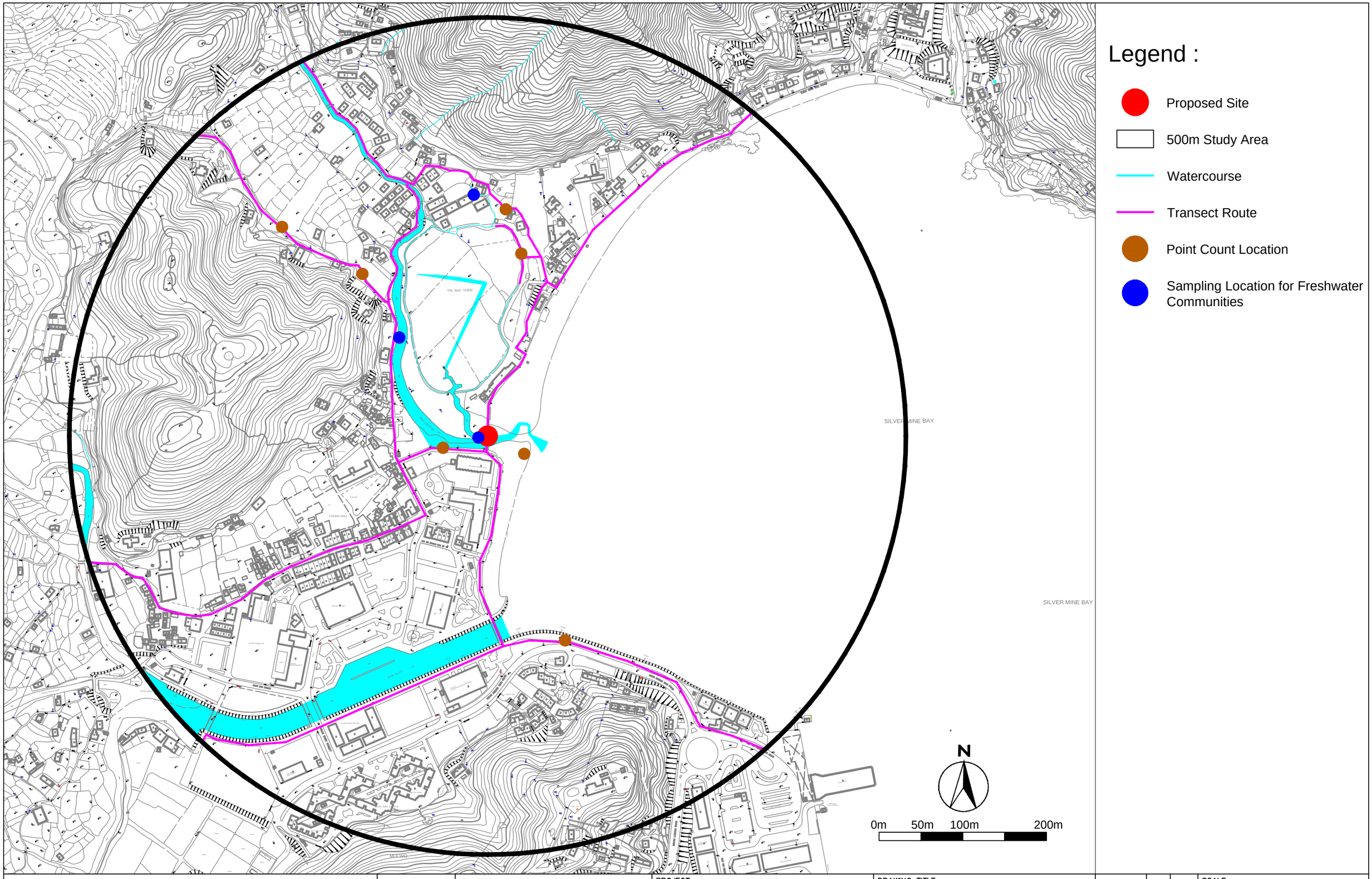
Highways Department

PROJECT:
AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI WO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

DRAWING TITLE:
Location of Water Sensitive Receivers

Drafting by	LHT	04/15	SCALE: As Shown
Designed by	LHT	04/15	
Checked by	BC	04/15	DRAWING NO: FIG 5.1
Approved by	BC	04/15	REV: –



Legend :

- Proposed Site
- 500m Study Area
- Watercourse
- Transect Route
- Point Count Location
- Sampling Location for Freshwater Communities

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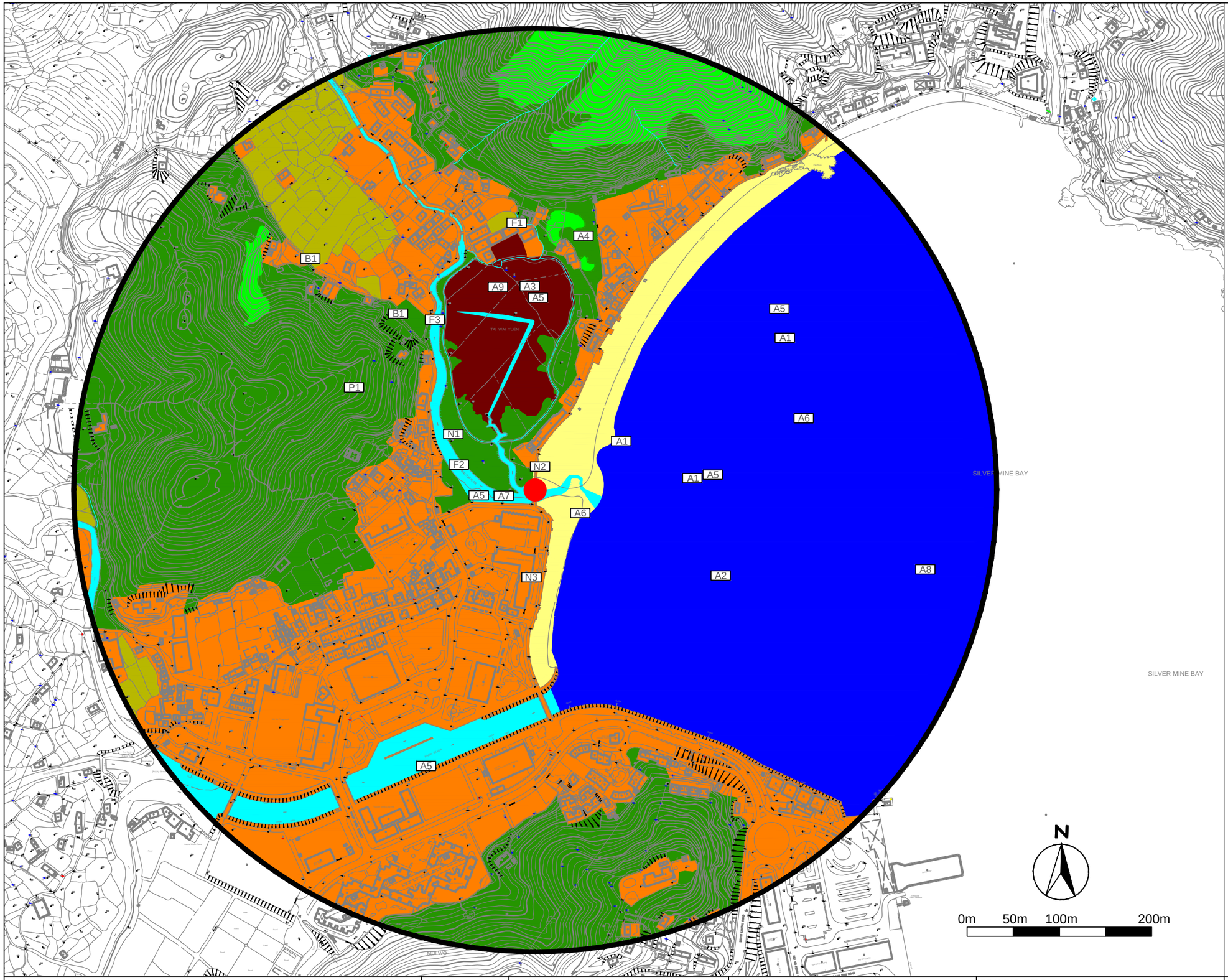
DRAWING TITLE:
ECOLOGICAL SURVEY PLAN

Drafting by	HT	04/15
Designed by	–	–
Checked by	BC	04/15
Approved by	BC	04/15

SCALE: As Shown

DRAWING NO: 7.1

REV: –



Legend:

- Proposed Site
- 500m Study Area

Habitats:

- Developed Area
- Woodland
- Abandoned Agricultural Land
- Shrubland / Grassland
- Marsh
- Sandy Shore
- Watercourse
- Marine Water

Species with Conservation Concern:

- P1 *Aquilaria sinensis*
- A1 *Ardea alba*
- A2 *Ardea cinerea*
- A3 *Bubulcus coromandus*
- A4 *Centropus sinensis*
- A5 *Egretta garzetta*
- A6 *Egretta sacra*
- A7 *Halcyon smyrnensis*
- A8 *Milvus migrans*
- A9 *Nycticorax nycticorax*
- B1 *Jamides alecto alocina*
- F1 *Channa asiatica*
- F2 *Favonigobius reichei*
- F3 *Parazacco spilurus*

Location of Nesting Site:

- N1 *Amaurornis phoenicurus*
- N2 *Gracupica nigricollis*
- N3 *Hirundo rustica*

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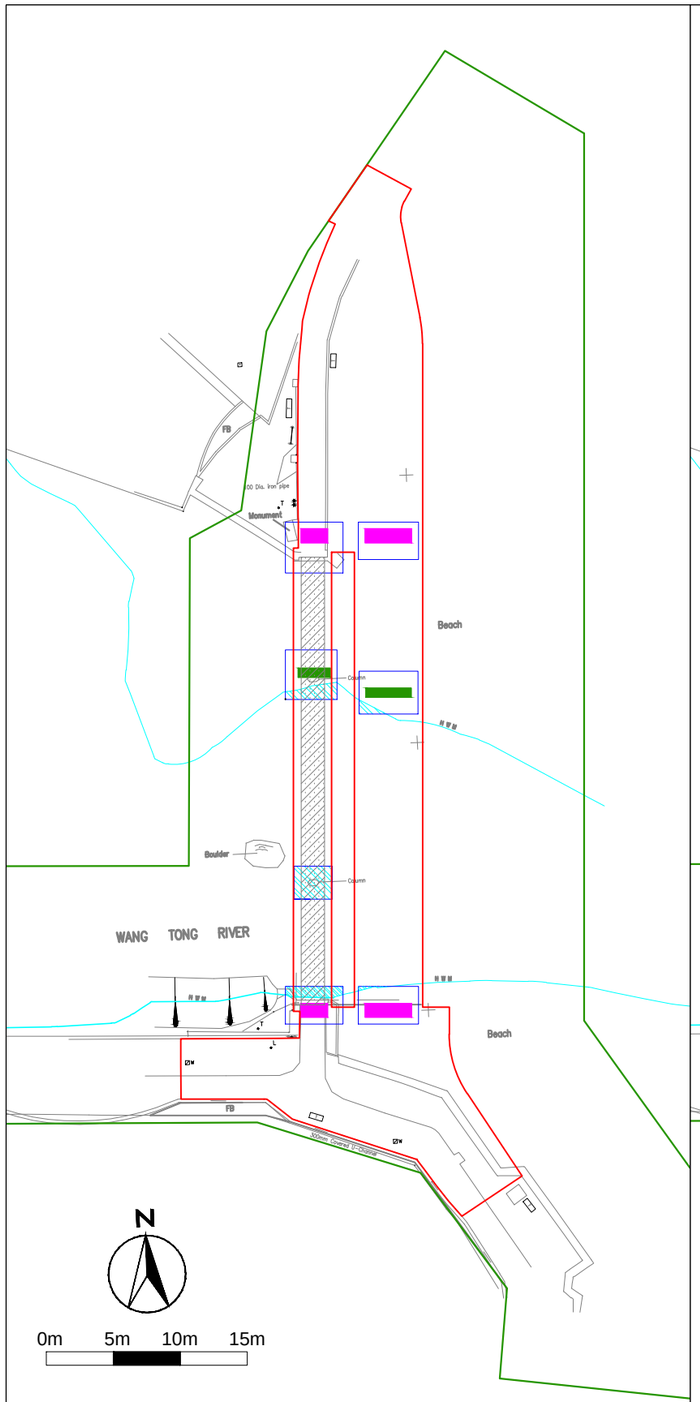
Highways Department

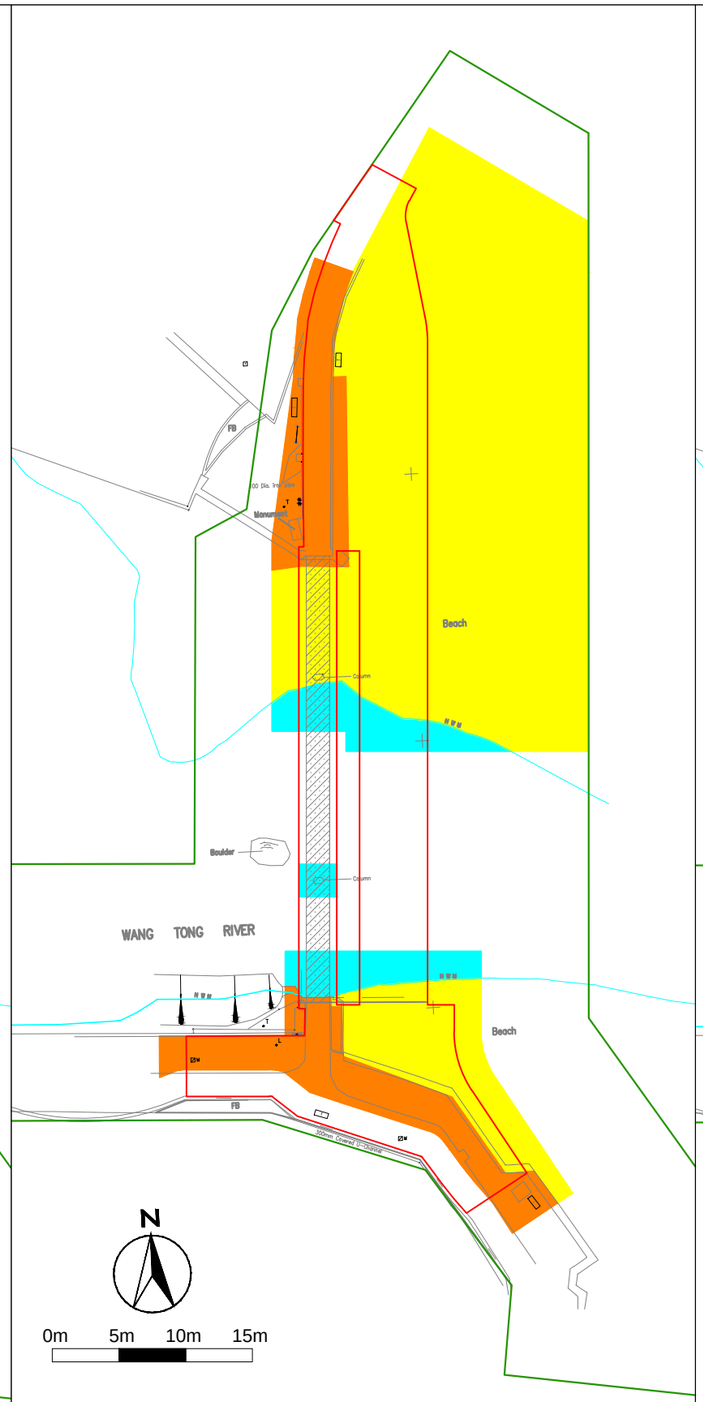
PROJECT:
AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI WO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

DRAWING TITLE:
HABITAT MAP, LOCATIONS OF SPECIES WITH CONSERVATION CONCERN AND LOCATIONS OF NESTING SITES

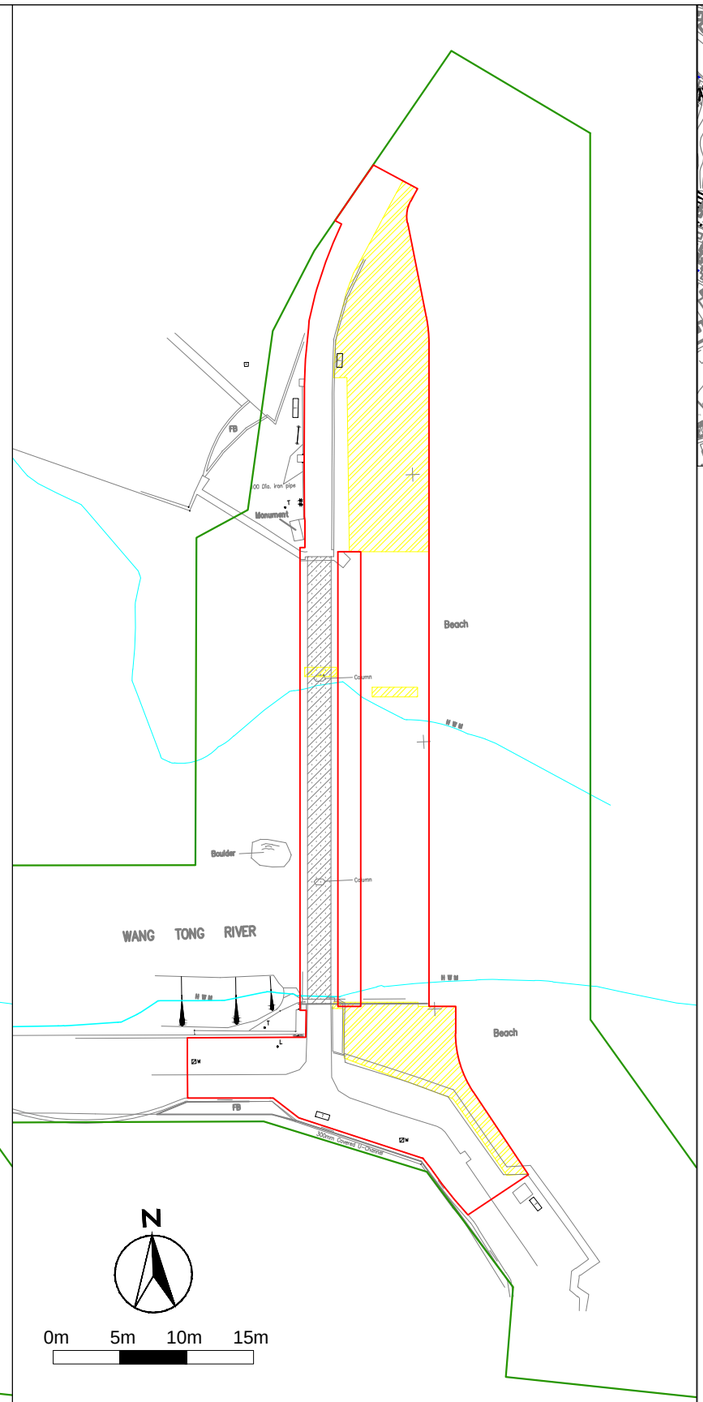
Drafting by	HT	04/15	SCALE: As Shown
Designed by	–	–	
Checked by	BC	04/15	FIGURE NO: 7.2
Approved by	BC	04/15	REV: –



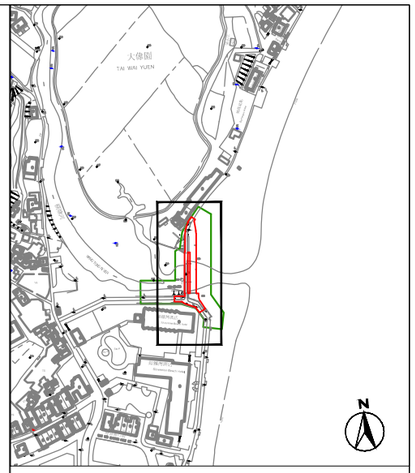
A. Excavation Areas within Cofferdam



B. Temporary loss on Habitats



C. Permanent loss on Habitats



Legend

- Project Site
- Existing Bridge Alignment
- Proposed Bridge Alignment
- Excavation Areas within Cofferdam
- Excavation Areas below High Water Mark
- Proposed Bridge Columns
- Proposed Bridge Abutments within Cofferdam
- Temporary loss on Sandy Shore
- Temporary loss on Developed Area
- Temporary loss below High Water Mark
- Permanent loss on Sandy Shore

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PROJECT:
AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI MO - ENVIRONMENTAL IMPACT ASSESSMENT & DRAINAGE IMPACT ASSESSMENT STUDIES - INVESTIGATION

DRAWING TITLE:
Excavation and Habitat Loss Areas

Drafting by	KL	08/15	SCALE: AS SHOWN
Designed by	–	08/15	
Checked by	HT	08/15	FIGURE NO: 7.3
Approved by	BC	08/15	REV: –

LEGEND

LANDSCAPE IMPACT STUDY BOUNDARY

PROJECT LOCATION

WANG TONG

TAI WAI YUEN

BUTTERFLY HILL

CHUNG HAU

SILVER MINE BAY

LING TSUI TAU

RIVER SILVER

NGAN WAN ESTATE

FU KONG SHAN

MUI WO FERRY PIER

N

SCALE 1 : 5,000

0 100 200 300m

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE STUDY AREA

Drawn by MC | Checked by | Approved by TO | Date 2015-04

Figure No. 8.1

Scale 1:5,000

Job No. MLAL1

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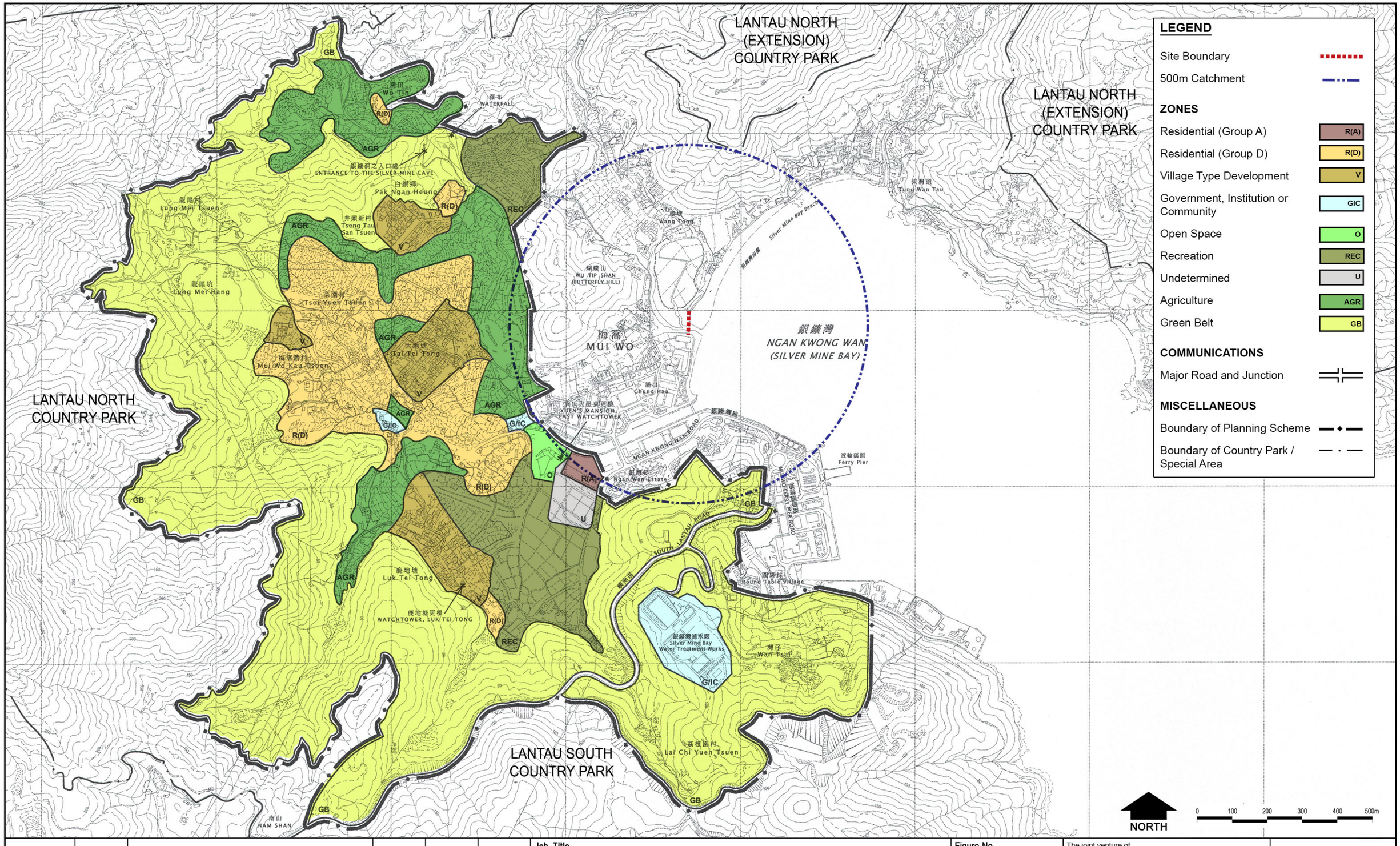
雅邦 Limited



LEGEND

- Site Boundary
- 500m Catchment

ZONES

- Residential (Group A) — R(A)
- Residential (Group D) — R(D)
- Village Type Development — V
- Government, Institution or Community — GIC
- Open Space — O
- Recreation — REC
- Undetermined — U
- Agriculture — AGR
- Green Belt — GB

COMMUNICATIONS

- Major Road and Junction

MISCELLANEOUS

- Boundary of Planning Scheme
- Boundary of Country Park / Special Area

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
REVIEW OF PLANNING FRAMEWORK
EXTRACT FROM MUI WO FRINGE OZP No. S/I-MWF/10

Drawn by	Checked by	Approved by	Date	Job No.
MC		TO	2015-04	MLAL1

Figure No.
8.2

Scale
1:10,000

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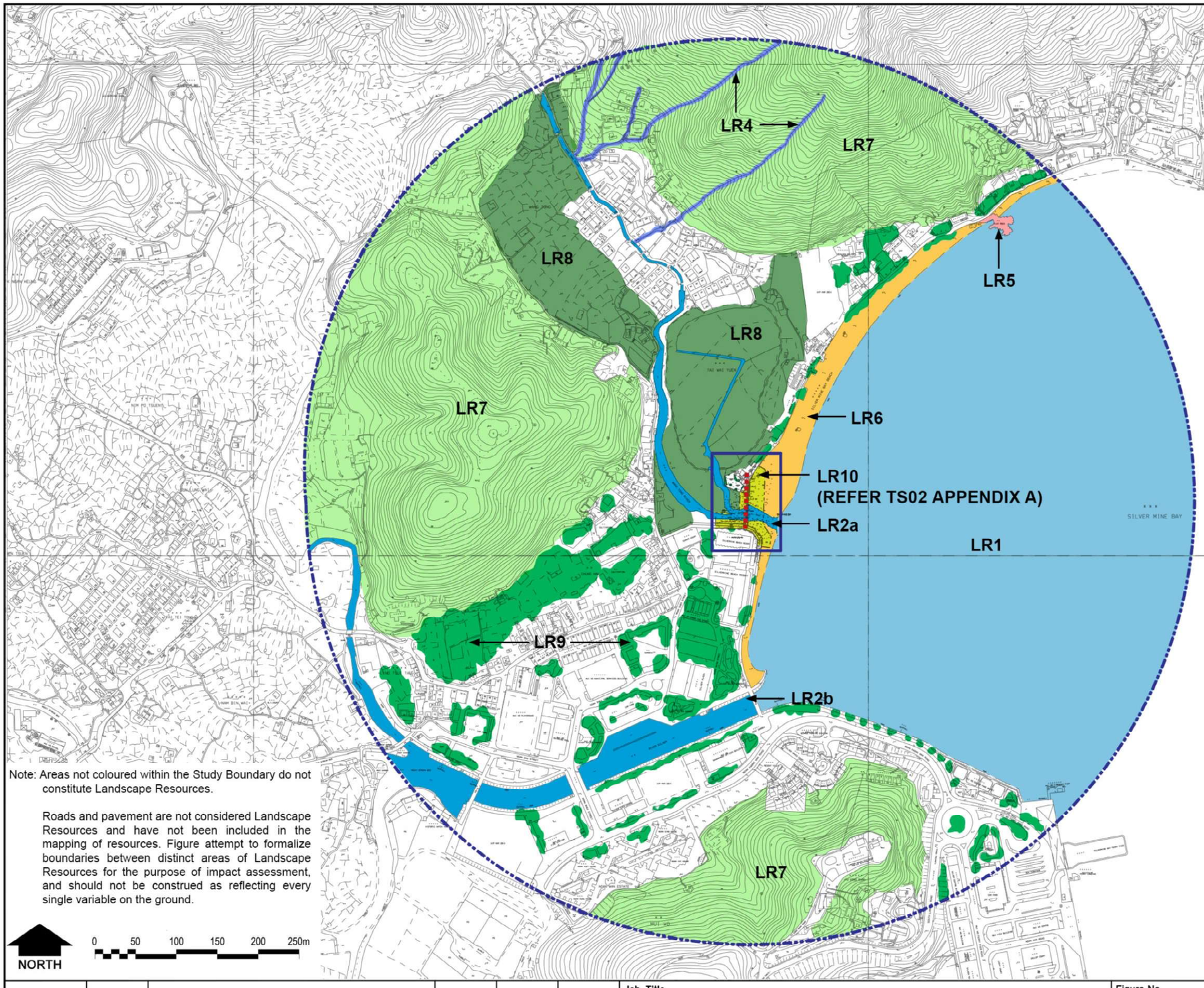
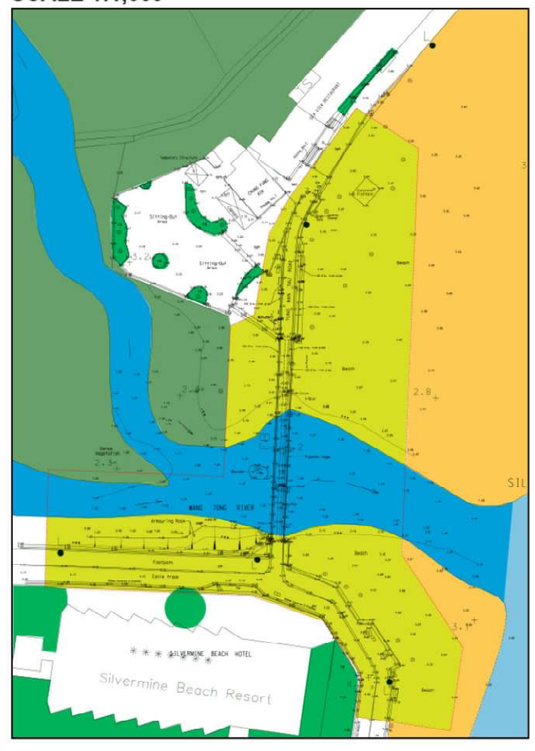


LEGEND

Site Boundary	
Landscape Study Boundary	
Coastal Waters	LR1
Rivers	LR2a, LR2b
Upland Streams	LR4
Natural Rocky Coastline	LR5
Silver Mine Bay Beach	LR6
Natural Upland Vegetation	LR7
Semi-natural Lowland Vegetation	LR8
Urban / Domestic Amenity Planting	LR9
Existing Trees in Vicinity of Wang Tong Bridge	LR10

BLOW-UP PLAN
SCALE 1:1,000



Note: Areas not coloured within the Study Boundary do not constitute Landscape Resources.

Roads and pavement are not considered Landscape Resources and have not been included in the mapping of resources. Figure attempt to formalize boundaries between distinct areas of Landscape Resources for the purpose of impact assessment, and should not be construed as reflecting every single variable on the ground.

NORTH

0 50 100 150 200 250m

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. C	2016-07-05	Note Edited and Blow-up Plan added	PN	TO	TO
Rev. B	2016-06-21	Note Added	PN	TO	TO
Rev. A	2015-08-17	General Update	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE RESOURCES

Drawn by MC | Checked by TO | Approved by TO | Date 2015-08

Figure No. 8.3

Scale 1:5,000

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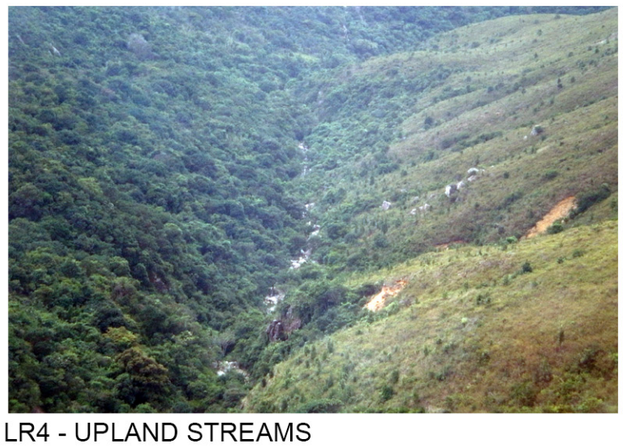
LR1 - COASTAL WATERS

LR2a - WANG TONG RIVER

LR2a - WANG TONG RIVER

LR2a - WANG TONG RIVER

LR2b - RIVER SILVER



LR4 - UPLAND STREAMS

LR5 - NATURAL ROCKY COASTLINE

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. B	2016-06-21	General Update	PN	TO	TO
Rev. A	2015-08-17	General Update	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE RESOURCES PHOTOGRAPHS (1 OF 5)

Drawn by	Checked by	Approved by	Date	Job No.
MC	TO	TO	2015-04	MLAL1

Figure No.
8.4.1

Scale
N.T.S.

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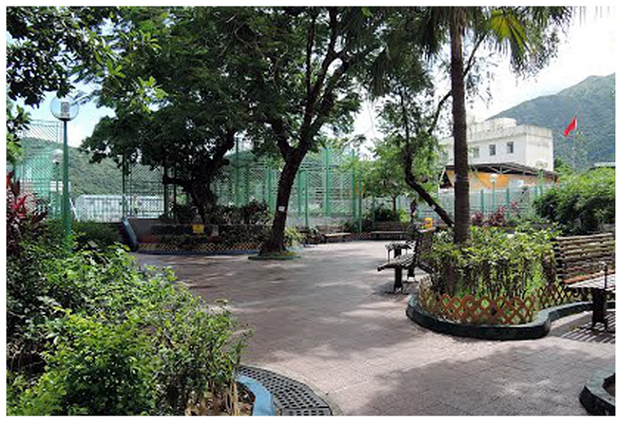
LR6 - SILVER MINE BAY BEACH

LR6 - SILVER MINE BAY BEACH

LR7 - NATURAL UPLAND VEGETATION

LR8 - SEMI-NATURAL LOWLAND VEGETATION



LR9 - URBAN, DOMESTIC AMENITY PLANTING

LR9 - URBAN, DOMESTIC AMENITY PLANTING

LR9 - URBAN, DOMESTIC AMENITY PLANTING

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. A	2016-06-21	Title Amended	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE RESOURCES PHOTOGRAPHS (2 OF 5)

Drawn by MC | Checked by | Approved by TO | Date 2015-04

Figure No. 8.4.2

Scale N.T.S.

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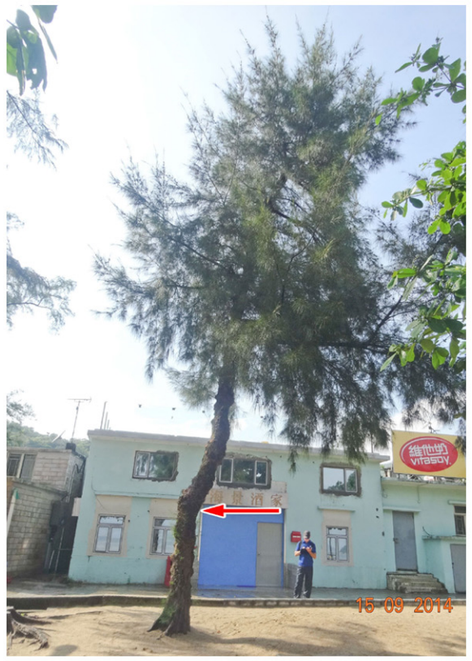
Ove Arup & Partners Hong Kong Limited 雅邦

EXISTING TREE NO. T1

EXISTING TREE NO. T2

EXISTING TREE NO. T3

EXISTING TREE NO. T4



EXISTING TREE NO. T6

EXISTING TREE NO. T7

EXISTING TREE NO. T8

EXISTING TREE NO. T9

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE RESOURCES PHOTOGRAPHS (3 OF 5)

Drawn by	Checked by	Approved by	Date	Job No.
MC		TO	2015-04	MLAL1

Figure No.
8.4.3

Scale
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EXISTING TREE NO. T27

EXISTING TREE NO. T29

EXISTING TREE NO. T30

EXISTING TREE NO. T31

EXISTING TREE NO. T32

EXISTING TREE NO. T33

EXISTING TREE NO. T34

EXISTING TREE NO. T35

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE RESOURCES PHOTOGRAPHS (4 OF 5)

Drawn by	Checked by	Approved by	Date
MC		TO	2015-04

Figure No. 8.4.4

Scale N.T.S.

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EXISTING TREE NO. T37

EXISTING TREE NO. T38

EXISTING TREE NO. T39

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE RESOURCES PHOTOGRAPHS (5 OF 5)

Drawn by	Checked by	Approved by	Date	Job No.
MC		TO	2015-04	MLAL1

Figure No.
8.4.5

Scale
N.T.S.

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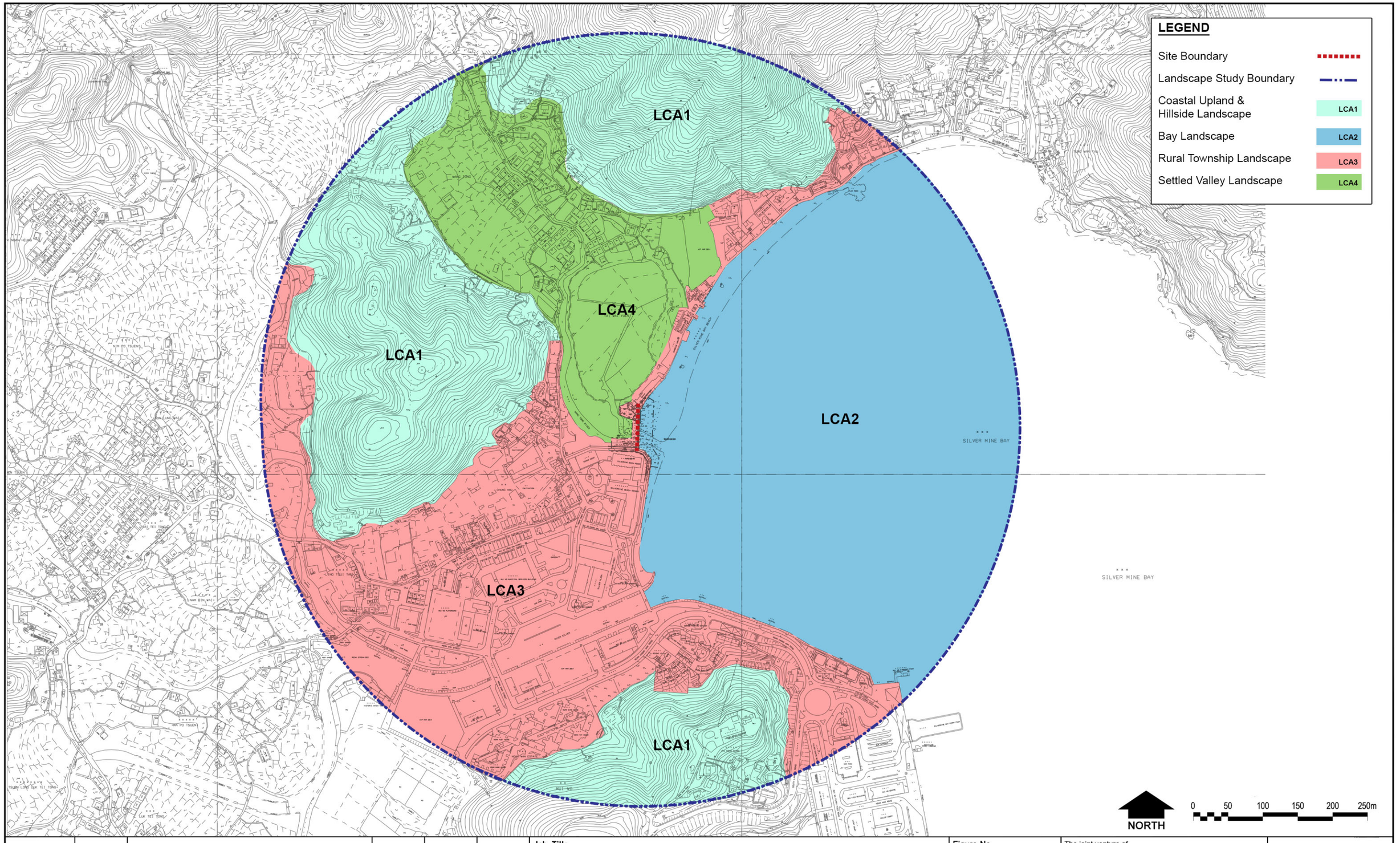
Limited



Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. A	2016-06-21	LCA4 Added	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE CHARACTER AREAS

Drawn by	Checked by	Approved by	Date
MC		TO	2015-04

Figure No. 8.5

Scale 1:5,000

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LCA1 - COASTAL & UPLAND HILLSIDE LANDSCAPE

LCA1 - COASTAL & UPLAND HILLSIDE LANDSCAPE

LCA2 - BAY LANDSCAPE

LCA2 - BAY LANDSCAPE

LCA3 - RURAL TOWNSHIP

LCA3 - RURAL TOWNSHIP

LCA4 - SETTLED VALLEY LANDSCAPE

LCA4 - SETTLED VALLEY LANDSCAPE

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE CHARACTER AREAS PHOTOGRAPHS

Drawn by MC | Checked by | Approved by TO | Date 2015-04

Figure No. 8.6

Scale N.T.S.

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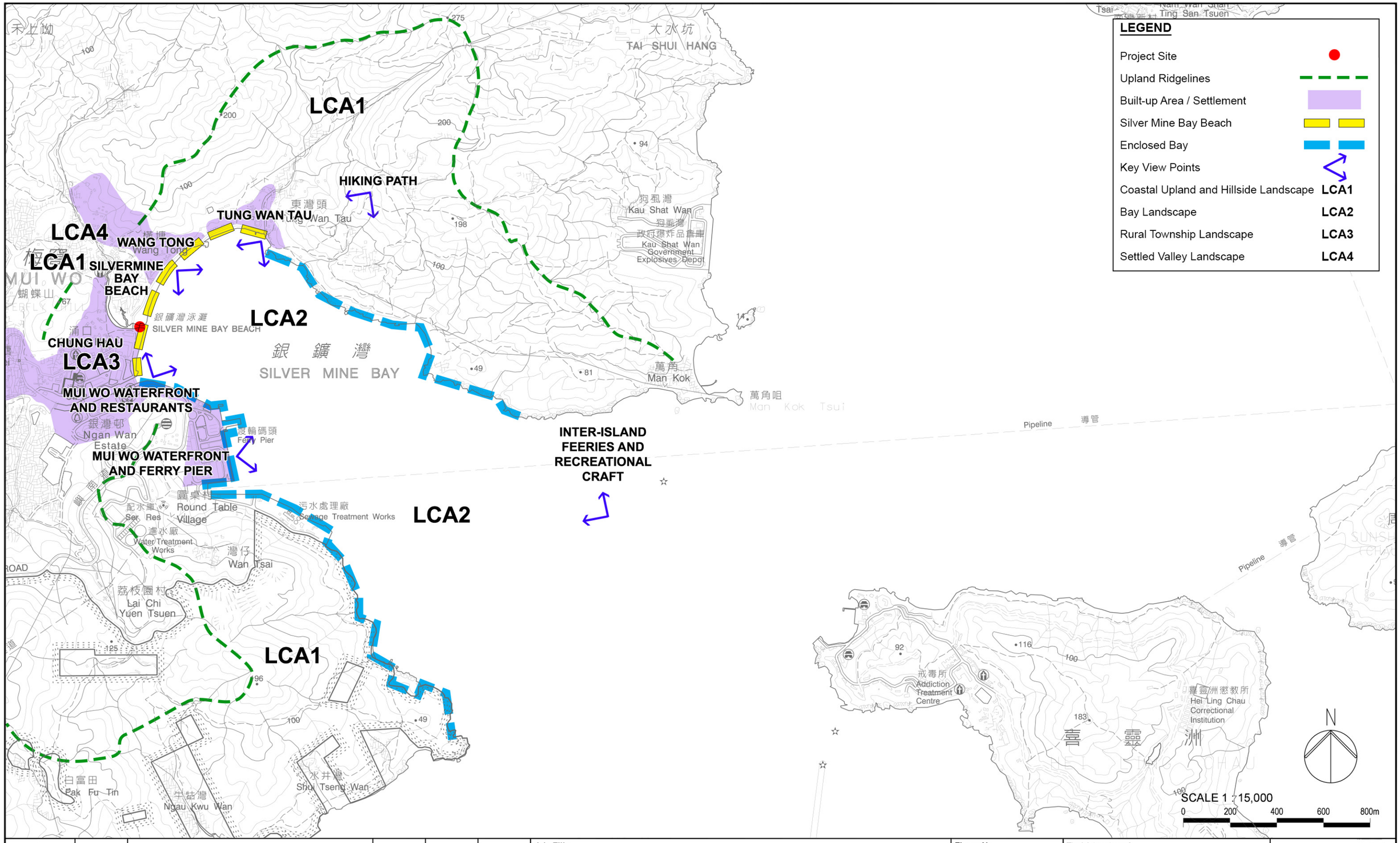
雅邦 Limited



Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. A	2016-04-19	View Corridors Deleted	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
KEY VISUAL ELEMENTS

Drawn by	Checked by	Approved by	Date
PN	TO	TO	2015-08

Figure No. 8.7.1

Scale 1:15,000

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CINOTECH consultants limited

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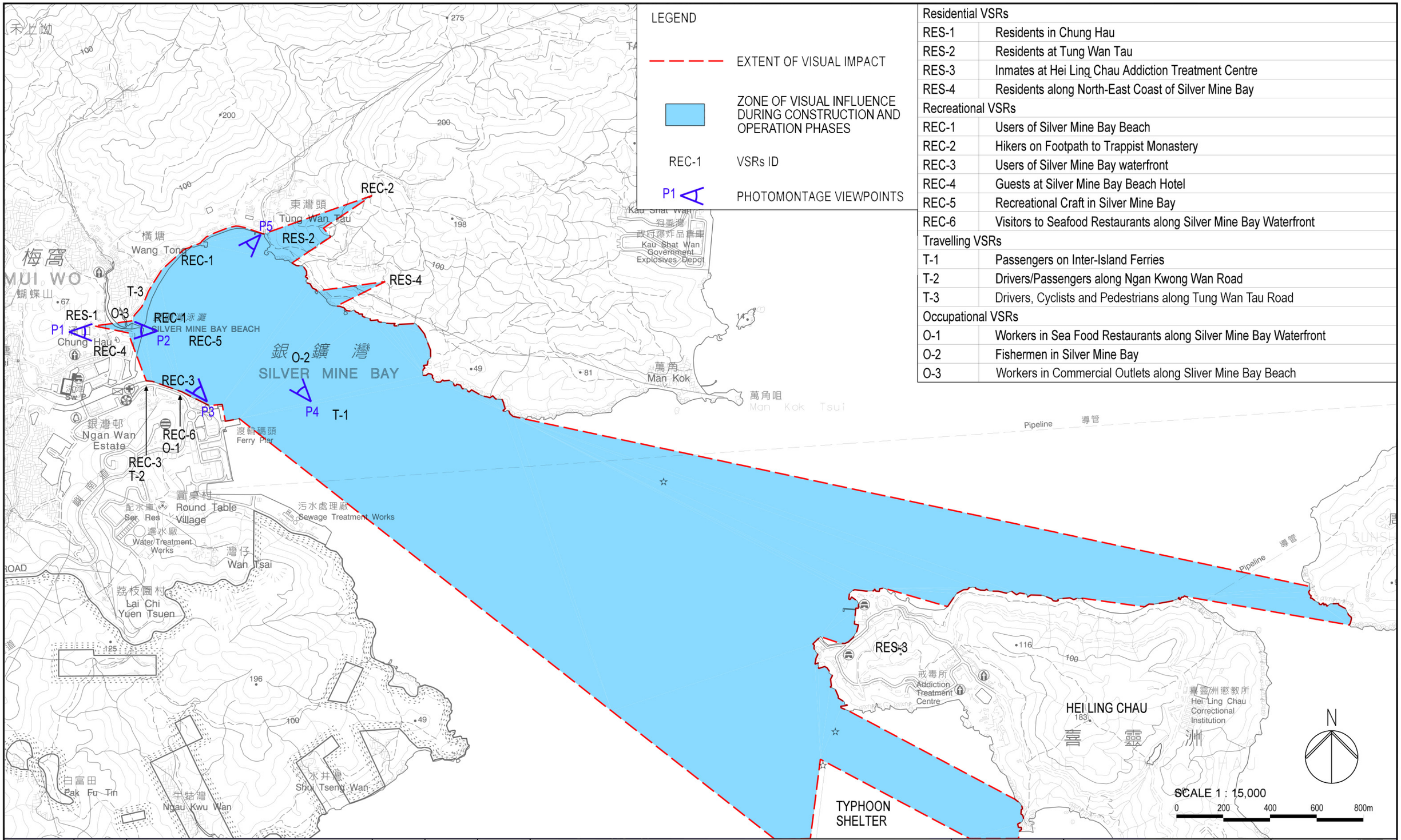

Residential VSRs	
RES-1	Residents in Chung Hau
RES-2	Residents at Tung Wan Tau
RES-3	Inmates at Hei Ling Chau Addiction Treatment Centre
RES-4	Residents along North-East Coast of Silver Mine Bay
Recreational VSRs	
REC-1	Users of Silver Mine Bay Beach
REC-2	Hikers on Footpath to Trappist Monastery
REC-3	Users of Silver Mine Bay waterfront
REC-4	Guests at Silver Mine Bay Beach Hotel
REC-5	Recreational Craft in Silver Mine Bay
REC-6	Visitors to Seafood Restaurants along Silver Mine Bay Waterfront
Travelling VSRs	
T-1	Passengers on Inter-Island Ferries
T-2	Drivers/Passengers along Ngan Kwong Wan Road
T-3	Drivers, Cyclists and Pedestrians along Tung Wan Tau Road
Occupational VSRs	
O-1	Workers in Sea Food Restaurants along Silver Mine Bay Waterfront
O-2	Fishermen in Silver Mine Bay
O-3	Workers in Commercial Outlets along Sliver Mine Bay Beach

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. C	2016-04-19	General Update	PN	TO	TO
Rev. B	2016-01-12	General Update	PN	TO	TO
Rev. A	2015-08-17	General Update	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
ZONE OF VISUAL INFLUENCE (ZVI) AND VISUALLY SENSITIVE RECEIVERS (VSRs)

Drawn by	Checked by	Approved by	Date	Job No.
MC	TO	TO	2015-04	MLAL1

Figure No. 8.7.2

Scale 1:15,000

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Maurice Lee & Associates Ltd.

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VIEW TO RES-1 FROM BRIDGE

VIEW FROM RES-2

VIEW FROM RES-3

VIEW FROM RES-4

VIEW FROM REC-2

VIEW FROM REC-3

VIEW FROM O-1, REC-6

VIEW TO O-3

VIEW TO O-3

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. A	2015-08-17	General Update	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
VISUALLY SENSITIVE RECEIVER PHOTOGRAPHS (1 OF 3)

Drawn by PN | Checked by | Approved by TO | Date 2015-04

Figure No. 8.8.1

Scale N.T.S.

Job No. MLAL1

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CINOTECH 漢臻 consultants limited

雅邦 Limited

VIEW TO REC-4

VIEW TO REC-4

VIEW TO REC-4

VIEW FROM REC-5

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. A	2015-08-17	General Update	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
VISUALLY SENSITIVE RECEIVER PHOTOGRAPHS (2 OF 3)

Drawn by	Checked by	Approved by	Date	Job No.
PN		TO	2015-04	MLAL1

Figure No. 8.8.2

Scale N.T.S.

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VIEW TO REC-1 FROM BRIDGE

VIEW FROM T-1, O-2

VIEW FROM WEST (BRIDGE SCREENED BY EXISTING TOPOGRAPHY AND TREES)

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. A	2015-08-17	General Update	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
VISUALLY SENSITIVE RECEIVER PHOTOGRAPHS (3 OF 3)

Drawn by	Checked by	Approved by	Date
PN	TO	TO	2015-08

Figure No. 8.8.3

Scale N.T.S.

Job No. MLAL1

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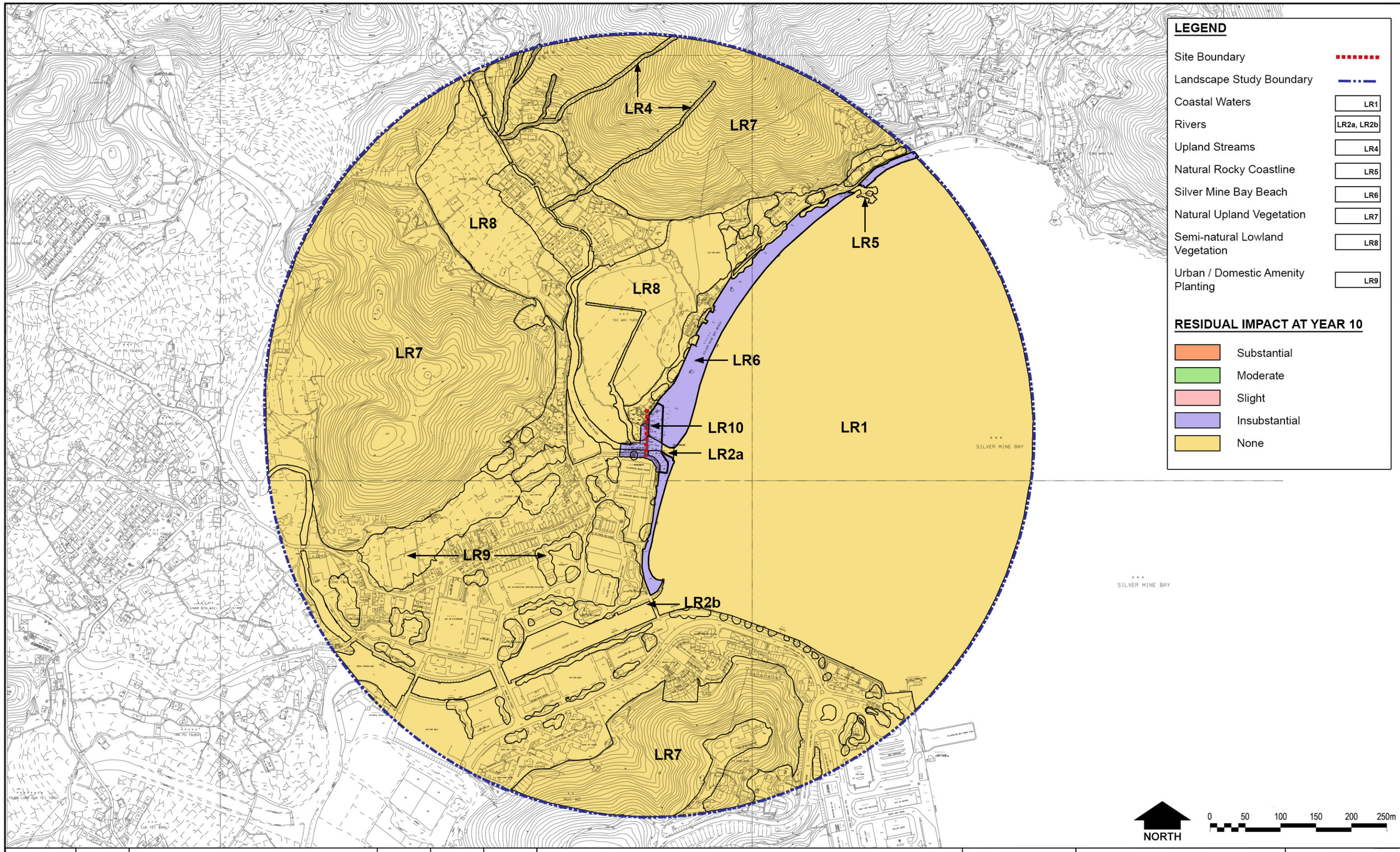
雅邦 Limited



Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. A	2015-08-17	General Update	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
RESIDUAL IMPACTS ON LANDSCAPE RESOURCES WITH MITIGATION AT YEAR 10

Drawn by	Checked by	Approved by	Date
MC	TO	TO	2015-04

Figure No. 8.9

Scale 1:5,000

Job No. MLAL1

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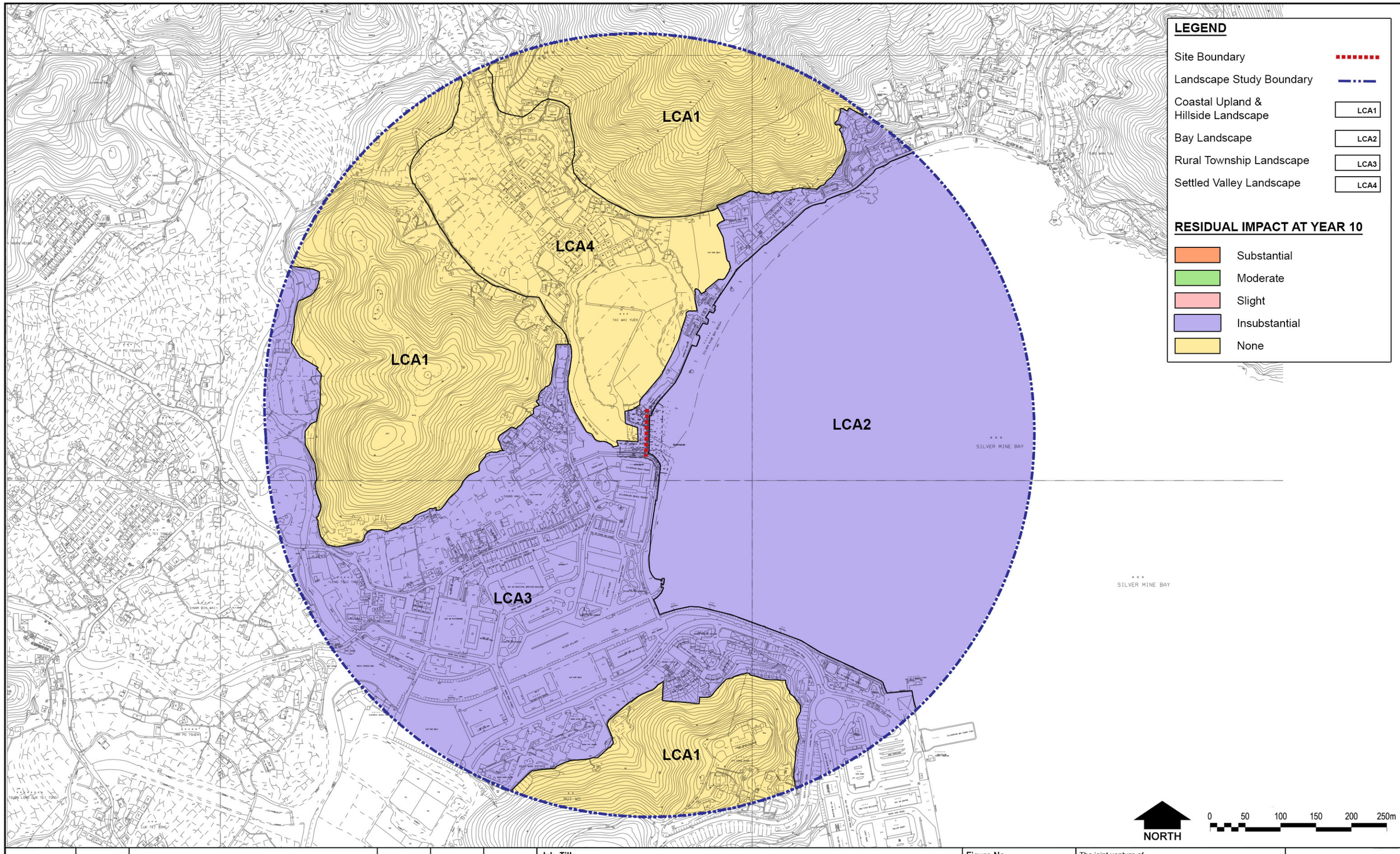

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
RESIDUAL IMPACTS ON LANDSCAPE CHARACTER AREAS WITH MITIGATION AT YEAR 10

Drawn by MC | Checked by | Approved by TO | Date 2015-04

Figure No. 8.10

Scale 1:5,000

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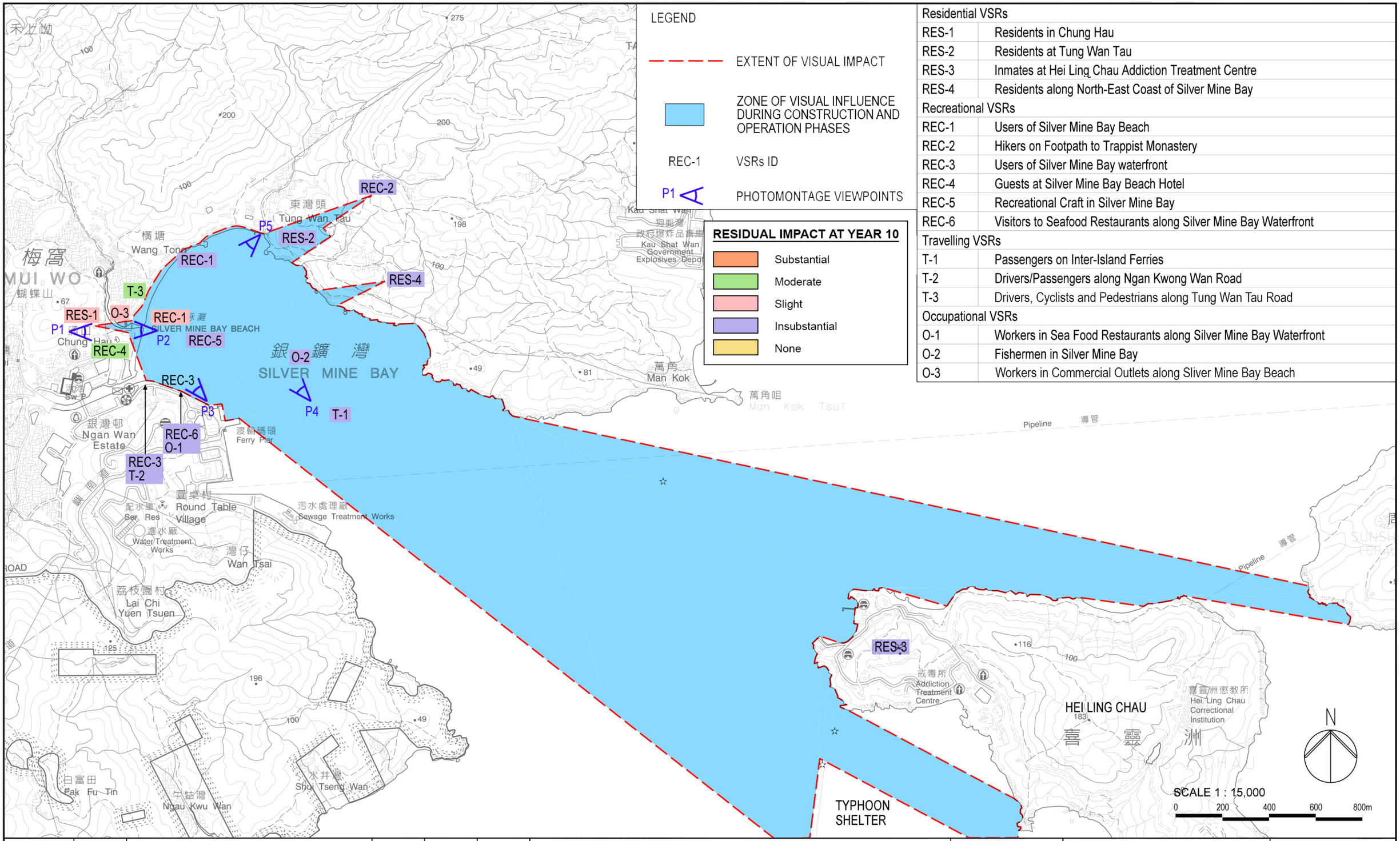

Residential VSRs	
RES-1	Residents in Chung Hau
RES-2	Residents at Tung Wan Tau
RES-3	Inmates at Hei Ling Chau Addiction Treatment Centre
RES-4	Residents along North-East Coast of Silver Mine Bay
Recreational VSRs	
REC-1	Users of Silver Mine Bay Beach
REC-2	Hikers on Footpath to Trappist Monastery
REC-3	Users of Silver Mine Bay waterfront
REC-4	Guests at Silver Mine Bay Beach Hotel
REC-5	Recreational Craft in Silver Mine Bay
REC-6	Visitors to Seafood Restaurants along Silver Mine Bay Waterfront
Travelling VSRs	
T-1	Passengers on Inter-Island Ferries
T-2	Drivers/Passengers along Ngan Kwong Wan Road
T-3	Drivers, Cyclists and Pedestrians along Tung Wan Tau Road
Occupational VSRs	
O-1	Workers in Sea Food Restaurants along Silver Mine Bay Waterfront
O-2	Fishermen in Silver Mine Bay
O-3	Workers in Commercial Outlets along Sliver Mine Bay Beach

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. C	2016-05-10	O-1 and O-3 Updated	PN	TO	TO
Rev. B	2016-04-19	General Update	PN	TO	TO
Rev. A	2015-08-17	General Update	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
RESIDUAL IMPACTS ON VSRS WITH MIGITATION YEAR 10

Drawn by MC | Checked by TO | Approved by TO | Date 2015-04

Figure No. 8.11

Scale 1:15,000

Job No. MLAL1

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EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. B	2015-12-30	Tree T4 retained; Tree 27 felled	LW	TO	TO
Rev. A	2015-06-09	General update	LW	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
PHOTOMONTAGE VIEWPOINT P1:
VIEW EAST FROM CHUNG HAU (1 OF 2)

Drawn by MC | Checked by | Approved by TO | Date 2015-04

Figure No.
8.12.1

Scale
N.T.S.

Job No. MLAL1

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CINOTECH consultants limited

DAY 1 WITH MITIGATION MEASURES

YEAR 10 WITH MITIGATION MEASURES

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. B	2015-12-30	Tree T4 retained; Tree 27 felled	LW	TO	TO
Rev. A	2015-06-09	General update	LW	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
PHOTOMONTAGE VIEWPOINT P1:
VIEW EAST FROM CHUNG HAU (2 OF 2)

Figure No. 8.12.2

Scale N.T.S.

Drawn by	Checked by	Approved by	Date	Job No.
MC		TO	2015-04	MLAL1

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EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. B	2015-12-30	Tree T4 retained	LW	TO	TO
Rev. A	2015-06-09	General update	LW	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
PHOTOMONTAGE VIEWPOINT P2:
VIEW WEST FROM SILVER MINE BAY BEACH (1 OF 2)

Drawn by	Checked by	Approved by	Date
MC		TO	2015-04

Figure No. 8.13.1

Scale N.T.S.

Job No. MLAL1

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雅邦 Limited

DAY 1 WITH MITIGATION MEASURES

YEAR 10 WITH MITIGATION MEASURES

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. B	2015-12-30	Tree T4 retained	LW	TO	TO
Rev. A	2015-06-09	General update	LW	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
PHOTOMONTAGE VIEWPOINT P2:
VIEW WEST FROM SILVER MINE BAY BEACH (2 OF 2)

Drawn by	Checked by	Approved by	Date
MC		TO	2015-04

Figure No. 8.13.2

Scale N.T.S.

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EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

DAY 1 WITH MITIGATION MEASURES

YEAR 10 WITH MITIGATION MEASURES

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
PHOTOMONTAGE VIEWPOINT P3: VIEW NORTH WEST FROM SILVER MINE BAY WATERFRONT

Drawn by	Checked by	Approved by	Date
MC		TO	2015-04

Figure No. 8.14

Scale N.T.S.

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EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

DAY 1 WITH MITIGATION MEASURES

YEAR 10 WITH MITIGATION MEASURES

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
PHOTOMONTAGE VIEWPOINT P4:
VIEW NORTH WEST FROM SILVER MINE BAY

Drawn by	Checked by	Approved by	Date
MC		TO	2015-04

Figure No. 8.15

Scale N.T.S.

Job No. MLAL1

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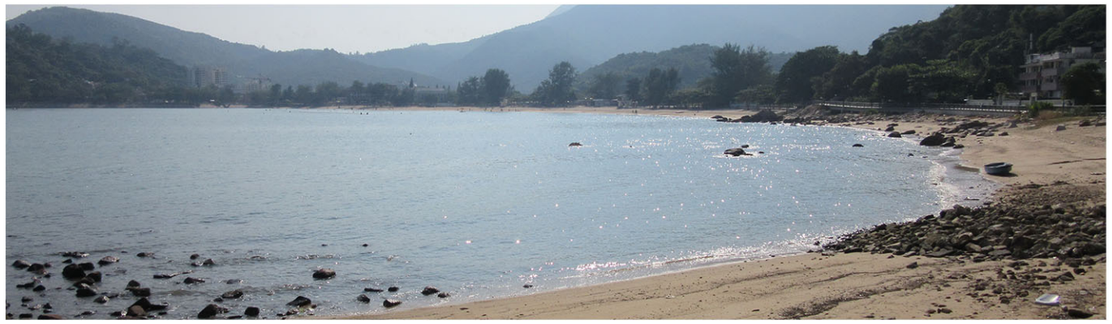

EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

DAY 1 WITH MITIGATION MEASURES

YEAR 10 WITH MITIGATION MEASURES

Amendment No.	Date	Description	Drawn by	Checked by	Approved by

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
PHOTOMONTAGE VIEWPOINT P5:
VIEW SOUTH WEST FROM TUNG WAN TAU

Drawn by	Checked by	Approved by	Date
MC		TO	2015-04

Figure No. 8.16

Scale N.T.S.

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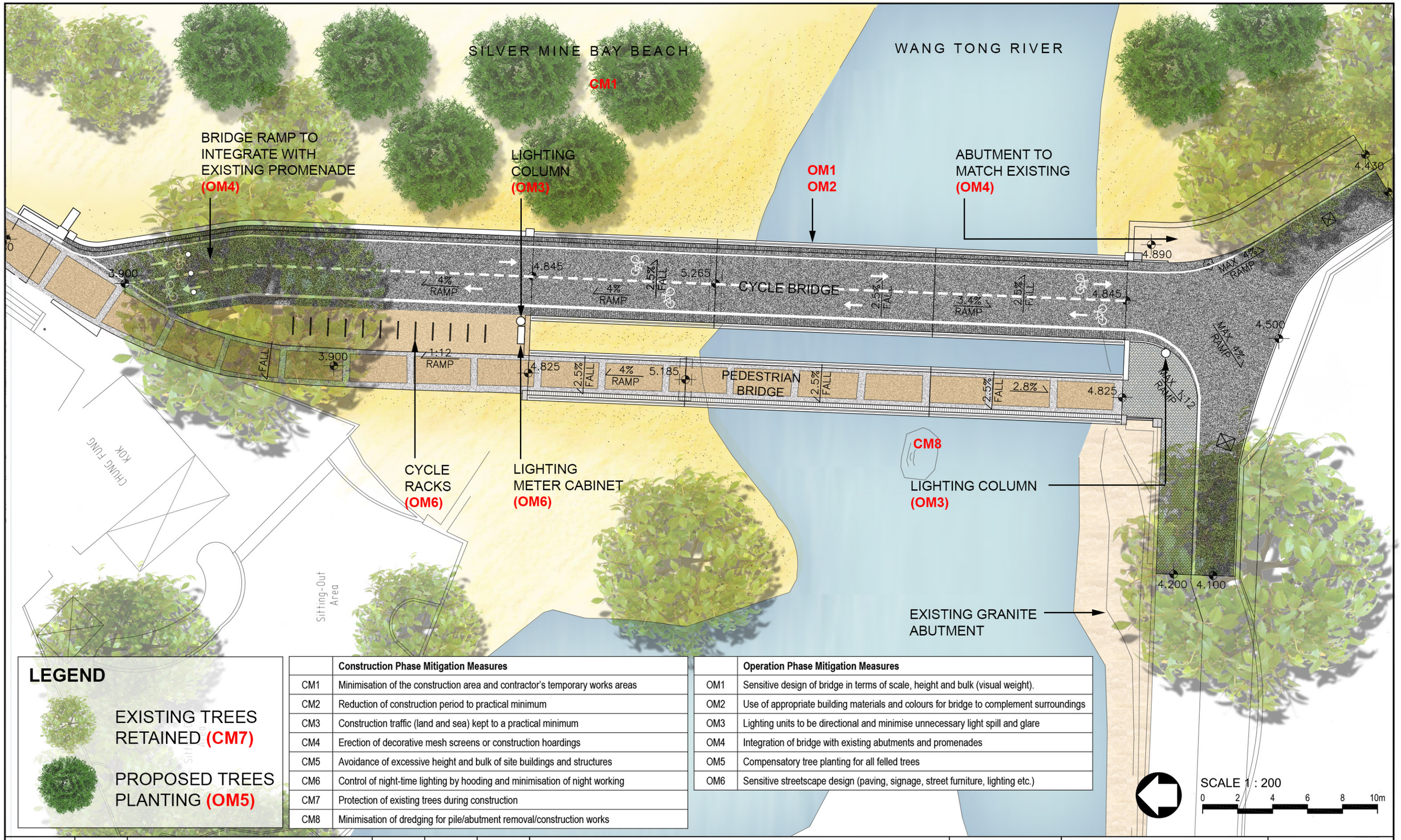

LEGEND

EXISTING TREES RETAINED **(CM7)**

PROPOSED TREES PLANTING **(OM5)**

	Construction Phase Mitigation Measures
CM1	Minimisation of the construction area and contractor's temporary works areas
CM2	Reduction of construction period to practical minimum
CM3	Construction traffic (land and sea) kept to a practical minimum
CM4	Erection of decorative mesh screens or construction hoardings
CM5	Avoidance of excessive height and bulk of site buildings and structures
CM6	Control of night-time lighting by hooding and minimisation of night working
CM7	Protection of existing trees during construction
CM8	Minimisation of dredging for pile/abutment removal/construction works

	Operation Phase Mitigation Measures
OM1	Sensitive design of bridge in terms of scale, height and bulk (visual weight).
OM2	Use of appropriate building materials and colours for bridge to complement surroundings
OM3	Lighting units to be directional and minimise unnecessary light spill and glare
OM4	Integration of bridge with existing abutments and promenades
OM5	Compensatory tree planting for all felled trees
OM6	Sensitive streetscape design (paving, signage, street furniture, lighting etc.)

SCALE 1 : 200
0 2 4 6 8 10m

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
Rev. A	2015-12-30	General revision	PN	TO	TO

Job Title
Agreement No. CE 14/2014 (HY)
New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Studies – Investigation

Drawing Title
LANDSCAPE AND VISUAL MITIGATION MEASURES

Figure No. 8.17

Scale 1:200

Drawn by PN | Checked by | Approved by TO | Date 2015-04 | Job No. MLAL1

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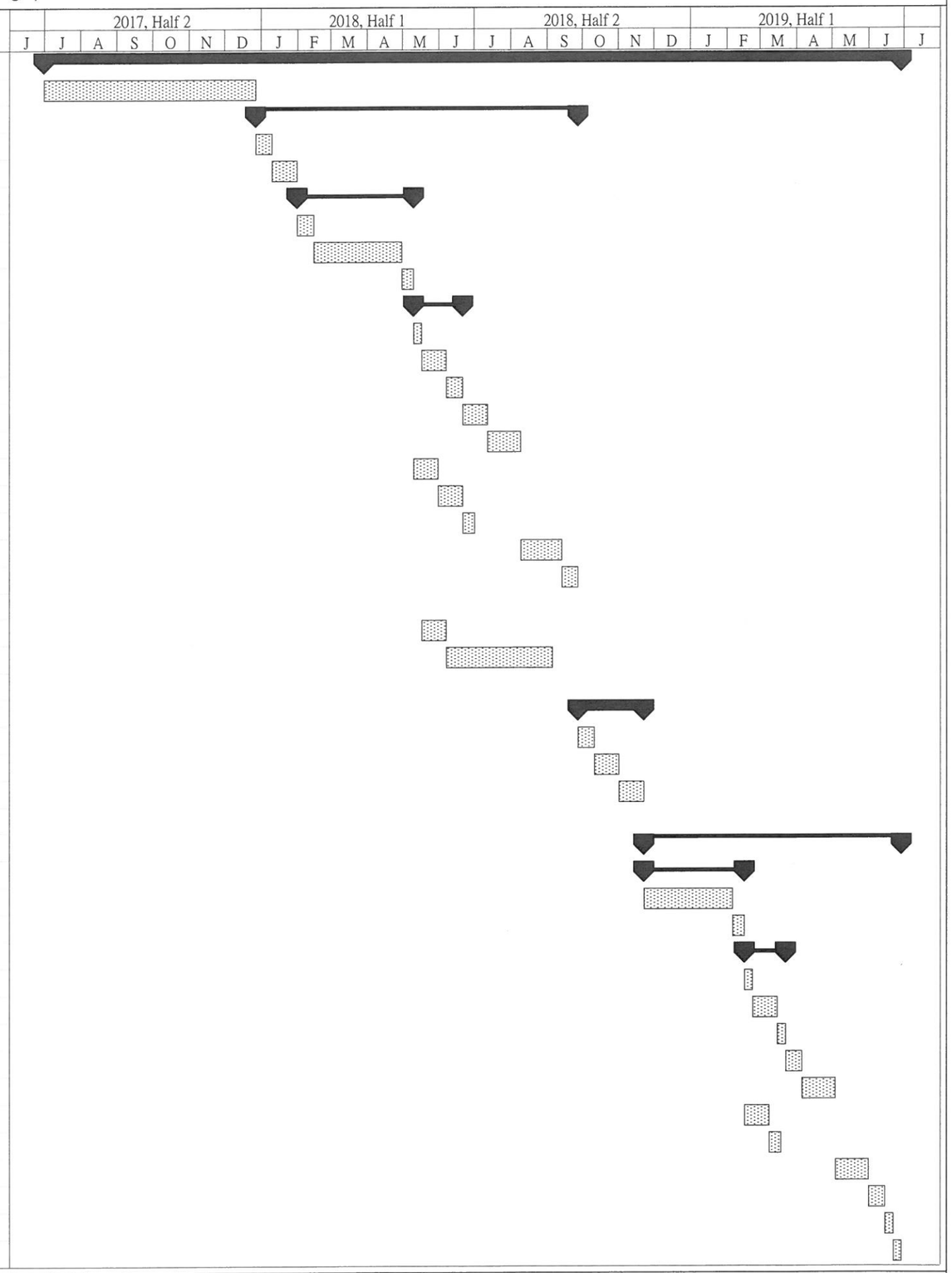
Appendix 2A
Preliminary Work Programme

Fig. 3.12
Preliminary Project Program
(Twin Bridge Design)

ID	Task Name	Duration	Start	Finish
1	**Project**	**728 days**	**Sat 17/7/1**	**Sat 19/6/29**
2	**Site Preliminaries**	**180 days**	**Sat 17/7/1**	**Thu 17/12/28**
3	**Construction of Cycle Bridge**	**274 days**	**Thu 17/12/28**	**Fri 18/9/28**
4	Mobilization	14 days	Thu 17/12/28	Thu 18/1/11
5	General working platform on the beach	21 days	Thu 18/1/11	Thu 18/2/1
6	Mini Pile	99 days	Thu 18/2/1	Fri 18/5/11
7	Mobilization	14 days	Thu 18/2/1	Thu 18/2/15
8	Construction (3 days per pile, with 25 piles in total)	75 days	Thu 18/2/15	Tue 18/5/1
9	Test	10 days	Tue 18/5/1	Fri 18/5/11
10	Pile Cap	42 days	Fri 18/5/11	Fri 18/6/22
11	Platform	7 days	Fri 18/5/11	Fri 18/5/18
12	Sheet pile	21 days	Fri 18/5/18	Fri 18/6/8
13	Excavation	14 days	Fri 18/6/8	Fri 18/6/22
14	Construction of piers	21 days	Fri 18/6/22	Fri 18/7/13
15	Construction of Abutments	28 days	Fri 18/7/13	Fri 18/8/10
16	Delivery of steel girders	21 days	Fri 18/5/11	Fri 18/6/1
17	On site fabrication	21 days	Fri 18/6/1	Fri 18/6/22
18	Erection of working platform under bridge	10 days	Fri 18/6/22	Mon 18/7/2
19	Construction of bridge deck	35 days	Fri 18/8/10	Fri 18/9/14
20	Finishes	14 days	Fri 18/9/14	Fri 18/9/28
21				
22	Construction of approach retaining wall	21 days	Fri 18/5/18	Fri 18/6/8
23	Utility Diversion	90 days	Fri 18/6/8	Thu 18/9/6
24				
25	**Demolition of Old Bridge**	**56 days**	**Fri 18/9/28**	**Fri 18/11/23**
26	Temporary works with fully propped structural members	14 days	Fri 18/9/28	Fri 18/10/12
27	Demolition of old bridge	21 days	Fri 18/10/12	Fri 18/11/2
28	Demolition of abutment & pier down to 300mm below ground lev	21 days	Fri 18/11/2	Fri 18/11/23
29				
30	**Re-construction of Pedestrian Bridge**	**218 days**	**Fri 18/11/23**	**Sat 19/6/29**
31	Mini Pile	85 days	Fri 18/11/23	Sat 19/2/16
32	Construction (3 days per pile, with 25 piles in total)	75 days	Fri 18/11/23	Wed 19/2/6
33	Test	10 days	Wed 19/2/6	Sat 19/2/16
34	Pile Cap	35 days	Sat 19/2/16	Sat 19/3/23
35	Platform	7 days	Sat 19/2/16	Sat 19/2/23
36	Sheet pile	21 days	Sat 19/2/23	Sat 19/3/16
37	Excavation	7 days	Sat 19/3/16	Sat 19/3/23
38	Construction of Piers	14 days	Sat 19/3/23	Sat 19/4/6
39	Construction of Abutments	28 days	Sat 19/4/6	Sat 19/5/4
40	Delivery / fabrication of steel	21 days	Sat 19/2/16	Sat 19/3/9
41	Erection of working platform	10 days	Sat 19/3/9	Tue 19/3/19
42	Construction of bridge deck	28 days	Sat 19/5/4	Sat 19/6/1
43	Finishes	14 days	Sat 19/6/1	Sat 19/6/15
44	Removal of platform & other external works	7 days	Sat 19/6/15	Sat 19/6/22
45	Site Clearance	7 days	Sat 19/6/22	Sat 19/6/29



Project: HA927
Date: Fri 15/6/19

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

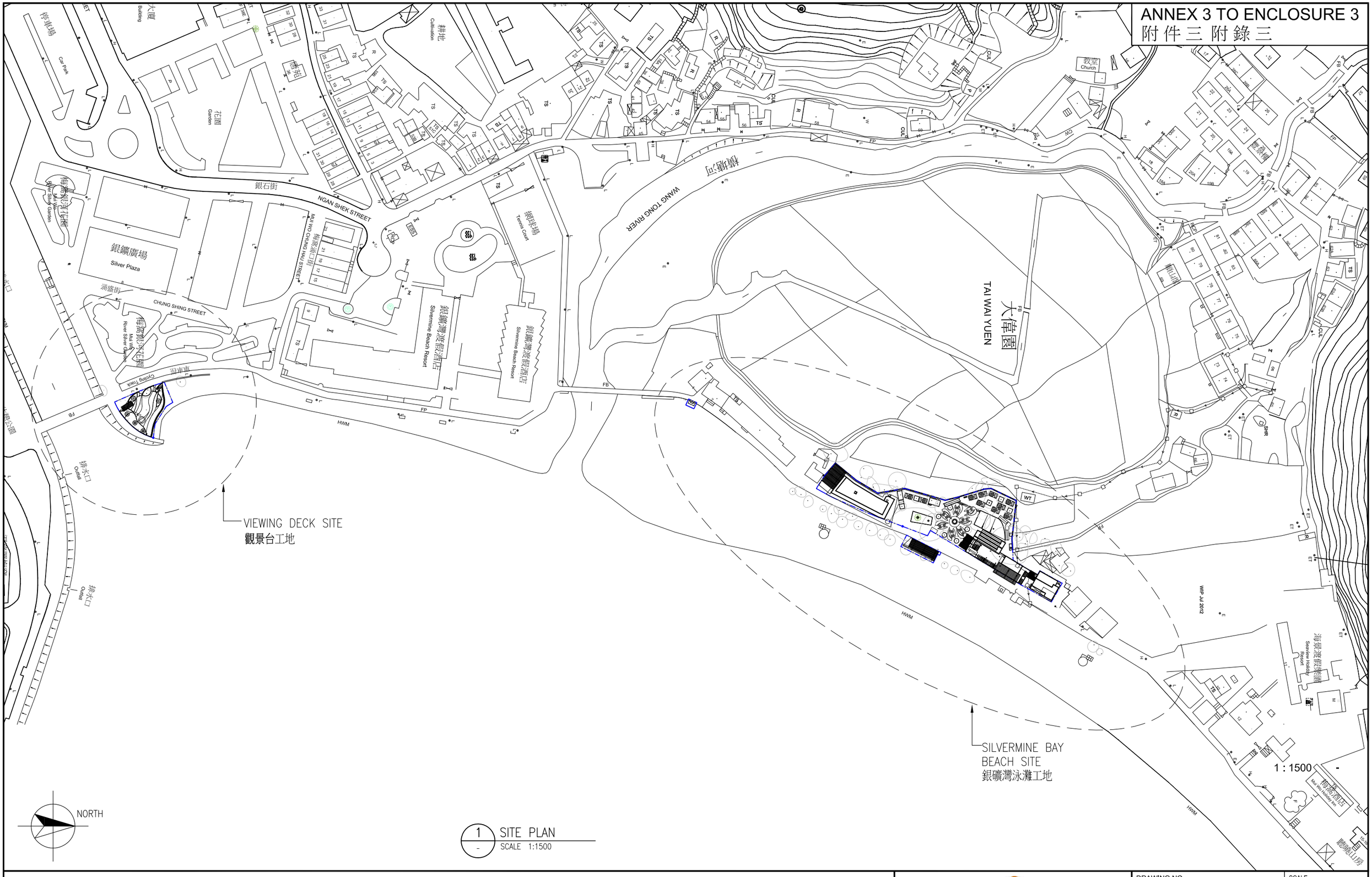
28 Jan 2015

Appendix 2B
Potential Concurrent Projects

Appendix 2B - Potential Concurrent Projects

	Project Name	Project Proponent	Works Involved	Construction Period	Overlap with the construction phase of this Project or not *
1	Signature Project Scheme (Islands District) – Improvement Works at Silvermine Bay Beach, Mui Wo, Lantau Island	Home Affairs Department (HAD)	• Demolition of the existing beach service buildings; • Construction of new beach buildings and associated beach facilities with an approximate construction floor area of 938 m^2; • Construction of new barbeque pit area and sitting-out area; and • Construction of a viewing deck near the entrance to the beach	End at January 2017	No
2	Upgrading of Mui Wo Sewage Treatment Works and Village Sewerage at Wang Tong and Yue Kwong Chuen	Drainage Service Department (DSD)	• Reinstatement of the roadside covered U-channel, cycletrack and footpath pavements (to be completed by end of December 2015); • The pipe cleaning and CCTV; • Painting of manhole internal wall face with epoxy paint (will be carried out in mid-2017).	End at mid-2017	Potentially, but no heavy works will be carried out concurrently with this Project
* Construction phase of this Project: mid-2017 to mid-2019					

ANNEX 3 TO ENCLOSURE 3
附件三 附錄三



1 SITE PLAN
SCALE 1:1500

7285RS

改善梅窩銀礦灣沙灘及附屬設施

IMPROVEMENT WORKS AT SILVERMINE BAY BEACH, MUI WO

HOME AFFAIRS DEPARTMENT
民政事務總署

DRAWING NO.:
圖則編號:
IS-SPS001-ANNEX-3A

SCALE :
比例:
1 : 1500

TITLE:
標題:
工地平面圖
SITE PLAN

Appendix 4A
Construction Plant Inventory
(Unmitigated Scenario)

	TM or other reference	SWL dB(A)	No. of PME	% on time	Total SWL dB(A)
Activity A - Site Preparation					
Lorry	CNP 141	112	1	50%	109
Village Vehicle	# (Note 1)	101	1	50%	98
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	95
Saw, circular, wood	CNP 201	108	1	50%	105
			Total SWL, dB(A)		**111**
Activity B - Piling					
Drilling Rig	CNP 072	110	2	70%	111
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	2	90%	98
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	2	70%	103
Lorry	CNP 141	112	1	50%	109
Concrete pump, stationary mounted	CNP 047	109	1	50%	106
Concrete lorry mixer	CNP 044	109	1	50%	106
			Total SWL, dB(A)		**115**
Activity C - Pile Caps					
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	95
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	60%	100
Mini-excavator	CNP 082	94	1	50%	91
Hammer driving sheet pile	CNP 172	115	1	50%	112
Concrete lorry mixer	CNP 044	109	1	50%	106
Concrete pump, stationary mounted	CNP 047	109	1	50%	106
Poker, vibratory, hand-held	CNP 170	113	2	50%	113
Lorry	CNP 141	112	1	50%	109
Bar bender and cutter (electric)	CNP 021	90	1	50%	87
			Total SWL, dB(A)		**117**
Activity D - Piers					
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	95
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	60%	100
Concrete lorry mixer	CNP 044	109	1	50%	106
Concrete pump, stationary mounted	CNP 047	109	1	50%	106
Poker, vibratory, hand-held	CNP 170	113	2	50%	113
Bar bender and cutter (electric)	CNP 021	90	1	50%	87
			Total SWL, dB(A)		**115**

	TM or other reference	SWL dB(A)	No. of PME	% on time	Total SWL dB(A)
Activity E - Bridge Decks					
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	95
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	60%	100
Concrete lorry mixer	CNP 044	109	1	50%	106
Concrete pump, stationary mounted	CNP 047	109	1	50%	106
Poker, vibratory, hand-held	CNP 170	113	2	50%	113
Lorry	CNP 141	112	1	50%	109
Bar bender and cutter (electric)	CNP 021	90	1	50%	87
			Total SWL, dB(A)		**116**
Activity F - Construction of Retaining Walls					
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	95
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	50%	99
Concrete lorry mixer	CNP 044	109	1	50%	106
Poker, vibratory, hand-held	CNP 170	113	2	50%	113
Lorry	CNP 141	112	1	50%	109
Bar bender and cutter (electric)	CNP 021	90	1	50%	87
			Total SWL, dB(A)		**115**
Activity G - Road Works					
Lorry	CNP 141	112	1	50%	109
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	50%	99
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	95
Asphalt paver	CNP 004	109	1	50%	106
Road roller	CNP 185	108	1	50%	105
Paint line marker	CNP 161	90	1	50%	87
			Total SWL, dB(A)		**112**

	TM or other reference	SWL dB(A)	No. of PME	% on time	Total SWL dB(A)
Activity H - Demolition					
Lorry	CNP 141	112	1	50%	109
Village Vehicle	# (Note 1)	101	1	50%	98
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	95
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	60%	100
Saw, circular, wood	CNP 201	108	1	50%	105
Saw/groover, concrete (petrol)	CNP 203	115	1	50%	112
			Total SWL, dB(A)		**115**

PME	Powered Mechanical Equipment
SWL	Sound Power Level
TM	Technical Memorandum on Noise from Construction Works other than Percussive Piling
#	Sound power level octave bands (source: EPD website on Guidance Notes for License Application under the NCO)
Note 1	Equivalent to light goods vehicle

References

1. Technical Memorandum on Noise from Construction Work Other Than Percussive Piling (Table 3)
http://www.epd.gov.hk/epd/english/environmentinhk/noise/guide_ref/tm_nonpp_4_3.html
2. Technical Memorandum on Noise from Construction Work Other Than Percussive Piling
http://www.epd.gov.hk/epd/english/environmentinhk/noise/guide_ref/files/tm_nonpp.pdf
3. For SWL, refer to the document prepared by the Noise Control Authority
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf
2. Details of Construction Noise Impact Assessment
http://www.epd.gov.hk/eia/register/report/eiareport/eia_1802010/EIA/Appendix/EIA%20Appendix%208.1.pdf
3. Sample photographs of some commonly used PME
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/cnp_annex2_tc.htm

Appendix 4B
Unmitigated Sound Power Level of Construction Activities

Stage/Activity		Sound Power Level (dB(A))																	
		2018												2019					
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1. Construction of Cycle Bridge																			
1.1	Site Preparation	111																	
1.2	Piling		115	115	115														
1.3	Pile Caps					117													
1.4	Pier						115	115											
1.5	Bridge Deck								116	116									
1.6	Construction of Retaining Walls						115												
1.7	Road Works									112									
2. Demolition of Old Bridge																			
2.1	Demolition										115	115							
3. Re-construction of Pedestrian Bridge																			
3.1	Piling												115	115	115				
3.2	Pile Caps															117			
3.3	Pier																115		
3.4	Bridge Deck																	116	
3.5	Road Works																		112

Appendix 4C
Unmitigated Construction Noise Level of the Project at NSR

NSR	Name	Notional Distance, m	Distance Correction with Façade Correction, dB(A)
NSR1	1 Tung Wan Tau Road	27	-34

Stage/Activity		Sound Pressure Level (dB(A))																	
		2018												2019					
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1. Construction of Cycle Bridge																			
1.1	Site Preparation	77																	
1.2	Piling		82	82	82														
1.3	Pile Caps					84													
1.4	Pier						81	81											
1.5	Bridge Deck								82	82									
1.6	Construction of Retaining Walls						82												
1.7	Road Works									78									
2. Demolition of Old Bridge																			
2.1	Demolition										81	81							
3. Re-construction of Pedestrian Bridge																			
3.1	Piling												82	82	82				
3.2	Pile Caps															84			
3.3	Pier																81		
3.4	Bridge Deck																	82	
3.5	Road Works																		78
	Total SPL, dB(A)	77	82	82	82	84	84	81	82	84	81	81	82	82	82	84	81	82	78
	Exceendance	2	7	7	7	9	9	6	7	9	6	6	7	7	7	9	6	7	3

Appendix 4D
Summary of Unmitigated Construction Noise Level of the Project

NSR	Noise Criteria, dB(A)	Max	Sound Pressure Level (dB(A))																	
			2018												2019					
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
NSR1	75	84	77	82	82	82	84	84	81	82	84	81	81	82	82	82	84	81	82	78

Appendix 4E
Construction Plant Inventory
(Mitigated Scenario)

	TM or other reference	SWL dB(A)	No. of PME	% on time	Barrier Correction	Total SWL dB(A)
Activity A - Site Preparation						
Lorry, 5.5 tonnes < gross vehicle weight <= 38 tonnes	-	105	1	50%	-5	97
Village Vehicle	# (Note 1)	101	1	50%	0	98
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	-10	85
Saw, circular, wood	D7-79	103	1	50%	-5	95
			Total SWL, dB(A)			**102**
Activity B - Piling						
Drilling Rig	C3-17	104	2	70%	-5	100
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	2	90%	-10	88
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	2	70%	-10	93
Lorry, 5.5 tonnes < gross vehicle weight <= 38 tonnes	-	105	1	50%	-5	97
Concrete pump, stationary	CNP 047	109	1	50%	-10	96
Concrete lorry mixer	C4-21	105	1	50%	-5	97
			Total SWL, dB(A)			**104**
Activity C - Pile Caps						
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	-10	85
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	60%	-10	90
Mini-excavator	CNP 082	94	1	50%	-5	86
Hammer driving sheet pile	C3-4	105	1	50%	-5	97
Concrete lorry mixer	C4-21	105	1	50%	-5	97
Concrete pump, stationary	CNP 047	109	1	50%	-10	96
Poker, vibratory, hand-held (electric)	-	103	2	50%	-5	98
Lorry, 5.5 tonnes < gross vehicle weight <= 38 tonnes	-	105	1	50%	-5	97
Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87
			Total SWL, dB(A)			**104**
Activity D - Piers						
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	-10	85
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	60%	-10	90
Concrete lorry mixer	C4-21	105	1	50%	-5	97
Concrete pump, stationary	CNP 047	109	1	50%	-10	96
Poker, vibratory, hand-held (electric)	-	103	2	50%	-5	98
Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87
			Total SWL, dB(A)			**102**

	TM or other reference	SWL dB(A)	No. of PME	% on time	Barrier Correction	Total SWL dB(A)
Activity E - Bridge Decks						
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	-10	85
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	60%	-10	90
Concrete lorry mixer	C4-21	105	1	50%	-5	97
Concrete pump, stationary	CNP 047	109	1	50%	-10	96
Poker, vibratory, hand-held (electric)	-	103	2	50%	-5	98
Lorry, 5.5 tonnes < gross vehicle weight <= 38 tonnes	-	105	1	50%	-5	97
Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87
			Total SWL, dB(A)			**103**
Activity F - Construction of Retaining Walls						
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	-10	85
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	50%	-10	89
Concrete lorry mixer	C4-21	105	1	50%	-5	97
Poker, vibratory, hand-held (electric)	-	103	2	50%	-5	98
Lorry, 5.5 tonnes < gross vehicle weight <= 38 tonnes	-	105	1	50%	-5	97
Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87
			Total SWL, dB(A)			**103**
Activity G - Road Works						
Lorry, 5.5 tonnes < gross vehicle weight <= 38 tonnes	-	105	1	50%	-5	97
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	50%	-10	89
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	-10	85
Asphalt paver	EPD-01226	104	1	50%	-5	96
Road roller	EPD-01183	97	1	50%	-5	89
Paint line marker	CNP 161	90	1	50%	0	87
			Total SWL, dB(A)			**101**

	TM or other reference	SWL dB(A)	No. of PME	% on time	Barrier Correction	Total SWL dB(A)
Activity H - Demolition						
Lorry, 5.5 tonnes < gross vehicle weight <= 38 tonnes	-	105	1	50%	-5	97
Village Vehicle	# (Note 1)	101	1	50%	0	98
Generator, super silenced, 70 dB(A) at 7m	CNP 103	95	1	90%	-10	85
Air compressor, air flow> $10m^3$/min and <= $30m^3$/min	CNP 002	102	1	60%	-10	90
Saw, circular, wood	D7-79	103	1	50%	-5	95
Saw/groover, concrete (petrol)	C4-72	107	1	50%	-5	99
			Total SWL, dB(A)			**104**

Remark:
Enclosure/ Shed/ Silencer will be applied on Generator, Air Compressor and Concrete Pump, 10 dB(A) reduction can be achieved.
Movable Noise Barrier will be applied on the other plants, 5 dB(A) reduction can be achieved.

PME	Powered Mechanical Equipment
SWL	Sound Power Level
TM	
	Technical Memorandum on Noise from Construction Works other than Percussive Piling
#	Sound power level octave bands (source: EPD website on Guidance Notes for License Application under the NCO)
Note 1	Equivalent to light goods vehicle

References

1. Technical Memorandum on Noise from Construction Work Other Than Percussive Piling (Table 3)
http://www.epd.gov.hk/epd/english/environmentinhk/noise/guide_ref/tm_nonpp_4_3.html
2. Technical Memorandum on Noise from Construction Work Other Than Percussive Piling
http://www.epd.gov.hk/epd/english/environmentinhk/noise/guide_ref/files/tm_nonpp.pdf
3. For SWL, refer to the document prepared by the Noise Control Authority
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf
2. Details of Construction Noise Impact Assessment
http://www.epd.gov.hk/eia/register/report/eiareport/eia_1802010/EIA/Appendix/EIA%20Appendix%208.1.pdf
3. Sample photographs of some commonly used PME
http://www.epd.gov.hk/epd/english/application_for_licences/guidance/cnp_annex2_tc.htm

Appendix 4F
Mitigated Sound Power Level of Construction Activities

Stage/Activity		Sound Power Level (dB(A))																	
		2018												2019					
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1. Construction of Cycle Bridge																			
1.1	Site Preparation	102																	
1.2	Piling		104	104	104														
1.3	Pile Caps					104													
1.4	Pier						102	102											
1.5	Bridge Deck								103	103									
1.6	Construction of Retaining Walls						103												
1.7	Road Works									101									
2. Demolition of Old Bridge																			
2.1	Demolition										104	104							
3. Re-construction of Pedestrian Bridge																			
3.1	Piling												104	104	104				
3.2	Pile Caps															104			
3.3	Pier																102		
3.4	Bridge Deck																	103	
3.5	Road Works																		101

Appendix 4G
Mitigated Construction Noise Level at NSR

NSR	Name	Notional Distance, m	Distance Correction with Façade Correction, dB(A)
NSR1	1 Tung Wan Tau Road	27	-34

Stage/Activity		Sound Pressure Level (dB(A))																	
		2018												2019					
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1. Construction of Cycle Bridge																			
1.1	Site Preparation	68																	
1.2	Piling		71	71	71														
1.3	Pile Caps					71													
1.4	Pier						69	69											
1.5	Bridge Deck								70	70									
1.6	Construction of Retaining Walls						69												
1.7	Road Works									67									
2. Demolition of Old Bridge																			
2.1	Demolition										70	70							
3. Re-construction of Pedestrian Bridge																			
3.1	Piling												71	71	71				
3.2	Pile Caps															71			
3.3	Pier																69		
3.4	Bridge Deck																	70	
3.5	Road Works																		67
	Total SPL, dB(A)	68	71	71	71	71	72	69	70	72	70	70	71	71	71	71	69	70	67
	Exceendance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 4H
Detailed Calculation of Mitigated Construction Noise Level of the Project

NSR	Noise Criteria, dB(A)	Max	Sound Pressure Level (dB(A))																	
			2018												2019					
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
NSR1	75	72	68	71	71	71	71	72	69	70	72	70	70	71	71	71	71	69	70	67

Appendix 4I
Photographic Record of
Representative Noise Sensitive Receivers

Appendix 4I Photographic Record of Representative Noise Sensitive Receiver

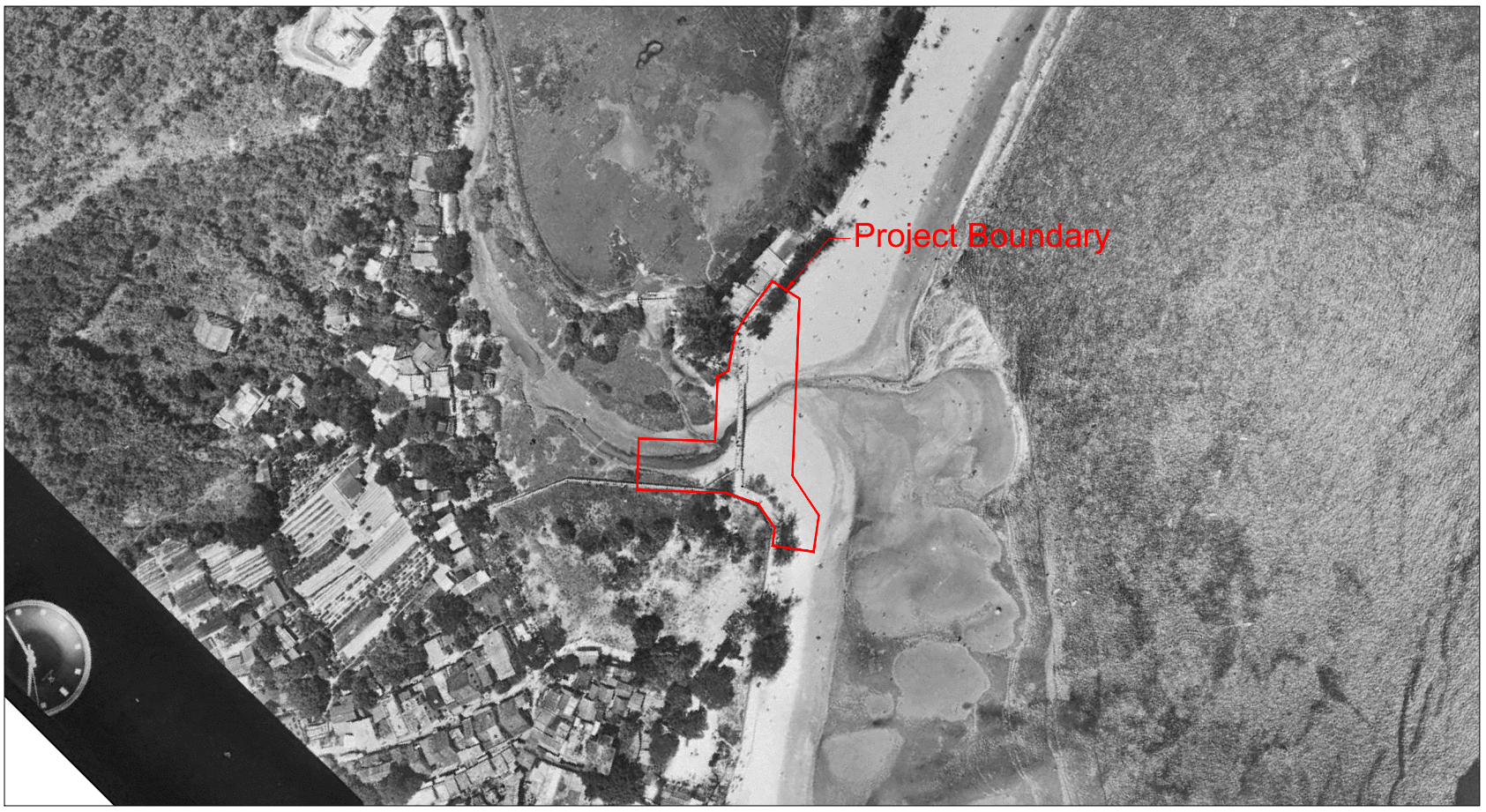
NSR1: Village House at 1 Tung Wan Tau Road

Appendix 6A
Representative Historical Photos

Year: 1945
- Very extensive agricultural land in Tai Wai Yuen and at the foot of Butterfly Hill - Old bridges at mouth of Wang Tong River - Wang Tong River was untrained and had large mudlfat at river mouth

Year: 1973
- The now Wang Tong River Bridge was constructed. - Shape of Wang Tong River as now - Houses built at Tung Wan Tau Road and along Wang Tong River at the foot of Butterfly Hill

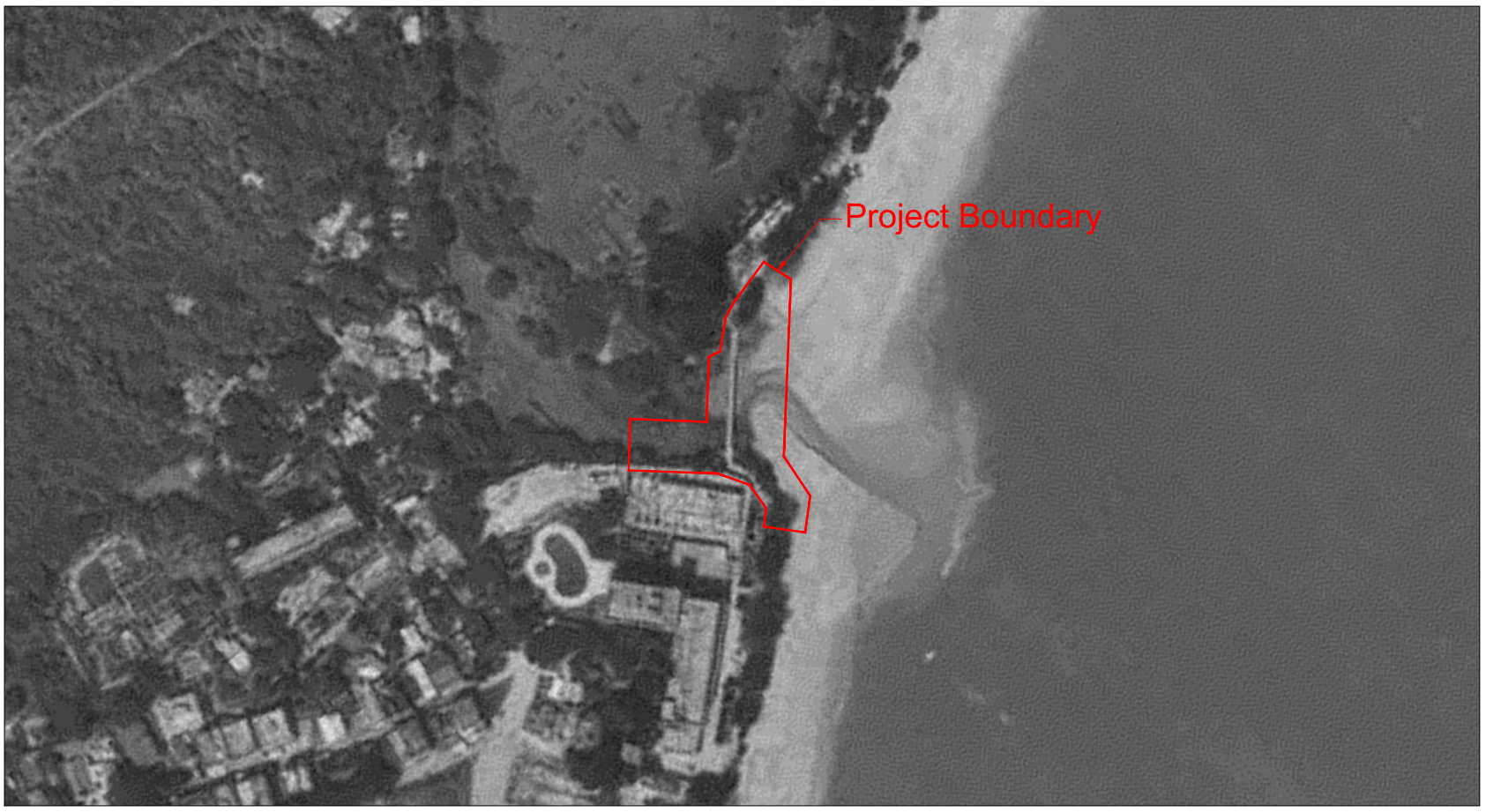
Appendix 6A Representative Historical Photos



Year: 1976
- Road constructed along Silvermine Bay Beach - Structure at the now Silvermine Beach Resort demolished

Year: 1982
- Construction of Silvermine Beach Resort (South Wing)

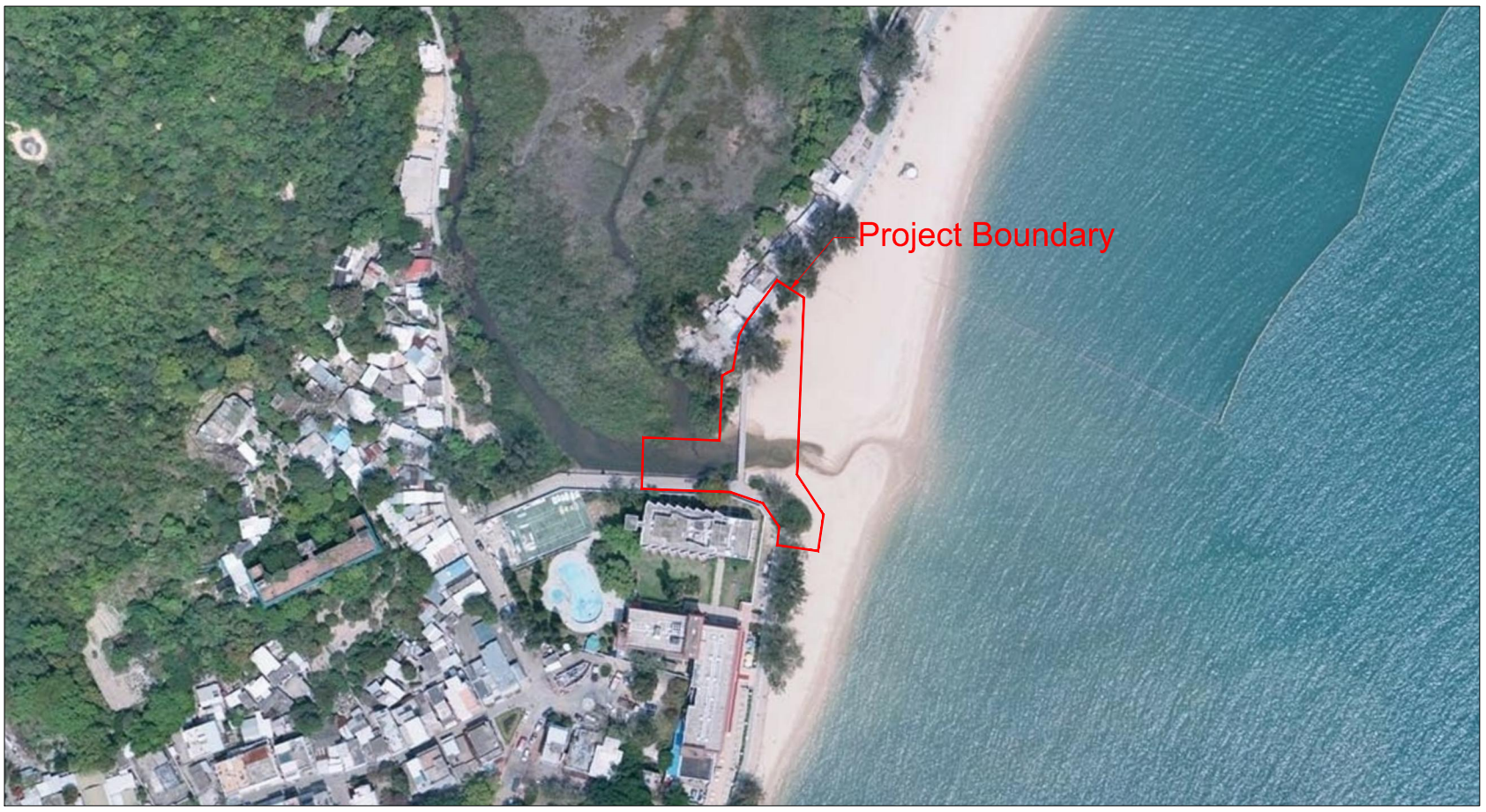
Appendix 6A Representative Historical Photos



Year: 1991
- Development of Silvermine Beach Resort (North Wing)

Year: 2010
- Barge berthed in waters in front of Silvermine Beach Resort, area of beach between front of Silvermine Beach Resort and Wang Tong River reduced

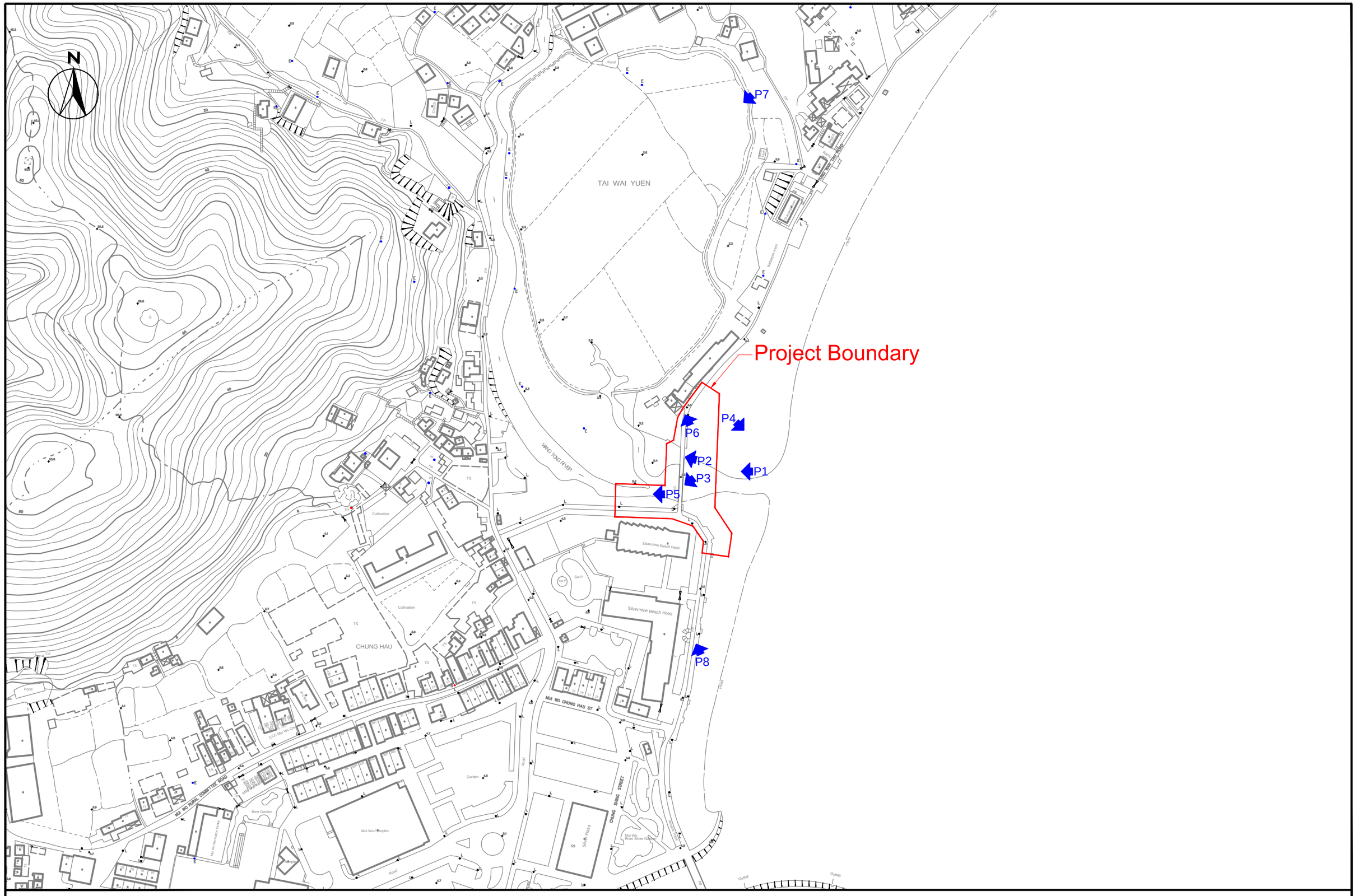
Appendix 6A Representative Historical Photos



Year: 2014
- Latest Aerial Photo

Appendix 6A Representative Historical Photos

Appendix 6B
Representative Photos of Current Land Uses



Appendix 6B Representative Photos of Current Land Uses (Key Plan)

P1: Wang Tong Bridge

P2: Northern pier of Wang Tong Bridge

P3: Southern pier of Wang Tong Bridge

P4: Silvermine Bay Beach (east of Wang Tong Bridge)

Appendix 6B Representative Photos of Current Land Uses

P5: Wang Tong River (west of Wang Tong Bridge)

P6: Village House to the north of Wang Tong Bridge

P7: Abandoned Agriculture Land in Tai Wai Yuen (north of Wang Tong Bridge)

P8: Silvermine Resort Hotel (south of Wang Tong Bridge)

Appendix 6B Representative Photos of Current Land Uses

Appendix 6C
Chemical Waste Producer, Dangerous Goods & Incident Records

本書檔案
OUR REF : EP749/I1/1
來函檔案
YOU REF : CCL/IA14024/corr/out/bc150908
電 話
TEL NO : 2516 1761
圖文傳真
FAX NO : 2960 1760
網 址
HOMEPAGE : http://www.epd.gov.hk/

Environmental Protection Department
Environmental Compliance Division
Regional Office (South)
2/F., Chinachem Exchange Square
1 Hoi Wan Street
Quarry Bay, Hong Kong

環境保護署
環保法規管理科
區域辦事處(南)
香港鰂魚涌
海灣街一號
華懋交易廣場二樓

By Post and Fax
(Fax no.: 2510 0189)

Cinotech Consultants Ltd.
8/F,
Hang Seng NP Building,
341 King's Road,
North Point, Hong Kong.
(Attn: Dr. HF CHAN)

14 September 2015

Dear Sir/Madam,

Agreement No. CE 14/2014 (HY) – New Wang Tong River Bridge, Mui Wo Environmental Impact Assessment and Drainage Impact Assessment Studies - Investigation
Re: Enquiry on Record of Land Contamination

I refer to your above letter dated 8 September 2015 regarding the subject matter.

2. For inspection of Chemical Waste Producer Registration records, please contact our Mr. Aaron HO of EPD Territory Control Office at 2835 1017.

3. Please note that we have no records of chemical spillage / leakage at the Project Site at Wang Tong, Mui Wo, as shown in the provided Figure.

Yours sincerely,

(Agnes Y. H. KWOK)
Regional Office (South)
for Director of Environmental Protection

Internal
CI(TC)5

消 防 處
港島・離島及海務總區總部
中區政府碼頭
香港中環民耀街 32 號

FIRE SERVICES DEPARTMENT,
HONG KONG ISLAND, ISLANDS &,
MARINE COMMAND HEADQUARTERS,
CENTRAL GOVERNMENT PIER,
32 MAN FAI STREET, CENTRAL

本處檔號 OUR REF : (100) in FSD/MW/I-120/3
來函檔號 YOUR REF :
圖文傳真 FAX NO : 2517 8841
電 話 TEL NO : 2534 7254

11.9.2015

Cinotech Consultants Ltd.
8/F, Hang Seng NP Building,
341 King's Road, North Point,
Hong Kong
Attn.: Dr HF CHAN (fax: 2510 0189)

Dear Dr CHAN,

Agreement No. CE 14/2014 (HY) –
New Wang Tong River Bridge, Mui Wo

I refer to your letter dated 8.9.2015.

According to our record, there was neither any dangerous goods license nor reported accidents of dangerous goods leakage or spillage within the vicinity of the proposed works near Silver Mine Bay Beach in the past.

Should you need further information, please feel free to contact me at Tel: 2534 7254.

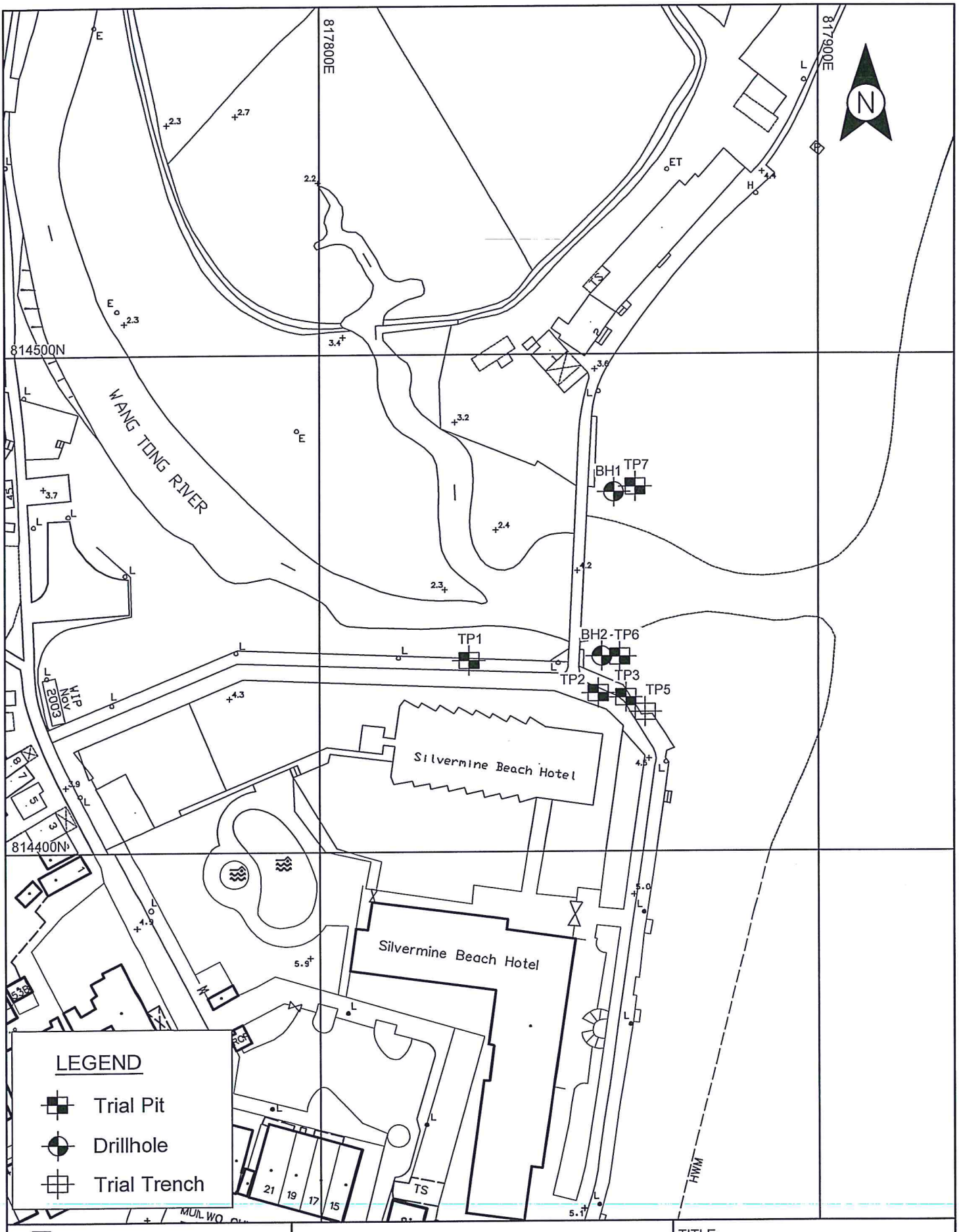
Yours Sincerely,

(WONG Chun-wang)
for Director of Fire Services

REF. NUMBER AND DATE SHOULD BE QUOTED IN REFERENCE TO THIS LETTER
凡提及本信時請引述編號及日期

FS 107A (Rev.10/95)

Appendix 6D
Extract of GI Record



FUGRO GEOTECHNICAL SERVICES LTD	PROJECT: Ground Investigation - New Territories West (Term Contract) New Wang Tong River Bridge, Mui Wo	TITLE: Ground Investigation Plan
		SCALE: 1:1000
JOB REF: 11 0365 03		CLIENT: CEDD-GEO
DATE: 1-Feb-2013	WORKS ORDER NO: GE/2012/02.24	FIGURE: 1

Table 1

Summary of Drillhole Results

DRILLHOLE NUMBER	GROUND LEVEL mPD / TERMINATION DEPTH m.b.g.l. (mPD)	REMARKS	Depth / Levels / Thickness											
			BEACH DEPOSIT			ALLUVIUM			SAPROLITE			ROCK		
			m.b.g.l. (mPD) m			m.b.g.l. (mPD) m			m.b.g.l. (mPD) m			m.b.g.l. (mPD) m		
BH1	+2.96	Vertical	0.00	to	4.00	4.00	to	10.00	10.00	to	26.35	26.35	to	31.90
	31.90		(+2.96	to	-1.04)	(-1.04	to	-7.04)	(-7.04	to	-23.39)	(-23.39	to	-28.94)
	(-28.94)			4.00			6.00			16.35			5.55	
BH2	+3.84	Vertical	0.00	to	4.00	4.00	to	19.10	19.10	to	25.67	25.67	to	31.45
	31.45		(+3.84	to	-0.16)	(-0.16	to	-15.26)	(-15.26	to	-21.83)	(-21.83	to	-27.61)
	(-27.61)			4.00			15.10			6.57			5.78	

Appendix 7A
Representative Photos of Habitats in the Study Area

Watercourse – Wang Tong River (Upper Reach)
(Taken in Jun 2014)

Watercourse – Wang Tong River(Middle Reach)
(Taken in Oct 2014)

Watercourse – Wang Tong River (Lower Reach)
(Taken in Sep 2014)

Wang Tong River- Discharge Point (Wet Season)
(Taken in Jun 2014)

Appendix 7A Representative Photos of Habitats in the Study Area

Wang Tong River- Discharge Point (Dry Season)
(Taken in Feb 2015)

Watercourse – Silver River
(Taken in Feb 2015)

Watercourse – Minor Watercourses
(Taken in Aug 2014)

Developed Area
(Taken in Jun 2014)

Appendix 7A Representative Photos of Habitats in the Study Area

Sandy Shore & Marine Waters
(Taken in Jun 2014)

Woodland
(Taken in Feb 2015)

Marsh
(Taken in Aug 2014)

Abandoned Agricultural Land
(Taken in Nov 2014)

Appendix 7A Representative Photos of Habitats in the Study Area

Shrubland/Grassland
(Taken in Jun 2014)

Appendix 7A Representative Photos of Habitats in the Study Area

Appendix 7B
Species List

Appendix 7B - Species List

Chinese Name	Species Name	Growth Form	Origin	Habitat							Conservation Status & Remarks
				Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	
Plant											
台灣相思	*Acacia confusa*	Tree	Exotic	Y		Y					-
老鼠簕	*Acanthus ilicifolius*	Shrub	Native					Y		Y	-
鹵蕨	*Acrostichum aureum*	Herb	Native					Y		Y	
扇葉鐵線蕨	*Adiantum flabellulatum*	Herb	Native			Y					-
蠟燭果	*Aegiceras corniculatum*	Evergreen shrub	Native							Y	-
勝紅薊	*Ageratum conyzoides*	Annual herb	Exotic						Y		-
小葉米仔蘭	*Aglaia odorata* var. *microphyllina*	Evergreen shrub	Exotic	Y							-
廣東萬年青	*Aglaonema modestum*	Perennial herb	Exotic	Y							-
石栗	*Aleurites moluccana*	Tree	Exotic	Y							-
軟枝黃蟬	*Allamanda cathartica*	Scandent shrub	Exotic	Y							-
黃蟬	*Allamanda schottii*	Shrub	Exotic	Y							-
海芋	*Alocasia macrorrhizos*	Perennial herb	Native	Y			Y	Y	Y		-
蘆薈	*Aloe vera*	Perennial herb	Exotic	Y							-
花葉豔山薑	*Alpinia zerumbet*	Perennial herb	Exotic	Y							-
紅龍莧	*Alternanthera dentata* f. *rubiginosa*	-	Exotic	Y							-
銀柴	*Aporusa dioica*	Tree	Native			Y					-
土沉香	*Aquilaria sinensis*	Evergreen tree	Native			Y					Cap. 586; Near Threatened (Rare and Precious Plants of Hong Kong); Vulnerable (China Plant Red Data Book); & Vulnerable (IUCN Red List)
蔓花生	*Arachis duranensis*	-	Exotic	Y							-
異葉南洋杉	*Araucaria heterophylla*	Tree	Exotic	Y							Vulnerable (IUCN Red List)
假檳榔	*Archontophoenix alexandrae*	Tree palm	Exotic	Y							-
郎傘樹	*Ardisia hanceana*	Evergreen shrub	Native			Y					-
天門冬	*Asparagus cochinchinensis*	Scandent subshrub	Native	Y		Y					-
小花十萬錯	*Asystasia micrantha*	-	Exotic			Y					-
楊桃	*Averrhoa carambola*	Evergreen small tree	Exotic			Y					-
滿江紅	*Azolla imbricata*	Herb	Native						Y		-
羊蹄甲屬	*Bauhinia* sp.	-	-	Y		Y					-
洋紫荊	*Bauhinia* x *blakeana*	Tree	Native	Y							-
射干	*Belamcanda chinensis*	Perennial herb	Exotic	Y							-
白花鬼針草	*Bidens alba*	Annual herb	Exotic	Y							-
烏毛蕨	*Blechnum orientale*	Herb	Native			Y					-
木棉	*Bombax ceiba*	Deciduous tree	Exotic	Y							-
簕杜鵑	*Bougainvillea spectabilis*	Scandent shrub	Exotic	Y							-
黑面神	*Breynia fruticosa*	Shrub	Native			Y					-
土蜜樹	*Bridelia tomentosa*	Shrub or small tree	Native			Y					-
串錢柳	*Callistemon viminalis*	Tree	Exotic	Y					Y		-
美人蕉	*Canna indica*	Perennial herb	Exotic	Y							-
魚骨木	*Canthium dicoccum*	Shrub or tree	Native			Y					-
薺菜	*Capsella bursa-pastoris*	Annual or biennial herb	Native	Y							-
竹節樹	*Carallia brachiata*	Tree	Native			Y					-
番木瓜	*Carica papaya*	Tree	Exotic	Y			Y	Y			-

Appendix 7B - Species List

Chinese Name	Species Name	Growth Form	Origin	Habitat							Conservation Status & Remarks
				Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	
小魚尾葵	*Caryota mitis*	Small tree palm	Exotic	Y							-
木麻黃	*Casuarina equisetifolia*	Tree	Exotic	Y	Y		Y				-
長春花	*Catharanthus roseus*	Subshrub	Exotic	Y		Y		Y			-
青葙	*Celosia argentea*	Annual herb	Native					Y			-
雞冠花	*Celosia argentea* var. *cristata*	Annual herb	Exotic	Y							-
朴樹	*Celtis sinensis*	Deciduous tree	Native	Y		Y					-
蒺藜草	*Cenchrus echinatus*	Annual herb	Exotic							Y	-
陰香	*Cinnamomum burmannii*	Tree or large shrub	Native	Y							-
樟	*Cinnamomum camphora*	Large tree	Native	Y							-
黃皮	*Clausena lansium*	Small tree	Exotic	Y		Y					-
苦郎樹	*Clerodendrum inerme*	Shrub	Native					Y			-
紅龍吐珠	*Clerodendrum splendens*	Shrub	Exotic	Y							-
木防己	*Cocculus orbiculatus*	Vine	Native	Y							-
變葉木	*Codiaeum variegatum*	Shrub	Exotic	Y							-
薏苡	*Coix lacryma-jobi*	Annual herb	Native	Y							-
五彩蘇	*Coleus scutellarioides*	Erect herb	Exotic	Y							-
芋	*Colocasia esculenta*	Herb	Native	Y				Y	Y		-
鴨跖草	*Commelina communis*	Herb	Native				Y	Y	Y		-
黃牛木	*Cratoxylum cochinchinense*	Deciduous shrub or tree	Native			Y					-
文殊蘭	*Crinum asiaticum* var. *sinicum*	Perennial herb	Native				Y				-
豬屎豆	*Crotalaria pallida* var. *obovata*	Herb	Exotic					Y			-
菟絲子	*Cuscuta chinensis*	Annual parasitic herb	Native				Y				-
華南毛蕨	*Cyclosorus parasiticus*	Herb	Native						Y		-
風車草	*Cyperus involucratus*	Herb	Exotic							Y	-
茳芏	*Cyperus malaccensis*	Herb	Native					Y		Y	-
牛耳楓	*Daphniphyllum calycinum*	Evergreen shrub	Native			Y					-
鳳凰木	*Delonix regia*	Tree	Exotic	Y							-
假地豆	*Desmodium heterocarpon*	Shrub	Native			Y					-
芒萁	*Dicranopteris pedata*	Herb	Native			Y					-
龍眼	*Dimocarpus longan*	Tree	Exotic	Y		Y					Near Threatened (IUCN Red List)
巴西鐵樹	*Dracaena fragrans*	Perennial herb	Exotic			Y					-
紅邊鐵樹	*Dracaena marginata*	Tree	Exotic	Y							-
假連翹	*Duranta erecta*	Climbing shrub	Exotic	Y							-
散尾葵	*Dypsis lutescens*	Shrub palm	Exotic	Y							Near Threatened (IUCN Red List)
鳳眼藍	*Eichhornia crassipes*	Aquatic herb	Exotic					Y			-
酸藤果	*Embelia laeta*	Evergreen vine	Native			Y					-
一點紅	*Emilia sonchifolia*	Annual herb	Native	Y							-
刺桐屬	*Erythrina* sp.	-	-	Y							-
猩猩草	*Euphorbia cyathophora*	Perennial herb	Exotic	Y				Y			-
飛揚草	*Euphorbia hirta*	Annual herb	Exotic	Y							-
紅背桂	*Excoecaria cochinchinensis*	Shrub	Exotic	Y							-
垂葉榕	*Ficus benjamina*	Tree	Exotic	Y							-
印度榕	*Ficus elastica*	Tree	Exotic	Y							-

Appendix 7B - Species List

Chinese Name	Species Name	Growth Form	Origin	Habitat							Conservation Status & Remarks
				Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	
粗葉榕 (五指毛桃)	*Ficus hirta*	Shrub or small tree	Native			Y					-
對葉榕	*Ficus hispida*	Shrub or small tree	Native	Y		Y		Y	Y		-
細葉榕	*Ficus microcarpa*	Tree	Native	Y		Y	Y				-
菩提樹	*Ficus religiosa*	Tree	Exotic	Y							-
筆管榕	*Ficus subpisocarpa*	Tree	Native	Y			Y				-
青果榕	*Ficus variegata*	Shrub or tree	Native	Y		Y					-
變葉榕	*Ficus variolosa*	Shrub or tree	Native			Y					-
黑莎草	*Gahnia tristis*	Herb	Native			Y					-
梔子	*Gardenia jasminoides*	Shrub	Native			Y					-
毛果算盤子	*Glochidion eriocarpum*	Shrub	Native			Y					-
薑花	*Hedychium coronarium*	Perennial herb	Exotic	Y					Y		-
耳草屬	*Hedyotis* sp.	-	-			Y					-
大紅花	*Hibiscus rosa-sinensis*	Evergreen shrub	Exotic	Y							-
玫瑰茄 (洛神花)	*Hibiscus sabdariffa*	Subshrub	Exotic	Y							-
黃槿	*Hibiscus tiliaceus*	Evergreen shrub or tree	Native	Y	Y		Y	Y			-
繡球	*Hydrangea macrophylla*	Deciduous shrub	Exotic	Y							-
梅葉冬青	*Ilex asprella*	Shrub	Native			Y					-
大白茅	*Imperata cylindrica* var. *major*	Perennial herb	Native			Y					-
五爪金龍	*Ipomoea cairica*	Perennial twining herb	Exotic	Y		Y		Y	Y		-
海灘牽牛	*Ipomoea pes-caprae*	Perennial herb	Native		Y						-
龍船花	*Ixora chinensis*	Shrub	Native	Y							-
燈心草	*Juncus effusus*	Herb	Native					Y			-
龍柏	*Juniperus chinensis*	Tree	Exotic	Y							-
單穗水蜈蚣	*Kyllinga nemoralis*	Herb	Native	Y		Y			Y		-
大花紫薇	*Lagerstroemia speciosa*	Large tree	Exotic	Y							Cap. 96
馬纓丹	*Lantana camara*	Shrub	Exotic	Y		Y	Y				-
銀合歡	*Leucaena leucocephala*	Shrub	Exotic	Y			Y	Y			-
山指甲	*Ligustrum sinense*	Deciduous shrub or tree	Native	Y		Y					-
麥門冬	*Liriope spicata*	Perennial herb	Native			Y					-
荔枝	*Litchi chinensis*	Tree	Exotic	Y		Y					-
潺槁樹	*Litsea glutinosa*	Tree	Native	Y				Y		Y	-
豺皮樟	*Litsea rotundifolia* var. *oblongifolia*	Shrub	Native			Y					-
蒲葵	*Livistona chinensis*	Tree palm	Exotic	Y			Y				-
紅花檵木	*Loropetalum chinense* f. *rubrum*	Shrub	Exotic	Y							-
草龍	*Ludwigia hyssopifolia*	-	Native						Y	Y	-
毛草龍	*Ludwigia octovalvis*	Perennial herb	Native						Y		-
海金沙	*Lygodium japonicum*	Climbing herb	Native	Y		Y					-
血桐	*Macaranga tanarius* var. *tomentosa*	Tree	Native	Y	Y	Y		Y	Y		-
浙江潤楠	*Machilus chekiangensis*	Tree	Native			Y					-
白楸	*Mallotus paniculatus*	Tree or shrub	Native	Y		Y					-
垂花懸鈴花	*Malvaviscus arboreus* var. *penduliflorus*	Shrub	Exotic	Y							-

Appendix 7B - Species List

Chinese Name	Species Name	Growth Form	Origin	Habitat							Conservation Status & Remarks
				Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	
杧果	*Mangifera indica*	Evergreen tree	Exotic	Y							Data Deficient (IUCN Red List)
白千層	*Melaleuca cajuputi* subsp. *cumingiana*	Tree	Exotic	Y							-
毛蒌	*Melastoma sanguineum*	Shrub	Native	Y		Y	Y				-
苦楝	*Melia azedarach*	Deciduous tree	Exotic					Y			-
紅毛草	*Melinis repens*	Perennial herb	Exotic	Y							-
白蘭	*Michelia* x *alba*	Tree	Exotic			Y					-
布渣葉	*Microcos nervosa*	Shrub or small tree	Native	Y		Y					-
薇甘菊	*Mikania micrantha*	Perennial herb	Exotic	Y			Y	Y	Y	Y	-
含羞草	*Mimosa pudica*	Shrub	Exotic	Y							-
紫茉莉	*Mirabilis jalapa*	Herb	Exotic	Y			Y			Y	-
雞眼藤	*Morinda parvifolia*	Climbing shrub	Native			Y					-
九里香	*Murraya paniculata*	Small tree	Exotic	Y		Y					-
芭蕉屬	*Musa* sp.	-	-	Y							-
竹葉草	*Oplismenus compositus*	Herb	Native			Y					-
酢漿草	*Oxalis corniculata*	Perennial herb	Native	Y							-
金苞花	*Pachystachys lutea*	Subshrub	Exotic	Y							-
鋪地蜈蚣	*Palhinhaea cernua*	Herb	Native			Y					-
露兜樹	*Pandanus tectorius*	Shrub or small tree	Native					Y		Y	-
異葉爬山虎	*Parthenocissus dalzielii*	Woody vine	Exotic			Y					-
日本葵	*Phoenix roebelenii*	Small tree palm	Exotic	Y							-
蘆葦	*Phragmites australis*	Perennial herb	Native					Y			-
越南葉下珠	*Phyllanthus cochinchinensis*	Shrub	Native			Y					-
葉下珠	*Phyllanthus urinaria*	Annual herb	Native			Y					-
側柏	*Platycladus orientalis*	Tree	Exotic	Y							Near Threatened (IUCN Red List)
雞蛋花	*Plumeria rubra*	Tree	Exotic	Y							-
火炭母	*Polygonum chinense*	Herb	Native						Y		-
假臭草	*Praxelis clematidea*	Perennial herb	Exotic	Y			Y				-
九節	*Psychotria asiatica*	Shrub or tree	Native			Y					-
蔓九節	*Psychotria serpens*	Vine	Native			Y					-
半邊旗	*Pteris semipinnata*	Herb	Native			Y					-
蜈蚣草	*Pteris vittata*	Herb	Native			Y					-
葛屬	*Pueraria* sp.	-	-				Y				-
錦繡杜鵑	*Rhododendron pulchrum*	Shrub	Exotic	Y							Cap. 96
紅杜鵑	*Rhododendron simsii*	Shrub	Native	Y							Cap. 96
崗梳	*Rhodomyrtus tomentosa*	Tree	Native			Y					-
野漆樹	*Rhus succedanea*	Shrub or small tree	Native			Y					-
蓖麻	*Ricinus communis*	Shrub	Exotic	Y				Y			-
爆仗竹	*Russelia equisetiformis*	Herb	Exotic			Y					-
雀梅藤	*Sageretia thea*	Shrub	Native			Y					-
垂柳	*Salix babylonica*	Deciduous tree	Exotic						Y		-
虎尾蘭	*Sansevieria trifasciata*	Perennial herb	Exotic	Y		Y		Y	Y		-
烏桕	*Sapium sebiferum*	Tree	Native	Y							-
草海桐	*Scaevola taccada*	Shrub	Native				Y				-

Appendix 7B - Species List

Chinese Name	Species Name	Growth Form	Origin	Habitat							Conservation Status & Remarks
				Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	
傘樹	*Schefflera actinophylla*	-	Exotic	Y							-
鵝掌藤	*Schefflera arboricola*	Scandent shrub	Exotic	Y							-
鴨腳木	*Schefflera heptaphylla*	Tree	Native			Y					-
刺柊	*Scolopia chinensis*	Small tree or large shrub	Native					Y			-
廣東刺柊	*Scolopia saeva*	Small tree or large shrub	Native	Y							-
菝葜	*Smilax china*	Climbing shrub	Native			Y					-
少花龍葵	*Solanum americanum*	Herb	Exotic	Y							-
水茄	*Solanum torvum*	Shrub	Exotic			Y					-
火焰木	*Spathodea campanulata*	Tree	Exotic	Y							-
假蘋婆	*Sterculia lanceolata*	Semi-deciduous tree	Native	Y		Y					-
紫背竹芋	*Stromanthe sanguinea*	Perennial herb	Exotic	Y							-
羊角拗	*Strophanthus divaricatus*	Woody vine	Native			Y					-
合果芋	*Syngonium podophyllum*	Herb	Exotic	Y		Y					-
蒲桃	*Syzygium jambos*	Tree	Exotic	Y		Y					-
洋蒲桃	*Syzygium samarangense*	Tree	Exotic	Y							-
狗牙花	*Tabernaemontana divaricata*	Shrub	Exotic	Y							-
假桂烏口樹	*Tarenna attenuata*	Shrub or tree	Native			Y					-
欖仁樹	*Terminalia catappa*	Large tree	Exotic	Y	Y	Y					-
錫葉藤	*Tetracera asiatica*	Woody vine	Native			Y					-
巴西野牡丹	*Tibouchina semidecandra*	-	Exotic	Y							-
藍豬耳	*Torenia fournieri*	Herb	Exotic	Y							-
紫鴨跖草	*Tradescantia pallida*	-	Exotic	Y							-
山黃麻屬	*Trema* sp.	-	-			Y					-
三星果	*Tristellateia australasiae*	Woody vine	Exotic	Y							-
肖梵天花	*Urena lobata*	Erect subshrubby herb	Native	Y			Y				-
牡荊	*Vitex negundo* var. *cannabifolia*	Shrub or small tree	Native	Y							-
雙頭菊	*Wedelia biflora*	Perennial herb	Native							Y	-
三裂葉蟛蜞菊	*Wedelia trilobata*	Perennial herb	Exotic	Y	Y	Y	Y	Y		Y	-
黃鵪菜	*Youngia japonica*	Annual herb	Native	Y							-
簕欓花椒	*Zanthoxylum avicennae*	Tree	Native			Y					-
兩面針	*Zanthoxylum nitidum*	Woody vine	Native			Y					-
蔥蓮	*Zephyranthes candida*	Perennial herb	Exotic	Y							-
薑	*Zingiber officinale*	Perennial herb	Exotic	Y							-

* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum

Chinese Name	Common Name	Species Name	Habitat								Conservation status	Distribution	Rarity (AFCD Assessment)	Remarks
			Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	Marine Water				
Terrestrial Mammal														
黃牛	Domestic Ox	*Bos taurus*	Y	Y							-	Widely distributed in countryside areas throughout Hong Kong, except for Hong Kong Island and northwestern New Territories	Common	Juveniles were recorded on Sandy Shore; Scats were found in Developed Area
水牛	Domestic Water Buffalo	*Bubalus bubalis*					Y				-	Found in Kam Tin, and the southern part of Lantau Island	Uncommon	-
* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum														
Avifauna														
八哥	Crested Myna	*Acridotheres cristatellus*	Y	Y	Y		Y		Y		-	Widely distributed in Hong Kong	Common resident	Immature individuals were recorded in Developed Area
叉尾太陽鳥	Fork-tailed Sunbird	*Aethopyga christinae*	Y		Y						-	Widely distributed in Hong Kong	Common resident	-
普通翠鳥	Common Kingfisher	*Alcedo atthis*							Y		-	Widely distributed in wetland habitat throughout Hong Kong	Common passage migrant and winter visitor	-
白胸苦惡鳥	White-breasted Waterhen	*Amaurornis phoenicurus*							Y		-	Widely distributed in wetland throughout Hong Kong	Common resident	Nest was found in *Hibiscus tiliaceus* Woodland adjacent to Wang Tong River
小白腰雨燕	House Swift	*Apus nipalensis*	Y				Y				-	Widely distributed in Hong Kong	Abundant spring migrant and locally common resident	-
大白鷺	Great Egret	*Ardea alba*								Y	Regional Concern (Fellowes et al. (2002))	Widely distributed in Hong Kong	Common resident and winter visitor	-
蒼鷺	Grey Heron	*Ardea cinerea*								Y	Potential Regional Concern (Fellowes et al. (2002))	Found in Deep Bay area, Starling Inlet, Kowloon Park, Cape D'Aguilar	Common winter visitor	-
牛背鷺	Eastern Cattle Egret	*Bubulcus coromandus*					Y				Local Concern (Fellowes et al. (2002))	Widely distributed in Hong Kong	Resident and common passage migrant	-
褐翅鴉鵑	Greater Coucal	*Centropus sinensis*			Y						Vulnerable (China Red Data Book Status)	Widely distributed in Hong Kong	Common resident	-
鵲鴝	Oriental Magpie Robin	*Copsychus saularis*	Y	Y	Y		Y		Y		-	Widely distributed in Hong Kong	Abundant resident	Immature individuals were recorded on Sandy Shore and Wang Tong River
大嘴烏鴉	Large-billed Crow	*Corvus macrorhynchos*		Y	Y						-	Widely distributed in Hong Kong	Common resident	-
黑卷尾	Black Drongo	*Dicrurus macrocercus*			Y		Y				-	Widely distributed in open area throughout Hong Kong	Common summer visitor	-
小白鷺	Little Egret	*Egretta garzetta*		Y			Y		Y	Y	Regional Concern (Fellowes et al. (2002))	Widely distributed in coastal area throughout Hong Kong	Common resident	-
岩鷺	Pacific Reef Heron	*Egretta sacra*		Y						Y	Rare (China Red Data Book Status); Local Concern (Fellowes et al. (2002))	Widely distributed in coastal area throughout Hong Kong	Uncommon resident	-

Appendix 7B - Species List

Chinese Name	Common Name	Species Name	Habitat								Conservation status	Distribution	Rarity (AFCD Assessment)	Remarks
			Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	Marine Water				
黑臉噪鶥	Masked Laughingthrush	*Garrulax perspicillatus*	Y		Y						-	Widely distributed in shrubland throughout Hong Kong	Abundant resident	-
黑領椋鳥	Black-collared Starling	*Gracupica nigricollis*	Y				Y		Y		-	Widely distributed in Hong Kong	Common resident	Nest was found on a *Casuarina equisetifolia* in Developed Area
白胸翡翠	White-throated Kingfisher	*Halcyon smyrnensis*					Y		Y		Local Concern (Fellowes et al. (2002))	Widely distributed in coastal areas throughout Hong Kong	Common resident	-
鷹鵑	Large Hawk Cuckoo	*Hierococcyx sparverioides*	Y									Widely distributed in woodland throughout in Hong Kong	Common passage migrant and summer visitor	-
家燕	Barn Swallow	*Hirundo rustica*	Y				Y		Y		-	Widely distributed in Hong Kong	Abundant passage migrant and summer visitor	Nest was found on man-made wall in Developed Area; Immature individuals were recorded in Developed Area
白腰文鳥	White-rumped Munia	*Lonchura striata*					Y				-	Widely distributed in Hong Kong	Common resident	-
黑鳶	Black Kite	*Milvus migrans*								Y	Cap. 586; Regional Concern (Fellowes et al. (2002))	Widely distributed in Hong Kong	Common resident and winter visitor	-
白鶺鴒	White Wagtail	*Motacilla alba*		Y			Y		Y		-	Widely distributed in Hong Kong	Common passage migrant and winter visitor	-
灰鶺鴒	Grey Wagtail	*Motacilla cinerea*	Y				Y		Y		-	Widely distributed in hill streams throughout Hong Kong	Common passage migrant and winter visitor	-
紫嘯鶇	Blue Whistling Thrush	*Myophonus caeruleus*			Y						-	Widely distributed in shrubland and woodland throughout Hong Kong	Common resident	-
夜鷺	Black-crowned Night Heron	*Nycticorax nycticorax*					Y				Local Concern (Fellowes et al. (2002))	Widely distributed in Hong Kong	Common resident and winter visitor	-
長尾縫葉鶯	Common Tailorbird	*Orthotomus sutorius*	Y		Y		Y				-	Widely distributed in Hong Kong	Common resident	-
大山雀	Cinereous Tit	*Parus cinereus*			Y				Y		-	Widely distributed in Hong Kong	Common resident	-
樹麻雀	Eurasian Tree Sparrow	*Passer montanus*	Y	Y		Y					-	Widely distributed in Hong Kong	Abundant resident	Immature individuals were recorded in Developed Area
北紅尾鴝	Daurian Redstart	*Phoenicurus auroreus*	Y								-	Widely distributed in Hong Kong	Common winter visitor	-
黃眉柳鶯	Yellow-browed Warbler	*Phylloscopus inornatus*	Y								-	Widely distributed in woodland throughout Hong Kong	Common winter visitor and spring migrant	-
喜鵲	Eurasian Magpie	*Pica pica*	Y				Y				-	Widely distributed in Hong Kong	Common resident	-
灰頭鷦鶯	Yellow-bellied Prinia	*Prinia flaviventris*	Y				Y				-	Widely distributed in Hong Kong	Common resident	-
褐頭鷦鶯	Plain Prinia	*Prinia inornata*						Y			-	Widely distributed in grassland throughout Hong Kong	Common resident	-
紅耳鵯	Red-whiskered Bulbul	*Pycnonotus jocosus*	Y		Y		Y		Y		-	Widely distributed in Hong Kong	Abundant resident	-
白頭鵯	Chinese Bulbul	*Pycnonotus sinensis*	Y		Y		Y		Y		-	Widely distributed in Hong Kong	Abundant resident	-
珠頸斑鳩	Spotted Dove	*Spilopelia chinensis*	Y	Y	Y				Y		-	Widely distributed in Hong Kong	Abundant resident	-
暗綠繡眼鳥	Japanese White-eye	*Zosterops japonicus*	Y		Y						-	Widely distributed in Hong Kong	Abundant resident	-

* All wild birds are protected under the Wild Animals Protection Ordinance (Cap. 170)

** Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum

Chinese Name	Common Name	Species Name	Habitat								Conservation status	Distribution	Rarity (AFCD Assessment)	Remarks
			Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	Marine Water				
Herpetofauna														
變色樹蜥	Changeable Lizard	*Calotes versicolor*	Y								-	Widely distributed throughout Hong Kong	-	Immature imdividuals were recorded in Developed Area
原尾蜥虎	Bowring's Gecko	*Hemidactylus bowringii*	Y								-	Distributed throughout Hong Kong	-	-
沼蛙	Gunther's Frog	*Hylarana guentheri*	Y				Y				-	Widely distributed throughout Hong Kong	-	-
* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum														
Butterfly														
蛇目褐蜆蝶	Plum Judy	*Abisara echerius echerius*	Y		Y						-	Widely distributed throughout Hong Kong	Very Common	-
鈕灰蝶	Common Hedge Blue	*Acytolepis puspa gisca*					Y				-	Widely distributed throughout Hong Kong	Common	-
波蛺蝶	Angled Castor	*Ariadne ariadne alterna*	Y								-	Widely distributed throughout Hong Kong	Common	Laid eggs on *Ricinus communis* in Developed Area; Larave were found on *Ricinus communis* in Developed Area;
秕弄蝶	Formosan Swift	*Borbo cinnara*			Y						-	Widely distributed in open grassland and abandoned field throughout Hong Kong	Common	-
遷粉蝶	Lemon Emigrant	*Catopsilia pomona pomona*	Y								-	Widely distributed throughout Hong Kong	Common	-
斑鳳蝶	Common Mime	*Chilasa clytia clytia*			Y						-	Widely distributed throughout Hong Kong	Common	-
黃襟蛺蝶	Rustic	*Cupha erymanthis erymanthis*			Y						-	Widely distributed throughout Hong Kong	Very Common	-
金斑蝶	Plain Tiger	*Danaus chrysippus chrysippus*	Y								-	Lung Kwu Tan, Tong Fuk, Tai Ho, Tung Chung, Pak Tam Chung	Uncommon	-
翠袖鋸眼蝶	Common Palmfly	*Elymnias hypermnestra hainana*	Y								-	Widely distributed in coast and urban parks throughout Hong Kong	Common	-
異型紫斑蝶	Striped Blue Crow	*Euploea mulciber mulciber*			Y						-	Tai Po Kau, Lung Kwu Tan, Cloudy Hill, Ho Chung, Wong Lung Hang, Shing Mun Reservoir, Pak Sin Leng, Plover Cove	Uncommon	-
寬邊黃粉蝶	Common Grass Yellow	*Eurema hecabe hecabe*	Y		Y						-	Widely distributed throughout Hong Kong	Very Common	-
串珠環蝶	Large Faun	*Faunis eumeus eumeus*	Y		Y						-	Widely distributed in woodland throughout Hong Kong	Common	-
統帥青鳳蝶	Tailed Jay	*Graphium agamemnon agamemnon*			Y						-	Widely distributed throughout Hong Kong	Common	-
鶴頂粉蝶	Great Orange Tip	*Hebomoia glaucippe glaucippe*	Y								-	Widely distributed throughout Hong Kong	Common	-
斜斑彩灰蝶	Purple Sapphire	*Heliophorus epicles phoenicoparyphus*							Y		-	Widely distributed throughout Hong Kong	Common	-
黑脈蛺蝶	Red Ring Skirt	*Hestina assimilis assimilis*	Y								-	Widely distributed in woodland throughout Hong Kong	Common	-

Chinese Name	Common Name	Species Name	Habitat								Conservation status	Distribution	Rarity (AFCD Assessment)	Remarks
			Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	Marine Water				
幻紫斑蛺蝶	Great Egg-fly	*Hypolimnas bolina kezia*	Y								-	Widely distributed throughout Hong Kong	Common	-
素雅灰蝶	Metallic Cerulean	*Jamides alecto alocina*			Y			Y			-	Victoria Peak, Fung Yuen, Chuen Lung, Mui Wo	Very Rare	-
亮灰蝶	Long-tailed Blue	*Lampides boeticus*					Y	Y			-	Widely distributed in abandoned field throughout Hong Kong	Common	-
瑪弄蝶	Common Redeye	*Matapa aria*	Y								-	Widely distributed in bamboo woodland throughout Hong Kong	Uncommon	-
小眉眼蝶	Dark Brand Bush Brown	*Mycalesis mineus mineus*	Y		Y						-	Widely distributed in woodland throughout Hong Kong	Very Common	-
中環蛺蝶	Common Sailer	*Neptis hylas hylas*	Y								-	Widely distributed throughout Hong Kong	Very Common	-
玉斑鳳蝶	Red Helen	*Papilio helenus helenus*	Y								-	Widely distributed throughout Hong Kong	Very Common	-
玉帶鳳蝶	Common Mormon	*Papilio polytes polytes*	Y		Y				Y		-	Widely distributed throughout Hong Kong	Very Common	-
藍鳳蝶	Spangle	*Papilio protenor protenor*	Y		Y						-	Widely distributed throughout Hong Kong	Very Common	-
殘鍔線蛺蝶	Five-dot Sergeant	*Parathyma sulpitia*			Y						-	Widely distributed in woodland area throughout Hong Kong	Common	-
柱菲蛺蝶	Short-banded Sailer	*Phaedyma columella columella*			Y						-	Widely distributed in woodland area throughout Hong Kong	Common	-
東方菜粉蝶	Indian Cabbage White	*Pieris canidia canidia*	Y						Y		-	Widely distributed throughout Hong Kong	Very Common	-
酢醬灰蝶	Pale Grass Blue	*Pseudozizeeria maha serica*	Y					Y			-	Widely distributed throughout Hong Kong	Very Common	-
毛眼灰蝶	Lesser Grass Blue	*Zizina otis otis*							Y		-	Widely distributed throughout Hong Kong	Common	-
* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum														
Odonata														
黃狹扇蟌	Yellow Featherlegs	*Copera marginipes*							Y		-	Widely distribute in streams throughout Hong Kong	Abundant	-
紋藍小蜻	Blue Percher	*Diplacodes trivialis*	Y				Y		Y		-	Widespread, especially in late summer, when it can be found almost everywhere in Hong Kong	Abundant	-
華麗灰蜻	Red-faced Skimmer	*Orthetrum chrysis*						Y	Y		-	Widely distribute in pools and marshy areas adjacent to flowing streams throughout Hong Kong	Abundant	-
黑尾灰蜻	Common Blue Skimmer	*Orthetrum glaucum*	Y								-	Widely distributed in streams, conduits, drainage channels, seepages and road gutters throughout Hong Kong	Abundant	-
赤褐灰蜻	Common Red Skimmer	*Orthetrum pruinosum neglectum*							Y		-	Widely distribute in slow streams, ponds, rain puddles and irrigation conduits	Abundant	-
狹腹灰蜻	Green Skimmer	*Orthetrum sabina sabina*					Y	Y			-	Widely distribute in all wetland habitats throughout Hong Kong	Abundant	-
黃蜻	Wandering Glider	*Pantala flavescens*	Y				Y				-	Widely distribute in all wetland habitats throughout Hong Kong	Abundant	-

Appendix 7B - Species List

Chinese Name	Common Name	Species Name	Habitat								Conservation status	Distribution	Rarity (AFCD Assessment)	Remarks
			Developed Area	Sandy Shore	Woodland	Shrubland / Grassland	Marsh	Abandoned Agricultural Land	Watercourse	Marine Water				
曉褐蜻	Crimson Dropwing	*Trithemis aurora*							Y		-	Widely distribute in marshes, ponds, streams and ornamental ponds throughout Hong Kong	Abundant	-
* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum														

Appendix 7B - Species List

Chinese Name	Common Name	Species Name	Relative Abundance	Conservation status	Distribution	Rarity	Remarks
Fish							
黃鰭棘鯛 (黃腳鱲)	Yellowfin seabream	*Acanthopagrus latus*	+	-	It is a popular food fish and is also a major mariculture fish in Hong Kong	Common	-
眶棘雙邊魚 (透明梳鱗)	Glassy perchlet	*Ambassis gymnocephalus*	+	-	Widespread in estuaries and coastal waters	Common	-
月鱧 (山斑)	Small snakehead	*Channa asiatica*	+	Local Concern (Fellowes et al. (2002))	Uncommon in the wild. Records from a few streams in North district and on Lantau Island. The fish is also cultivated in some fish farms and are available from fish market	Uncommon	-
賴氏蜂巢鰕虎魚	Indo-Pacific tropical sand goby	*Favonigobius reichei*	+	Near Threatened (IUCN Red List)	Found in intertidal waters throughout Hong Kong	Common	-
鰕虎魚科	-	Gobiidae	++	-	-	-	Immature individuals found in Wang Tong
紫紅笛鯛 (紅鮸)	Mangrove snapper	*Lutjanus argentimaculatus*	+	-	Common, especially in Sai Kung District. It is a popular food fish and is an important mariculture species in Hong Kong	Common	Immature individuals found in Wang Tong River
鯔 (烏頭)	Grey mullet	*Mugil cephalus*	+++	-	Widespread in estuaries and marine environment in Hong Kong	Common	Immature individuals found in Wang Tong
金山鯽, 福壽魚	Tilapia	*Oreochromis* spp.	++	-	-	-	-
異鱲	Predaceous chub	*Parazacco spilurus*	+	Vulnerable (China Red Data Book Status); Data Deficient (IUCN Red List)	A widespread species occurring in most unpolluted hill streams in both upper and lower courses	Common	Immature individual found in Wang Tong
廣東彈塗魚	Common mudskipper	*Periophthalmus modestus*	+++	-	It is the commonest mudskipper in Hong Kong and almost found in all mudflats and estuaries	Common	-
金鼓	Spotted scat	*Scatophagus argus*	++	-	Frequently recorded from estuaries and coastal areas. It is also a popular food fish	Common	Immature individuals found in Wang Tong
長鰭籃子魚 (泥鯭)	White-spotted rabbit fish	*Siganus canaliculatus*	+++	-	Widespread in local coastal waters and estuaries	Common	Immature individuals found in Wang Tong
細鱗鰆 (釘公)	Jarbua terapon	*Terapon jarbua*	+++	-	Widespread in estuaries and coastal regions of Hong Kong	Common	Immature individuals found in Wang Tong

* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum

** Relative Abundance: + = Occasional (< 5 recorded individuals); ++ = Common (5-20 recorded individuals); +++ = Abundant (> 20 recorded individuals)

Appendix 7B - Species List

Chinese Name	Common Name	Species Name	Habitat			Conservation status	Distribution	Rarity	Remarks
			Sandy Shore	Marsh	Watercourse				
Mollusca									
簾蛤	False Cockles	*Anomalocardia* sp.	Y			-	-	-	-
縱帶灘棲螺	-	*Batillaria zonalis*	Y			-	-	-	-
文蛤	Asiatic Hard Clam	*Meretrix meretrix*	Y			-	-	-	-
* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum									

Chinese Name	Common Name	Species Name	Habitat			Conservation status	Distribution	Rarity	Remarks
			Sandy Shore	Marsh	Watercourse				
Crustacean									
海蟑螂	Sea slater	*Ligia exotica*			Y	-	-	-	-
角眼沙蟹	-	*Ocypode ceratophthalma*	Y			-	-	-	Immature individuals were found on Sandy
粗腿綠眼招潮蟹	-	*Uca crassipes*		Y		-	-	-	-
* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum									

Appendix 7C
Photographic Record of Species with Conservation Concern

Aquilaria sinensis
(Taken in Feb 2015)

Ardea alba
(Taken in Nov 2014)

Ardea cinerea
(Taken in Feb 2015)

Bubulcus coromandus
(Taken in Nov 2014)

Appendix 7C Photographic Record of Species with Conservation Concern

Egretta garzetta
(Taken in Feb 2015)

Egretta sacra
(Taken in Aug 2014)

Halcyon smyrnensis
(Taken in Aug 2014)

Jamides alecto alocina
(Taken in Nov 2014)

Appendix 7C Photographic Record of Species with Conservation Concern

Channa asiatica
(Taken in Aug 2014)

Parazacco spilurus
(Taken in Oct 2014)

Appendix 7C Photographic Record of Species with Conservation Concern

Appendix 7D
Photographic Record of the Project Site

(Taken in June 2014, facing the northern bank)

(Taken in Sep 2014, looking towards Wang Tong River)
(left side = southern bank, right side = northern bank)

(Taken in Oct 2014, facing the southern bank)

(Taken in Dec 2013, facing the northern bank)

Appendix 7D Photographic Record of the Project Site

Appendix 7E
Distribution of Marine Mammals

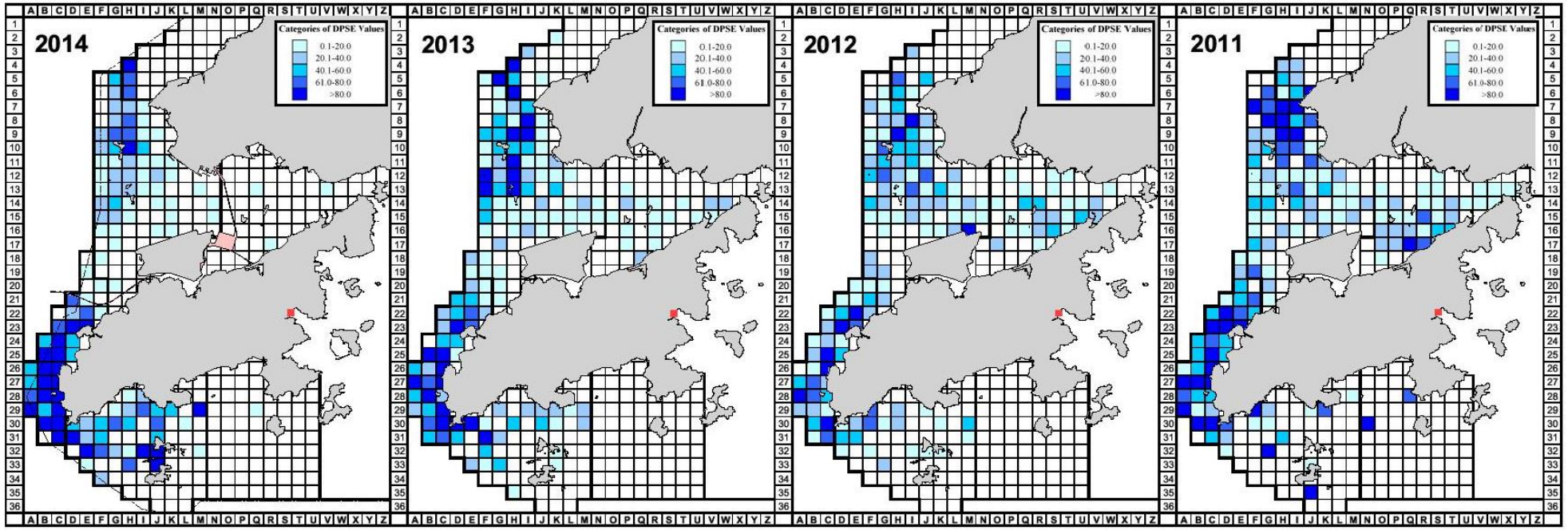


Figure 1: Density of Chinese White Dolphin Around Lantau Island in 2011-2014

*Figure retrieved from Monitoring of Marine Mammals in Hong Kong Waters Final Report (2014-2015)
**** Red square = Project Site**

Appendix 7E Distribution of Marine Mammals

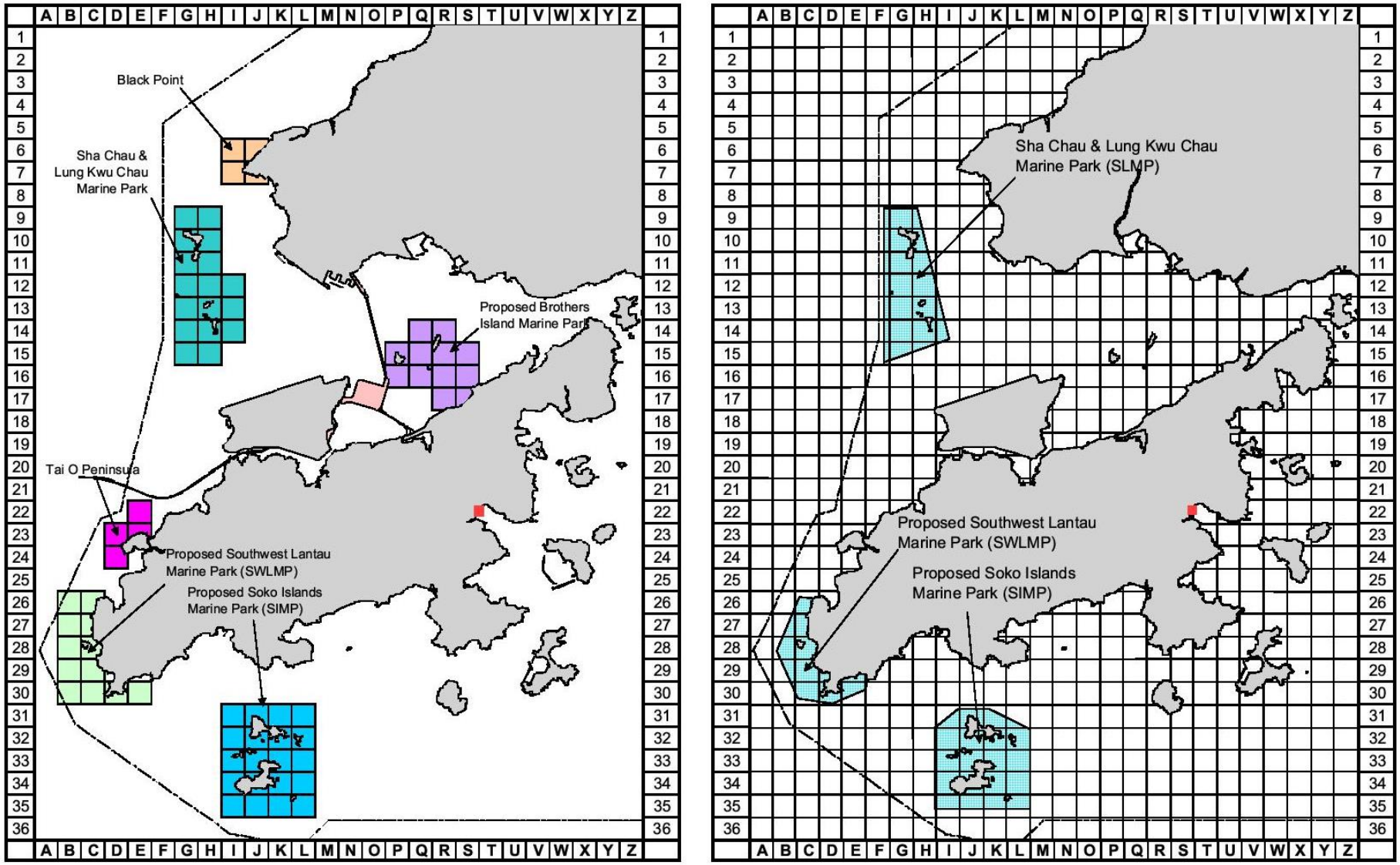


Figure 2: Key Habitats for Chinese White Dolphins

*Figure retrieved from Monitoring of Marine Mammals in Hong Kong Waters Final Report (2014-2015)

**** Red square = Project Site**

Appendix 7E Distribution of Marine Mammals

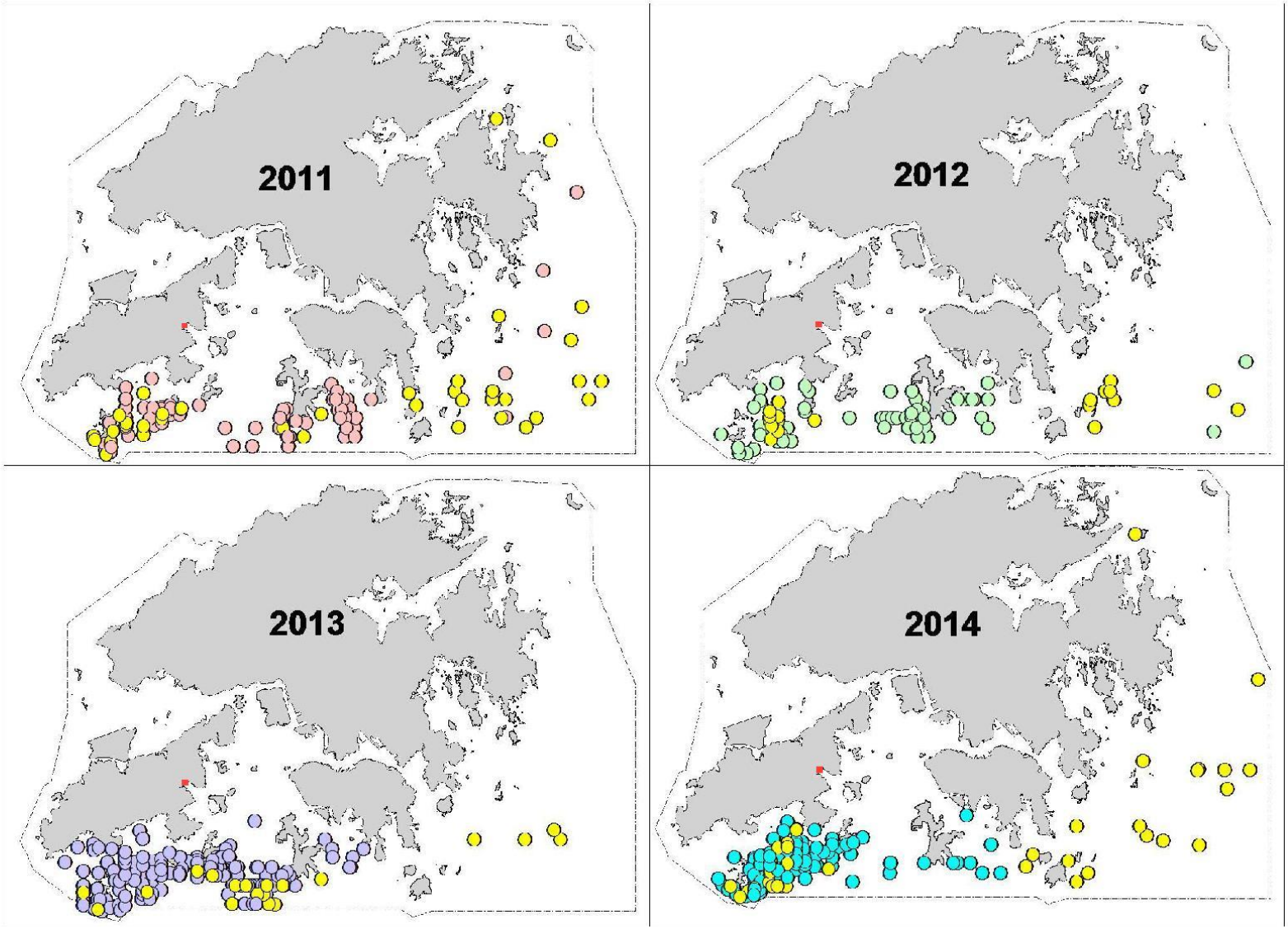


Figure 3: Finless Porpoise Distribution in Hong Kong (2011 – 2014)

*Figure retrieved from Monitoring of Marine Mammals in Hong Kong Waters Final Report (2014-2015)
****Red Square = Project Site**

Appendix 7E Distribution of Marine Mammals

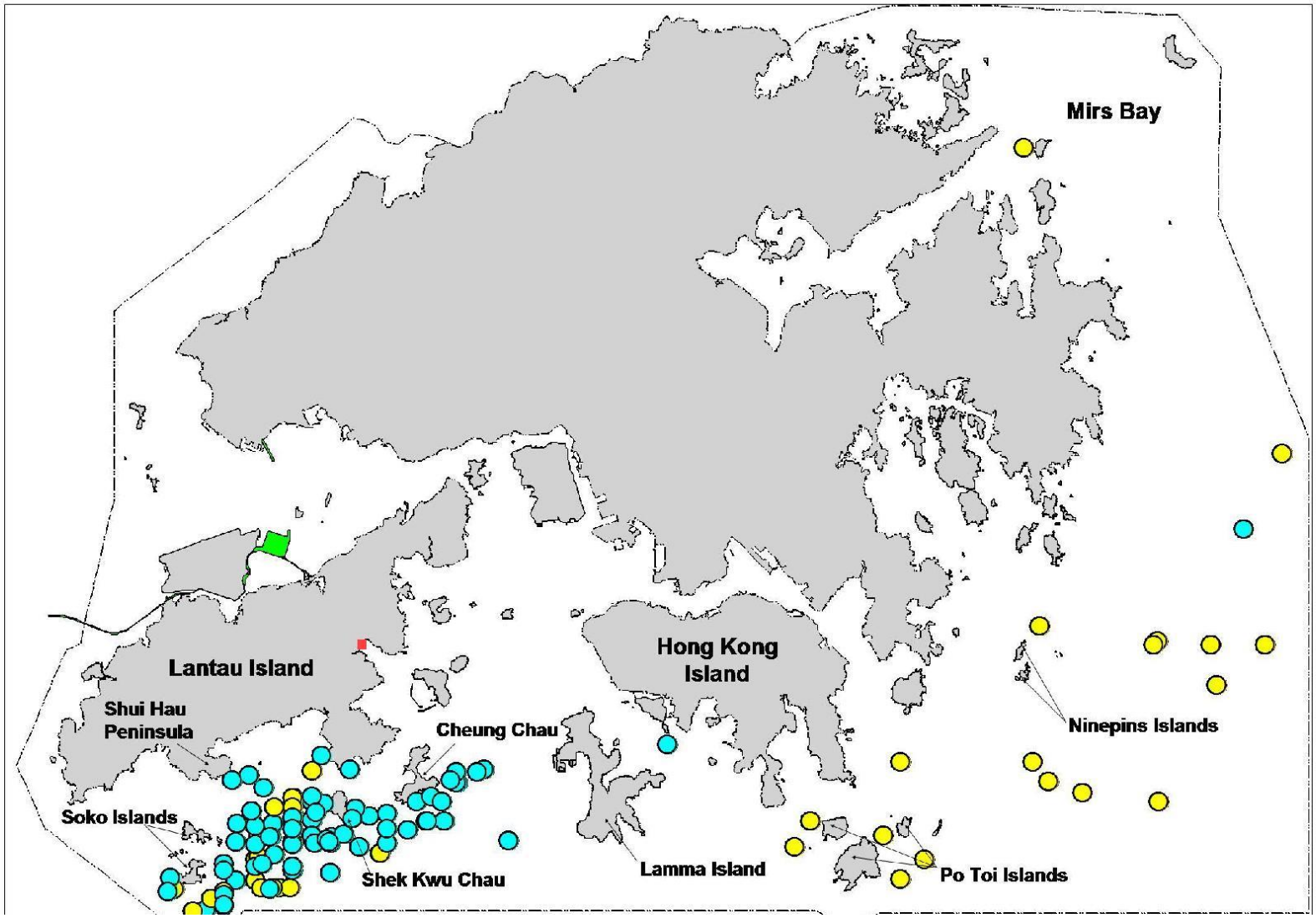
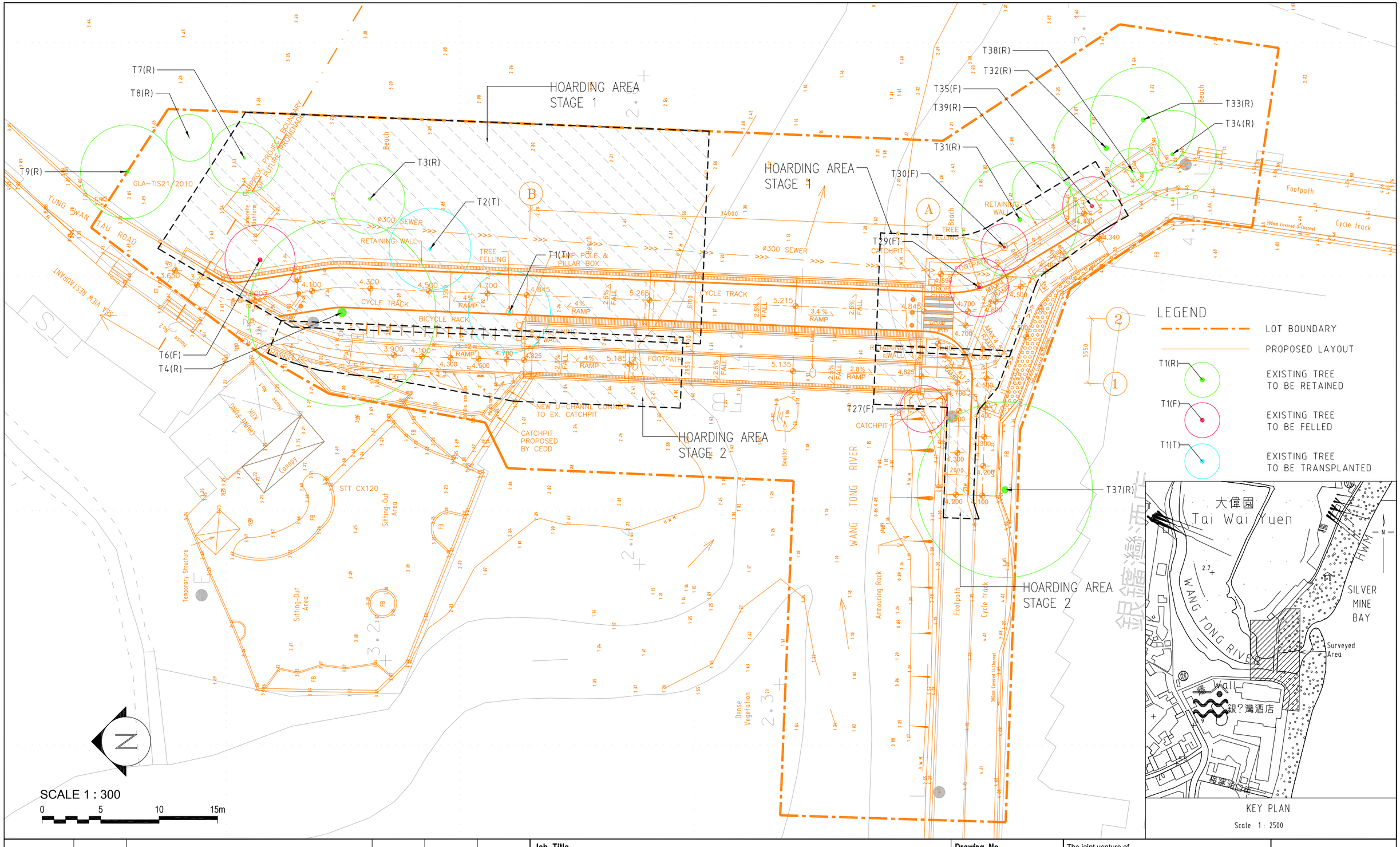


Figure 4: Finless Porpoise Distribution in Hong Kong (AFCD surveys in April 2014 – March 2015)

*Figure retrieved from Monitoring of Marine Mammals in Hong Kong Waters Final Report (2014-2015)
****Red Square = Project Site**

Appendix 7E Distribution of Marine Mammals

Appendix 8A
Tree Survey Results and Recommendations



Amendment No.	Date	Description	Drawn by	Checked by	Approved by
B	DEC 2015	RECOMMENDATION REVISED FOR TREE NO. T4	AC	TO	TO
A	DEC 2015	HOARDING AREAS ADDED	AC	TO	TO

Job Title
AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI MO

Drawing Title
TREE RECOMMENDATION PLAN

Drawn by	Checked by	Approved by	Date
AC	PW	TO	FEB2015

Drawing No. MLAL1-TS02

Scale 1:300

Job. No. MLAL1

The joint venture of
Maurice Lee & Associates Ltd. and Cinotech Consultants Ltd.

Maurice Lee & Associates Ltd.

CINOTECH 漢臻 consultants limited

雅邦 Limited

I:\MLAL1\DWG-GA\MLAL1_TS02.dwg, Layout, 28/Dec/2015 10:48:22, Amy, PostScript Custom Page Size, 1:1

T7(R)
T8(R)
T9(R)
6 NOS. TER.CAT.
T3(R)
T2(T)
T1(T)
T4(R)
T38(R)
T32(R)
T39(R)
T31(R)
T33(R)
T34(R)
T37(R)
GLA-TIS21/2010
TUNG WAN TAU ROAD
SEA VIEW RESTAURANT
CHANNEL
CHAMBER
PROJECT BOUNDARY OF FUTURE ADJACENT
Concrete Platform
ø300 SEWER
RETAINING WALL
TREE FELLING
LAMP POLE & PILLAR BOX
CYCLE TRACK
BICYCLE RACK
FOOTPATH
RETAINING WALL
NEW U-CHANNL CONNECT TO EX. CATCHPIT
CATCHPIT PROPOSED BY CEDD
CATCHPIT
FOOTPATH
DROP KERB
MAX 4% RAMP
Beach
RIVER
WANG TONG
Armouring Rock
Footpath
Cycle track
30mm Covered U-Channel
Boulder
Dense Vegetation
STT CX120
Sitting-Out Area
Temporary Structure
Canopy
Footpath
Cycle track
RETAINING WALL
TREE FELLING
CATCHPIT
DROP KERB
MAX 4% RAMP
Beach
Wall
Surveyed Area
SILVER MINE BAY
大偉園
Tai Wai Yuen
WANG TONG RIVER
HWM
N

LEGEND

- LOT BOUNDARY
- PROPOSED LAYOUT
- T1(R) EXISTING TREE TO BE RETAINED
- T1(T) TRANSPLANTED TREE
- PROPOSED TREE

KEY PLAN
Scale 1 : 2500

N

SCALE 1 : 300
0 5 10 15m

ABB.	SCIENTIFIC NAME	CHINESE NAME	SIZE	MIN. DBH (mm)	HT. X SPR. (mm)	LIVE CROWN RATIO	SPACING	QTY.
TER.CAT.	TERMINALTA CATAPPA	欖 仁 樹	HEAVY STANDARD	75	5000x4000	50	MIN. 5m	6
							TOTAL:	6

Amendment No.	Date	Description	Drawn by	Checked by	Approved by
A	DEC 2015	RECOMMENDATION REVISED FOR TREE NO. T4	AC	TO	TO

Job Title
AGREEMENT NO. CE 14/2014(HY) NEW WANG TONG RIVER BRIDGE, MUI MO

Drawing Title
COMPENSATORY PLANTING PLAN

Drawing No. MLAL1-CP01

Scale 1:300

Drawn by	Checked by	Approved by	Date	Job. No.
AC	PW	TO	MAR2015	MLAL1

The joint venture of
Maurice Lee & Associates Ltd. and Cinotech Consultants Ltd.

Maurice Lee & Associates Ltd.
CINOTECH 漢蘇 consultants limited
雅邦 Limited

Tree Assessment Schedule

Project Title: Agreement No. CE 14/2-14 (HY) New Wang Tong River Bridge, Mui Wo

Date of Tree Si 15/09/2014 and 16/02/2015 Surveyed by: Andre Le Claire & Pure Wong

Tree No.	Species		Measurements			Amenity value	Form	Health condition	Structural condition	Suitability for transplanting		Conservation status	Recommendation	Justification	Department to provide expert advice to LandsD	Additional Remarks
	Scientific name	Chinese name	height (m)	DBH (mm)	crown spread (m)	(good/fair/poor)				(high/medium/low)	Remarks		(retain/transplant/fell)			
T1	*Terminalia catappa*	欖仁樹	9.0	216.5	7.0	Fair	Good	Good	Fair	Medium	Located in sand limiting rootball formation; only bare root transplanting feasible	None	Transplant	Impacted by northern bridge ramp; Good Form & Health with Medium suitability for Transplanting	LCSD	Slightly over-topped tree.
T2	*Terminalia catappa*	欖仁樹	8.0	248.3	7.0	Fair	Fair	Good	Fair	Medium	Located in sand limiting rootball formation; only bare root transplanting feasible	None	Transplant	Impacted by northern bridge ramp footing excavations; Fair Form, Good Health with Medium suitability for Transplanting	LCSD	Over-topped tree.
T3	*Terminalia catappa*	欖仁樹	9.0	248.3	6.0	Fair	Fair	Good	Fair	Medium	Located in sand limiting rootball formation; only bare root transplanting feasible	None	Retain		LCSD	Form not typical due to previous failure.
T4	*Casuarina equisetifolia*	木麻黃	14.0	732.1	16.0	Good	Good	Fair	Good	Low	Mature specimen	None	Retain		LCSD	Quality specimen with a strong central leader. Good basal flare.
T6	*Casuarina equisetifolia*	木麻黃	11.0	366.1	6.0	Fair	Fair	Fair	Fair	Low	Evidence of stress	None	Fell	Impacted by northern bridge ramp footing excavations; only Fair Form, Health & Amenity Value and Low transplanting suitability	LCSD	Minor cavity, epicormic developments from burls.
T7	*Terminalia catappa*	欖仁樹	9.0	229.2	7.0	Fair	Fair	Good	Fair	Medium	Located in sand limiting rootball formation; only bare root transplanting feasible	None	Retain		LCSD	Trunk wound.
T8	*Terminalia catappa*	欖仁樹	5.0	95.5	4.0	Poor	Fair	Fair	Fair	Medium	Juvenile specimen	None	Retain		LCSD	No basal flare due to guying to the tree surround.
T9	*Ficus microcarpa*	榕樹	5.0	299.2	8.0	Fair	Fair	Good	Poor	Medium	Located in sand. Limitation	None	Retain		LCSD	Very broad specimen. Over-extended laterals. Medium sized cavity on lower main trunk with internal decay with wound wood development.
T27	*Macaranga tanarius var. tomentosa*	血桐	2.0	95.5	4.0	Poor	Poor	Good	Poor	Low	Growing on granite revetment	None	Fell	Impacted by existing bridge demolition and reconstruction works; impractical to transplant due to root environment in granite revetment	LCSD	Juvenile specimen.
T29	*Macaranga tanarius var. tomentosa*	血桐	5.0	283.3	5.0	Poor	Fair	Good	Poor	Low	Trunk leaning	None	Fell	Impacted by southern bridge ramp construction; trunk wounds and leaning form plus Low transplanting suitability.	LCSD	Significant trunk wound and basal damage.
T30	*Macaranga tanarius var. tomentosa*	血桐	4.5	213.3	4.0	Poor	Poor	Fair	Fair	Low	Numerous wounds	None	Fell	Impacted by southern bridge ramp construction; Poor Amenity Value & Form plus Low transplanting suitability.	LCSD	Asymmetrical tree: Incomplete union.
T31	*Casuarina equisetifolia*	木麻黃	12.0	382.0	10.0	Fair	Fair	Fair	Fair	Low	Low crown vitality	None	Retain		LCSD	Some cracks, wounds and pruning cuts observed although these are not considered threatening to the viability of the tree.
T32	*Hibiscus tiliaceus*	黃槿	8.0	423.4	9.0	Fair	Fair	Good	Fair	Low	Irregular specimen	None	Retain		LCSD	Poor previous pruning.
T33	*Hibiscus tiliaceus*	黃槿	8.0	375.6	9.0	Fair	Fair	Good	Fair	Low	Irregular specimen	None	Retain		LCSD	Poor previous pruning.
T34	*Casuarina equisetifolia*	木麻黃	12.0	292.8	7.5	Fair	Fair	Poor	Poor	Low	Wall impediment	None	Retain		LCSD	Numerous wounds created by pruning and previous failures.
T35	*Casuarina equisetifolia*	木麻黃	12.0	283.3	5.0	Fair	Fair	Poor	Poor	Low	Located in a paved tree surround	None	Fell	Impacted by southern bridge ramp construction; Poor Health & Structure plus Low transplanting suitability.	LCSD	Poor previous pruning, low foliage density.
T37	*Celtis sinensis*	朴樹	12.0	557.0	15.0	Fair	Good	Good	Good	Low	Growing location confined by wall & paving	None	Retain		LCSD	Quality specimen tree.
T38	*Ficus microcarpa*	榕樹	4.0	203.7	4.0	Poor	Poor	Poor	Poor	Low	Wall tree	None	Retain		LCSD	Rooting environment is shared between the planting pit and the beach wall. Severely asymmetrical.
T39	*Terminalia catappa*	欖仁樹	6.5	101.9	5.0	Poor	Fair	Good	Fair	Medium	Juvenile specimen	None	Retain		LCSD	Insect nest present. Trunk wounds observed.

Photo No. 1 | T1 (Transplant)

Photo No. 2 | T1 (Transplant)

Photo No. 3 | T2 (Transplant)

Photo No. 4 | T2 (Transplant)

Photo No. 5 | T3 (Retain)

Photo No. 6 | T3 (Retain)

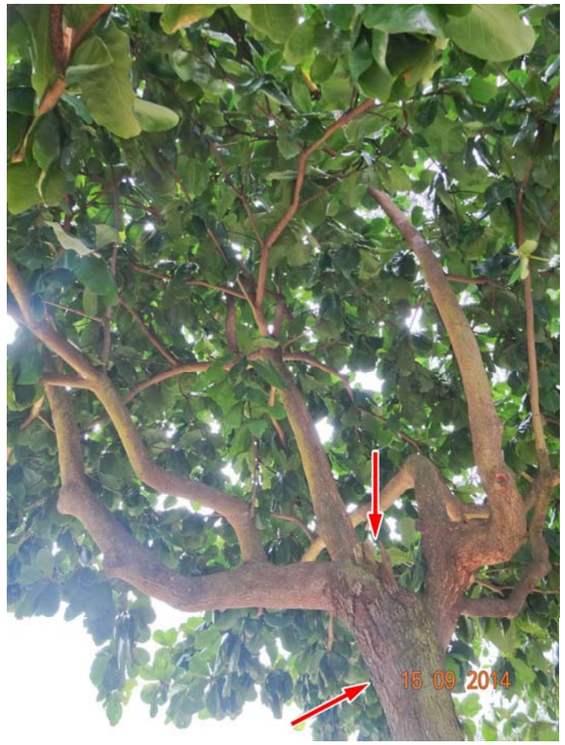


Photo No. 7 | T3 (Retain)

Photo No. 8 | T4 (Retain)

AGREEMENT NO. CE 14/2-14 (HY) NEW WANG TONG RIVER BRIDGE, MUI WO
TREE SURVEY PHOTOGRAPHS

Photo No. 9 | T4 (Retain)

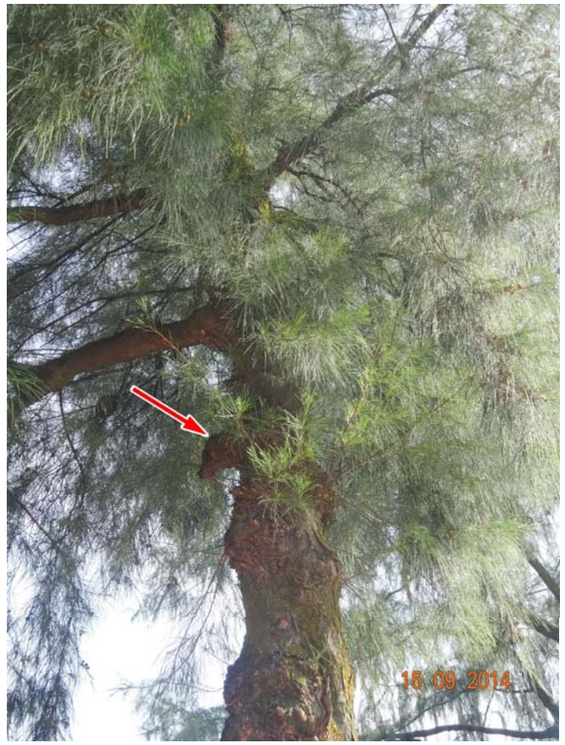
Photo No. 10 | T4 (Retain)

Photo No. 11 | T6 (Fell)

Photo No. 12 | T6 (Fell)

Photo No. 13 | T6 (Fell)

Photo No. 14 | T6 (Fell)



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AGREEMENT NO. CE 14/2-14 (HY) NEW WANG TONG RIVER BRIDGE, MUI WO
TREE SURVEY PHOTOGRAPHS

Photo No. 17 | T7 (Retain)

Photo No. 18 | T8 (Retain)

Photo No. 19 | T8 (Retain)

Photo No. 20 | T9 (Retain)

Photo No. 21 | T9 (Retain)

Photo No. 22 | T9 (Retain)

Photo No. 23 | T9 (Retain)

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AGREEMENT NO. CE 14/2-14 (HY) NEW WANG TONG RIVER BRIDGE, MUI WO
TREE SURVEY PHOTOGRAPHS

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NOT USED

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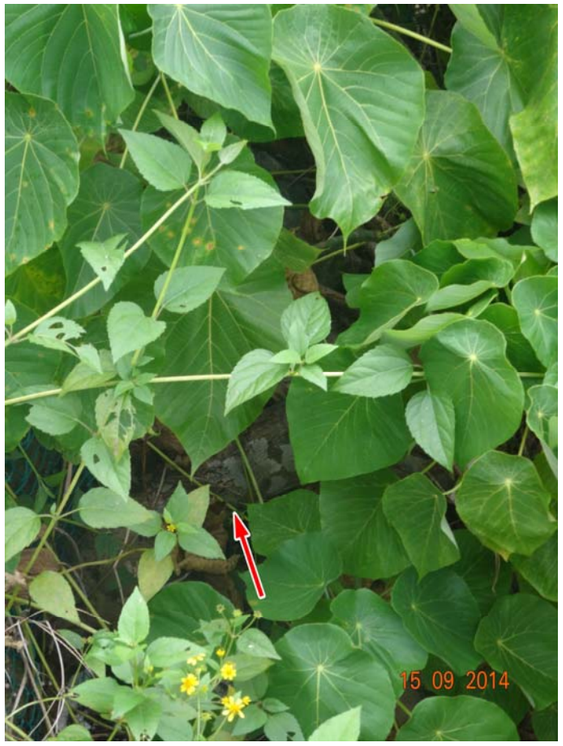

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TREE SURVEY PHOTOGRAPHS

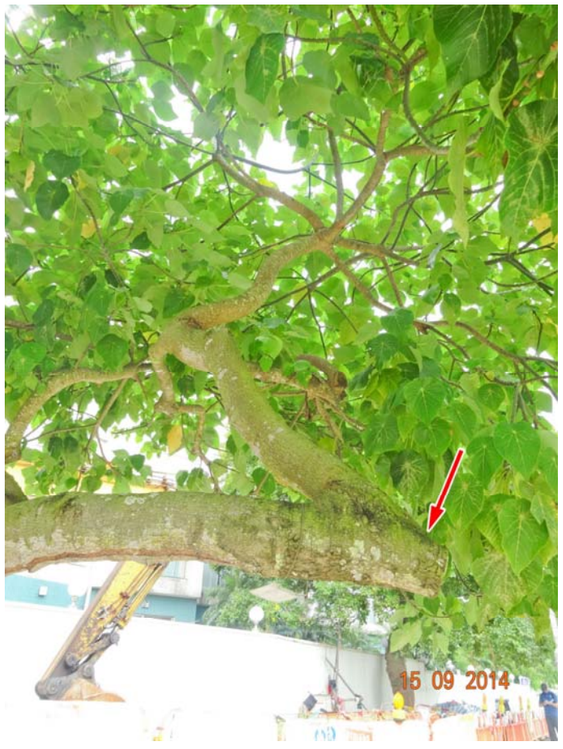

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Photo No. 34 | T30 (Fell)

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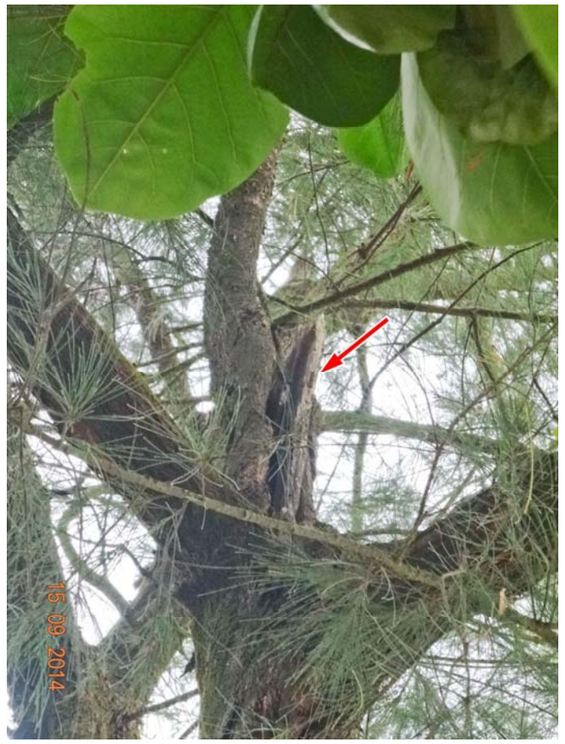
Photo No. 36 | T31 (Retain)



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AGREEMENT NO. CE 14/2-14 (HY) NEW WANG TONG RIVER BRIDGE, MUI WO
TREE SURVEY PHOTOGRAPHS

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Photo No. 40 | T32 (Retain)

Photo No. 41 | T32 (Retain)

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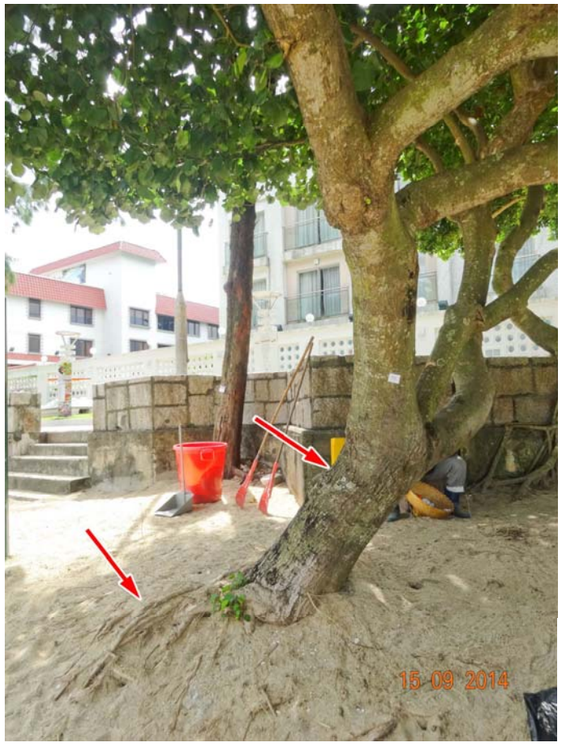
Photo No. 43 | T32 (Retain)

Photo No. 44 | T32 (Retain)

Photo No. 45 | T33 (Retain)



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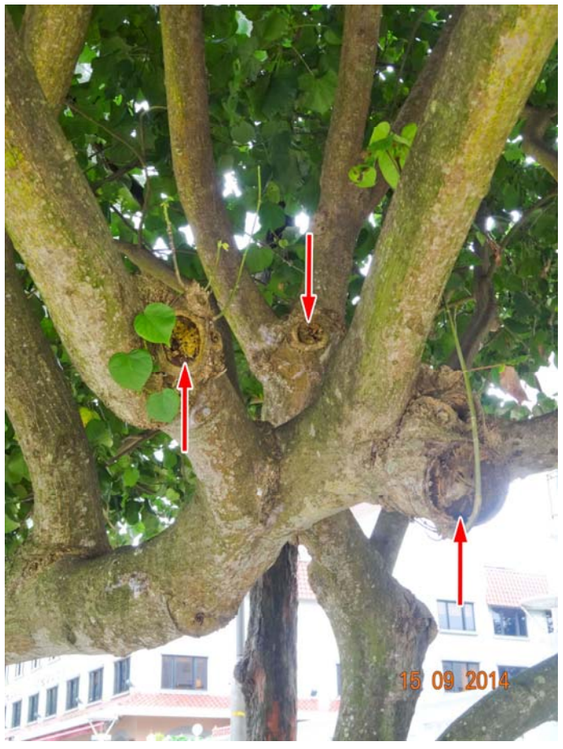
TREE SURVEY PHOTOGRAPHS



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AGREEMENT NO. CE 14/2-14 (HY) NEW WANG TONG RIVER BRIDGE, MUI WO
TREE SURVEY PHOTOGRAPHS

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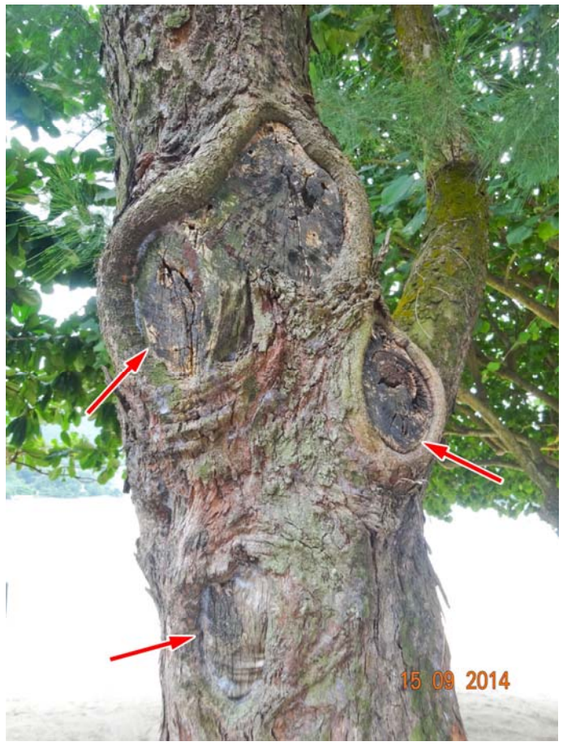

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Photo No. 59 | T37 (Retain)

Photo No. 60 | T37 (Retain)

Photo No. 61 | T37 (Retain)

Photo No. 62 | T38 (Retain)

AGREEMENT NO. CE 14/2-14 (HY) NEW WANG TONG RIVER BRIDGE, MUI WO
TREE SURVEY PHOTOGRAPHS

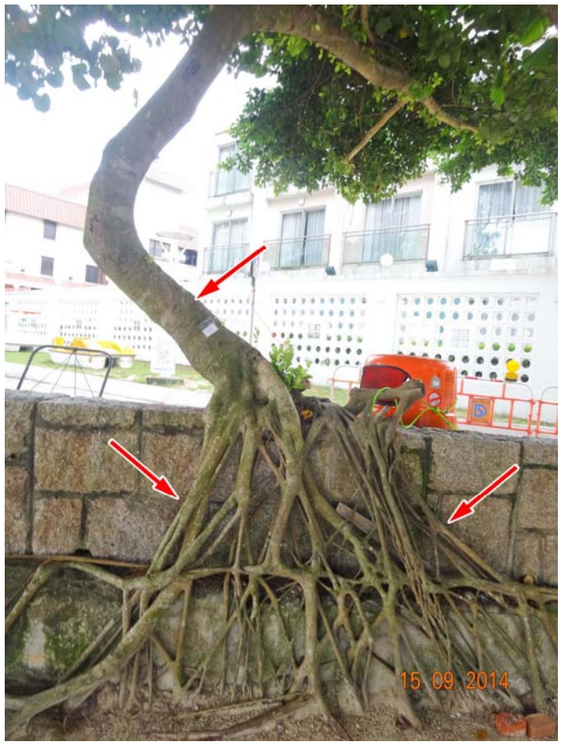

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Photo No. 65 | T38 (Retain)

Photo No. 66 | T38 (Retain)

Photo No. 67 | T39 (Retain)

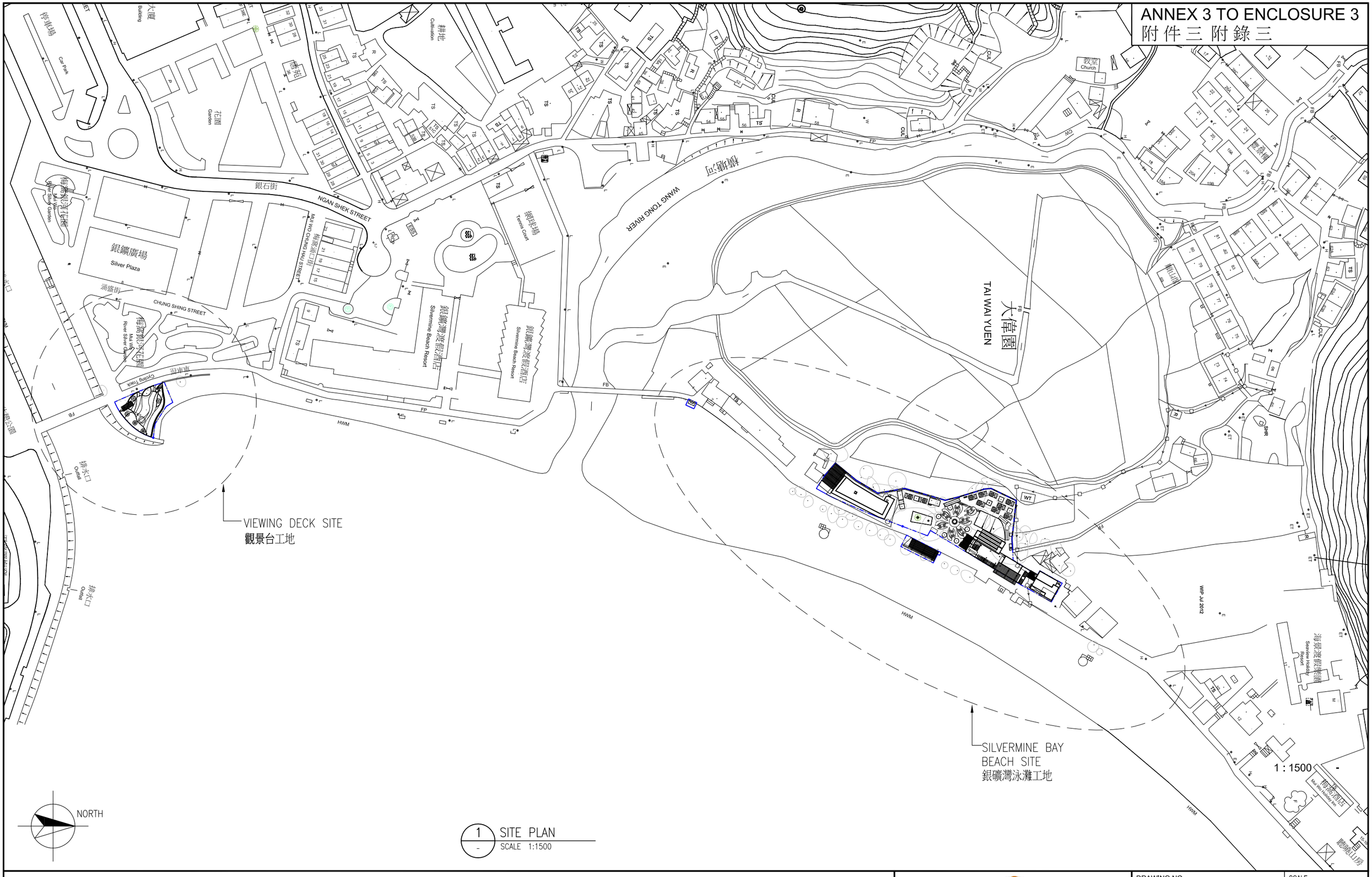
Photo No. 68 | T39 (Retain)

Photo No. 69 | T39 (Retain)

AGREEMENT NO. CE 14/2-14 (HY) NEW WANG TONG RIVER BRIDGE, MUI WO
TREE SURVEY PHOTOGRAPHS

Appendix 8B
Concurrent Projects

ANNEX 3 TO ENCLOSURE 3
附件三 附錄三



1 SITE PLAN
SCALE 1:1500

7285RS

改善梅窩銀礦灣沙灘及附屬設施

IMPROVEMENT WORKS AT SILVERMINE BAY BEACH, MUI WO

HOME AFFAIRS DEPARTMENT
民政事務總署

DRAWING NO.:
圖則編號:
IS-SPS001-ANNEX-3A

SCALE :
比例:
1 : 1500

TITLE:
標題:
工地平面圖
SITE PLAN

Appendix 9
Implementation Schedule

Appendix 9 - Implementation Schedule of Recommended Mitigation Measures

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
Air Quality Impact						
Construction Phase						
A1	Good housekeeping to minimize dust generation, e.g. by properly handling and storing dusty materials	To minimize dust generation	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A2	Adopt dust control measures, such as dust suppression using water spray on exposed soil, in areas with dusty construction activities, and during material handling	To minimize dust generation due to erosion	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A3	Dust suppression shall be applied to the working area immediately before, during and immediately after site clearance, excavation or earth moving operation to keep the surface wet.	To minimize dust generation due to erosion	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A4	Use water spray to wet the remaining dusty materials on the floor after removing stockpile. The surface of roads or streets shall be free from dust	To minimize dust generation due to erosion	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A5	Storage of dusty materials and debris shall be either entirely covered by impervious sheeting or stored in a three-side and top enclosed area. Alternatively, it should be sprayed with water or a dust suppression chemical to maintain the entire surface wet	To minimize dust generation due to erosion	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A6	All demolished items (e.g. trees, vegetation, structures, debris and rubbish) that may dislodge dust particles shall be covered entirely by impervious sheeting or placed in a three-side and top enclosed area within a day of demolition.	To minimize dust generation	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A7	Store cement bags in shelter with 3 sides and the top covered by impervious materials if the stack exceeds 20 bags	To prevent leakage of cement	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A8	Cement bag shall be debagged, batched and mixed in a three-side and top enclosed area	To minimize dust generation	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A9	Maintain a reasonable height when dropping excavated materials to limit dust generation	To minimize dust generation during movement of excavated materials	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A10	Minimize exposed earth after completion of work in a certain area by hydroseeding, vegetating, soil compacting or paving	To minimize dust generation due to erosion	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO

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EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
A11	Cover materials on trolleys and trucks before leaving the site to prevent debris from dropping during traffic movement or being blown away by wind	To prevent falling of debris during traffic movement and by wind	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A12	Water or a dust suppression chemical shall be continuously sprayed on the surface where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation is carried out, unless the process is accompanied by the operation of an effective dust extraction and filtering device	To minimize dust emission	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A13	Regular maintenance of plant equipment to prevent black smoke emission	To minimize black smoke emission	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A14	Throttle down or switch off unused machines or machine in intermittent use	To minimize unncessary emission	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A15	Minimize excavation area as far as possible	To minimize dust emission and potential release of odour from exposed ground	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A16	Cover open stockpiles of construction materials (e.g. aggregates, sand and fill materials) with impermeable materials such as tarpaulin during rainstorms.	To prevent soil erosion under rainstorm	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A17	Hoarding of not less than 2.4 m high shall be erected from ground level to surround the work area except for a site entrance or exit	To minimize dust emission	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO
A18	Carry out air quality monitoring throughout the construction period	To monitor construction dust level	HyD's Contractor	At representative ASRs	Prior to and throughout construction phase	EIAO-TM
A19	Carry out regular site inspection to audit the implementation of mitigation measures	To check the implemenation status and effectiveness of mitigation measures	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO

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EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
Noise Impact						
Construction Phase						
N1	Schedule noisy activities to minimise exposure of nearby NSRs to high levels of construction noise	To minimize construction noise level	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N2	Use hand-held plant equipment or manual equipment as far as possible	To minimize construction noise level	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N3	Use Quality Powered Mechanical Equipment (QPME) which produces lower noise level	To minimize construction noise level	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N4	In the direction of noise sensitive receivers, erect mobile barriers with 3m in height from a few metres of stationary plants, and from about 5m of more mobile plant such as hydraulic breaker to prevent direct view. The barrier should have skid footing and a small cantilevered upper portion. The minimum surface density of the movable noise barrier is 7 kg/m² and provide with noise absorbing material.	To lower noise transmission	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N5	Position mobile noisy equipment in location and direction away from NSR	To minimize noise transmission to NSR	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N6	Use silencer or muffler on plant equipment and should be properly maintained	To minimize noise transmission	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N7	Operate noisy plant equipment such as air compressor, generator and concrete pump within enclosure	To minimize noise transmission	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N8	Cover the noisy part of piling machine with acoustic mat	To minimize noise transmission	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N9	Throttle down or switch off unused machines or machine in intermittent use between work	To mimize noise production	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N10	Avoid carrying out noisy activities at the same time	To mimize noise production	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM

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EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
N11	Reduce the percentage on-time for some noisy PMEs	To mimize noise production	HyD's Contractor	Whole construction site	Throughout construction phase	NCO, EIAO-TM
N12	Carry out noise monitoring throughout the construction period	To monitor construction noise level	HyD's Contractor	At representative NSRs	Prior to and throughout construction phase	EIAO-TM

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EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
Water Quality Impact						
Construction Phase						
W1	Works in the river (excavation within highwater mark and cutting of pier of Old Bridge) shall be carried out inside the watertight cofferdam. The cofferdam can only be removed after completion of work.	To prevent the excavated materials or cuttings from falling into the water and being carried into the sea	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM
W2	Install sheet piles by vibratory action.	To minimize dispersion of sand	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W3	Erect water-tight temporary working platform that can contain falling debris above Wang Tong River. The platform shall be sheltered by tarpaulin for directing rainwater away from the working platform.	To prevent falling of debris and generation of surface runoff into the river	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W4	Water removed from the cofferdam should be desilted before discharge.	To prevent discharge of silty water	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM
W5	Set up sedimentation tank for settling suspended solids in wastewater before discharge into storm drains. Sand/silt removal facilities such as sand traps, silt traps and sedimentation basin should be provided with adequate capacity.	To reduce the amount of suspended solid in wastewater	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W6	Maintain silt removal facilities, channels, manholes before and after rainstorm.	To prevent failure that may lead to flooding	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W7	Remove silt and grit from silt trap at regular interval.	To prevent blockage that may lead to flooding	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W8	Design works program carefully to minimize work areas, hence minimize soil exposure and site runoff.	To minimize surface runoff and chance of erosion	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W9	Arrange excavation works outside rainy seasons (April to September) as far as possible. If this cannot be achieved, the following measures should be implemented: - Cover temporary exposed slope surfaces with impermeable materials, e.g. tarpaulin - Protect temporary access roads by crushed stone or gravel - Carry out adequate surface protection measures well before the arrival of a rainstorm	To minimize surface runoff and chance of erosion	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM

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EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
W10	Minimize exposed earth after completion of work in a certain area by hydroseeding, vegetating, soil compacting or paving	To prevent soil erosion under rainstorm	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W11	Cover open stockpiles of construction materials (e.g. aggregates, sand and fill materials) with impermeable materials such as tarpaulin during rainstorms.	To prevent soil erosion under rainstorm	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W12	Cover and temporary seal manholes to prevent silt, construction materials or debris and surface runoff from entering foul sewers.	To prevent overloading of foul sewers	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W13	Placing equipment, materials and wastes away from Wang Tong River and Silver Mine Bay	To prevent water contamination	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM
W14	Remove waste from the site regularly.	To prevent waste accumulation	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
W15	Apply discharge license for effluent discharge. Treat the discharge to comply with the requirement in TM-DSS.	To ensure compliance with effluent discharge requirement	HyD's Contractor	Whole construction site	Throughout construction phase	WPCO, TM-DSS, EIAO-TM
W16	Reuse treated effluent onsite, e.g. dust suppression and general cleaning.	To minimize wastewater generation	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
W17	Monitor effluent water quality.	To ensure compliance with effluent discharge requirement	HyD's Contractor	Whole construction site	Throughout construction phase	WPCO, EIAO-TM
W18	Register as chemical waste producer if chemical waste will be generated.	To control chemical waste	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM
W19	Perform maintenance of vehicles and equipment that have oil leakage and spillage potential on hard standings within a bunded area with sumps and oil interceptors.	To prevent oil leakage or spillage	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM
W20	Dispose chemical waste in accordance to Waste Disposal Ordinance. Follow the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* , examples as follows: - Store chemical wastes at designated safe location with adequate space	To avoid accident in waste storage and handling	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
W21	Placing chemical toilet away from waterbodies as far as possible and on stable, impermeable surface	To minimize accidental leakage of sewage into waterbodies	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM

Appendix 9 - Implementation Schedule of Recommended Mitigation Measures

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
W22	Carry out water quality monitoring at water sensitive receivers	To identify any water quality impact due to the project	HyD's Contractor	Whole construction site	Before, throughout and after construction phase	EIAO-TM
W23	Carry out regular site inspection to audit the implementation of mitigation measures	To check the implemenation status and effectiveness of mitigation measures	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM, APCO

Appendix 9 - Implementation Schedule of Recommended Mitigation Measures

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Ecological Impact						
Construction Phase						
E1	Before site clearance, the work area should be inspected by ecologist to confirm no active bird nest is present. If any active bird nest is identified, suitable size of buffer area should be established until the nest is abandoned.	To minimize direct impact on the breeding activity of Black-collared Starling	HyD's Contractor	Whole construction site	Before site clearance	EIAO-TM
E2	Erection of hoarding, fencing or provision of clear demarcation of work zones	To minimize direct impact outside work boundary	HyD's Contractor	Whole construction site	Throughout construction phase	EIAO-TM

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EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
Waste Management						
Construction Phase						
WM1	Allocate an area for waste sorting and storage of C&D materials into the following categories for reuse, recycle or disposal if possible. Remove waste from the Site for sorting once generated if no suitable space can be identified.	To minimize waste generation	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
	- excavated material suitable for reuse					
	- inert C&D materials for reuse/disposal offsite					
	- non-inert C&D materials for disposal at landfills					
	- chemical waste					
	- general refuse					
WM2	Adopt good site practice as follows:	To proper handling of waste	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
	- Provide training to workers on site cleanliness, waste management (waste reduction, reuse and recycle) and chemical handling procedures					
	- Provide sufficient waste collection points and regular removal					
	- Cover waste materials with tarpaulin or in enclosure during transportation					
	- Maintain drainage systems, sumps and oil interceptors					
	- Sort out chemical waste for proper handling and treatment onsite or offsite					
WM3	Adopt waste reduction measures as follows:	To minimize waste generation	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
	- Allocate area/containers for sorting, recovering and storing waste for reuse, recycle or disposal (e.g. demolition debris and excavated materials, general refuse like aluminium cans). Remove waste from the Site for sorting once generated if no suitable space can be identified.					
	- Allocate area for proper storage of construction materials to prevent contamination					

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EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
WM4	Prepare and implement a site specific Waste Management Plan (WMP) as part of Environmental Management Plan (EMP) in accordance with ETWB TCW No. 19/25. Detail waste management method in the form of avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal according to the recommendations on the EIA and EM&A Manual. It should be approved by the ER and regularly reviewed.	To provide guidance to waste management	HyD's Contractor	Whole construction site	Throughout construction phase	ETWB TCW No. 19/2005, EIAO-TM
WM5	Store waste materials properly as follows: - Avoid contamination by proper handling and storing waste - Prevent erosion by covering waste - Maintain and clean storage area regularly - Sort and stockpile different materials at designated location to enhance reuse	To properly store waste	HyD's Contractor	Whole construction site	Throughout construction phase	ProPECC PN 1/94, EIAO-TM
WM6	Apply for relevant waste disposal permits in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28).	To properly dispose waste	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28), Dumping at Sea Ordinance (Cap. 466), EIAO-TM
WM7	Implement trip-ticket system for recording the amount of waste generated, recycled and disposed, including chemical wastes	To monitor movement of waste	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal (Chemical Waste) (General) Regulation, Waste Disposal Ordinance, EIAO-TM
WM8	Reduce water content in wet spoil generated from piling work by mixing with dry materials. Only dispose treated spoil with less than 25% dry density to Public Fill Reception Facilities	To minimize load to reception facilities	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
WM9	Dispose dry waste or waste with less than 70% water content by weight to landfill	To minimize load to reception facilities	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM

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WM10	Follow the *Code of Practice on the Packaging, Labelling and Storage of Chemical Waste* as follows: - Store chemical wastes with suitable containers. Seal and maintain the container to avoid leakage or spillage during storage, handling and transport - Label chemical waste containers in both English and Chinese with instructions in accordance to Schedule 2 of the Waste Disposal (Chemical Waste) (General) Regulation - The container capacity should be smaller than 450 litres unless agreed by the EPD	To avoid accident in waste storage and handling	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
W11	Comply with the requirement of the chemical storage area: - Store only chemical waste and label clearly the chemical characters of the waste - Have at least 3 sides enclosed and protected from rainfall with cover - Provide sufficient ventilation - Have impermeable floor and has bunds to contain 110% of the capacity of the largest container or 20% of the total volume of the stored waste in the area, whichever is larger - Adequately spaced incompatible materials	To ensure proper storage of chemical waste	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
W12	Transfer used lubricants, waste oils and other chemicals to oil recycling companies, if possible, and empty oil drums for reuse or refill. No direct or indirect discharge is permitted	To ensure proper disposal of chemical waste	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM
W13	Hire licensed chemical waste disposal contractors for waste collection and removal. Dispose chemical waste at the approved CWTC at Tsing Yi or other licensed facility	To ensure proper disposal of chemical waste	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM
W14	Provide recycling bins for sorting out recyclables for collection by recycling companies. Non-recyclables should be removed to designated landfills every day by licensed collectors to prevent environmental and health nuisance.	To ensure proper recycling and disposal of general refuse	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM
W15	Terminate excavation work if contaminated soil is found. Prepare Land Contamination Plan (CAP) in accordance with EPD's Guidance Note for Contaminated Land Assessment and Remediation for identifying soil and groundwater sampling locations, followed by testing and remediation where necessary.	To identify presence of contaminated soil and provide proper remediation	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM

Appendix 9 - Implementation Schedule of Recommended Mitigation Measures

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
W16	Marine sediment shall be cement solidified and and sent to laboratory for Toxicity Characteristics Leaching Procedure (TCLP) test according to USEPA Method 1311 and 6020. The results are considered satisfactory if Universal Treatment Standards (UTS) are being met as per Table 4.6 of Practice Guide of Investigation and Remediation of Contaminated Land. The Unconfined Compressive Strength (UCS) of the solidified sediment shall also reach 1000kPa according to the above Practice Guide.If the TCLP and UCS testing results cannot meet the criteria, the sediment shall be retreated by cement solidification. After passing the tests, the solidified sediment shall be backfilled on land after the piling work (e.g. for construction of new piers and abutments). Alternatively, the solidified sediment shall be delivered to public fill reception facilities for beneficial reuse as the last resort.	To prevent leakage of contaminants to water.	HyD's Contractor	Whole construction site	Throughout construction phase	Waste Disposal Ordinance, EIAO-TM, Practice Guide of Investigation and Remediation of Contaminated Land

Appendix 9 - Implementation Schedule of Recommended Mitigation Measures

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
Landscape and Visual						
Construction Phase						
CM1	The construction area and contractor's temporary works areas should be minimised to avoid impacts on adjacent landscape. (Measure for mitigating Landscape and Visual impacts)	To minimise landscape footprint and reduce potential for visual impact	HyD's Contractor	Adjacent to existing bridge	Construction Phase	To approved Detailed Design and RLA's Approval
CM2	Reduction of construction period to practical minimum. (Measure for mitigating Visual impact)	To reduce duration of impacts	HyD's Contractor	N/A	Construction Phase	To approved Detailed Design and RLA's Approval
CM3	Construction traffic (land and sea) including construction plant, construction vessels and barges should be kept to a practical minimum. (Measure for mitigating Visual impact)	To minimise temporary visual impacts	HyD's Contractor	Connecting roads to site and Silver Mine Bay	Construction Phase	To approved Detailed Design and RLA's Approval
CM4	Erection of decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours. (Measure for mitigating Visual impact)	To screen works sites and plant	HyD's Contractor	Around works areas	Construction Phase	To approved Detailed Design and RLA's Approval
CM5	Avoidance of excessive height and bulk of site buildings and structures. (Measure for mitigating Visual impact)	To reduce temporary visual impacts	HyD's Contractor	Within works sites	Construction Phase	To approved Detailed Design and RLA's Approval
CM6	Control of night-time lighting by hooding all lights and through minimisation of night working periods. (Measure for mitigating Visual impact)	To reduce temporary visual impacts	HyD's Contractor	Within works sites	Construction Phase	To approved Detailed Design and RLA's Approval

Appendix 9 - Implementation Schedule of Recommended Mitigation Measures

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to Implement the measure	Location of the measure	When to implement the measure	What requirements or standard for the measure to achieve
CM7	All existing trees shall be carefully protected before, during construction and after construction. A Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees or trees to be transplanted, including trees in contractor's works areas for approval by the Registered Landscape Architect (RLA). This method statement for tree protection and transplanting shall make reference to "Guidelines on Tree Preservation during Construction" and "Guidelines on Tree Transplanting" published by GLTM of the DEVB. Early preparation of trees to be transplanted shall be undertaken to increase their likely survival rate following transplanting. (Measure for mitigating Landscape impact)	To minimise tree impacts and maximise tree preservation	HyD's Contractor	Within and adjacent to works sites	Construction Phase	To approved Detailed Design and RLA's Approval
CM8	Minimisation of Impacts to Wang Tong River through minimised and carefully controlled dredging for pile/abutment removal/construction works. (Measure for mitigating Landscape impact)	To minimise contamination of Wang Tong River	HyD's Contractor	Wang Tong River	Construction Phase	To approved Detailed Design and RLA's Approval

Appendix 10
Summary of Environmental Impact

Appendix 10 Summary of Environmental Impacts

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Air Quality					
Construction Phase					
Silvermine Beach Resort & Village House in 1 Tung Wan Tau Road	Major dust impact	- AQO & Annex 4 of EIAO-TM: 1-hr average TSP: 500 µg/m^3 24-hr average RSP: 100 µg/m^3 Annual average RSP: 50 µg/m^3 Annual average FSP: 35 µg/m^3	N/A	- Construction of cycle/foot bridges and demolition of Old Bridge will be carried out in different phases - Adopt less heavy construction method (minipiling instead of bored piling) - Implement dust control measures under Air Pollution Control (Construction Dust) Regulation	No residual impact
Operational Phase: No impact anticipated					
Noise					
Construction Phase					
Village House in 1 Tung Wan Tau Road	84 dB(A)	- Annex 5 of EIAO-TM: Leq 30min 75 dB(A)	9 dB(A)	- Adopt silenced plants or quality powered mechanical equipment (QPME) - Screen noise by mobile noise barriers - Adopt good site practices and noise management	Mitigated noise level: 72 dB(A), no residual impact
Operational Phase: No impact anticipated					
Water Quality					
Construction Phase					
Wang Tong River , Silver Mine Bay Beach , Silver Mine Bay, River Silver, Secondary contact recreation sub-zones	Major water quality impact due to release of suspended solids	- WQO for Marine Waters: Suspended solids <30% increase from baseline - WQO for Inland Waters: Suspended solids <25mg/L - TM on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS) - Practice Note for Professional Persons (ProPECC) PN 1/94	N/A	- Dredge and excavate inside watertight cofferdam - Construct solid working platform with toe board above Wang Tong River underneath the working areas - Adopt good site practices	No residual impact
Operational Phase: No impact anticipated					

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Waste Management					
Construction Phase					
Silvermine Beach Resort & Village House in 1 Tung Wan Tau Road	Generation of: - 1,069m^3 inert C&D materials - 82m^3 non-inert C&D materials - 87m^3 marine sediment - 1m^3 chemical waste - 8m^3 general refuse	- EIAO-TM Annexes 7 & 15 - Waste Disposal Ordinance (Cap. 354) and subsidiary legislation - Public Health and Municipal Services Ordinance (Cap. 132) - Land (Miscellaneous Provisions) Ordinance (Cap. 28) - Dumping at Sea Ordinance (Cap. 466)	N/A	- The Contractor should prepare and implement a Waste Management Plan in accordance with ETWB TCW No. 19/2005 - Marine sediment shall be treated by cement solidification and reused onsite by backfilling on land. - Handling, storage, collection and disposal of waste shall be proposed in accordance with Waste Disposal Ordinance	No residual impact
Operational Phase: No impact anticipated					
Land Contamination					
Construction Phase: No impact anticipated					
Operational Phase: No impact anticipated					
Ecology					
Construction Phase					
Wildlife and Habitats in 500m Study Area	Permanent loss of: - Sandy Shore (226m^2) Temporary loss of: - Wang Tong River (91m^2) - Developed Area (204m^2) - Sandy Shore (676m^2)	- EIAO-TM Annexes 8 & 16 - Forests and Countryside Ordinance (Cap. 96) and its subsidiary legislation in the Forestry Regulations - Wild Animals Protection Ordinance (Cap. 170) - Country Parks Ordinance (Cap. 208) - Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) - Town Planning Ordinance (Cap. 131) - Hong Kong Planning Standard and Guidelines (Chapter 10)	N/A	- Implement noise and water quality mitigation measures - Before site clearance, the works area should be inspected by ecologist to confirm no active bird nest is present. If any active bird nest is identified, suitable size of buffer area should be established until the nest is abandoned.	No unacceptable residual impact
Operational Phase: No impact anticipated					

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Landscape and Visual					
Construction Phase					
Landscape Resources (LR) and Landscape Character Areas (LCA) within 500m Study Area, Visually Sensitive Receivers (VSR) within Zones of Visual Influence	- LR: moderate impact on existing trees in vicinity of Wang Tong River Bridge due to removal of 7 trees - LCA: slight impact on bay landscape and rural township landscape - VSR: moderate impact on residents in Chung Hau, users of Silver Mine Bay Waterfront and workers in commercial outlets along Silver Mine Bay Beach	- EIAO-TM Annexes 3, 10, 11, 18, 20 and 21 - Hong Kong Planning Standard and Guidelines (Chapters 4, 10, 11) - Town Planning Ordinance (Cap 131) and Town Planning (Amendment) Ordinance 2004 - Relevant guidelines and practices on tree management published by Greening, Landscape and Tree Management Section (GLTM) of the DEVB (e.g. TC(W) No. 2/2013, No. 6/2015, No. 7/2015)	N/A	- Minimize the construction area and contractor's temporary works areas to avoid impacts on adjacent landscape. - Reduce construction period to practical minimum. - Construction traffic (land and sea) including construction plant, construction vessels and barges should be kept to a practical minimum. - Erect decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours. - Avoid excessive height and bulk of site buildings and structures. - Control night-time lighting by hooding all lights and through minimisation of night working periods. - All existing trees shall be carefully protected before, during construction and after construction. A Detailed Tree Protection Specification shall be provided in the Contract Specification. Early preparation of trees to be transplanted shall be undertaken to increase their likely survival rate following transplanting. - Minimisation of Impacts to Wang Tong River through minimised and carefully controlled dredging for pile/abutment removal/construction works	No substantial residual impacts

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Operational Phase					
Landscape Resources (LR) and Landscape Character Areas (LCA) within 500m Study Area, Visually Sensitive Receivers (VSR) within Zones of Visual Influence	- LR: slight impact on existing trees in vicinity of Wang Tong River Bridge due to the transplanting of 2 no. of the trees and the planting of 6 no. compensatory trees - LCA: insubstantial impact on bay landscape and rural township landscape - VSR: moderate impact on residents in Chung Hau, users of Silver Mine Bay Waterfront and workers in commercial outlets along Silver Mine Bay Beach	- EIAO-TM Annexes 3, 10, 11, 18, 20 and 21 - Hong Kong Planning Standard and Guidelines (Chapters 4, 10, 11) - Town Planning Ordinance (Cap 131) and Town Planning (Amendment) Ordinance 2004 - Relevant guidelines and practices on tree management published by Greening, Landscape and Tree Management Section (GLTM) of the DEVB (e.g. TC(W) No. 2/2013, No. 6/2015, No. 7/2015)	N/A	- Sensitive design of bridge in terms of scale, height and bulk (visual weight). - Use of appropriate building materials and colours for bridge to complement surroundings. - Lighting units to be directional and minimise unnecessary light spill and glare. - Integration of bridge with existing abutments and promenades. - Compensatory tree planting for all felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under the relevant technical circulars. - Streetscape (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the existing village context, and minimises potential adverse landscape and visual impacts.	No substantial residual impacts

Appendix 11
Compliance Checklist – Study Brief

Appendix 11 – Compliance Checklist – Study Brief

Sections of the EIA SB	Specific Requirements	Compliance Check
3	**Detailed Requirements of the EIA Study**	
3.1	The Purpose The purpose of this Study Brief is to scope the key issues of the EIA study and to specify the environmental issues that are required to be reviewed and assessed in the EIA report. The Applicant has to demonstrate in the EIA Report that the criteria in the relevant sections of the Technical Memorandum on the Environmental Impact Assessment Process of the Environmental Impact Assessment Ordiance (hereinafter referred as "the TM" are fully complied with.	-
3.2.1	The Scope The scope of this EIA study shall cover the Project and associated works mentioned in sub-section 1.2 above. For the purpose of assessing whether the environmental impacts shall comply with the criteria of the TM, the EIA study shall address the key issues described below, together with any other key issues identified during the course of the EIA study:	-
3.2.1 (i)	considerations on alternative design, construction method(s) and sequence(s) so as to avoid and minimize the need for dredging (including consideration of a "no-dredge" option) and the potential environmental impacts to environmentally sensitive areas and sensitive uses associated with the Project;	Sections 2.2 & 2.3
3.2.1 (ii)	potential water quality impacts on water sensitive receivers including the Wang Tong River and Silver Mine Bay Beach during construction and operation of the Project;	Section 5
3.2.1 (iii)	potential impacts to ecological sensitive areas during construction and operation of the Project including loss of vegetation and disturbance to wildlife;	Section 7
3.2.1 (iv)	potential air quality impact on the sensitive receivers due to the construction of the Project and associated works, in particular arising from construction dust;	Section 3
3.2.1 (v)	potential noise impact on the sensitive receivers due to the construction of the Project and associated works,	Section 4

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Sections of the EIA SB	Specific Requirements	Compliance Check
	including impact from construction equipment during construction of the Project;	
3.2.1 (vi)	potential waste management issues and impacts during construction of the Project, in particular arising from handling and disposal of construction and demolition materials and dredged sediment during construction;	Section 6
3.2.1 (vii)	potential landscape and visual impacts on sensitive receivers during the construction and operation of the Project; and	Section 8
3.2.1 (viii)	potential cumulative environmental impacts of the Project, through interaction or in combination with other existing, committed and planned projects in the vicinity of the Project, and that those impacts may have a bearing on the environmental acceptability of the Project.	Sections 2.8, 3.6.5, 4.7.5, 5.6.14, 7.9.11 & 8.8
3.3	**Consideration of Alternatives**	
3.3.1	Need of the Project The Applicant shall study and review the need of the Project. In particular justification shall be given to explain the need for the scale and size of the Project by making reference to the relevant recommendation from "Improvement Works for Mui Wo Facelift – Feasibility Study". The Applicant shall provide information to justify the need, explain clearly the purpose, objectives and environmental benefits of the Project, and describe the scenarios with and without the Project.	Section 2.1
3.3.2	Consideration of Alternative Design and Layout The Applicant shall consider alternative design of the New Bridge including consideration of the location of pier(s), minimize the number of pier and the option of widening of existing bridge and retaining the Old Bridge in situ. The Applicant shall provide justification for the selected design, including description of the environmental factors considered in the design selection and attempts made to avoid and minimize dredging, blockage of river flow, felling of trees and impact to the naturalness, landscape and visual aspects of Wang Tong River and its vicinity.	Section 2.2

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Sections of the EIA SB	Specific Requirements	Compliance Check
3.3.3	Consideration of Alternative Construction Methods and Sequences of Works Taking into consideration the combined effect with respect to the severity and duration of the construction impacts to the affected sensitive receivers, the EIA study shall explore alternative construction methods and sequences of works for the Project. Alternative construction methods including a "no-dredge option" shall be considered. A comparison of the environmental benefits and dis-benefits of applying different construction methods, including retaining the Old Bridge in situ and sequence of works shall be made.	Section 2.3
3.3.4	Selection of Preferred Scenario Taking into consideration of the findings in sub-sections 3.3.2 and 3.3.3 above, the Applicant shall recommend/justify the adoption of the preferred scenario that will maximise environmental benefits and avoid or minimize adverse environmental effects arising from the Project, and adequately describe the part that environmental factors played in arriving at the final selection.	Section 2.4
3.4	**Technical Requirements**	
3.4.1	The Applicant shall conduct the EIA study to address the environmental aspects of the activities as described in section 3.2 above. The assessment shall be based on the best and latest information available during the course of the EIA study. The Applicant shall include in the EIA report details of the construction and operational programme and methodologies for assessing environmental impacts of the Project. The Applicant shall clearly state the time frame, staged implementation programme and works programmes of the Project and other concurrent projects, for assessing the cumulative environmental impacts from the Project and interacting projects as identified in the EIA study.	Sections 2.4, 2.7 & 2.8, and Appendix 2A
3.4.2	The EIA study shall include the following technical requirements specified below and in the Appendices of this EIA study brief.	Please refer to relevant parts of the

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Sections of the EIA SB	Specific Requirements	Compliance Check
		Table below
3.4.3	Air Quality Impact (required only for construction of the Project)	
3.4.3.1	The Applicant shall follow the criteria and guidelines for evaluating and assessing air quality impact as stated in section 1 of Annex 4 and Annex 12 of the TM respectively.	Section 3.2
3.4.3.2	The study area for air quality impact assessment shall be defined by a distance of 500 meters from the boundary of the Project site, with consideration to be extended to include major existing, planned and committed air pollutant emission sources identified to have a bearing on the environmental acceptability of the Project. The assessment shall include the existing, committed and planned sensitive receivers within the study area. The assessment shall also take into account the impacts of emission sources from nearby concurrent projects, if any. The assessment shall be based on the best available information at the time of the assessment.	Sections 3.4.2 and 3.7.1
3.4.3.3	The air quality impact assessment for construction of the Project shall follow the detailed technical requirements given in Appendix A.	Please refer to relevant parts of the Table below
3.4.4	Noise Impact (required only for construction of the Project)	
3.4.4.1	The Applicant shall follow the criteria and guidelines for evaluating and assessing noise impact as stated in Annexes 5 and 13 of the TM respectively.	Section 4.2.1
3.4.4.2	The study area for the noise impact assessment shall generally include areas within 300 meters from the boundary of the Project site. Subject to the agreement of the Director, the study area could be reduced accordingly if the first layer of noise sensitive receivers (NSRs), closer than 300 meters from the outer Project limit, provides acoustic shielding to those receivers at distances further away from the Project. The assessment area shall be expanded to include NSRs at distances over 300 meters from the Project and associated works if those NSRs are also affected	Section 4.5

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Sections of the EIA SB	Specific Requirements	Compliance Check
	by the construction of the Project.	
3.4.4.3	The noise impact assessment for construction of the Project shall follow the detailed technical requirements given in Appendix B.	Please refer to relevant parts of the Table below
3.4.5	**Water Quality Impact**	
3.4.5.1	The Applicant shall follow the criteria and guidelines for evaluating and assessing water pollution as stated in Annexes 6 and 14 of the TM respectively.	Section 5.2.1
3.4.5.2	The study area for the water quality impact assessment shall cover the Southern Water Control Zone as designated under the Water Pollution Control Ordinance (Cap 358) and the water sensitive receivers including Wang Tong River in the vicinity of the Project. The study area could be extended to include other areas if they are found also being affected by the project during the EIA study and have a bearing on the environmental acceptability of the Project. The following sensitive receivers and other sensitive receivers identified during the course of the EIA study shall be included and assessed in the water quality impact assessment: - secondary contact recreational zones, recreation and tourism related uses, natural streams and rivers in and near Wang Tong; - areas of ecological or conservation value at Wang Tong including intertidal habitats; - sea water intakes (if any).	Section 5.4 and Table 5.1
3.4.5.3	The Applicant shall demonstrate in the EIA study that the Wang Tong River shall remain natural and unblocked during both construction and operational stages.	Sections 5.6.3 – 5.6.7, and 5.6.14

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Sections of the EIA SB	Specific Requirements	Compliance Check
3.4.5.4	The water quality impact assessment for construction and operation of the Project shall follow the detailed technical requirements given in Appendix C.	Please refer to relevant parts of the Table below
3.4.6	**Waste Management Implication and Land Contamination**	
3.4.6.1	The Applicant shall follow the criteria and guidelines for evaluating and assessing waste management implications as stated in Annexes 7 and 15 of the TM respectively.	Section 6.3.1
3.4.6.2	The applicant shall identify the possible sources of land contamination (if any) associated with the construction of the Project. If any contaminated land uses as stated in Sections 3.1 of Annex 19 in the TM is identified, the Applicant shall follow the guidelines for evaluating and assessing potential land contamination issues as stated in Sections 3.1 of Annex 19 of the TM.	Section 6.5
3.4.6.3	The assessment of the waste management implication and potential land contamination issue shall follow the detailed requirements given in Appendix D.	Please refer to relevant parts of the Table below
3.4.7	**Ecological Impact**	
3.4.7.1	The Applicant shall follow the criteria and guidelines for evaluating and assessing ecological impact as stated in Annexes 8 and 16 of the TM respectively.	Section 7.3.2
3.4.7.2	The assessment area for the purpose of the terrestrial and aquatic ecological impact assessment shall include Silver Mine Bay, Wang Tong River, Tai Wai Yuen and any other areas likely to be impacted by the Project.	Section 7.3.1
3.4.7.3	The ecological impact assessment shall follow the detailed technical requirements given in Appendix E.	Please refer to relevant

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Sections of the EIA SB	Specific Requirements	Compliance Check
		parts of the Table below
3.4.8	**Landscape and Visual Impacts**	
3.4.8.1	The Applicant shall follow the criteria and guidelines as stated in Annexes 10 and 18 of the TM, the EIAO Guidance Note No. 8/2010 on "Preparation of Landscape and Visual Impact Assessment under the Environmental Impact Assessment Ordinance" and the report of "Landscape Value Mapping of Hong Kong" for evaluating and assessing the landscape and visual impacts during construction and operation phases of the Project.	Sections 8.4 & 8.5.5.
3.4.8.2	The assessment area for landscape impact assessment shall include all areas within a 500 meters distance from the boundary of the Project site, including river, beach, pebble stone, coastline, etc. The cumulative impacts on landscape resources and characters from other projects should be included in this assessment. The assessment area for the visual impact assessment shall be defined by the visual envelope of the Project and shall be shown on plans.	Sections 8.4.3, 8.5.1 and 8.8.
3.4.8.3	The Applicant shall provide bridge designs shown on plans, sections and photomontages in significant viewpoints. The Applicant shall take into consideration of the compatibility of the New Bridge to the surrounding area and the design shall be sympathetic to the rural setting.	Sections 8.5 & 8.6.4, and Figures 1.1 & 8.12 – 8.16
3.4.8.4	The landscape and visual impact assessments for construction and operation of the Project shall follow the detailed technical requirements given in Appendix F.	Please refer to relevant parts of the Table below
3.4.9	**Environmental Monitoring and Audit (EM&A) Requirements**	
3.4.9.1	The Applicant shall identify and justify in the EIA study whether there is any need for EM&A activities during the construction and operation phases of the Project and, if affirmative, to define the scope of EM&A requirements for	Section 9

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Sections of the EIA SB	Specific Requirements	Compliance Check
	the Project in the EIA study.	
3.4.9.2	Subject to the confirmation of the EIA study findings, the Applicant shall comply with the requirements as stipulated in Annex 21 of the TM. The Applicant shall also propose if there is any need for real-time reporting of monitoring data for the Project through a dedicated internet website.	Section 9
3.4.9.3	The Applicant shall prepare a Project Implementation Schedule (in the form of a checklist as shown in Appendix G to this EIA study brief) containing the EIA study recommendations and mitigation measures with reference to the implementation programme.	Appendix 9 of EIA Report, Appendix A of EM&A Manual
3.5	**Presentation of Summary Information**	
3.5.1	Summary of Environmental Outcomes The EIA report shall contain a summary of key environmental outcomes arising from the EIA study, including estimated population protected from various environmental impacts, environmentally sensitive areas protected, environmentally friendly options considered and incorporated in the preferred option, environmental designs recommended, key environmental problems avoided, compensation areas included and the environmental benefits of environmental protection measures recommended.	Section 10.2
3.5.2	Summary of Environmental Impacts To facilitate effective retrieval of pertinent key information, the EIA report shall contain a summary table of environmental impacts showing the assessment points, results of impact predictions, relevant standards or criteria, extents of exceedances predicted, impact avoidance measures considered, mitigation measures proposed and residual impacts (after mitigation). This summary shall cover each individual impact and shall also form an	Appendix 10

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Sections of the EIA SB	Specific Requirements	Compliance Check
	essential part of the executive summary of the EIA report.	
App A	**Requirements for Air Quality Impact Assessment**	
App A: 1	Background and Analysis of Activities	-
App A: 1(i)	Provision of background information relating to air quality relevant to the Project, e.g. description of the types of activities of the Project that may affect air quality during construction and operation stages of the Project.	Section 3.5
App A: 1(ii)	Provision of an account, where appropriate, of the considerations/measures that have been considered in the planning of the Project to abate the air pollution impact. The Applicant shall consider alternative construction methods/ phasing programmes, and alternative operation modes to minimize the air quality impact during construction and operation stages of the Project.	Section 2.2, 3.6.2
App A: 1(iii)	Presentation of background air quality levels in the assessment area for the purpose of evaluating cumulative air quality impacts during construction and operation stages of the Project.	Section 3.3
App A: 2	Identification of Air Sensitive Receivers (ASRs) and Examination of Emission/ Dispersion Characteristics	-
App A: 2(i)	Identification and description of existing, planned and committed ASRs that would likely be affected by the Project, including those earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans and Layout Plans and other relevant published land use plans, including plans and drawings published by Lands Department and any land use and development applications approved by the Town Planning Board. The Applicant shall select the assessment points of the identified ASRs that represent the worst impact point of these ASRs. A map clearly showing the location and description such as name of buildings, their uses and height of the selected assessment points shall be given. The separation distances of these ASRs from the nearest emission sources shall also be given.	Section 3.4 and Figure 3.1
App A: 2(ii)	Provision of a list of air pollutant emission sources, including any nearby emission sources which are likely to have impact related to the Project based on the analysis of the construction and operation activities in Section 1 above.	Sections 3.5.3 and 3.6

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Sections of the EIA SB	Specific Requirements	Compliance Check
	Confirmation regarding the validity of the assumptions adopted and the magnitude of the activities (e.g. volume of construction material handled, frequency of construction vehicles and barges transportation, etc.) shall be obtained from the relevant government departments / authorities and documented.	
App A: 2(iii)	The emissions from any concurrent projects identified as relevant during the course of the EIA study shall be taken into account as contributing towards the overall cumulative air quality impacts. The impact at the existing, committed and planned ASRs within the assessment area shall be assessed, based on the best information available at the time of assessment.	Section 3.7.1
App A: 3	Construction Phase Air Quality Impact	-
App A: 3(i)	The Applicant shall follow the requirements stipulated under the Air Pollution Control (Construction Dust) Regulation to ensure that construction dust impacts are controlled within the relevant standards as stipulated in Section 1 of Annex 4 of the TM. A monitoring and audit programme for the construction phase shall be devised to verify the effectiveness of the control measures proposed so as to ensure proper construction dust control.	Sections 3.8 and 3.9.
App A: 3(ii)	If the Applicant anticipates that the Project will give rise to significant construction dust impacts likely to exceed recommended limits in the TM at the ASRs despite the incorporation of the dust control measures proposed, a quantitative assessment should be carried out to evaluate the construction dust impact at the identified ASRs. The Applicant shall follow the methodology set out in Sections 4 to 6 below when carrying out the quantitative assessment.	Section 3.6.4
App A: 4	Quantitative Assessment Methodology	No quantitative assessment required.
App A: 4(i)	The Applicant shall apply the general principles enunciated in the modeling guidelines in Appendices A-1 to A-3 while making allowance for the specific characteristic of the Project. The Applicant must ensure consistency between the text description and the model files at every stage of submissions for review. In case of doubt, prior agreement between the Applicant and the Director on the specific modelling details should be sought.	

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Sections of the EIA SB	Specific Requirements	Compliance Check
App A: 4(ii)	The Applicant shall identify the key/representative air pollution parameters (types of pollutants and averaging time concentrations) to be evaluated and provide explanation for selecting such parameters for assessing the impact from the Project.	
App A: 4(iii)	The Applicant shall calculate the overall cumulative air quality impact at the ASRs identified under Section 2 above and compare these results against the criteria set out in Section 1 of Annex 4 in the TM. The predicted air quality impacts (both unmitigated and mitigated) shall be presented in the form of summary table(s) and pollution contours, to be evaluated against the relevant air quality standards and on any effect they may have on the land use implications. Plans of a suitable scale should be used to present pollution contours to allow buffer distance requirements to be determined properly.	
App A: 5	Mitigation Measures for Non-compliance The Applicant shall propose remedies and mitigating measures where the predicted air quality impact exceeds the criteria set in Section 1 of Annex 4 in the TM. These measures and any constraints on future land use planning shall be agreed with the relevant government departments/authorities and documented. The Applicant shall demonstrate quantitatively whether the residual impacts after incorporation of the proposed mitigating measures will comply with the criteria stipulated in Section 1 of Annex 4 in the TM.	
App A: 6	Submission of Model Files All input and output file(s) of the model run(s) shall be submitted to the Director in electronic format together with the submission of the EIA report.	
App B	Requirements for Noise Impact Assessment	
App B: 1	Provision of Background Information and Existing Noise Levels	-
App B: 1(i)	The Applicant shall provide background information relevant to the Project, including relevant previous or current studies.	Section 4.3

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Sections of the EIA SB	Specific Requirements	Compliance Check
App B: 2	Identification of Noise Sensitive Receivers	-
App B: 2(i)	The Applicant shall refer to Annex 13 of the TM when identifying the NSRs. The NSRs shall include existing NSRs and planned/committed noise sensitive developments and uses earmarked on the relevant Outline Zoning Plans, Outline Development Plans, Layout Plans and other relevant published land use plans, including plans and drawings published by Lands Department and any land use and development applications approved by the Town Planning Board. Photographs of existing NSRs shall be appended to the EIA report.	Section 4.5.1, Figure 4-1
App B: 2(ii)	The Applicant shall select assessment points to represent the identified NSRs for carrying out quantitative noise assessment described below. A map showing the locations and descriptions such as name of building, use, and floor of the selected assessment points shall be given.	Section 4.5.1, Table 4.4 & Figure 4.1
App B: 3	Provision of an Emission Inventory of the Noise Sources	-
App B: 3(i)	The Applicant shall provide an inventory of noise sources including representative construction equipment for the purpose of carrying out the construction noise assessment. Confirmation of the validity of the inventory shall be obtained from the relevant government departments/authorities and documented in the EIA report.	Appendix 4A
App B: 4	Construction Noise Assessment	-
App B: 4(i)	The Applicant shall carry out assessment of noise impact from construction (excluding percussive piling) of the Project during daytime, i.e. 7 am to 7pm, on weekdays other than general holidays in accordance with methodology in paragprahs 5.3 and 5.4 of Annex 13 of the TM. The criteria in Table 1B of Annex 5 of TM shall be adopted in the assessment.	Sections 4.2, Table 4.1, 4.5, 4.6
App B: 4(ii)	If the unmitigated construction noise levels are found exceeding the relevant criteria, the Applicant shall propose practicable direct mitigation measures (including movable barriers, enclosures, quieter alternative methods, rescheduling and restricting hours of operation of noisy tasks) to minimize the impact. If the mitigated noise levels still exceed the relevant criteria, the duration of the noise exceedance at the affected NSRs shall be given.	Section 4.8

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Sections of the EIA SB	Specific Requirements	Compliance Check
App B: 4(iii)	The Applicant shall, as far as practicable, formulate a reasonable construction programme so that no work will be required in restricted hours as defined under the Noise Control Ordinance (NCO). In case the Applicant needs to evaluate whether construction works in restricted hours as defined under the NCO are feasible or not in the context of programming construction works, reference should be made to relevant technical memoranda issued under the NCO. In case the Applicant considers that there is an unavoidable need to conduct certain type of construction works during the restricted hours, justifications shall be provided with the assessment of the degree and duration of the noise impact. Regardless of the results of construction noise impact assessment for restricted hours, the Noise Control Authority will process Construction Noise Permit (CNP) application, if necessary, based on the NCO, the relevant technical memoranda issued under the NCO, and the contemporary conditions/situations. This aspect shall be explicitly stated in the EIA report.	Section 4.2.8
App B: 4(iv)	The assessment shall cover the cumulative noise impacts due to the construction works of the Project and other concurrent projects identified during the course of the EIA study.	Section 4.7.5
5	Assessment of Side Effects and Constraints	-
App B: 5(i)	The Applicant shall identify, assess and propose means to minimize any side effects and to resolve any potential constraints due to the inclusion of any recommended direct mitigation measures.	Section 4.8.3
App B: 6	Evaluation of Constraints on Planned Noise Sensitive Developments/Land uses	-
App B: 6(i)	For planned noise sensitive uses which will still be affected even with practicable direct mitigation measures in place, the Applicant shall propose, evaluate and confirm the practicability of additional measures within the planned noise sensitive uses and shall make recommendations on how these noise sensitive uses will be designed for the information of relevant parties.	No planned noise sensitive use (Section 4.5.2)
App B: 6(ii)	The Applicant shall take into account agreed environmental requirements/ constraints identified by the EIA study to	Section 4.7.6

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Sections of the EIA SB	Specific Requirements	Compliance Check
	assess the development potential of concerned sites which shall be made known to the relevant parties.	
App C	Requirements for Water Quality Impact Assessment	
App C: 1	The Applicant shall identify and analyse physical, chemical and biological disruptions of marine, freshwater system(s) and coastal water arising from the construction and operation of the Project.	Section 5.6
App C: 2	The Applicant shall predict and assess any water quality impacts arising from the construction and operation of the Project including, but not limited to, excavations of sediments, site runoff, effluent and emergency discharges from the on-site wastewater treatment plant, and spillages of chemicals feedstocks, reagents, intermediate products and final products at site on the water system(s) and the sensitive receivers within the study area.	Section 5.6
App C: 3	The Applicant shall take into account and include likely different construction and operational stages or sequences of the Project in the assessment. The assessment shall have regard to the frequency, duration, volume and flow rate of the discharges and its pollutant and sediment loading to water system(s) within the study area. Essentially the water quality impact assessment shall address the following:	-
App C: 3(i)	collection and review of background information on the existing and planned water system(s) and their respective sensitive receivers which might be affected by the construction and operation of the Project;	Sections 5.3 & 5.4
App C: 3(ii)	characterisation of water and sediment quality of the water system(s) based on existing information or appropriate site surveys and tests;	Section 5.3
App C: 3(iii)	identification and analysis of existing and future activities and beneficial uses related to the water system(s) and identification of the water sensitive receivers. The Applicant shall refer to those developments and uses earmarked on the relevant Outline Zoning Plans and Layout Plans;	Sections 5.3 & 5.4
App C: 3(iv)	identification of pertinent water and sediment quality objectives, criteria and standards for the water system(s) and the sensitive receivers;	Section 5.2
App C: 3(v)	identification of any alterations or changes to bathymetry or flow regimes;	Sections

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Sections of the EIA SB	Specific Requirements	Compliance Check
		5.6.5 & 5.6.15
App C: 3(vi)	identification and evaluation of existing and future water and sediment pollution sources and loading, including point and non-point discharges generated during the construction and operational phases of the Project. An emission inventory on the quantities and characteristics of these existing and future pollution sources in the study area shall also be provided. Field investigation and laboratory tests, as appropriate, shall be conducted to fill in any relevant information gaps;	Section 5.6.14
App C: 3(vii)	evaluation, by review of historical experience on various aspects including on-site spill prevention and control facilities similar to the Project or by other means, of the potential impacts on the water system(s) and the sensitive receivers due to accidental spillages of chemicals, feedstocks, reagents, intermediate products and final products;	Section 5.7.1
App C: 3(viii)	prediction by desk top calculation or qualitative means of the impacts on the affected water system(s) and the sensitive receivers due to those alterations/changes identified in (v) above;	Sections 5.6.3 – 5.6.7, & 5.6.14
App C: 3(ix)	analysis of the provision of wastewater treatment facilities in terms of capacity and level of treatment to reduce pollution identified in (vi) above. Report on the adequacy of the existing/planned sewerage and sewage treatment for handling, treatment and disposal of wastewater arising from the Project;	Section 5.7.3
App C: 3(x)	recommendation of appropriate mitigation measures to avoid or minimise the impacts identified above. Development of effective pollution prevention and control measures to control and clean up accidental spillages of chemicals, feedstocks, reagents, intermediate products and final products; emergency overflow discharges; and malfunction of on-site wastewater treatment plant, so as to minimise the water and sediment quality impacts;	Section 5.7
App C: 3(xi)	development of effective management practices to reduce stormwater and non-point source pollution during the construction and operation phases of the Project; and	Section 5.7

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Sections of the EIA SB	Specific Requirements	Compliance Check
App C: 3(xii)	evaluation and quantification of residual impacts on the water system(s) and the sensitive receivers with regard to the appropriate water quality criteria, standards or guidelines.	Section 5.8
App D	Requirements for Assessment of Waste Management Implication	
App D: 1	Analysis of Activities and Waste Generation	-
App D: 1(i)	The Applicant shall identify the quantity, quality and timing of the wastes arising as a result of the construction and operation (if any) activities of the Project based on the sequence, duration, method and process of these activities e.g. any dredged/excavated sediment/mud, construction and demolition materials, floating refuse and other wastes which will be generated during construction and operational (if any) stages.	Sections 6.4.3 – 6.4.20, Table 6.2
App D: 1(ii)	The Applicant shall adopt appropriate design, general layout, construction methods and programme to minimize the generation of public fill/inert construction and demolition (C&D) materials and maximize the use of public fill / inert C&D materials for other construction works.	Sections 6.4.1 and 6.7.l – 6.7.3
App D: 2	Proposal for Waste Management	-
App D: 2(i)	Prior to considering the disposal options for various types of wastes, opportunities for reducing waste generation, on-site or off-site re-use and recycling shall be fully evaluated. Measures that can be taken in the planning and design stages e.g. by modifying the design approach and in the construction stage for maximizing waste reduction shall be separately considered;	Section 6.4.1
App D: 2(ii)	The Applicant shall consider alternative project designs/ measures to avoid/ minimize floating refuse accumulation / entrapment and measures/ proposals for the potential floating refuse problem, e.g. regular collection of the floating refuse along the coast. Regarding the potential trapping of floating refuse along the shoreline of the Project, the Applicant shall estimate as far as practicable the amount of floating refuse to be found/trapped along the shoreline of the Project in construction stage and after the completion of the Project (if any). The Applicant shall develop an effective plan / design to avoid/ minimize the trapping of floating refuse. If floating refuse	Section 6.4.17 & 6.4.18

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Sections of the EIA SB	Specific Requirements	Compliance Check
	problem is identified and needs to be dealt with, the Applicant shall propose appropriate measures to deal with this floating refuse in a proper and acceptable manner e.g. to collect, recycle, reuse, store, transport and dispose of;	
App D: 2(iii)	After considering the opportunities for reducing waste generation and maximizing re-use, the types and quantities of the wastes required to be disposed of as a consequence shall be estimated and the disposal methods/ options for each type of wastes shall be described in detail. The disposal methods/ options recommended for each type of wastes shall take into account the result of the assessment in Section 2 (v) below;	Sections 6.4.3 – 6.4.20, Table 6.2
App D: 2(iv)	The EIA report shall state clearly the transportation routings and the frequency of the trucks/ vessels involved, any barging point or conveyor system to be used, the stockpiling areas and the disposal outlets for the wastes identified; and	Section 6.4.9
App D: 2(v)	The impact caused by handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use/ disposal of wastes shall be addressed and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas: - potential hazard; - air and odour emissions; - noise; - wastewater discharge; - ecology; and - public transport.	Section 6.4.9, 6.5.9, 6.7.3 point 1
App D: 3	Dredging/Excavation, Filling and Dumping	-
App D: 3(i)	Identification and quantification as far as practicable of all dredging/ excavation, fill extraction, filling, reclamation, sediment/mud transportation and disposal activities and requirements shall be conducted. Potential fill source and dumping ground to be involved shall also be identified. Field investigation, sampling and chemical and	Sections 6.4.11, 6.4.12

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	biological laboratory tests to characterize the sediment / mud concerned shall be conducted as appropriate. The ranges of parameters to be analyzed; the number, type and methods of sampling; sample preservation; chemical and biological laboratory test methods to be used shall be agreed with the Director (with reference to Section 4.4.2(c) of the TM) prior to the commencement of the tests and documented in the EIA report for consideration. The categories of sediment/mud which are to be disposed of in accordance with a permit granted under the Dumping at Sea Ordinance (DASO) shall be identified by both chemical and biological tests and their quantities shall be estimated. If the presence of any serious contamination of sediment/mud which requires special treatment/disposal is confirmed, the Applicant shall identify the most appropriate treatment and / or disposal arrangement and demonstrate its feasibility. The Applicant shall provide supporting document, such as agreement by the relevant facilities management authorities, to demonstrate the viability of any treatment/disposal plan;	
App D: 3(ii)	Identification and evaluation of the best practicable dredging/excavation methods, treatment methods, reuse/ recycling options and construction programme to minimize dredging / excavation and dumping requirements and demand for fill sources based on the criterion that existing sediment / mud shall be left in place and not to be disturbed as far as possible and the inert C&D materials shall be used to maximum practicable extent for reclamation works.	Sections 6.4 & 6.7
App D: 4	Land Contamination	-
App D: 4(i)	The Applicant shall identify all land lots and sites within the site boundary of the Project which, due to their past or present land uses, are potential contaminated sites. A detailed account of the present activities and all past land uses history in relation to possible land contamination shall be provided.	Section 6.5
App D: 4(ii)	The list of potential contaminants which are anticipated to be found in these potential contaminated sites shall be provided and the relevant remediation options shall be presented.	Section 6.5

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Sections of the EIA SB	Specific Requirements	Compliance Check
App E	**Requirements for Ecological Impact Assessment (Terrestrial and Aquatic)**	
App E: 1	The assessment area for the purpose of terrestrial ecological assessment shall include all areas within 500 metres from the Project boundary and any areas likely to be impacted by the Project. For aquatic ecology, the assessment area shall be the same as the water quality impact assessment described in section 3.4.5.2 in the Study Brief.	Section 7.3.1
App E: 2	The Applicant shall examine the flora, fauna and other components of the ecological habitats within the assessment area. The aim shall be to protect, maintain or rehabilitate the natural environment. In particular, the Project shall avoid or minimise impacts on recognized sites of conservation importance and other ecological sensitive areas. The assessment shall identify and quantify as far as possible the potential ecological impacts associated with the Project, both directly by physical disturbance and indirectly by changes of water quality and hydrodynamic regime to the natural environment and the associated wildlife groups and habitats / species including its construction as well as the subsequent operation, management and maintenance phase.	Sections 7.4 – 7.7, 7.9 & 7.11
App E: 3	The assessment shall include the followings:	-
App E: 3(i)	Review of the findings of relevant studies / surveys and collate the available information regarding the ecological characters of the assessment area	Sections 7.4.1 – 7.4.12
App E: 3(ii)	Evaluation of information collected and identify of any information gap relating to the assessment of potential ecological impact to the natural environment	Section 7.4.13
App E: 3(iii)	Carrying out necessary field surveys (the duration of which shall be at least 4 months covering the wet season) and investigations to verify the information collected in (ii) above, to fill the information gaps identified and to fulfill the objectives of the EIA study. The field surveys shall include but not be limited to flora, fauna and any other habitats/species of conservation importance	Section 7.5
App E: 3(iv)	Establishment of the general ecological profile of the Study Area based on data of relevant previous studies / surveys and results of the ecological field surveys, and description of the characteristics of each habitat found;	-

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	major information to be provided shall include :	
App E: 3(iv)a	description of the physical environment, including all recognized sites of conservation importance, and assessment of whether these sites will be affected by the Project or not;	Section 7.6
App E: 3(iv)b	habitat maps of suitable scale (1:1000 to 1:5000) showing the types and locations of habitats and species of conservation interest in the assessment area;	Figure 7.2
App E: 3(iv)c	ecological characteristics of each habitat type such as extent, substrate, size, type, species present, dominant species found, species diversity and abundance, community structure, ecological value and inter-dependence of the habitats and species, and presence of any features of ecological importance;	Sections 7.6 & 7.8, and Appendix 7B
App E: 3(iv)d	Representative colour photos of each habitat type and any important ecological features identified; and	Appendix 7A
App E: 3(iv)e	Species found that are rare, endangered and/or listed under local legislation, international conventions for conservation of wildlife/ habitats or red data books.	Section 7.7 and Appendix 7B
App E: 3(v)	Investigation and description of the existing wildlife uses of the various habitats with special attention to those wildlife groups and habitats with conservation interest, including (a) Natural stream courses, rivers and associated riparian habitats; (b) Woodlands; (c) Vertebrates including avifauna (e.g. ardeids) and fish (e.g. estuarine species); (d) Macroinvertebrates (e.g. crustaceans); and (e) Any other habitats/species identified as having special conservation interest by this EIA study.	Section 7.7
App E: 3(vi)	Using suitable methodology (including but not limited to those adopted in other relevant EIA studies in Hong Kong) and considering also other works activities from other projects reasonably likely to occur at the same time, identification and quantification as far as possible of any direct (e.g. loss of habitats due to various elements such as	Sections 7.9 & 7.10

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	excavation works and other associated works of the Project), indirect (e.g. changes in water qualities, hydrodynamics properties, hydrology, accidental discharge of untreated sewage, noise and other disturbance generated by the construction and operational activities etc), on-site, off-site, primary, secondary and cumulative ecological impacts such as destruction of habitats, reduction of species abundance / diversity, loss of feeding and breeding grounds, reduction of ecological carrying capacity and habitat fragmentation.	
App E: 3(vii)	Evaluation of ecological impact based on the best and latest information available during the course of the EIA study, using quantitative approach as far as practicable and covering construction and operational phases of the Project;	Section 7.10
App E: 3(viii)	Recommendations for possible and practicable mitigation measures to avoid, minimize and/or compensate for the adverse ecological impacts identified during construction and operation of the Project;	Section 7.11
App E: 3(ix)	Evaluation of the feasibility and effectiveness of the recommended mitigation measures and definition of the scope, type, location, implementation arrangement, resources requirement, subsequent management and maintenance of such measures;	Section 7.11
App E: 3(x)	Determination and quantification as far as possible of the residual ecological impacts after implementation of the proposed mitigation measures;	Section 7.12
App E: 3(xi)	Evaluation of the significance and acceptability of the residual ecological impacts by making reference to the criteria in Annex 8 of the TM and determine if off-site mitigation measures are necessary to mitigate the residual impacts and if affirmative, guidelines and requirements laid down in Annex 16 of the TM should be followed ; and	Section 7.12
App E: 3(xii)	Review of the need for and recommendation on any ecological monitoring programme required.	Section 7.13
App F	**Requirements for landscape and Visual Impact Assessments**	
App F: 1	The Applicant shall review relevant plan(s) and/or studies which may identify areas of high landscape value and recommend country park, coastal protection area, green belt and conservation area designations. Any guidelines on	Section 8.5.3

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	landscape and urban design strategies and frameworks that may affect the appreciation of the Project shall also be reviewed. The aim is to gain an insight to the future outlook of the area affected so as to assess whether the Project can fit into the surrounding setting. Any conflict with the statutory town plan(s) and any published land use plans shall be highlighted and appropriate follow-up action shall be recommended.	
App F: 2	The Applicant shall describe, appraise, analyse and evaluate the existing and planned landscape resources and character of the assessment area. A system shall be derived for judging landscape and visual impact significance. Annotated oblique aerial photographs and plans of suitable scale showing the baseline landscape character areas and landscape resources and mapping of impact assessment shall be extensively used to present the findings of impact assessment. Descriptive text shall provide a concise and reasoned judgment from a landscape and visual point of view. The sensitivity of the landscape framework and its ability to accommodate change shall be particularly focused on. The Applicant shall identify the degree of compatibility of the Project with the existing and planned landscape setting, recreation and tourism related uses, and scenic spot. The landscape impact assessment shall quantify the potential landscape impact as far as possible so as to illustrate the significance of such impacts arising from the proposed development. Clear mapping of the landscape impact is required. Where applicable, broad-brush tree survey shall be carried out and the impacts on existing trees shall be addressed. Cumulative landscape and visual impacts of the Project with other committed and planned developments shall be assessed.	Sections 8.4.2 – 8.4.3, 8.5.1 – 8.5.5, 8.6.1 – 8.6.3 and 8.8; Table 8.5; Figures 8.3 - 8.6, 8.9 & 8.10; Appendix 8B
App F: 3	The Applicant shall assess the visual impacts of the Project. Clear illustration including mapping of visual impact is required. The assessment shall include the following:	-
App F: 3(i)	identification and plotting of visual envelope of the Project;	Section 8.5.6 & Figure 8.7.2
App F: 3(ii)	identification of the key groups of existing and planned sensitive receivers including, but not limited to, travelers to	Section 8.5.7,

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	Mui Wo, recreational visitors such as hikers from Butterfly Hill, workers in resort nearby, ferry passengers (with regard to views from sea level) and residents in the vicinity of the project within the visual envelope with regard to views from ground level and elevated vantage points;	Table 8.4 and Figures 8.7.2 & 8.11
App F: 3(iii)	description of the visual compatibility of the Project with the surrounding and the planned setting, and its obstruction and interference with the key views within the visual envelope;	Sections 8.7.5 & 8.10.2
App F: 3(iv)	identification of the severity of visual impacts in terms of distance, nature and number of sensitive receivers. The visual impacts of the Project with and without mitigation measures shall be included and illustrated so as to demonstrate the effectiveness of the proposed mitigation measures across time; and	Section 8.7.6, Tables 8.4, 8.9 & 8.10 and Figures 8.12.1 – 8.16
App F: 3(v)	evaluations and explanations of the factors considered in arriving the significance thresholds of visual impact.	Section 8.7
App F: 4	The Applicant shall evaluate the merits of preservation in totality, in parts or total destruction of existing landscape and the establishment of a new landscape character area if it will be affected by the Project. In addition, alternative site layout, design, built form and construction method that will avoid or reduce the identified landscape and visual impacts shall be evaluated for comparison before adopting other mitigation or compensatory measures to alleviate the impacts. The mitigation measures proposed shall not only be concerned with damage reduction but shall also include consideration of potential enhancement of existing landscape and compatibility of design with surrounding area in order to enhance the visual quality. The Applicant shall recommend mitigation measures to minimize adverse effects identified above, including provision of a master landscape plan.	Sections 8.4.2 & 8.6.4, Tables 8.6 & 8.7 and Figure 8.17
App F: 5	The mitigation measures shall also include design of structure, conservation of topsoil or rock for use, colour scheme and texture of material used and any measures to mitigate the impact on the existing and planned land use	Section 8.6.4, Tables 8.6 &

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	and visually sensitive receivers. Parties shall be identified for the on going management and maintenance of the proposed mitigation works to ensure their effectiveness throughout the construction phase and operational phase of the Project, associated works, supporting facilities and essential infrastructures. A practical programme and funding proposal for the implementation of the recommendation measures shall be provided.	8.7 and Figure 8.17
App F: 6	Annotated illustration materials such as colour perspective drawings, plans and section/elevation diagrams, annotated oblique aerial photographs, photographs taken at vantage points, and computer-generated photomontage shall be adopted to fully illustrate the landscape and visual impacts of the Project. In particular, the landscape and visual impacts of the Project with and without mitigation measures from representative viewpoints, particularly from views of the most severely affected visually sensitive receivers (i.e. worst case scenario), shall be properly illustrated in existing and planned setting at four stages (existing condition, Day 1 with no mitigation measures, Day 1 with mitigation measures and Year 10 with mitigation measures) by computer-generated photomontage so as to demonstrate the effectiveness of the proposed mitigation measures. Computer graphics shall be compatible with Microstation DGN file format. The Applicant shall record the technical details in preparing the illustration, which may need to be submitted for verification of the accuracy of the illustration.	Figures 8.12.1 – 8.16