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Your Ref : ( ) in EP 2/N7/A/52 Ax(1) Pt.31  
Our Ref : (CV/2013/08)/M45/200/(H10513)

1 November 2019

**By Hand**

Environmental Protection Department  
EIAO Register Office  
27th Floor, Southorn Centre,  
130 Hennessy Road,  
Wan Chai, Hong Kong

Attn: EIAO Register Office

Dear Sirs,

**Agreement No. CE 38/2010 (CE)  
Liantang / Heung Yuen Wai Boundary Control Point and associated works  
(Site Formation and Infrastructures) – Design and Construction**

**Contract No. CV/2013/08  
Liantang / Heung Yuen Wai Boundary Control Point  
Site Formation and Infrastructure Works – Contract 6**

**Environmental Permit (EP) No. EP-404/2011/D  
Condition 2.10 – Submission of a Habitat Compensation and Management Plan (Revision 3)**

I refer to your above referenced letter dated 17 October 2019 regarding the approval given to our *Submission of Habitat Creation and Management Plan (Revision 3)*, dated 26 September 2019.

Pursuant to Condition 2.10 of the Environmental Permit (EP) No. EP-404/2011/D, I now on behalf of the Permit Holder, Civil Engineering and Development Department (CEDD), submit herewith the following for your endorsement:-

1. Letter of Certification issued by Environmental Team;
2. Letter of Verification issued by Independent Environmental Checker; and
3. **3 sets of clean copies and 1 CD-ROM for the soft copy** of the approved *Habitat Creation and Management Plan (Revision 3)*

.../Cont'd

Your Ref : ( ) in EP 2/N7/A/52 Ax(1) Pt.31  
Our Ref : (CV/2013/08)/M45/200/(H10513)

Should you have any queries, please contact my Senior Resident Landscape Architect – Ms. Carol Leung, at Tel. No. 2171 3405.

Yours faithfully,



Owen Ng  
Senior Resident Engineer  
AECOM Asia Co. Ltd.

Encl.

c.c.

CEDD/NDO	- Attn: Mr. Joe Yip / Mr. P Y Lu / Mr. Steve Tang / Mr. Steve Lo / Mr. Albert Lam / Mr. Raymond Leong / Mr. Ben Ho	(w/o encl.)
AECOM	- Attn: Mr. Francis Leong / Mr. Pat Lam / Ms. Elaine Lam	(w/o encl.)
AUES (ET)	- Attn: Mr. T.W. Tam	(w/o encl.)
SMEC (IEC)	- Attn: Mr. Antony Wong	(w/o encl.)
ER (CV/2012/08)		(w/o encl.)
ER (CV/2012/09)		(w/o encl.)

CTW/ON/JL/CLS/TNTK/MLWK/CW/elyh



Our Ref: TCS00694/13/300/L2205

AECOM  
8/f Grand Central Plaza, Tower 2  
138 Shatin Rural Committee Road  
Shatin, Hong Kong

Attn: Mr. Owen Ng

16 September 2019

By E-mail

Dear Sir,

**Re: Agreement No. CE 45/2008 (CE)  
Liantang/ Heung Yuen Wai Boundary Control Point and Associated Works  
Habitat Creation and Management Plan (Revision 3)**

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With reference to the resubmission of Habitat Creation and Management Plan (Revision 3), we have no adverse comments on this submission. We herewith certify the captioned Plan as confirming to the information and recommendation contained in the approved EIA Report in accordance with *Condition 2.10* of Environmental Permit (EP) No. EP-404/2011/D.

Should you have any question or require further information, please feel free to contact the undersigned at Tel: 2959-6059 or Fax: 2959-6079 or E-mail: [twtam@fordbusiness.com](mailto:twtam@fordbusiness.com).

Yours sincerely,  
For and on Behalf of  
**Action-United Environmental Services & Consulting**



T. W. Tam  
Environmental Team Leader  
TW/nh

c.c. Mr. Vincent Chan (CCKJV - C6 Contractor)  
Mr. Antony Wong (IEC, SMEC)

By email  
By email



Member of the Surbana Jurong Group

G 60374

local  
global experience

Our ref: 7076192/L25101/AW/MCC/CL/rw

17 September 2019

AECOM

8/F, Grand Central Plaza, Tower 2  
138 Shatin Rural Committee Road  
Shatin, N.T.

**By Email & Post**

Attention: Mr Owen NG


Dear Sirs

**Agreement No. CE 45/2008 (CE)  
Liantang/Heung Yuen Wai Boundary Control Point and Associated Works  
Independent Environmental Checker – Investigation  
Habitat Creation and Management Plan**

With reference to the Habitat Creation and Management Plan (HCMP) (Revision 3) – Resubmission provided to us on 12 September 2019, please note that we have no adverse comment on the captioned submission and confirmed the Plan is tally with the information and recommendation contained in the approved EIA Report. Hence, we herewith verify the Habitat Creation and Management Plan (HCMP) (Revision 3) – Resubmission in accordance with Condition 2.10 of Environmental Permit No. EP-404/2011/D.

Thank you for your attention and please do not hesitate to contact the undersigned on tel. 3995 8120 or by email to antony.wong@smec.com; or our Mr Arthur CHIU on tel. 3995 8144 or by email to arthur.chiu@smec.com.

Yours faithfully



**Antony WONG**  
Independent Environmental Checker

cc	CEDD/BCP	-	Mr LU Pei Yu / Mr William CHEUNG	by fax: 3547 1659
	AECOM	-	Mr Pat LAM/ Mr Perry YAM	by email
	CCKJV	-	Mr Vincent CHAN	by email
	AUES	-	Mr TW TAM	by email

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**Civil Engineering and Development Department**

**Agreement No. CE 38/2010 (CE)**

**Liantang/Heung Yuen Wai Boundary Control Point and  
Associated Works (Site Formation and Infrastructure) –  
Design and Construction**

**Habitat Creation and Management Plan**

September 2019

(Revision 3)

Re-submission

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## 1 INTRODUCTION

### *Background*

1.1 The “Liantang/Heung Yuen Wai Boundary Control Point and Associated Works Project” (hereinafter referred to as “the Project”) comprises a new Boundary Control Point (BCP) proposed at Liantang/Heung Yuen Wai (LT/HYW), its connecting road and other associated works. The Project comprises the following key components:

- Construction of BCP at the boundary with Shenzhen near the existing Chuk Yuen Village;
- Lin Ma Hang to Frontier Closed Area (FCA) Boundary – this section comprises at-grade and viaducts and includes the improvement works at Lin Ma Hang Road;
- Ping Yeung to Wo Keng Shan – this section stretches from the Frontier Closed Area Boundary to the tunnel portal at Cheung Shan and comprises at-grade and viaducts including an interchange at Ping Yeung;
- North Tunnel – this section comprises the tunnel segment at Cheung Shan and includes a ventilation building at the portals on either end of the tunnel;
- Sha Tau Kok Road – this section stretches from the tunnel portal at Wo Keng Shan to the tunnel portal south of Loi Tung and comprises at-grade and viaducts including an interchange at Sha Tau Kok and an administration building;
- South Tunnel – this section comprises a tunnel segment that stretches from Loi Tung to Fanling and includes a ventilation building at the portals on either end of the tunnel as well as a ventilation building in the middle of the tunnel near Lau Shui Heung; and
- Fanling – this section comprises the at-grade, viaducts and interchange connection to the existing Fanling Highway.

1.2 An Environmental Impact Assessment (EIA) study for the Project was conducted in accordance with EIA Study Brief No. ESB-199/2008. The EIA study concluded that the Project would be environmentally acceptable with the implementation of recommended mitigation measures.

1.3 The EIA Report (Register No.: AEIAR-161/2011) was approved on 24 March 2011 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, an Environmental Permit (EP) was granted on 24 March 2011 (EP No.: EP-404/2011) for the construction and operation of the Project. Pursuant to Section 13 of the EIAO, the Director amends the environmental permit (No. EP-404/2011/C) based on the Application No. VEP-519/2016. The amendments are incorporated into the current environmental permit (No. EP-404/2011/D).

1.4 The EIA identified 1.4ha of freshwater wetland habitat loss due to the proposed construction. On the basis of literature review and field surveys, the abandoned wet agricultural land found within the Assessment Area was found only in moderate to low ecological value. Nonetheless, in view of its ecological potential and the ecological significance of cumulative loss of wetland, the loss of freshwater wetland is proposed to be compensated by creation of a freshwater wetland.

1.5 According to Condition 2.10 of the latest Environmental Permit EP No. EP-404/2011/D the Permit Holder shall no later than three months before commencement of construction of the Project, submit to the Director for approval 3 sets of Habitat Creation and Management Plan (HCMP) for the Wetland Compensation Area of an area not less than 1.4 hectares shown in **Figure 2b** of this Permit. The submission shall take into account the recommendations of the EIA Report to set out details of the specifications for the habitats and ecological functions and to define the management and ecological monitoring and audit requirements of the Wetland Compensation Area. Before submission to the Director, the HCMP shall be certified by the ET Leader and verified by the IEC as

confirming to the information and recommendations contained in the approved EIA Report.

**Table 1-1 Compliance to EP Condition 2.10**

	<b>Key requirements as identified in EP Condition 2.10</b>	<b>Compliance made in this HCMP submission</b>
1	<i>“The Permit Holder shall ... submit to the Director for approval 3 sets of Habitat Creation and Management Plan (HCMP)”</i>	3 sets of hardcopies would be submitted to EPD for approval.
2	<i>“Wetland Compensation Area of an area not less than 1.4 hectares shown in Figure 2b of this Permit.”</i>	Wetland Compensation Area comprised of an area not less than 1.4 hectares as shown in Drawing No. C6/C00/WL-025A.
3	<i>“The submission shall take into account the recommendations of the EIA Report to set out details of the specifications for the habitats and ecological functions and to define the management and ecological monitoring and audit requirements of the Wetland Compensation Area.”</i>	Section 3.17 tabulates the summary of the considerations of the EIA Report for setting out the details of the specifications for the habitats and ecological functions. The management and ecological monitoring and audit requirements of the Wetland Compensation Area has been elaborated in Section 4 of this report.
4	<i>“Before submission to the Director, the HCMP shall be certified by the ET Leader and verified by the IEC as confirming to the information and recommendations contained in the approved EIA Report.”</i>	Certification by the ET Leader and Verification by the IEC as confirming to the information and recommendations contained in the approved EIA Report, have been incorporated in this HCMP submission.

1.6 AECOM Asia Co. Ltd (AECOM) has been commissioned by the Civil Engineering and Development Department (CEDD) to prepare and submit the Habitat Creation and Management Plan (HCMP).

1.7 This report is to provide the implementation and establishment details for the proposed Wetland Compensation Area (WCA).

**Construction Contract Packaging**

1.8 To facilitate project management and implementation, the Project will be implemented in the following contract packages: (refer to **Figure 1.0** Project Layout Plan)

- Contract 2 (CV/2012/08)
- Contract 3 (CV/2012/09)
- Contract 4 (TCSS/NE2014/02)
- Contract 5 (CV/2013/03)
- Contract 6 (CV/2013/08)
- Contract 7 (NE/2014/03)

1.9 The details of the contracts are summarized below:

<b>Contract 2</b>	
Contract No.:	CV/2012/08
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 2
Contract Period:	The works commenced in December 2013 and will take about 54



	months to complete.
Major Scope of Works:	The works include construction of a dual two-lane trunk road (with about 0.4km of at-grade road and 4.8km of tunnel) connecting the Fanling Interchange with the proposed Sha Tau Kok Interchange, provision and installation of ventilation system, E&M works and building services works for Lung Shan tunnel and Cheung Shan tunnel and their portal buildings, Tunnel Administration Building adjacent to Wo Keng Shan Road and associated landscaping works, drainage / sewerage, waterworks, utilities and traffic engineering works.
Contractor:	Dragages Hong Kong Limited

<b>Contract 3</b>	
Contract No.:	CV/2012/09
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 3
Contract Period:	The works commenced in July 2013 and will take about 63 months to complete.
Major Scope of Works:	The works include construction of four link roads connecting the existing Fanling Highway with the south portal of the Lung Shan Tunnel, realignment of the existing Tai Wo Service Road West and Tai Wo Service Road East, widening portion of the existing Fanling Highway and the associated works, demolition of the existing vehicular bridge and footbridge at Kiu Tau and reconstruction of the Kiu Tau Footbridge.
Contractor:	Chun Wo Construction and Engineering Company Limited

<b>Contract 4</b>	
Contract No.:	NE/2014/02
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 4
Contract Period:	The works are scheduled to commence in Q3 2015.
Major Scope of Works:	The works mainly include provision and installation of Traffic Control and Surveillance System for the connecting road.

<b>Contract 5</b>	
Contract No.:	CV/2013/03
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 5
Contract Period:	The works commenced in April 2013 and will take about 24 months to complete.
Major Scope of Works:	The works include site formation of about 23 hectares of land for the development of the new Boundary Control Point (BCP), diversion/modification of Lin Ma Hang Road, landscaping works,

	drainage/sewerage, waterworks, utilities and traffic engineering works.
Contractor:	Sang Hing Civil - Richwell Machinery JV

<b>Contract 6</b>	
Contract No.:	CV/2013/08
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 6
Contract Period:	The works commenced in June 2015 and will take about 40 months to complete.
Major Scope of Works:	The works include construction of a 4.6km long dual two-lane trunk road (with about 0.6km at grade roads, 3.3km viaducts and a 0.7km tunnel) connecting Sha Tau Kok Road Interchange to BCP, and the associated environmental mitigation measures, landscaping, drainage/sewerage, waterworks and utilities works.
Contractor:	CRBC-CEC-KADEN Joint Venture

<b>Contract 7</b>	
Contract No.:	NE/2014/03
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 7
Contract Period:	The works are scheduled to commence in Q3 2015.
Major Scope of Works:	The works include construction of the Hong Kong Special Administrative Region (HKSAR) portion of four vehicular bridges and one pedestrian bridge crossing Shenzhen (SZ) River (cross boundary bridges).

## 2 PROPOSED COMPENSATION ON WETLAND IN THE EIA REPORT

### *Impact on Ecologically Sensitive Wetland*

- 2.1 According to the EIA Report, Section 9.7.6, the wetland habitat to be lost as a result of this Project is identified as freshwater wetland (mainly the abandoned wet agricultural land) only. Unlike the wetland ecosystem in the northwest New Territories, the wetland habitat found within the Works Area comprises no fishpond or intertidal mudflat and therefore the inhabiting wetland community is less diverse and lower in fauna abundance. For the river crossing section, the Connecting Road is constructed in the form of viaduct so that no permanent deck over structure and no channelization and training works are required. Also, the proposed piers or abutments of the viaduct will not encroach on the existing watercourse.
- 2.2 According to Table 9.67 of the EIA Report, 1.4ha of freshwater wetland habitat loss was identified.

### *Compensation on Wetland*

- 2.3 According to the EIA Report, Section 9.8, loss of this type of habitat was identified in Loi Tung, Wo Keng Shan and Nga Yiu Ha area. All the potentially affected freshwater wetlands are derived from wet agriculture and grown with thick herbs, predominantly *Hedychium coronarium*. The habitats are lack of active management and some are seasonally dry generally not regarded optimal habitat for wetland-dependent birds. Freshwater wetland is generally considered as having ecological value for sustaining aquatic community such as amphibian and dragonfly species. On the basis of literature review and field surveys, the abandoned wet agricultural land found within the Assessment Area was found only in moderate to low ecological value. Nonetheless, in view of its ecological potential and the ecological significance of cumulative loss of wetland, the loss of freshwater wetland is proposed to be compensated by creation of a freshwater wetland. Taking into consideration the existing situation of the habitats affected, the wetland created would be targeted for wetland communities in general (e.g. wetland associated insects and amphibians) instead of wetland-dependent birds in particular.
- 2.4 The Wetland Compensation Area (WCA) will be provided near the affected habitat as far as possible for the purpose of on-site mitigation. The low-lying area contiguous with River Ganges near Ping Yeung Interchange is proposed as a potential location for provision of compensation wetland (preliminary indicative boundary and conceptual layout plan of the WCA refer to **Figure 9.27** and **9.28** respectively). Details of the Wetland Compensation Plan (WCP) would be formulated and provided under a Habitat Creation and Management Plan during the detailed design stage.

### 3 HABITAT CREATION AND MANAGEMENT

- 3.1 The proposed Wetland Compensation Area (WCA) near the Ping Yeung Interchange adjacent to a section of Ping Yuen River was adopted. **Drawing No. C6/C00/WL-002** shows the layout of the area and site photos in **Appendix 2** show the current site condition.
- 3.2 A wetland with approximately 1.48 ha in area within the boundary of the potential Wetland Compensation Area proposed in the EIA Report was identified. Within the Area seven numbers of wetland ponds will be created between viaduct columns with various sizes by re-contour the wetland area. The water ponds are designed to receive water supply from rainfall and the Ping Yuen River. The location of the WCA is contiguous with existing river channel which enables a potential ecological linkage between the river and the wetland. With water, silt, plant, seeds and aquatic lives being washed into the ponds, a self-sustaining wetland habitat would be created. The area of compensatory wetland is proposed to be enlarged from 1.42ha to 1.48ha due to revised road alignment bounding to the east of the site, which is compared in Drawing No. **C6/C00/WL-025**.
- 3.3 Water is the major element of the wetland habitats. 60% of the Wetland is to be covered by the viaducts, rainfall is considered not the main source of fresh water supply for the Wetland. Instead, manual water inlet is proposed to secure the water supply to the Wetland (**Drawing No. C6/C00/WL-007 refers**). A layer of 'sodium bentonite waterproofing composite' will be laid at the bottom of the ponds to avoid water leaking; and suitable growing medium such as imported soil mix or sandy clay loam will be provided for wetland vegetation cultivation (**Drawing No. C6/C00/WL-016 refers**). Groundwater Level monitoring at GI No. ADH115 and ADH117 conducted in 2012 and 2013. Monitoring location and results are shown in **Appendix 1**, Groundwater levels at ADH115 ranged from +9.38 to +11.43mPD, while levels at ADH117 ranged from +8.62 to +10.84mPD. Pond beds are designed at a level of +8.00mPD to 8.50mPD. Sufficient fall will be made in the proposed Wetland area to ensure water from Ping Yuen River, fresh water and some rainwater to be collected by the ponds. To enable water supply from Ping Yuen River (River Ganges) and establishment of linkage between the River and the Wetland, several openings in form of balancing pipes with gate valves for the ponds will be constructed (**Drawing Nos. C6/C00/WL-005 and C6/C00/WL-006 refer**). Survey of the River bed was conducted on 20 August 2015 and the levels are shown in the **Drawing No. C6/C00/WL-002**. Monitoring of the water level will be conducted on a monthly basis during the coming dry season from October 2015 to March 2016. Grey water collected from the viaduct will be drained away from the wetland (**Drawing Nos. C6/C00/WL-005 and C6/C00/WL-008 refer**).
- 3.4 In order to secure the survival rate of wetland vegetation in the early stage of the wetland establishment and encourage the re-colonization and stable population of invertebrate species such as dragonfly nymph and amphibians, landscape solutions mentioned in **item 3.5 to 3.15** below will be implemented.
- 3.5 A mixture of small size native/exotic wetland plant is proposed to suit the site context. Concerning the relative slow-growing habit of the majority of native plants and the shady environment; a series of shade tolerant native and exotic wetland plants in form of 6 types of plant matrix will be planted. The fast growth exotic wetland plant may speed up the greening effect and provide a shelter to protect the slow growth native wetland plant and control weed growth to certain extend. The majority of wetland dependent species identified in the survey conducted on 25 August 2015 as shown in **Table 4-1** will be maintained, subject to the market availability. In case the wetland vegetation is not growing satisfactorily, the selection of wetland vegetation will be reviewed in later monitoring stages. Change of wetland species will be allowed when necessary.
- 3.6 Patches of bare grounds with boulders in various sizes will be introduced. The bare grounds may facilitate the germination of self-seeded vegetation and reserve as a hiding shelter or resting place for the wetland fauna. The boulders will strengthen the stability of the newly planted wetland plants and protect them from the water current damage in wet seasons.

- 3.7 In order to enhance the bio-diversity of the wetland, the soil surface of the proposed seven numbers of wetland ponds are carefully graded from 5° to 25° to suit the growth of varies plantings in different planting zones, details of planting zones are elaborated in **Table 3-1**:

**Table 3-1 Planting Zones (Planting Plan is shown in Drawing No. C6/C00/WL-014 and C6/C00/WL-017 refers)**

Wetland entrance	The entrance of wetland is open to the sky in south-west and covered by the viaduct with an average 10.8m (H) headroom in north-east. It will be fully vegetated with the shade tolerance flowering shrubs to echo the existing environment. Loading and unloading bay paved with grasscrete will be provided for the maintenance vehicular parking. Surface U-channel will be provided along the perimeter of the wetland entrance. Thus, no surface water from the wetland will be drained out and the risk of flooding will be minimized.
Dry Zone	Dry Zone is proposed at above the water level in wet season (+mPD11.5), planting will be relatively tall and no need to be immersed in water. Shade-tolerant flowering shrubs and broad leaves shrubs in the Plant Matrix 1 and 2 will be planted at Dry Zone. Some patches of bare ground will be reserved in the Dry Zone. And it naturally creates hiding shelters for birds and butterflies.
Semi Dry and Wet Zone	Semi Dry and Wet Zone is proposed at the water level in between dry and wet season (+mPD 9.5 to +mPD 11.5), planting will be able to tolerate flood and drought condition and their root system will be relative pliable but strong. Aquatic plants in the Matrix 3 and 4 are to be planted at Semi-Dry and Wet Zone. Some patches of bare ground may be reserved in the Semi Dry and Wet Zone. It encourages to sustain the aquatic communities such as amphibian and dragonfly species in year-round allow their migration within the whole wetland.
Wet Zone	Wet Zone is proposed at the water level at/below the water level at dry season (+mPD 9.5), planting will be floating on water and their root system shall be immersed in water at all time. Aquatic plants with floating habitat as identified in the Plant Matrix 5 and 6 are to be planted by the water edge at +mPD 9.5.

- 3.8 To facilitate the departmental maintenance and inspections to the Bridge Piers structures, continuous hard-paved maintenance access at min. 1000mm wide is reserved. Multiple gates will be installed at the front of each maintenance path along the public footpath. Details of vehicular access gate and pedestrian access gates are shown in Drawing Nos. **C6/C00/WL-018 and C6/C00/WL-019** respectively.
- 3.9 The habitats of the proposed wetland area include seven ponds of open water and wetland planting area. The wetland is designed to have a shallow water covering most of the wetland area during the wet season while during the dry months water can still be retained at the lower area of the ponds to sustaining the aquatic communities such as amphibian and dragonfly species year-round and allow their migration within the whole wetland. The ponds are suitable for amphibians to breed and develop larvae. Existing wetland dependent plant species will be planted on the gentle slopes of the ponds while open water will be maintained in the centre of the ponds. Area with vegetation allows safe dispersal, refuge and feeding of the amphibians. Through the openings to the Ping Yuen River, migration of aquatic communities is also expected. In long term the wetland will become an additional area to facilitate a better development of existing local insect and aquatic communities.
- 3.10 Thematic plantings will be provided along the 6m footpath of the wetland to enhance visual interest. Details of planting are shown in the Drawing Nos. **C6/C00/WL-014 and C6/C00/WL-017**.

- 3.11 Sitting out area will be provided near the entrance of wetland to encourage public enjoyment. Details of sitting out area are shown in Drawing No. **C6/C00/WL-013**.
- 3.12 Water level ruler will be provided for monitoring purpose. Details of water level ruler are shown in Drawing No. **C6/C00/WL-010**.
- 3.13 Life Buoy will be provided as safety measures, Details of life buoy are shown in Drawing No. **C6/C00/WL-009**.
- 3.14 Water retaining capacity of the created ponds will reduce the risk of flooding in the subject area.
- 3.15 To maintain the integrity of the wetland and to avoid any trespass/unauthorized activities, 1.2m railing will be constructed along the footpath of wetland. Details of railing are shown in Drawing No. **C6/C00/WL-020**.
- 3.16 The location and boundary of the proposed wetland compensation area has been slightly revised to blend in the adjacent site context. Site constraints are elaborated in **Table 3-2**, Drawing No. **C6/C00/WL-025** and **C6/C00/WL-026**.

**Table 3-2 Site Constraints Requiring the Change of Site Boundary**

1	The actual landform in relation to the formation of wetland	The proposed wetland should be designed in relatively “round” shape for better water retention, those areas in narrow or odd shape are not suitable to be converted as wetland.
2	The distance of water supply from the Ping Yeung River	According to the approved HCMP, Ping Yuen River serves as the main water supply source for the Created Wetland, area located far from Ping Yuen River was actually not feasible to be converted as wetland since there was technical constraint to discharge water from the Ping Yuen River to the area which was not directly attached to the river.
3	Some existing site levels are higher than the designed pond level of the wetland	The area opposite the Ping Yuen River was actually much higher than the design level of the Created Wetland and also there was an existing hill at the western side of the Created Wetland, where had been determined as not suitable for the construction of Wetland. Therefore, those area were omitted from the approved HCMP rev. 2.
4	The 6m hard paved path confined the extent of wetland	After the commencement of the Contract, an additional 6m hard paved path was provisioned through the Created Wetland and it physically divided the wetland in 2 parts. Further site analysis was conducted in later stage and it determined that the wetland located at northern side of the 6m hard paved path was not suitable to be converted as wetland, since it involved substantial construction cost and time implication, and it eventually weaken the cost effectiveness of the wetland.
5	Actual alignment of Ping Yuen River was further verified on site	The actual alignment of the Ping Yuen River was verified on site after the commencement of the Contract, the works boundary of the Created Wetland was therefore slightly adjusted to tally with the actual site context.

- 3.17 Summary of the considerations of the EIA Report for setting out the details of the specifications for the habitats and ecological functions are elaborated in **Table 3-3, 3-4 and 3-5**.

**Table 3-3 Summary of Details of the Specifications for the Habitats & Ecological Functions (Guiding Principles)**

	<b>Guiding Principles as identified in AEIAR Section 9.8.1</b>	<b>Design consideration in this HCMP submission</b>
1	Recognition of the potential of the WCA to compensate the loss of wetland function.	The Compensation Wetland is at 1.48ha, which is larger than the original 1.4 ha. of abandoned farmland; and it conforms to the principles of “No-Net-Loss in Wetland function”.
2	Requirement that the wetland habitats should be largely self-sustaining – once the compensation wetlands are established, management should largely limit to maintenance works.	A mix of native, shade-tolerant, drought-tolerant or aquatic species is carefully selected for the compensation wetlands. All of them are self-sustaining once the compensation wetlands are established.  The source of water will be primarily relying upon the Ping Yuen River to minimize human intervention.
3	Requirement that the wetland habitats should be provided with sustainable sources of water supply and amount of sunlight reaching the wetland habitats should be maximized as far as practicable.	The water supply will be primarily relying upon the Ping Yuen River, which is a sustainable water source in the long run.  Shadowing effect is unavoidable since 60% of at grade area is covered by the viaduct structure and it constrained the availability of direct sunlight to penetrate through the compensation wetlands.  However, the amount of sunlight is maximized by enlarging the area at the entrance of the compensations wetlands. Colorful and flowering species will be planted over there to enhance the landscape visual effect, while drought tolerant species will be planted as to adapt the contextual constraint.
4	Requirement that hydrological changes as part of the compensation wetland creation must not increase the flood risk to other basin users.	The proposed compensation wetland is designed to absorb the potential overflow from the Ping Yuen River, it helps reducing the risk of flooding.  Manmade balancing pipes will be installed between the wetland ponds and the Ping Yuen river as control of hydrological changes. Disturbance to Ping Yuen River is therefore minimized.
5	Understanding the feasibility of the provision of the required habitats and the habitat requirement of wetland communities.	Taking into consideration the existing situation of the habitats affected, the wetland created would be targeted for wetland communities in general (e.g. wetland associated insects and amphibians) instead of wetland-dependent birds in particular. Selected plant species have made reference to the Wetland Dependent Species identified in the baseline monitoring,

		which resembles the habitat requirement of existing insects and amphibians.
6	Recognition that monitoring is essential to assess the success or otherwise of the compensation wetland and to inform management decisions.	<p>Adaptive management and monitoring will be the main guiding principle. The compensation wetlands have been designed with the best available ecological information, including data on local species of conservation significance and general ecological design principles, as well as market availability of materials for construction.</p> <p>Ecological monitoring is required to evaluate the efficacy of wetland and acts as a source of empirical data to allow for adaptive management in the future.</p> <p>Active management of the subclimax community in the long-run will be the secondary guiding principle. In regard to effects of community succession, continuous and active management is required to prevent the newly-established subclimax community from being lost though minimum maintenance shall be aimed at.</p>

**Table 3-4 Summary of Details of the Specifications for the Habitats & Ecological Functions (Key Characters)**

	<b>Key Characters as identified in AEIAR Section 9.8.1</b>	<b>Design consideration in this HCMP submission</b>
1	The location of the WCA is contiguous with existing river channel which enables a potential ecological linkage between the river and the wetland.	<p>Ecological linkage of existing river channels and the wetland ponds is enhanced. Physical connection between the Ping Yuen River and the wetland compensation wetland enabled by the provision of balancing pipes which controls the intake/ discharge of water resource.</p> <p>Selection of plant species have made reference to the Wetland Dependent Species identified in the baseline monitoring, which resembles the habitat requirement of existing insects and amphibians and enhances the ecological linkage with other habitat in the vicinity.</p>
2	Rainfall and infiltration of groundwater are the main sources of water supply. Overflow of freshwater from contiguous River Ganges would provide supplementary water source. The practicability and feasibility of using River Ganges as supplementary water source would be further explored during the detailed design stage.	<p>Pursuant to AFCD's advice, groundwater is not a reliable water source, it is concerned that water in the compensation wetlands may easily leak out and soak away; and water supply from rainfall is limited by the overhead viaduct structure. Although Ping Yuen River is considered as the major water supply to the wetland via balancing pipes, additional manual water point will be provided at each pond to safeguard the water reservation in the dry season.</p> <p>To avoid water leaking from the wetland, a proprietary product - Sodium Bentonite</p>



		Waterproofing Composite will be laid to seal up the pond base, which ensures no leakage of water from the wetland to the surrounding.
3	The WCA will be re-profiled to a level comparable to the water table and the river bed level of River Ganges. The WCA is self-sustainable in water management owing to the relative high water table in the WCA.	The bottom of compensation wetland will be re-profiled to a level that is comparable to the river bed level of adjacent Ping Yuen River at approximately +8.5mPD. The water management of wetland will be self-sustainable in regard to the provision of balancing pipe, such that fluctuating water table will be equalized.
4	A total wetland area of at least 1.4 ha is proposed.	The wetland area has been maximized to 1.48 ha with regard to site opportunities.
5	The surplus of compensation area where possible, would be beneficial to mitigate the wetland loss during the time lag before the maturation of the WCA.	A surplus of 0.08 ha wetland area has been provided to mitigate the ecological loss as far as practicable.

**Table 3-5 Summary of Details of the Specifications for the Habitats & Ecological Functions (Implementation)**

	<b>Implementation as identified in AEIAR Section 9.8.1</b>	<b>Design consideration in this HCMP submission</b>
1	Identification of the exact profile of the wetland with more than 1.4 ha in area within the boundary of potential WCA. Amount of sunlight reaching the wetland should be considered during the detailed design stage of the wetland and the road infrastructure. The decision would take into account the feasibility of the plan.	1.48 ha of wetland has been identified within the boundary of potential WCA. Amount of sunlight is considered, area with direct sunlight has been maximized and variety of shade tolerant species has been proposed as appropriate.  Sufficient road infrastructure has been providing to connect with the local villages, and to serve for maintenance purpose.
2	To maintain the integrity of the proposed WCA and to avoid any trespass/unauthorized activities in the WCA, the WCA should be well demarcated and fenced off with appropriate hoarding and fencing during the construction and operation phases respectively. Maintenance parties of any hard landscape features including the fencing would be early identified.	The wetland will be fenced off with 1.2m (H) railing whilst the overall development of Liantang/ Heung Yuen Wai Boundary Control Point will be fenced off with chain-link fence to avoid any trespass/unauthorized activities.  AFCD will be the maintenance agent of all hard landscape features within the wetland, which includes the railing along the site perimeter.
3	Site formation to re-profile the WCA to reach water table level; Site clearance, re-contour the wetland area and connection with a sustainable source of water supply where appropriate.	The compensation wetlands are carefully re-profiled with comprehensive consideration of water table levels, site clearance, re-contour and the connection with a sustainable source of water supply from the Ping Yuen River.
4	Planting of wetland vegetation. When preparing the Habitat Creation and Management Plan during the detailed design stage, shade-tolerant species of wetland plants should be considered to meet the site-specific condition of the	A mix of native, shade-tolerant, drought-tolerant or aquatic species is carefully selected for the compensation wetlands. All of them are able to meet the site specific condition of the proposed WCA.

	proposed WCA.	Provisions of change to as-planted species are allowed when necessary.
5	The implementation of the proposed WCP would commence within the construction phase after completion of the construction works at Ping Yeung Section. The implementation stage would firstly include about two years for construction of the wetland site and the following planting works. After implementation stage, the wetland is self-sustainable. The practicability and feasibility of using water from River Ganges, such as lowering of river bank to allow overflow of freshwater in wet season and extraction of water from River Ganges before an inflatable dam nearby the WCA, should be further explored during the subsequent detailed design stage. Connection details between the wetland and the river bank shall be submitted to DSD for approval prior to the WCP implementation. After construction, about 12 months would be required for the establishment of the created wetland site. After the mitigation plantings are properly grown and established, AFCD would take over the maintenance and management of the ecological plantings.	The project proponent will implement the proposed WCP in accordance to the AEIAR, followed by the handover of works to AFCD for further maintenance.
6	On the basis of similar freshwater wetland setting in Wo Keng Shan and Nga Yiu Ha (upstream direction of the WCA) where direct inflow of river water is not required, it is predicted that the WCA can be self-sustained. The water source can be supplemented with inflow of freshwater from contiguous River Ganges in wet season. Supplementary water source by extraction of water from River Ganges before an inflatable dam nearby the WCA would be considered during the detailed design stage upon liaison with the relevant government departments (e.g. Drainage Services Department, AFCD and Lands Department).	<p>Ping Yuen River will be the major water supply to the wetland via balancing pipes. Additional manual water point will be provided at each pond to safeguard the water reservation in the dry season.</p> <p>Therefore, it is considered that the provision of "Supplementary water source by extraction of water from River Ganges before an inflatable dam nearby the WCA" is not necessary.</p> <p>All relevant governments including AFCD and DSD had offered "no further comment" on this submission.</p>
7	Since the WCA is self-sustainable in long term, it is expected the affected invertebrate species such as dragonfly nymph will recolonize the created wetland and develop a stable population in the WCA. Therefore, the loss of ecological function due to the loss of freshwater wetland can be fully	A Habitat Creation and Management Plan is herewith submitted for EPD's review. Designed wetland features resemble those has been lost, in order to retain ecological value in the vicinity. Habitat heterogeneity and diversity of micro habitats shall be enhanced by creating various wetland types, different vegetation composition and aerial coverage, so as to be made

<p>mitigated with the proposed WCA. A Habitat Creation and Management Plan including detailed layout, monitoring and management would be finalized and submitted in the detailed design stage before commencement of works under the Project.</p>	<p>available to various wetland wildlife. Also, areas of open water optimize ecoclone in designed irregularities whilst patches of bare zones create islands for greater niche capacity.</p>
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#### 4 MONITORING PLAN

4.1 Ecological monitoring at implementation and establishment periods will be conducted to cover the ecological attributes. Implementation of the wetland will commence within the construction phase after completion of the construction works at Ping Yeung Section. According to Section 5.3.2.4 of the latest EM&A Program (Revision 7); monitoring on the WCA will be conducted in implementation and establishment stages. The monitoring would be conducted by the Environmental Team (ET) and supervised by a qualified ecologist (Project Ecologist) who will be formed as a member of the ET.

**Table 4-1 Compliance to Section 5.3.2.4 of the latest EM&A Program (Revision 7)**

	<b>Key requirements as identified in Section 5.3.2.4 of the latest EM&amp;A Program (Revision 7)</b>	<b>Compliance made in this HCMP submission</b>
1	<i>"In order to mitigate the ecological impact of loss of 1.4 ha freshwater wetland, more than 1.4 ha Wetland Compensation Area (WCA) will be created near Nga Yiu Ha."</i>	Wetland Compensation Area comprised of an area not less than 1.4 hectares as shown in Drawing No. C6/C00/WL-025A.
2	<i>"According to the proposed plan, the programme will comprise implementation, establishment and maintenance stages."</i>	Section 5.1 described the general programme of implementation, establishment and maintenance for the Wetland Compensation Area.
3	<i>"Ecological monitoring at implementation and establishment periods will be conducted to cover the ecological attributes. Implementation of the wetland will commence within the construction phase after completion of the construction works at Ping Yeung Section."</i>	Section 4.2 – 4.9 detailed the monitoring requirement of the Wetland Compensation Area at implementation and establishment periods.
4	<i>"Monitoring on the WCA will be conducted in implementation and establishment stages. The monitoring shall be conducted by the Environmental Team (ET) and supervised by a qualified ecologist (Project Ecologist) who will be formed as a member of the ET. After establishment stage, AFCD will be responsible of the maintenance and the monitoring works, which is not covered in this Program."</i>	The monitoring would be conducted by the Environmental Team (ET) and supervised by a qualified ecologist (Project Ecologist) who will be formed as a member of the ET. After establishment stage, AFCD will be responsible of the maintenance and the monitoring works, which is not covered in this manual.

### Baseline Monitoring

- 4.2 A baseline monitoring was conducted on 25 August 2015 prior to commencement of construction. This will provide the baseline for evaluation of the success for the establishment of the wetland. Findings of the monitoring are summarized in **Table 4-1** to **Table 4-3**.

**Table 4-1 Summary of Baseline Monitoring – Wetland Dependent Species**

Common Name	Common Name	中文名	Abundance
Water Hyssop <sup>(1)</sup>	<i>Bacopa monnieri</i>	假馬齒莧	++
Blunt Signal-grass <sup>(1)</sup>	<i>Brachiaria mutica</i>	巴拉草, 爬拉草	+++
Taro <sup>(1)</sup>	<i>Colocasia esculenta</i>	芋	++
Diffuse Day-flower <sup>(1)</sup>	<i>Commelina diffusa</i>	節節草	+++
Laxspiculate Galingale <sup>(1)</sup>	<i>Cyperus distans</i>	疏穗莎草, 疏穎莎草	+
Umbrella Plant <sup>(1)</sup>	<i>Cyperus involucratus Rottb</i>	風車草	++
Short-leaved Kyllinga <sup>(1)</sup>	<i>Kyllinga brevifolia</i>	短葉水蜈蚣	++
Hairy Knotweed <sup>(1)</sup>	<i>Polygonum barbatum</i>	毛蓼	++
Notes: - <sup>(1)</sup> Wetland dependent species. - A full list of flora species recorded in the area is shown in <b>Appendix 3</b> . - Code for Abundance: +++++=dominant; ++++=abundant; +++=frequent; ++=occasional; +=scarce			

**Table 4-2 Summary of Baseline Monitoring – Dragonfly**

Common Name	Scientific Name	中文名稱	Abundance
Blue Dasher	<i>Brachydiplax chalybea flavovittata</i>	藍額疏脈蜻	+
Common Red Skimmer	<i>Orthetrum pruinosum neglectum</i>	赤褐灰蜻	+
Wandering Glider	<i>Pantala flavescens</i>	黃蜻	+++++
Pied Skimmer	<i>Pseudothemis zonata</i>	玉帶蜻	+
Crimson Dropwing	<i>Trithemis aurora</i>	曉褐蜻	++
Note: Code for Abundance: +++++=dominant; ++++=abundant; +++=frequent; ++=occasional; +=scarce			

**Table 4-3 Summary of Baseline Monitoring – Butterfly**

Common Name	Scientific Name	中文名稱	Abundance
Common Mormon	<i>Papilio polytes polytes</i>	玉帶鳳蝶	+
Common Grass Yellow	<i>Eurema hecabe hecabe</i>	寬邊黃粉蝶	+
Angled Castor	<i>Ariadne ariadne alterna</i>	波蚨蝶	+
Great Egg-fly	<i>Hypolimnas bolina kezia</i>	幻紫斑蚨蝶	+
Common Sailer	<i>Neptis hylas hylas</i>	中環蚨蝶	+
Common Sergeant	<i>Athyma perius perius</i>	玄珠帶蚨蝶	+
Red Ring Skirt	<i>Hestina assimilis assimilis</i>	黑脈蚨蝶	+
Note: Code for Abundance: +++++=dominant; ++++=abundant; +++=frequent; ++=occasional; +=scarce			

### Monitoring in implementation and establishment stage

4.3 Monitoring in implementation and establishment stage is summarized in the **Table 4-4** and findings of the monitoring would be reported in the Monthly and Quarterly EM&A Reports.

**Table 4-4** Summary of Monitoring in Implementation and Establishment Stage

Monitoring Parameters	Frequency
Site Inspection	Weekly
Monitoring of Water level in the ponds	Monthly
Monitoring of Water Quality	Monthly (for in-situ parameters)
	Every six months (for laboratory testing)
Monitoring of Vegetation Cover	Every six months
Monitoring of Dragonflies	Twice per month (April to August)
	Monthly (September to March)
Monitoring of Butterflies	Monthly
Amphibians	Monthly (March to October)
	Every two Months (November to February)

4.4 Monitoring of Water level in the ponds

Monitoring of water level at the centre of each ponds will be conducted at a monthly basis.

4.5 Monitoring of Water Quality

In-situ water quality will be measured in each pond once per month. The following parameters will be monitored:

- Temperature
- pH
- Dissolved Oxygen
- Turbidity

In addition, every six months (end of the wet season, in September, and end of the dry season, in March) water samples will be collected at each pond and the following parameters will be tested by a HOKLAS laboratory:

- Ammoniacal nitrogen
- Biochemical oxygen demand
- Total oxidized nitrogen
- Total phosphorus
- Total reactive phosphorus (orthophosphate)

4.6 Monitoring of Vegetation Cover

Detailed floristic surveys will be conducted at six monthly intervals at the end of the wet season (September) and the end of the dry season (March). A numbers of 2mx2m quadrats will be used for the survey. Within each quadrat all plant species and their densities will be identified to species-level and estimated respectively. The percentage cover of bare ground, leaf litter cover and coverage by each species will be measured. The tallest height of each plant species will be measured in nearest cm. Any rare or protected species will also be identified.

#### 4.7 Monitoring of Dragonflies and Butterflies

Dragonfly and butterfly utilization of the site will reflect the effectiveness of the wetland and will be useful in assessing the effectiveness of the management strategy. Surveys for dragonflies and butterflies will be undertaken twice per month during the peak period of dragonfly emergence in April to August. Monthly monitoring will be conducted during other months. Survey will be conducted during the middle of the day to coincide with the peak flight time for these species. During the surveys a fixed survey route will be followed. All dragonfly species observed will be identified and counted. Dragonfly exuviae will be recorded qualitatively to monitoring breeding success. All butterfly species will be identified and numbers estimated quantitatively or semi-quantitatively.

#### 4.8 Monitoring of Amphibians

Amphibians migrated to the wetland area, breeding and development of larvae will be surveyed. Survey will be conducted monthly (March to October) and bi-monthly (November to February). A dip net and bottle-traps may be used depends on the condition by the time of the survey.

#### Performance Limits and Action Plans

4.9 **Table 4-5** shows the proposed Wetland Quality Performance Limits and the corresponding Contingency Plans. The proposed plans will be reviewed and updated on a quarterly basis by the ER based on the monitoring results and situation of the site in future. Any proposed changes, if necessary, would be agreed with ET, Ecologist and IEC and submitted to relevant Authority for approval.

**Table 4-5** Wetland Quality Performance Limits and Contingency Plan

Monitoring Parameters	Action Level	Limit Level	Action
Flooding/storm damage	NA	NA	Discuss among ETL, Ecologist, IEC, ER and the Contractor to review and determine damage. If necessary, ER to review design and agree mitigation measures with ETL, Ecologist and IEC, and the Contractor to undertake repairs/modifications.
Area of water coverage in wet season	<50%	Water in one of the ponds is isolated	<b>AL:</b> Double the monitoring frequency. Discuss among ETL, Ecologist, IEC, ER and the Contractor to Identify and review the problem. Action plan for the limit level exceedance should be implemented in case further deterioration is expected.
Monitoring Parameters	Action Level	Limit Level	Action
			<b>LL:</b> Discuss among ETL, Ecologist, IEC, ER and the Contractor to Identify and review the problem. If necessary, ER to review design and agree on mitigation measures with ETL, Ecologist and IEC, and the Contractor to undertake repairs/modifications to establish linkage for all water ponds.
Area of water coverage in dry season	<10%	Water depth in one of the ponds <100mm	<b>AL:</b> Double the monitoring frequency. Discuss among ETL, Ecologist, IEC, ER and the Contractor to Identify and review the problem. Action plan for the limit level exceedance should be implemented in case further deterioration is expected.  <b>LL:</b> Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. If necessary, ER to review design and agree on mitigation measures with ETL, Ecologist and IEC, and the Contractor to undertake repairs/modifications to maintain water level at 100mm.
Monitoring of Water Quality	AL and LL will be established after the wetland formed.		<b>AL:</b> Double the monitoring frequency. Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. Action plan for the limit level exceedance should be implemented in case further deterioration is expected.  <b>LL:</b> Discuss among ETL, Ecologist, IEC, ER and the

			Contractor to identify and review the problem and if necessary agree on mitigation measures. The Contractor will be responsible to undertake repairs/modifications to resume the water quality.
Vegetation in permanent open water designed last during dry season	Area >10%	Area >20%	<b>AL:</b> Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. Action plan for the limit level exceedance should be implemented in case further deterioration is expected.  <b>LL:</b> The Contractor will be responsible to remove the vegetation.
Vegetation cover on the seasonal water level fluctuation area	Area <60%	Area <40%	<b>AL:</b> Double the monitoring frequency. Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. Action plan for the limit level exceedance should be implemented in case further deterioration is expected.  <b>LL:</b> Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem, in particular the species of planting. The Contractor will be responsible to undertake supplemental planting.
Monitoring of Dragonflies	Species identified in the baseline monitoring cannot be found in two successive monitoring periods	Species identified in the baseline monitoring cannot be found in four successive monitoring periods	<b>AL:</b> Double the monitoring frequency. Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. Action plan for the limit level exceedance should be implemented in case the problem is likely due to the Project works or the design.  <b>LL:</b> Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. ER/The Contractor to provide feasible mitigation measures in case the problem was due to the Project works. If necessary, ER to review the design and the Contractor to provide necessary modification.
Monitoring of Butterflies	Species identified in the baseline monitoring cannot be found in two successive monitoring periods	Species identified in the baseline monitoring cannot be found in four successive monitoring periods	<b>AL:</b> Double the monitoring frequency. Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. Action plan for the limit level exceedance should be implemented in case the problem is likely due to the Project works or the design.  <b>LL:</b> Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. ER/The Contractor to provide feasible mitigation measures in case the problem was due to the Project works. If necessary, ER to review the design and the Contractor to provide necessary modification.
<b>Monitoring Parameters</b>	<b>Action Level</b>	<b>Limit Level</b>	<b>Action</b>
Amphibians	Not observed	Not observed in two successive monitoring periods	<b>AL:</b> Double the monitoring frequency. Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. Action plan for the limit level exceedance should be implemented in case the problem is likely due to the Project works or the design.  <b>LL:</b> Discuss among ETL, Ecologist, IEC, ER and the Contractor to identify and review the problem. ER/The Contractor to provide feasible mitigation measures in case the problem was due to the Project works. If necessary, ER to review the design and the Contractor to provide necessary modification.

## 5 IMPLEMENTATION PROGRAMME

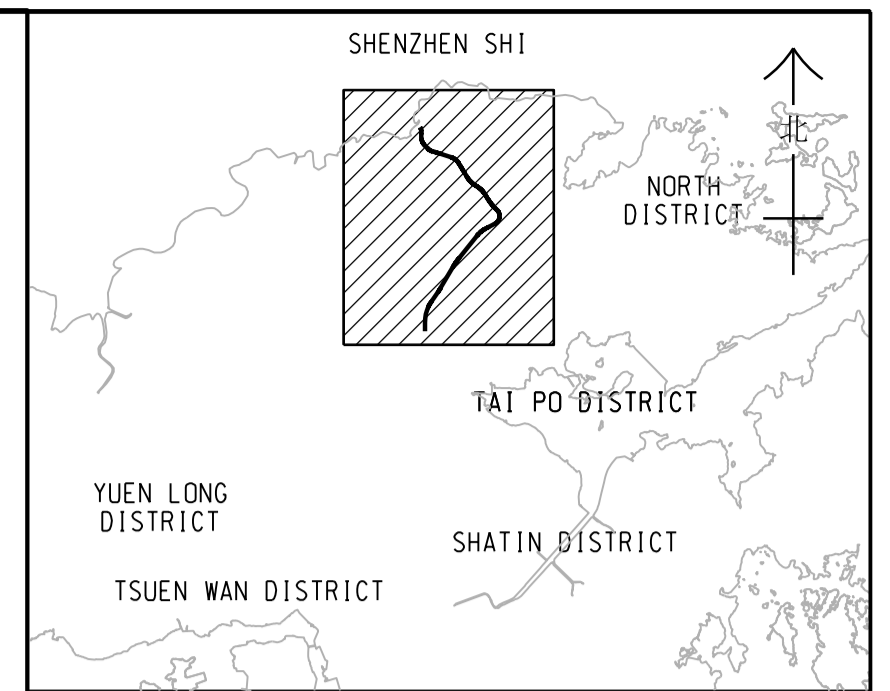
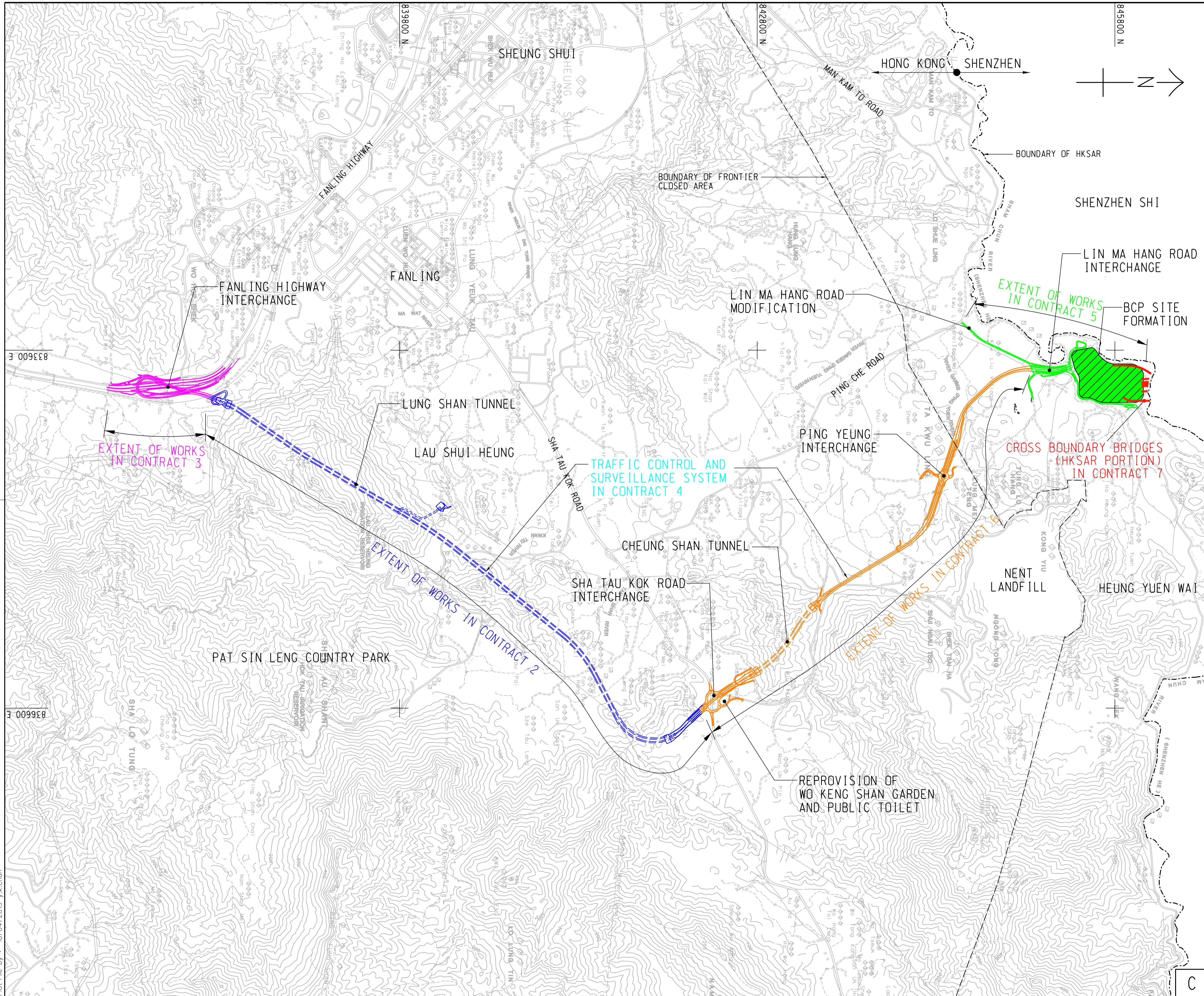
- 5.1 The wetland would be constructed after completion of the construction works at Ping Yeung Section. The implementation stage would firstly include about two years for construction of the wetland. After construction, about twelve months would be required for the establishment of wetland habitats.
- 5.2 The management details of the WCA depends on the ecological monitoring and audit results and will be provided at the later stage of the establishment period.
- 5.3 After establishment stage, AFCD will be responsible of the maintenance and the monitoring works.
- 5.4 Connection details between the wetland and the river bank would be submitted to DSD for approval prior the construction.
- 5.5 According to EP Condition 3.6, all measures recommended in the Habitat Creation and Management Plan approved under Condition 2.10 of this Permit respectively shall be fully implemented and thereafter maintained.
- 5.6 The Permit Holder shall ensure the ecological mitigation measures stated in Habitat Creation and Management Plan are properly implemented, maintained and monitored during the entire period of the life of the Project.
- 5.7 This submission had taken into account the recommendations of the EIA Report to set out details of the specifications for the habitats and ecological functions and to define the management and ecological monitoring and audit requirements of the Wetland Compensation Area.
- 5.8 This HCMP had been certified by the ET Leader and verified by the IEC as confirming to the information and recommendations contained in the approved EIA Report.

## 6 CONCLUSION

- 6.1 1.4ha of freshwater wetland habitat loss was identified in the EIA Report. On the basis of literature review and field surveys, the abandoned wet agricultural land found within the Assessment Area was found only in moderate to low ecological value. Nonetheless, in view of its ecological potential and the ecological significance of cumulative loss of wetland, the loss of freshwater wetland is proposed to be compensated by creation of a freshwater wetland.
- 6.2 The Permit Holder is therefore required to compensate a freshwater wetland area not less than 1.4 hectares and provide a Habitat Creation and Management Plan (HCMP).
- 6.3 This is the Habitat Creation and Management Plan (HCMP) provide with detailed information for the implementation and establishment of a **1.48ha** in area of freshwater wetland.



## Figures



LOCATION PLAN  
SCALE 1 : 30000

LEGEND:  
----- UNDERGROUND WORKS

REV. 修訂	DESCRIPTION 內容摘要	D.C. 校核	C.K. 查核	DATE 日期

**CEDD** 土木工程拓展署  
Civil Engineering and Development Department

LIAN TANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS (SITE FORMATION AND INFRASTRUCTURES) - DESIGN AND CONSTRUCTION

PROJECT LAYOUT PLAN

**AECOM**

DRG.NO. 圖紙編號 60212563/PLP/001

DESIGNED BY 設計	CONTRACT NO. 合約編號	P. D.C. APPROVED 審核人
DRAWN BY 繪圖	STATUS 階段	
ZJ		

SCALE 比例 A1 1 : 15000 A3 1 : 30000  
DIMENSIONS ARE IN 尺寸單位 METRES  
© COPYRIGHT RESERVED 版權所有

Plot File by : 10/04/2015 y.k.chan

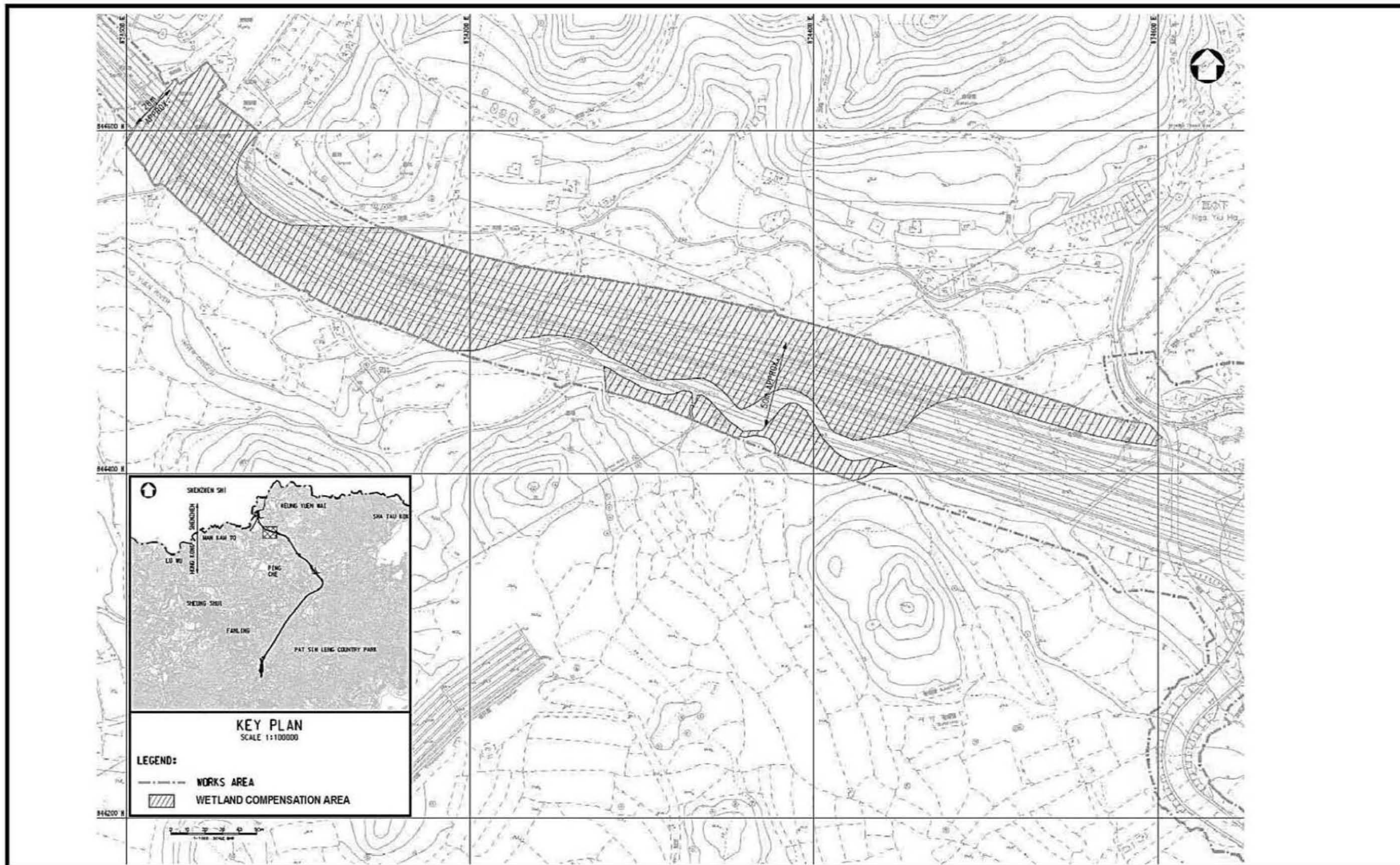


Figure 2b  
圖二 b

Liangtang / Heung Yuen Wai Boundary Control Point and Associated Works 蓮塘/香園圍口岸與相關工程

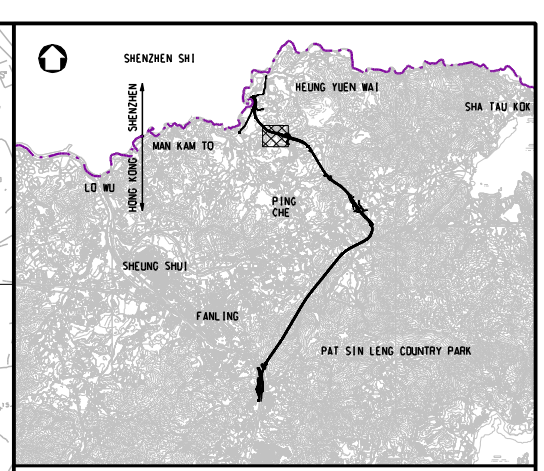
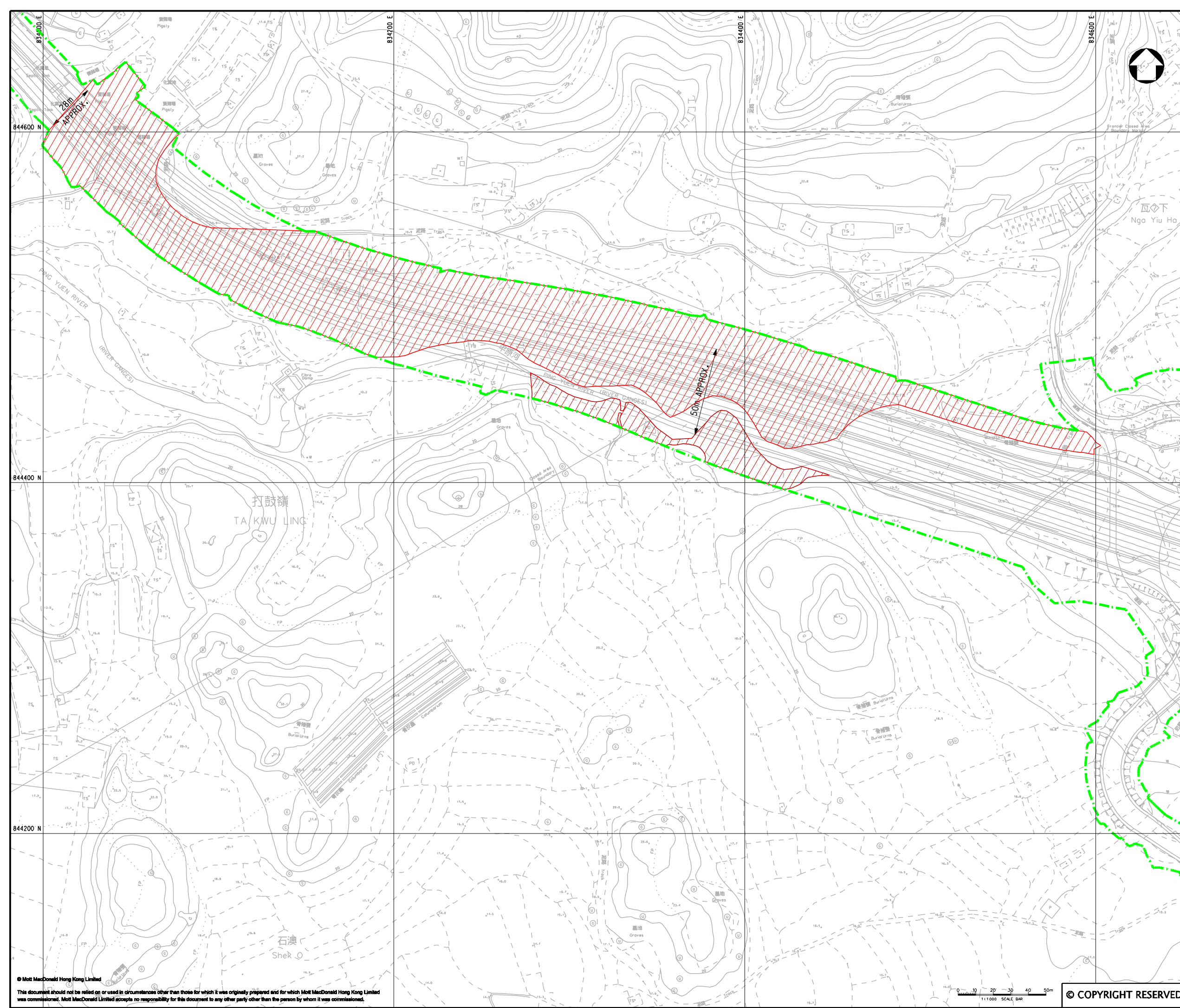
Location of Wetland Compensation Area 濕地補償地區位置

The figure was prepared based on Figure 2 b of Application for Variation of Environmental Permits (No. VEP466/2015)  
本圖是根據更改環境許可證申請(編號:VEP466/2015)的圖二 b 編制

Environmental Permit No.:EP-404/2011/D

環境許可證編號:EP-404/2011/D





**KEY PLAN**  
SCALE 1:100000


- LEGEND:**
- - - WORKS AREA
  - / / / / PROPOSED WCA

P2	NOV 10	MING	GENERAL REVISION	PW	HT
P1	OCT 10	MING	FIRST ISSUE	PW	HT
Rev	Date	Drawn	Description	Ch'k'd	App'd



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F +852 2827 1823  
W www.mottmac.com.hk

Client



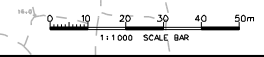
**CIVIL ENGINEERING  
AND DEVELOPMENT  
DEPARTMENT**

Project  
AGREEMENT NO. CE45/2008 (CE)  
LIANTANG/HEUNG YUEN WAI BOUNDARY  
CONTROL POINT AND ASSOCIATED WORKS

Title  
**INDICATIVE BOUNDARY OF THE POTENTIAL  
WETLAND COMPENSATION AREA**

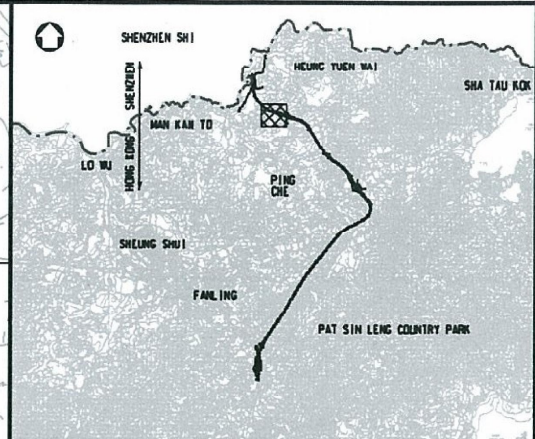
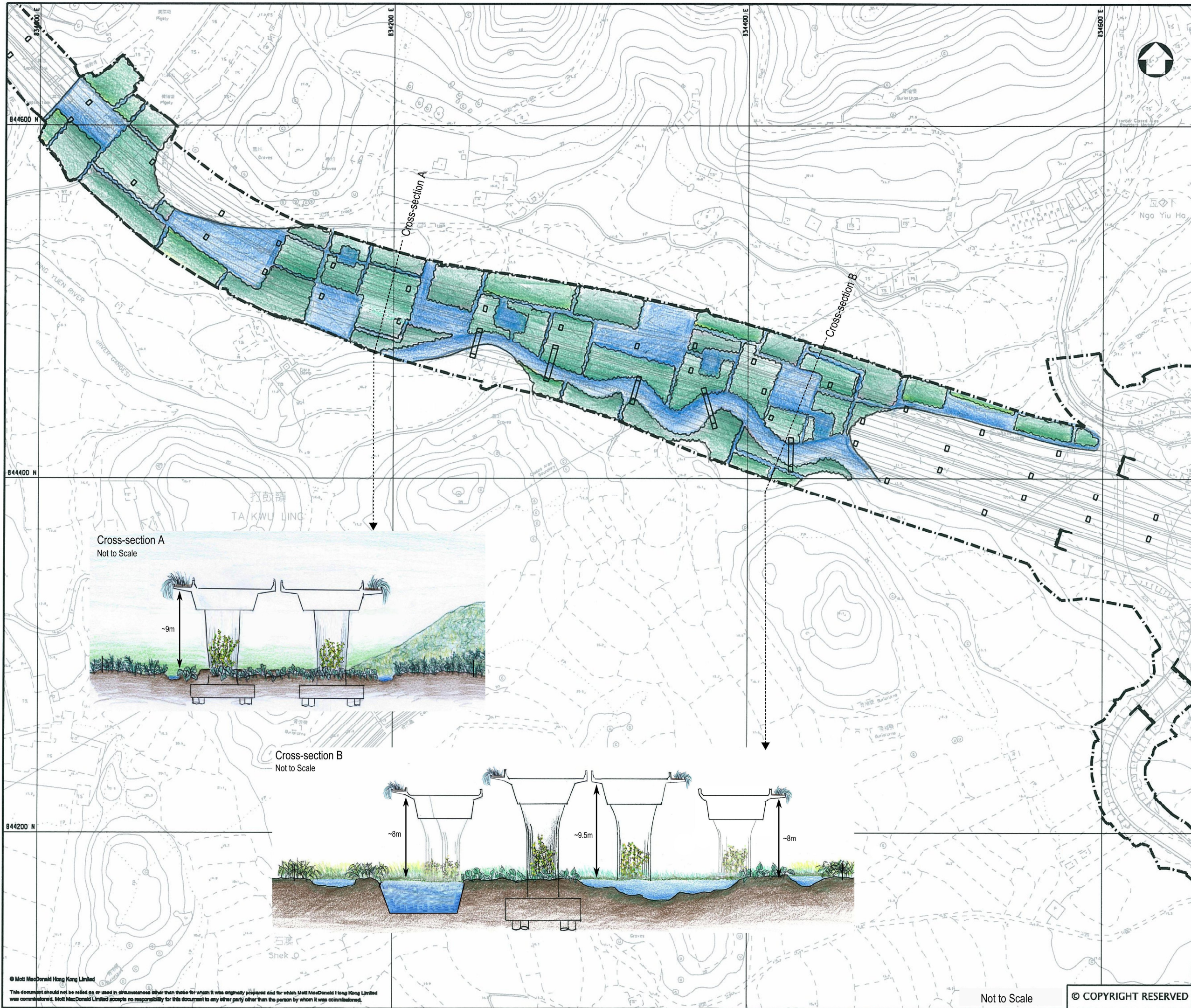
Designed	HY	Eng.Chk.	EC	
Drawn	MING	Coordination	EC	
Dwg.Chk.	HY	Approved	HT	
Scale at A1	1:1000	Project	255228	Status
		CAD file	LV255228\REPORT\ENV\SI\A1\015\FIG_9-27.dgn	PRE
Drawing No				Rev
				P2

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FIGURE 9.27



**KEY PLAN**  
SCALE 1:100000

- LEGEND:**
- WORKS AREA
  - OPEN WATER
  - INDICATIVE WETLAND PLANTING

P1	OCT 10	MING	FIRST ISSUE	GC	HT
Rev	Date	Drawn	Description	Ch'kd	App'd

**Mott MacDonald**

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**CEDD** CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Project: AGREEMENT NO. CE45/2008(CE)  
LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS

Title: CONCEPTUAL PLAN AND TYPICAL CROSS-SECTION VIEWS OF THE PROPOSED WETLAND COMPENSATION AREA

Designed	HY	Eng.Chk.	EC
Drawn	MING	Coordination	EC
Dwg.Chk.	HY	Approved	HT
Scale at A1	Project	255228	Status
Not to Scale	CAD file		PRE
Drawing No			Rev
			P1

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## Drawings

AECOM

# Proposed freshwater wetland habitat

Agreement No. CE 38/2010 (CE)

Liantang/ Heung Yuen Wai Boundary Control Point and Associated Works  
(Site Formation and Infrastructures) – Design and Construction

- The EIA identified 1.4ha of freshwater wetland habitat loss due to the proposed construction.
- On the basis of literature review and field surveys, the abandoned wet agricultural land found within the Assessment Area was found only in moderate to low ecological value.
- Nonetheless, in view of its ecological potential and the ecological significance of cumulative loss of wetland, the loss of freshwater wetland is proposed to be compensated by creation of a freshwater wetland.



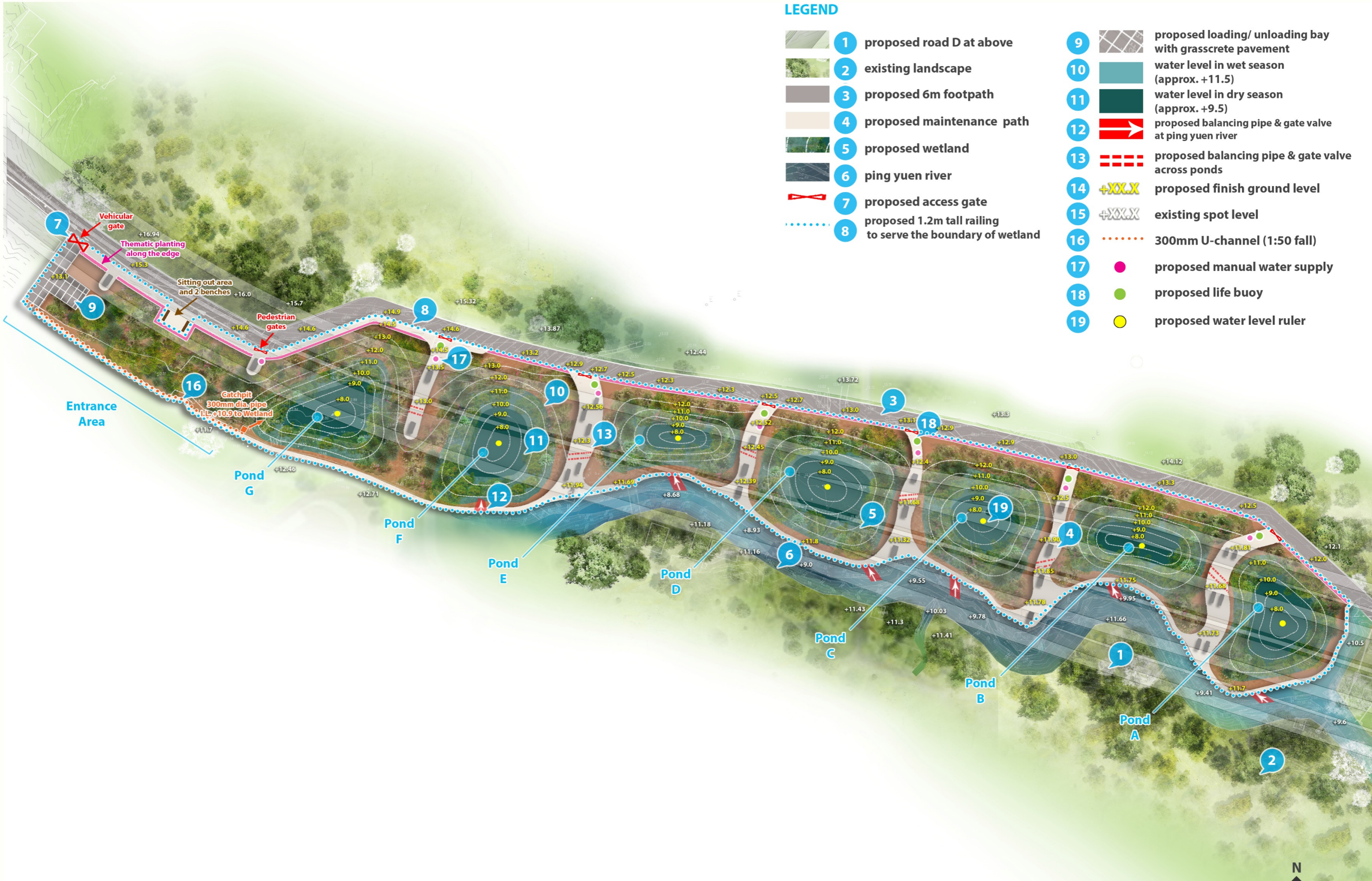
## Background & Existing Site Conditions

Figure No.: C6/C00/WL-001



**LEGEND**

- 1 proposed road D at above
- 2 existing landscape
- 3 proposed 6m footpath
- 4 proposed maintenance path
- 5 proposed wetland
- 6 ping yuen river
- 7 proposed access gate
- 8 proposed 1.2m tall railing to serve the boundary of wetland
- 9 proposed loading/ unloading bay with grasscrete pavement
- 10 water level in wet season (approx. +11.5)
- 11 water level in dry season (approx. +9.5)
- 12 proposed balancing pipe & gate valve at ping yuen river
- 13 proposed balancing pipe & gate valve across ponds
- 14 +XXX.X proposed finish ground level
- 15 +XXX.X existing spot level
- 16 ..... 300mm U-channel (1:50 fall)
- 17 ● proposed manual water supply
- 18 ● proposed life buoy
- 19 ● proposed water level ruler

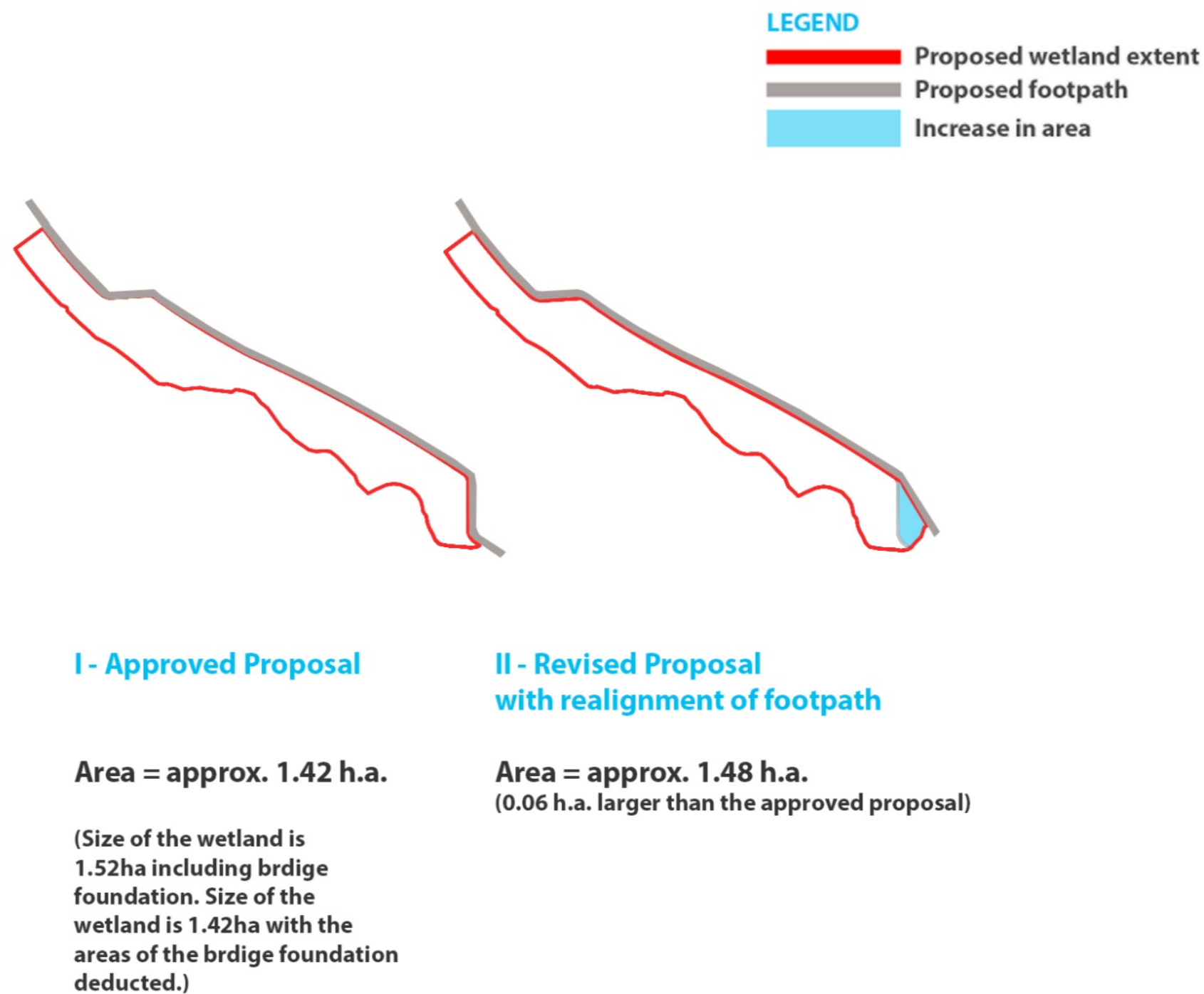


**Proposed Wetland Layout Plan**

Figure No.: C6/C00/WL-002

1 5 10 20 50m  
scale - 1:500 @ A1

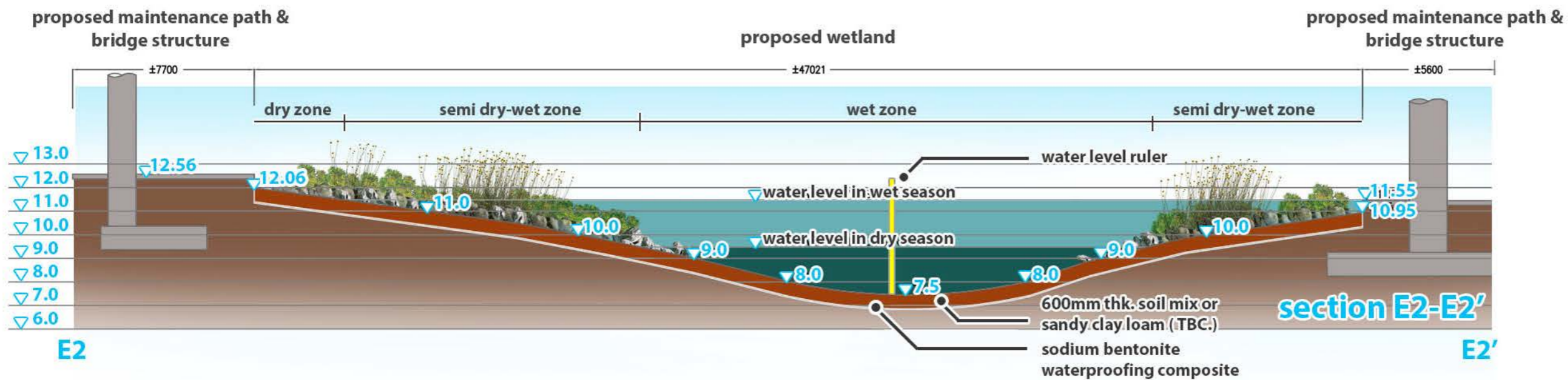
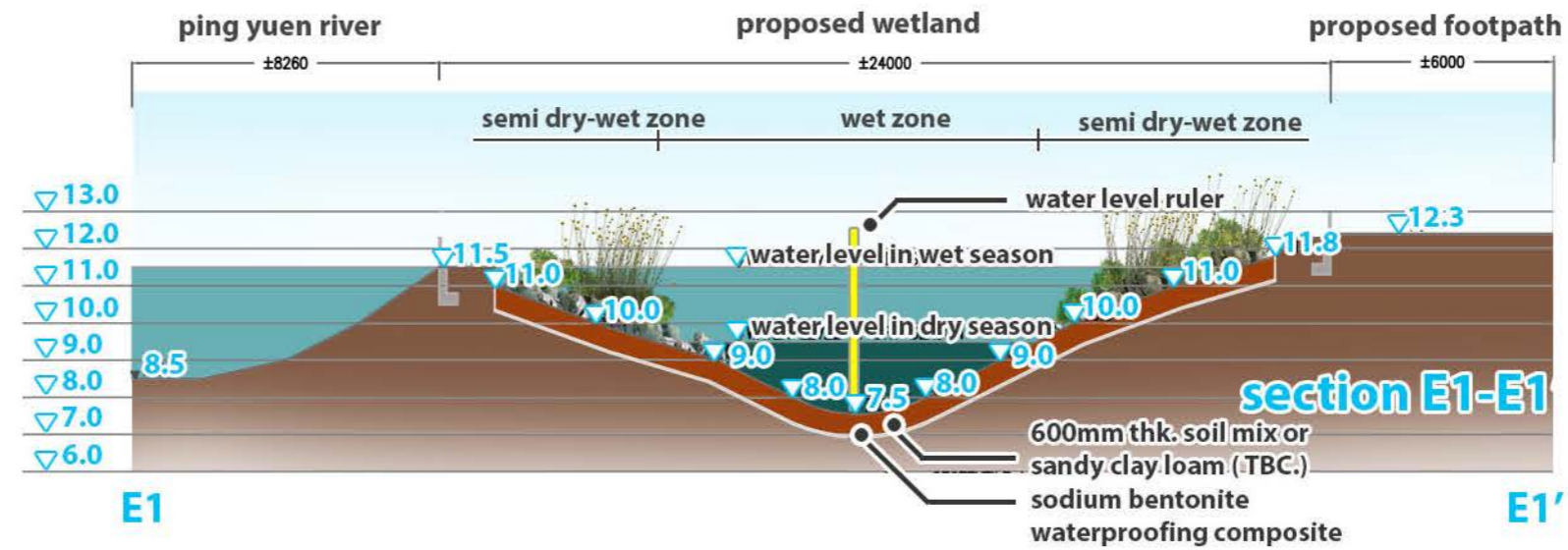
- Extract of Habitat Creation and Management Plan (Rev. 2) - Para.6.2:
  - The Permit Holder is therefore required to compensate a freshwater wetland area not less than 1.4 hectares and provide a Habitat Creation and Management Plan (HCMP).



## Area of Proposed Freshwater Wetland

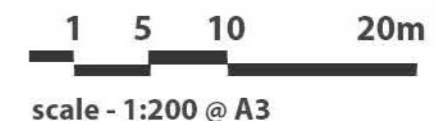
Figure No.: C6/C00/WL-003

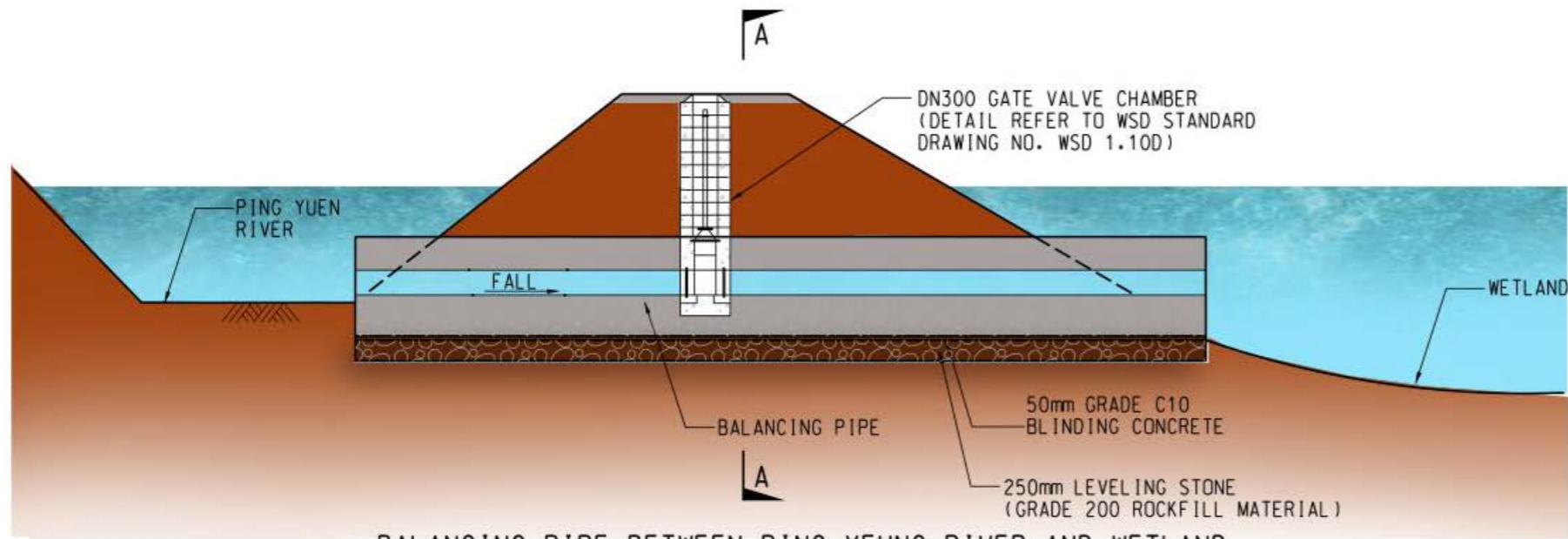
- Estimated Water level
  - wet season = approx. +11.5
  - dry season = approx. +9.5
- Aquatic plants with boulders to be planted above +9.5
- Provision of 600mm thick Clear soil depth
- Provision of maintenance access and footpath
- Proposed wetland to be surrounded with railing



## Typical Section of Proposed Wetland Pond

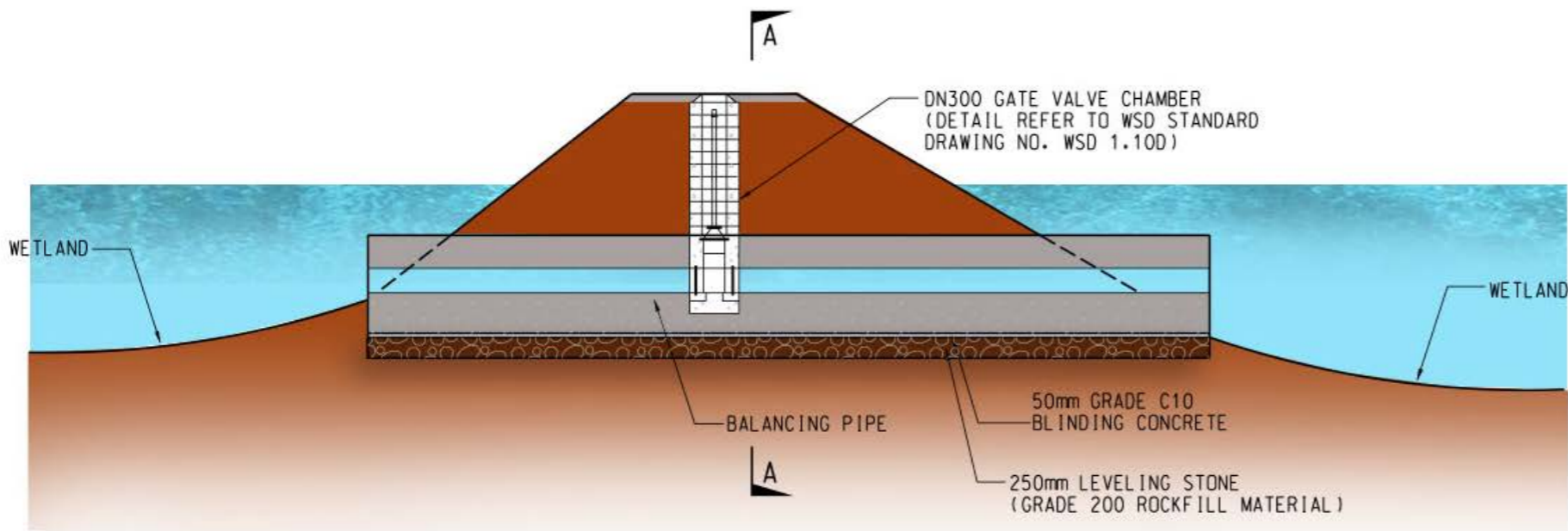
Figure No.: C6/C00/WL-004





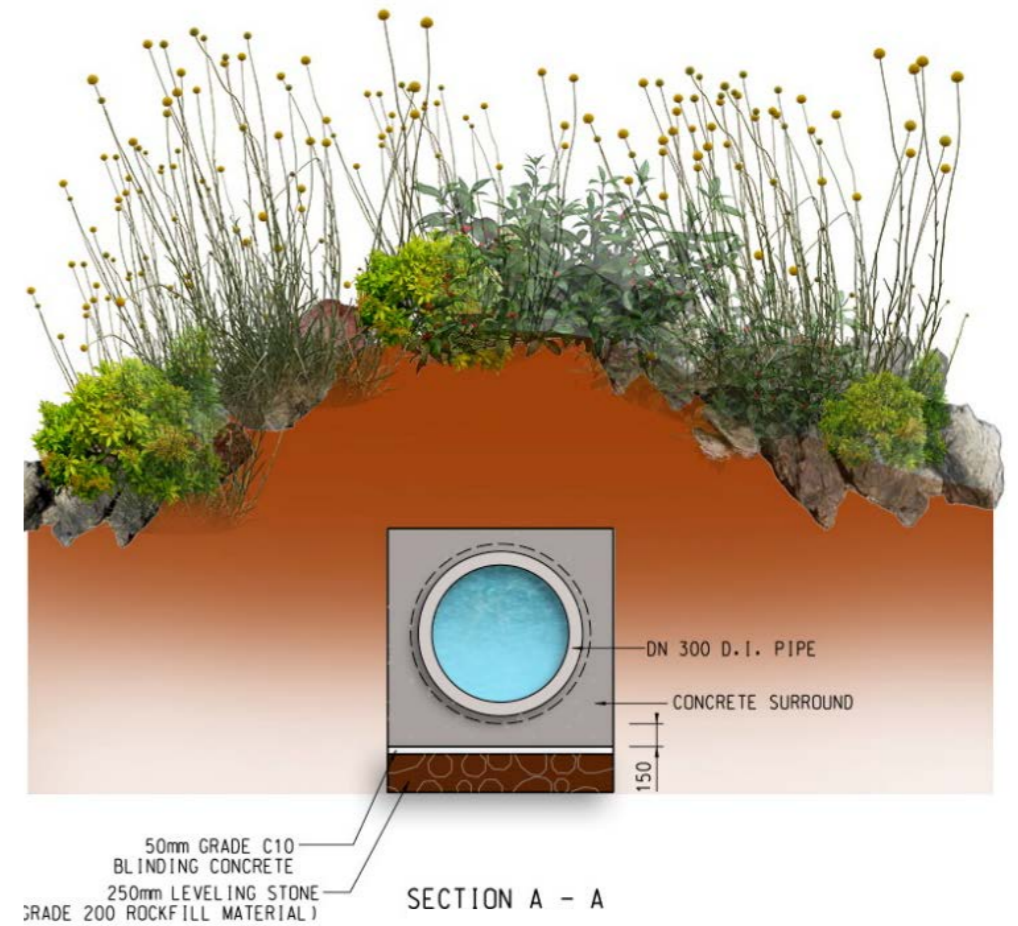
BALANCING PIPE BETWEEN PING YEUNG RIVER AND WETLAND

SCALE 1 : 100



BALANCING PIPE BETWEEN WETLAND PONDS

SCALE 1 : 100

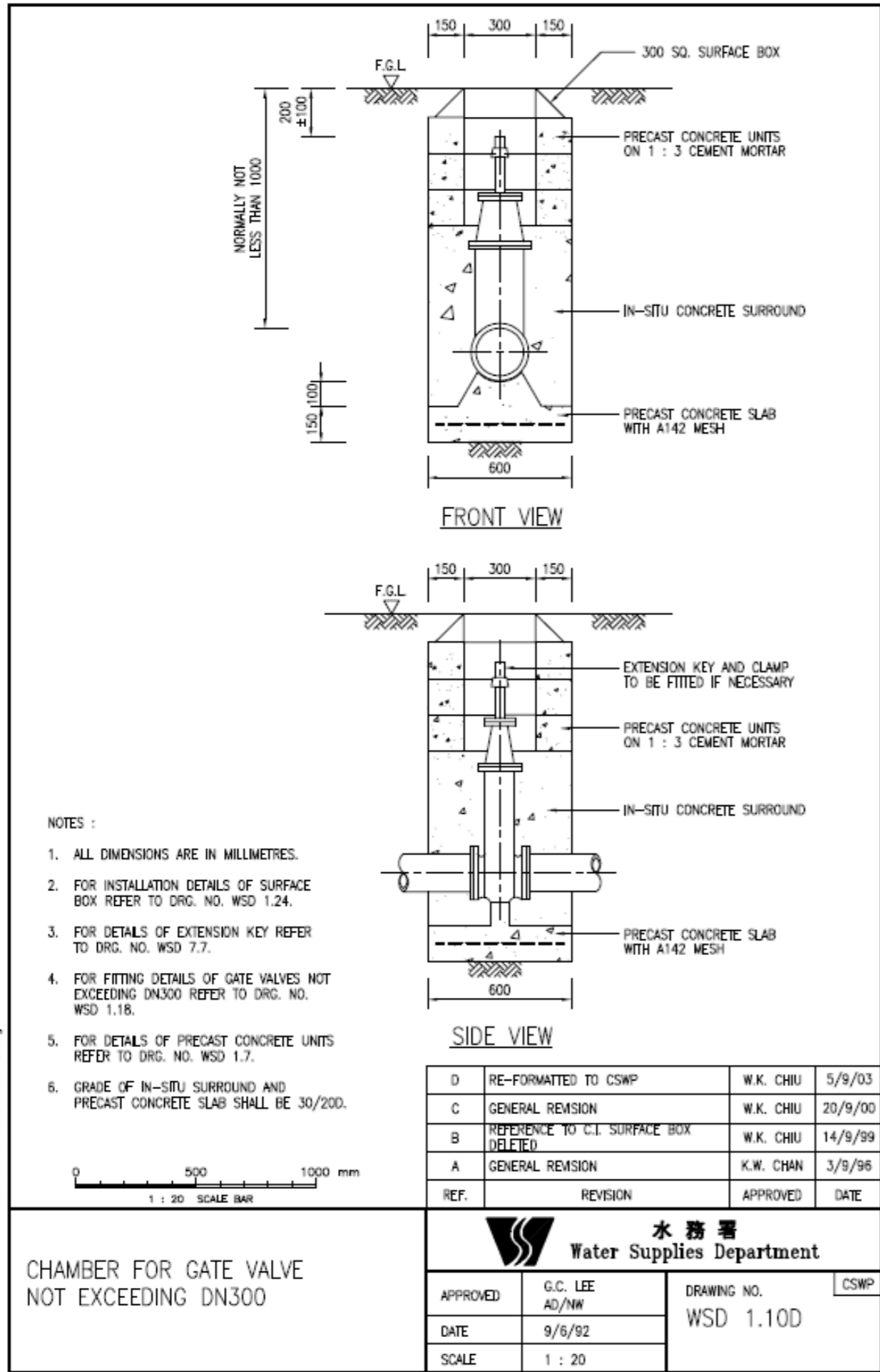


SECTION A - A

\* Please note that all dimensions to be confirmed.

## Typical Details of Balancing Pipe and Gate Valve

Figure No.: C6/C00/WL-005



## WATERFRONT

### Waterfront 263 Metal Seated Gate Valve 50 - 300mm

Gate Valves function is to isolate or sectionalise any piece of equipment or length of pipeline in water or sewage systems. It is normal practice, therefore, to use them on a suction and delivery branches of pumps at regular intervals along a pipeline, at branches underneath air valves, on bypasses, on drains or washouts etc. They have a low head loss coefficient, hence are ideal on pump installations to maximise system efficiency.



#### Design Features

- Stem cap or handwheel operation
- Underground service
- CLOSE clockwise
- Lifelong sealing
- Epoxy coating to BS6920
- Gland bolt housing arranged for easy removal of bolts
- Service areas: Waterworks / Drainage / Sewage / Sea Water / Potable water / Alkalies acids / Dilute acids etc
- Stem cap: Shear device to prevent overtorque
- Body: minimal height for strength and rigidity
- Seats: Mechanically fixed to the wedge and body
- Spindle: non-rising type with strong square thread
- Flange drilling: BS/ANSI/JIS and on request

#### Coating

Electrostatically fusion powder coated epoxy with full tests of effect on water quality of BS6920.

#### Testing

All valves are machine tested on each face to the nominal pressure and on the body to the test pressure in accordance with BS5163 -1&2, BS EN1074 - 1&2, BS EN12266-1.

Working pressure	16 Bar
Body test pressure	25 Bar
Seat test pressure	17.6 Bar

\*The right to change or modify product design without prior notice is reserved. Issue: 09/15

**WATERFRONT FLUID CONTROLS LTD**  
www.waterfront.co.uk  
The Hub (Unit 8), Digital Media Quarter, Pacific Drive, Glasgow, G51 1EA  
Tel: +44(0)141 427 7266 Fax: +44(0)141 427 2706  
Email: sales@waterfront.co.uk  
Company Reg No: 305356 VAT Reg No: 894898138

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## WATERFRONT

### Gate Valve Specifications

DN	L	-H	-H1	Ø W	-KG
50	178	329	275	160	14.5
65	190	368	317	200	18
80	203	390	344	200	23
100	229	425	381	200	34
150	267	521	491	254	52.5
200	292	608	585	305	105
250	330	712	700	406	136
300	356	792	791	406	182

\*All dimensions in mm.

COMPONENT	MATERIAL
Body/Bonnet/Stem Seal Housing Bridge	Spheroidal Graphite Cast Iron BS EN1563 Grade 450-10 or 500-7
Obturator and Wedge Gate	Spheroidal Graphite Cast Iron BS EN1563 Grade 450-10 or 500-7
Body Seat	Copper Alloy BS EN1982 Grade CC331G
Obturator and Wedge Gate Facing	Copper Alloy BS EN1982 Grade CC331G
Stem	Stainless Steel BS EN10088-1 Grade 1.4057
Stem Nut	Copper Alloy BS EN1982 Grade CC331G
Fixing Bolts/Nuts/Studs/Washers	Stainless Steel BS EN10088-1 Grade 1.4301
Gasket	EPDM or NBR BS EN681-1 and BS6920
O-Ring	EPDM or NBR BS EN681-1 and BS6920
Stem Cap/Handwheel	Spheroidal Graphite Cast Iron BS EN1563 Grade 450-10 or 500-7
Position Indicator (optional)	Plastic

\*Alternative materials available on request

\*The right to change or modify product design without prior notice is reserved. Issue: 09/15

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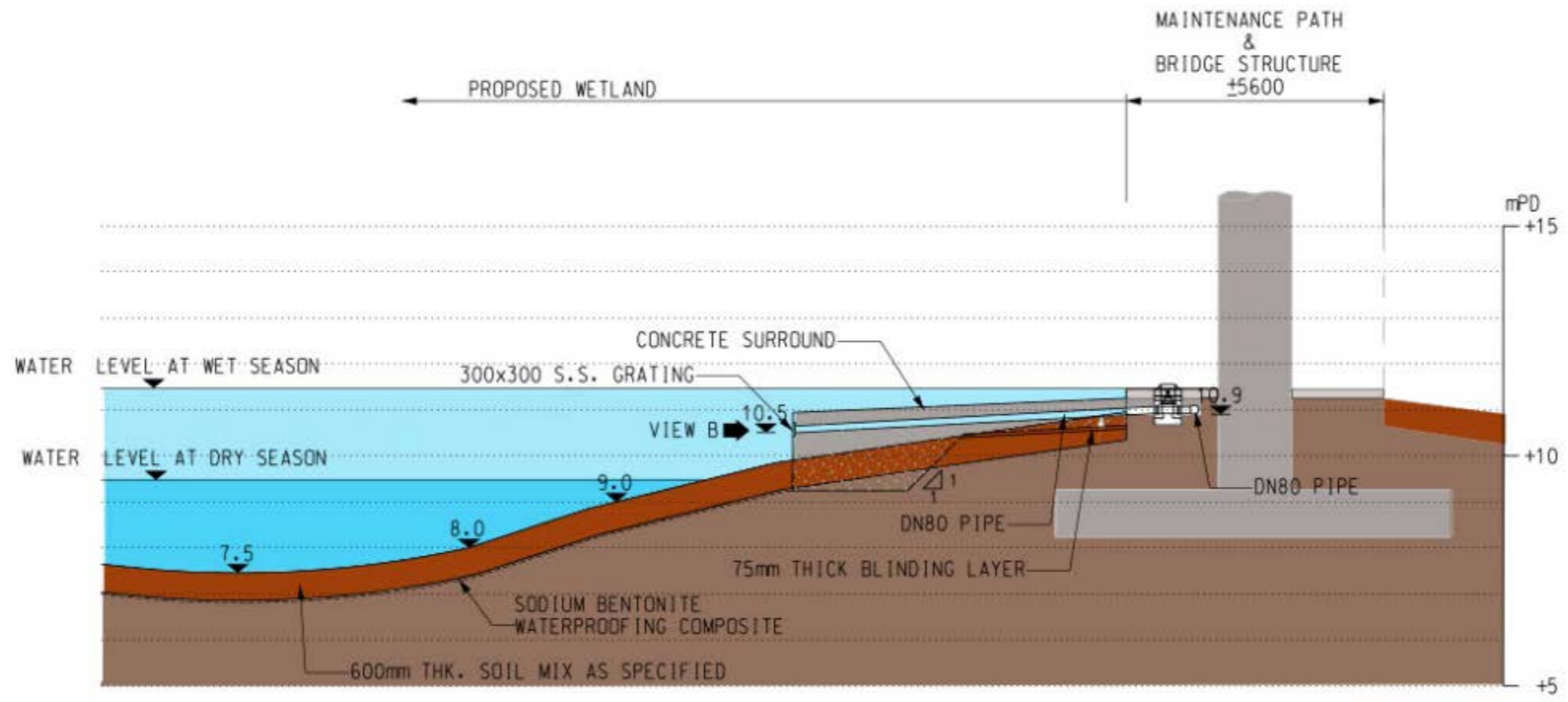
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Gate valve for controlling the change of water level

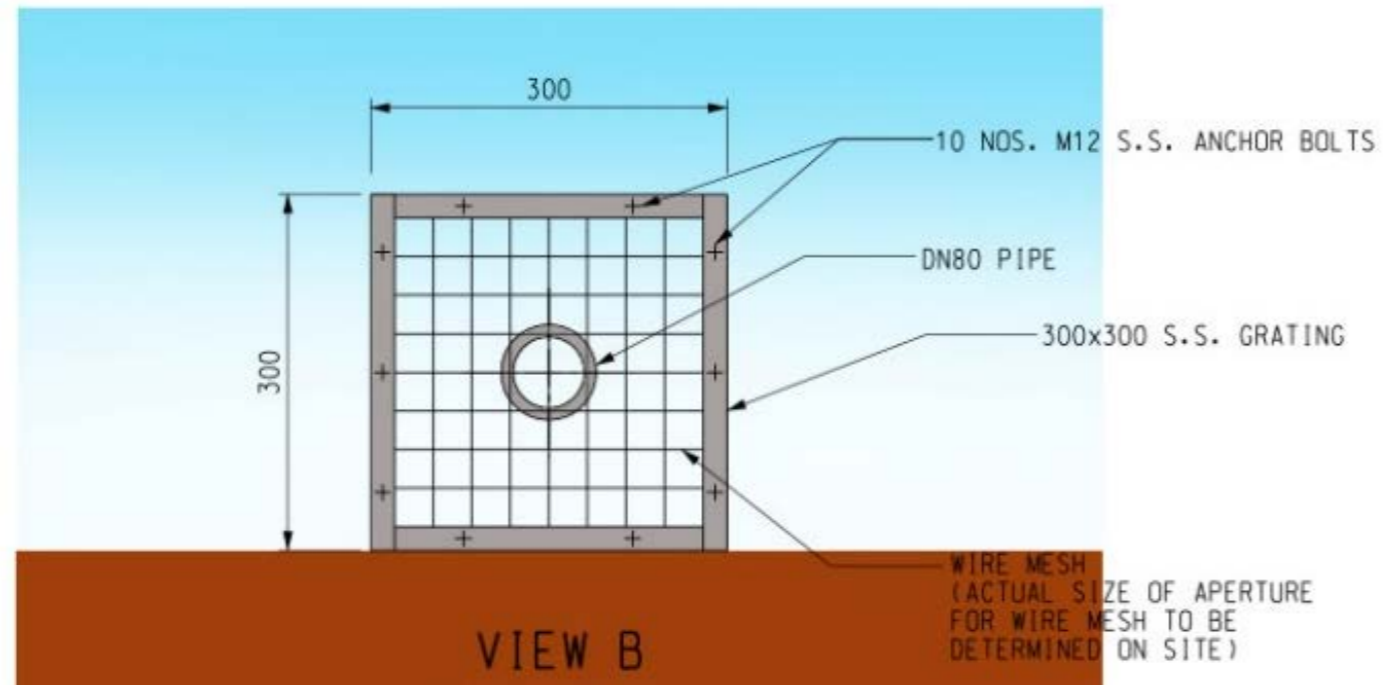
## Typical Details of Gate Valve

Figure No.: C6/C00/WL-006

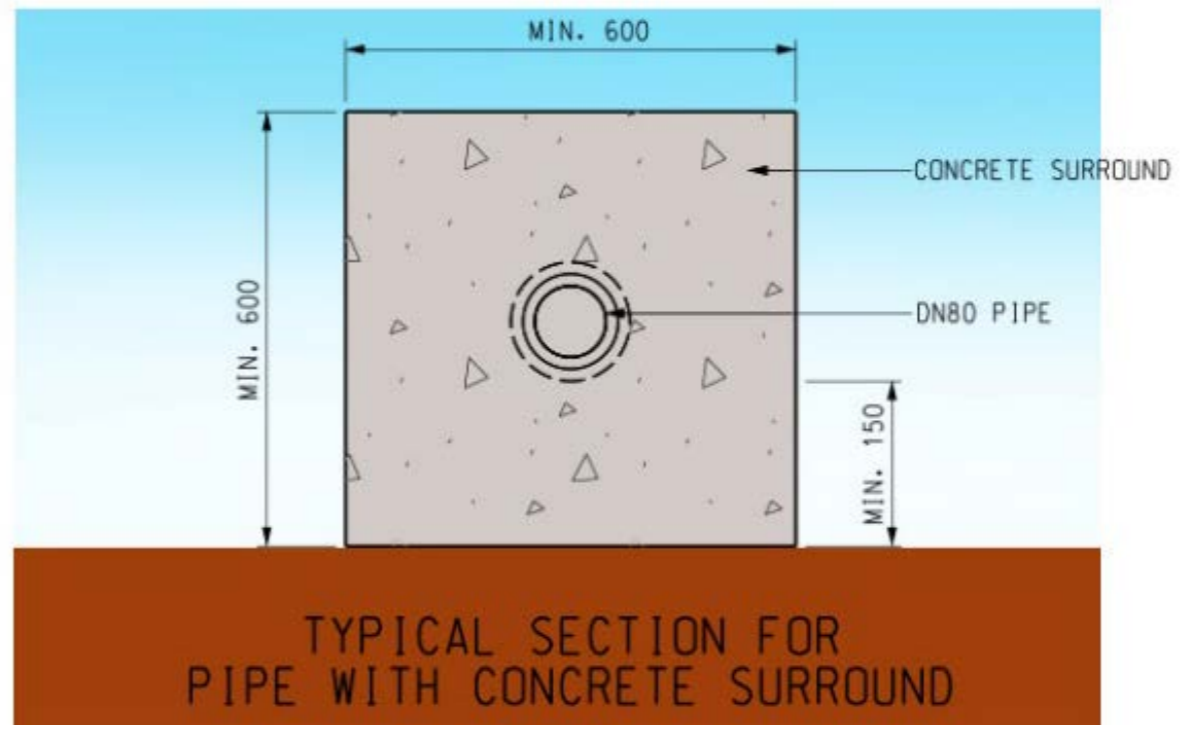


Manual water supply will be available during dry season to prevent the wetland ponds from drying out.

Typical details for fresh water supply to wetland

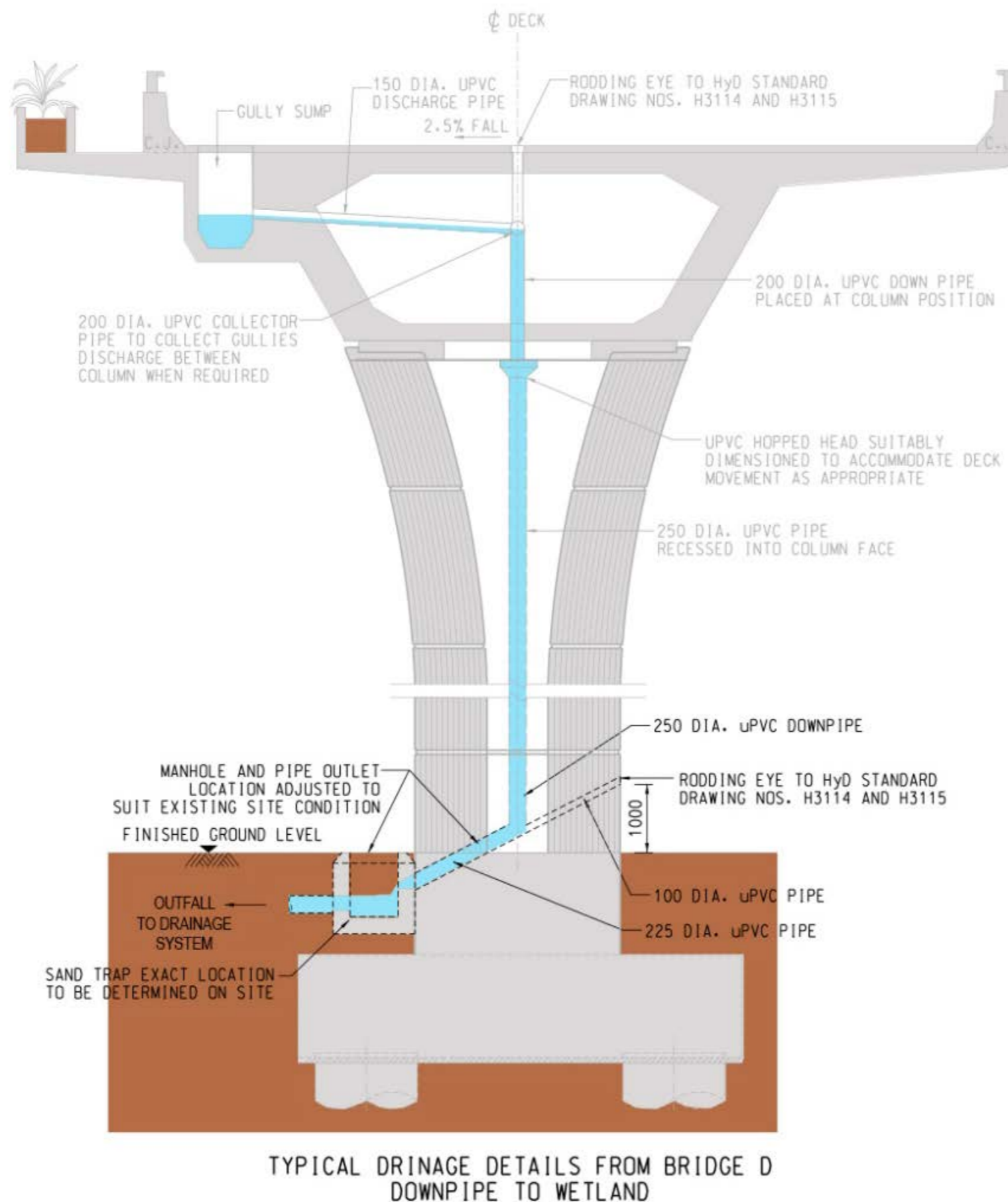


Typical S.S. grating detail



Typical section for pipe with concrete surround

\* Please note that all dimensions to be confirmed.

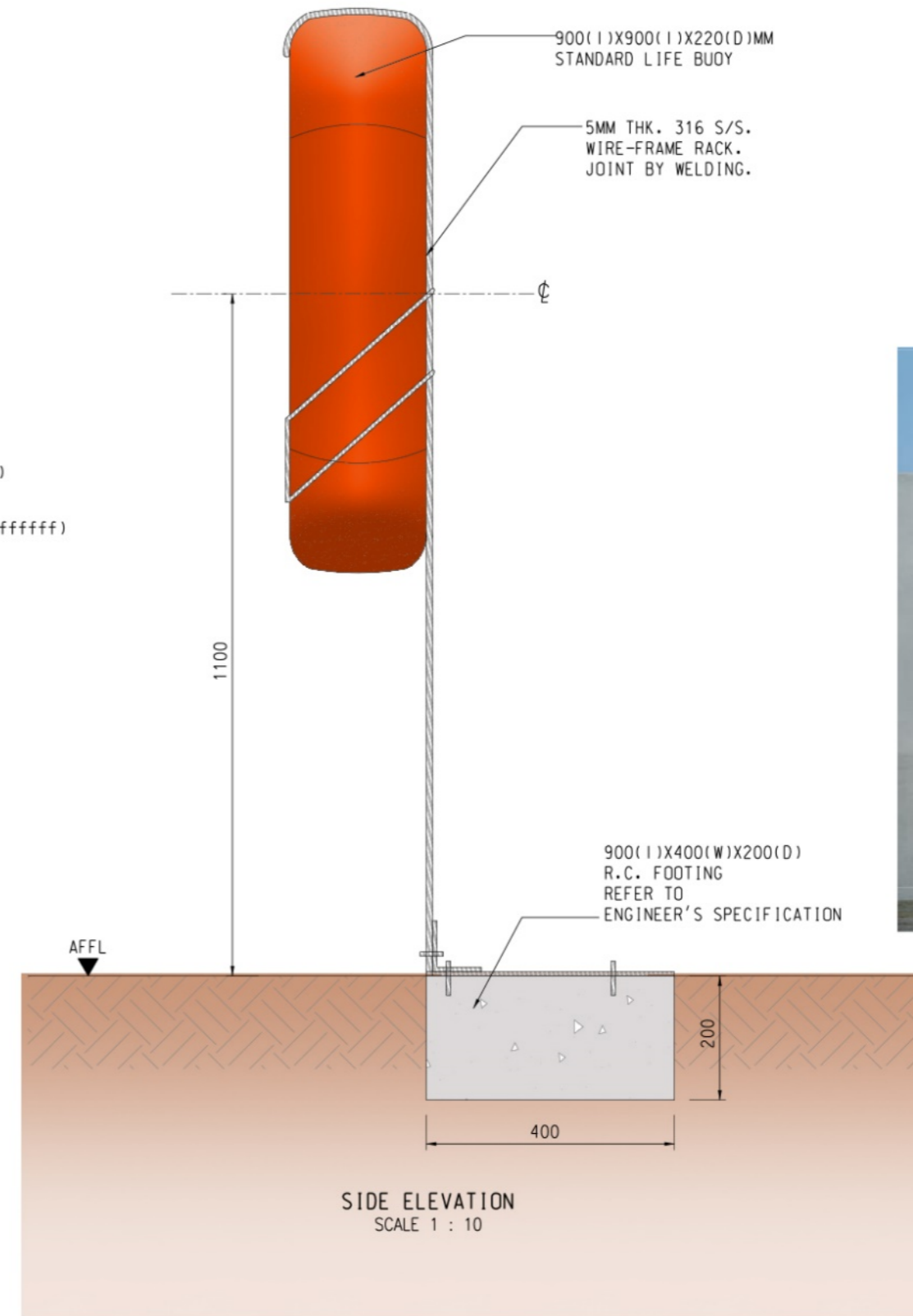
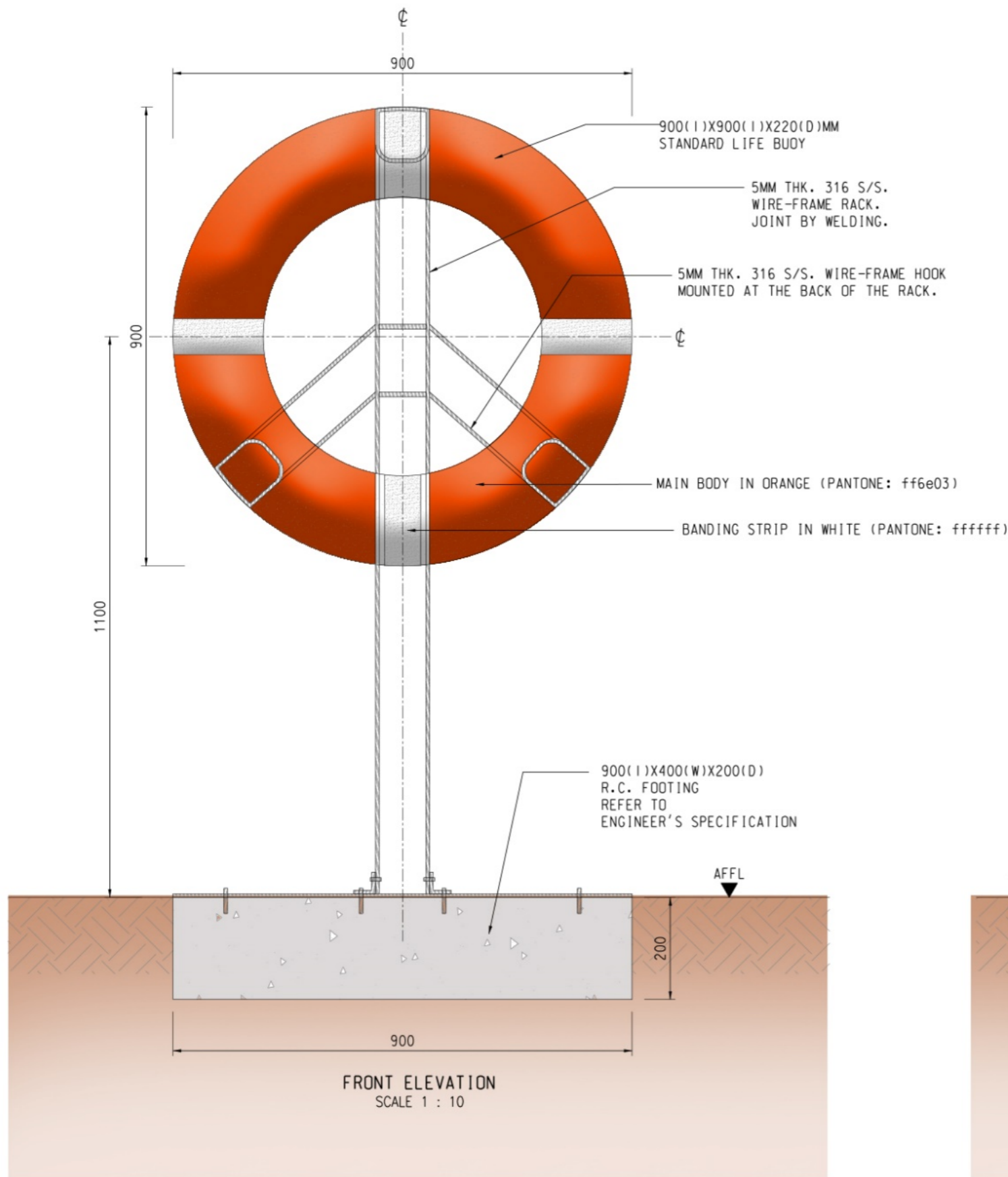


**Greywater harvested from Bridge D will be discharged to drainage system.**

\* Please note that all dimensions to be confirmed.

## Typical Drainage Details From Bridge D Downpipe to Wetland

Figure No.: C6/C00/WL-008



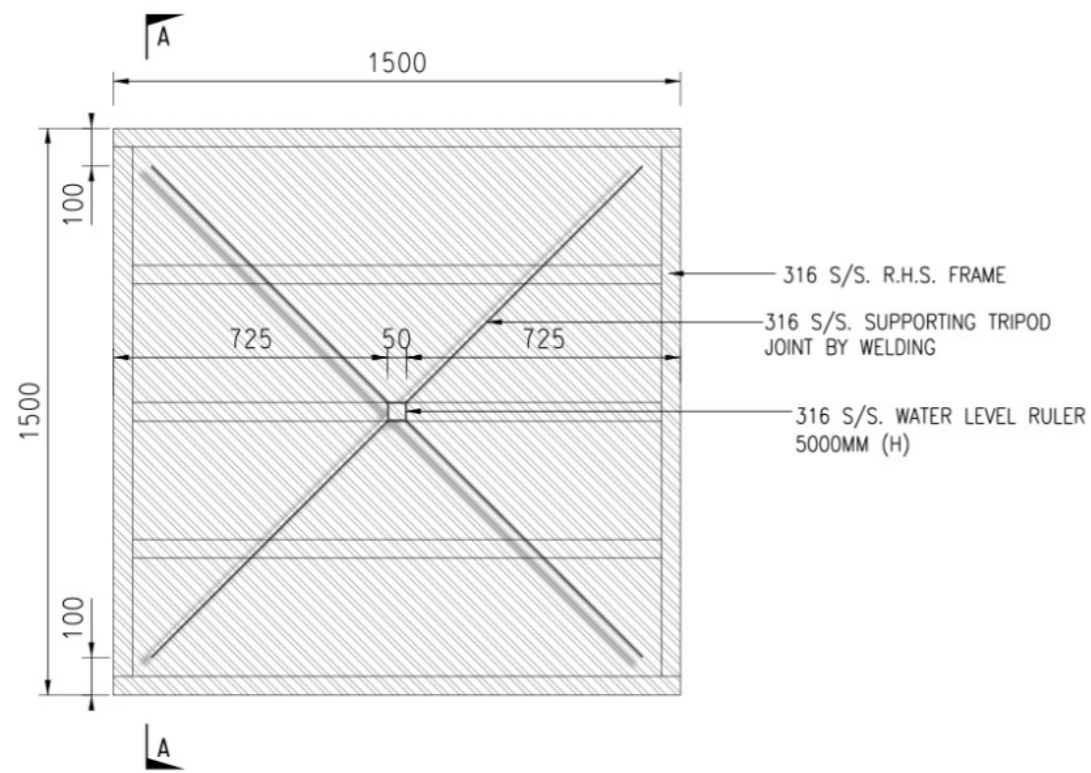
REFERENCE IMAGE  
N.T.S.

\* Please note that all dimensions to be confirmed.

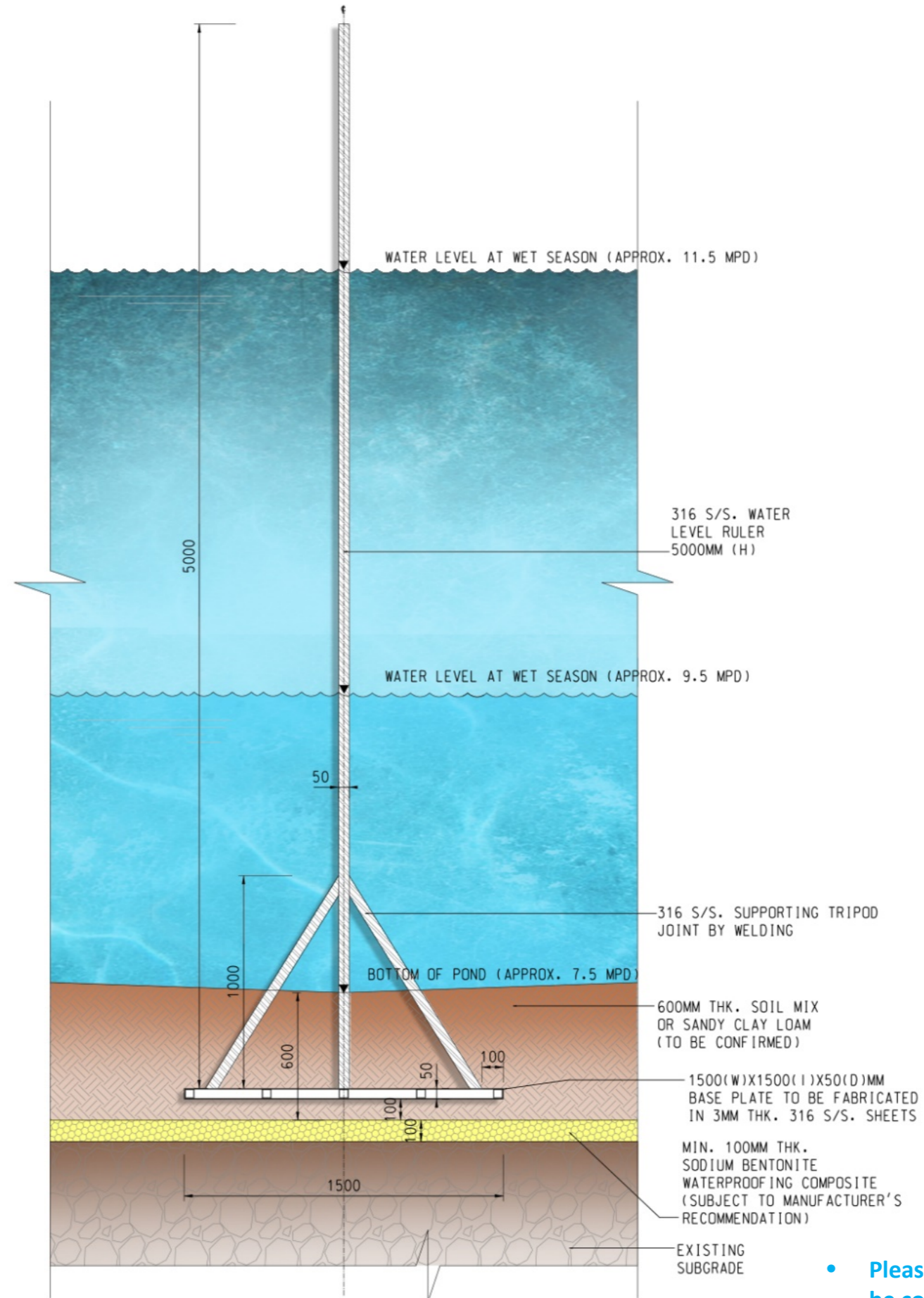
## Typical Details of Life Buoy

Figure No.: C6/C00/WL-009





PLAN OF WATER LEVEL METER  
SCALE 1 : 20



SECTION A - A  
SCALE 1 : 25

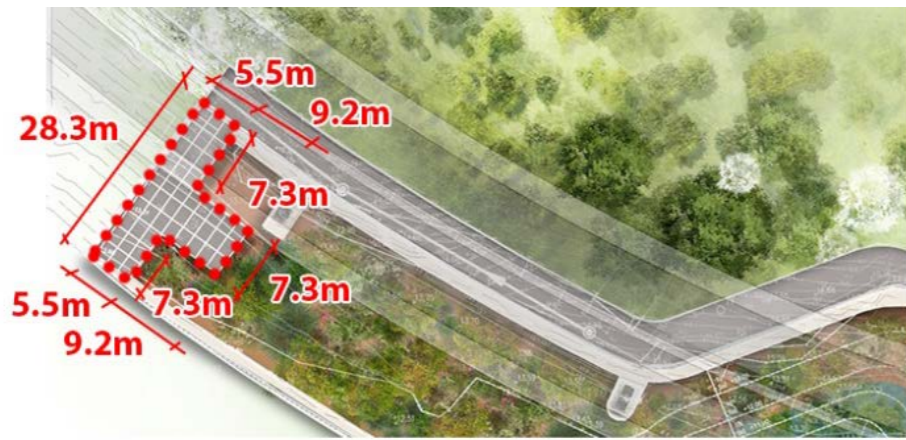


REFERENCE IMAGE  
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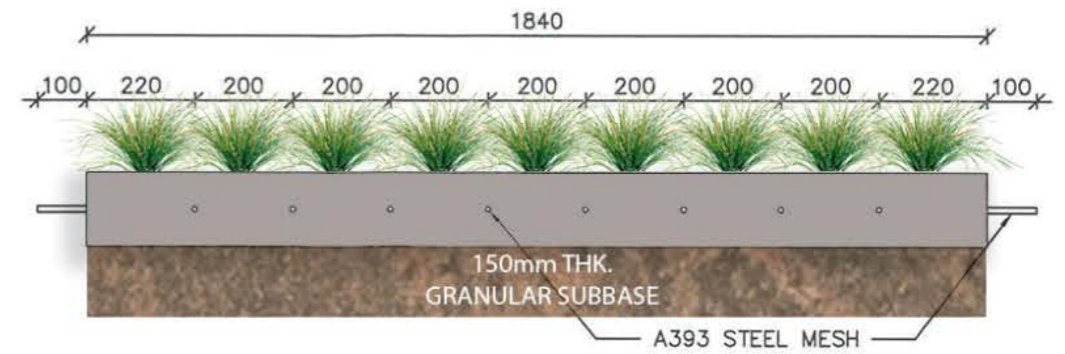
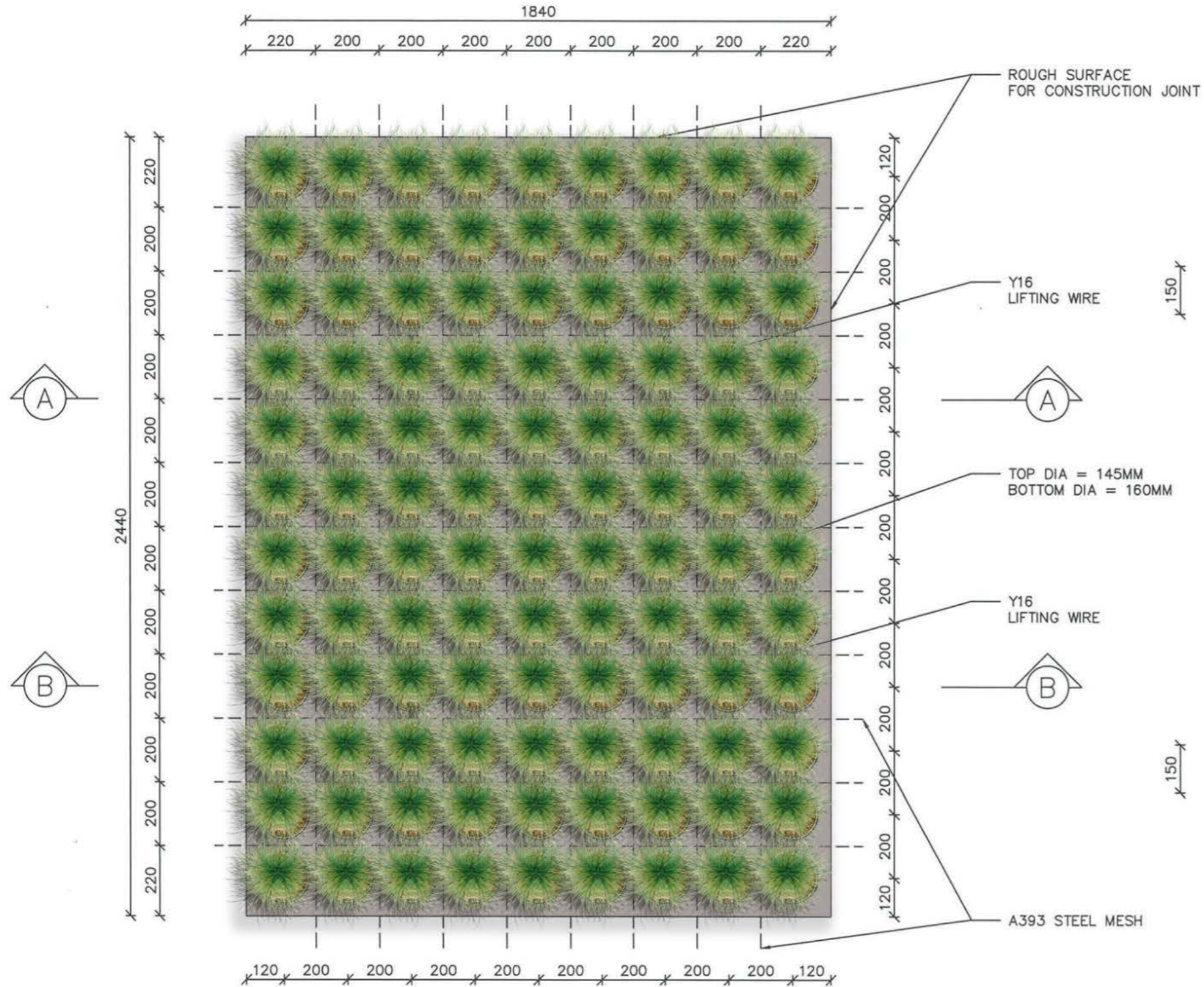
- Please note that all dimensions to be confirmed.
- Water level ruler to be installed at the lowest level of each ponds.

## Typical Details of Water Level Ruler

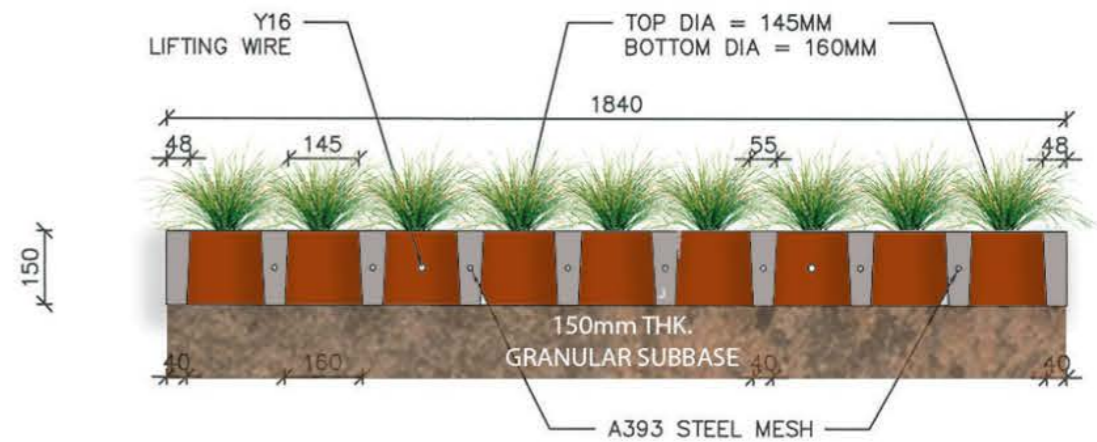
Figure No.: C6/C00/WL-010



Key Plan



Section A - A



Section B - B

# Typical Grass Paver Detail at Loading & Unloading Bay

Figure No.: C6/C00/WL-011

东莞华润水泥厂有限公司  
Dongguan Huarun Cement Manufactory Co., Ltd  
水泥检验报告单  
Cement Test Certificate



购主(Buyer): 文件编号(File No.): ZG-R-088

品种(Type)	普通硅酸盐水泥	填报日期(Report Date)	2017年05月18日							
代号(Symbol)	P·O	出厂日期(Leave Factory Date)	2017年05月15日							
出厂编号(Batch No.)	2017GTN25901	强度等级(Strength Classification)	42.5R							
窑型(Kiln Type)	旋窑(Rotary Kiln)	检验依据(Test According as)	GB175-2007							
检验项目(Test Items)	单位(Units)	标准要求(Specifications)	实际检验结果(Actual test Result)							
比表面积 (Specific Surface)	m <sup>2</sup> /kg	≥300	363							
80μm筛余 (80μm Screen Residue)	%	/	0.1							
标准稠度(Standard Consistence)	%	/	25.7							
凝结时间 (Setting Times)	初凝时间(Initial)	min	≥45							
	终凝时间(Final)	min	≤600							
安定性(Invariability)	/	沸煮法合格	合格							
不溶物(Insoluble Residue)	%	/	/							
三氧化硫(Sulphate Content)	%	≤3.5	2.16							
氧化镁(Magnesia Content)	%	≤5.0	2.56							
烧失量(Loss-on-Ignition)	%	≤5.0	4.20							
氯离子(Chloride Ion Content)	%	≤0.06	0.019							
碱含量(Alkali Content)	%	≤0.6	0.45							
混合材料品种及掺加量(Admixture)	%	>5且≤20	13.0							
石膏品种及掺加量(Gypsum)	%	/	5.6							
助磨剂品种及掺加量(Grinding aid)	%	≤0.5	/							
抗折强度 (Flexural Strength)	3天(3 days)	MPa	≥4.0	1	2	3	平均值			
				6.5	6.8	7.0	6.8			
抗压强度 (Compressive Strength)	3天(3 days)	MPa	≥22.0	1	2	3	4	5	6	平均值
				30.9	30.7	31.5	33.0	31.5	31.5	
抗压强度 (Compressive Strength)	28天(28 days)	MPa	≥42.5	1	2	3	4	5	6	平均值

备注: 结论: 经确认水泥各项技术指标符合GB175-2007标准要求。  
审核人(Assessor): 汤晓刚 填报人(Lister): 陈剑锋



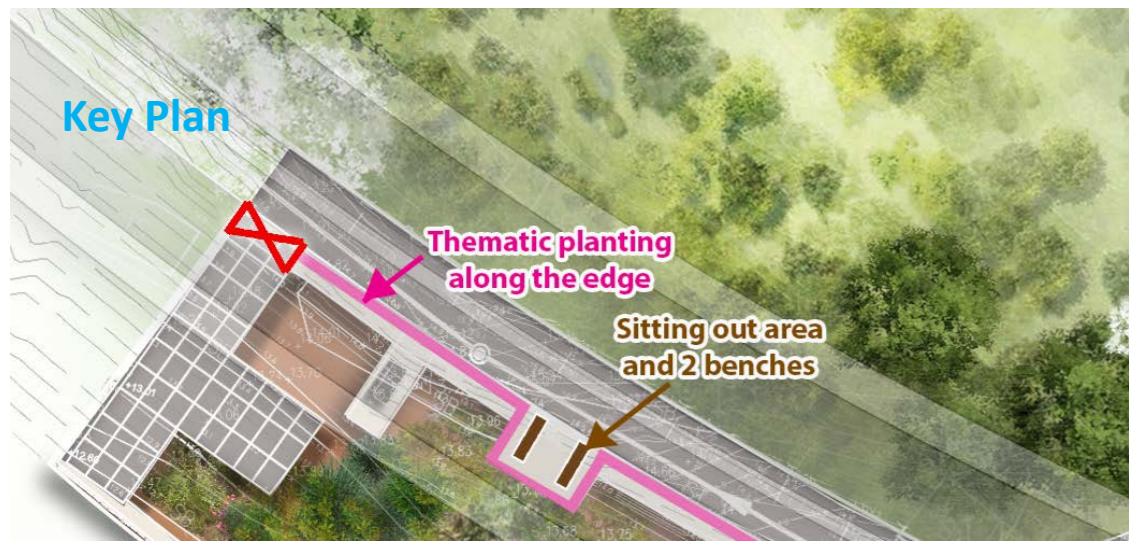
Qualitech Testing & Consultancy Limited  
匯駿檢測及顧問有限公司  
Flat E & F, 9/F, Block B, Universal Industrial Centre, 19-25 Shan Mei Street, Sha Tin, Hong Kong.  
新界火炭山尾街19-25號宇宙工業中心B座9樓E&F室  
Tel: (852) 2185-0900 Fax: (852) 2687-6752 Website: www.qtc-hk.com E-mail: qtc@qtc-hk.com



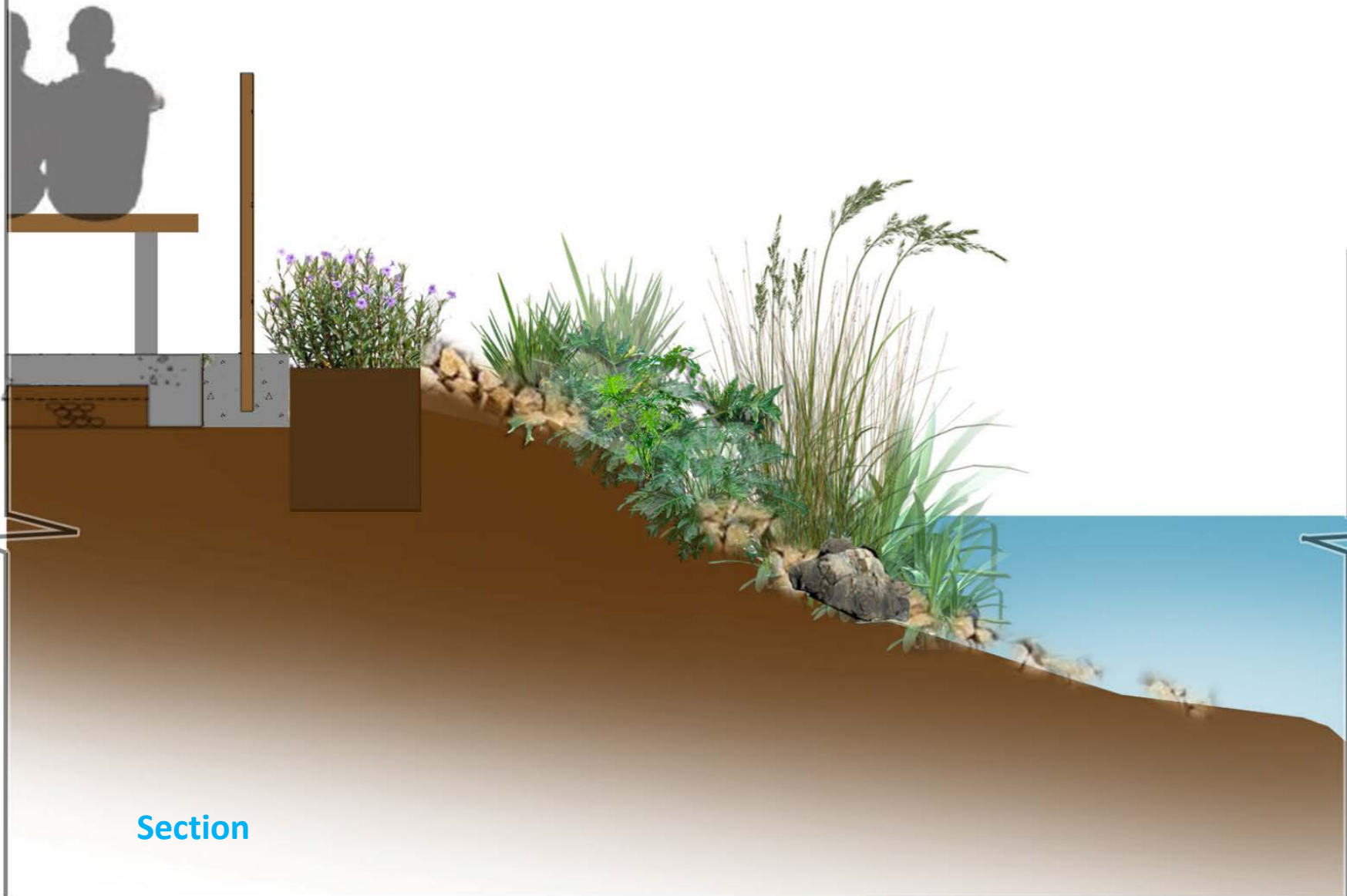
TEST REPORT  
DETERMINATION OF COMPRESSIVE STRENGTH OF CONCRETE CUBES  
(CS1 : 2010 Section 12)

Report No.:	1709900-7	Rev.:	0	Amd.:	0	Issued date:	25 July, 2017	Page	1 of 1	Page(s)
Date of sample received:	24 July, 2017		Date of test:	24 July, 2017						
Customer information: (provided by customer)										
Customer's name: Yee Kee Precast Concrete Products Co., Limited										
Customer's address: Unit 2, 2/F., Winsum Industrial Bldg., 588-592 Castle Peak Road, Cheung Sha Wan, Kowloon, Hong Kong.										
Contract no.: - Work order no.: -										
Project: Wan Chai Bypass Precast Concrete Channel Cover 800*460*50mm										
Sample description: Concrete Cube										
Location in work of concrete sample: -										
Mix I.D. of concrete: - Grade of concrete: 40/10										
Date of cubes made: 26 June, 2017 Age of cubes at test: 28 days										
Time water added to cement: - Concrete supplier / plant: Yee Kee Precast Concrete Products Co., Limited										
Test result :- Test location: QTC - Veristrong Industrial Centre										
Items		Result								
Identification no.		A	B							
Delivery condition (P=Protected; UP=Unprotected)		P	P							
Received condition (S=Segregation; H=Honeycombing; B=Broken edge; N=Normal)		N	N							
Perpendicularity (N=Normal; IR=Irregular)		N	N							
Dimensions (mm)	Width 1	150.7	150.6							
	Width 2	150.5	150.7							
	Height	151.4	151.6							
	(N=Normal; O=Oversize; U=Undersize)	N	N							
Mass (kg)	As-received (in air)	7.949	7.959							
	Saturated (in air)	-	-							
Density (kg/m <sup>3</sup> ) (CS1:2010 Section 16)	As-received	2310	2310							
	Saturated (Vol. by calculation)	-	-							
Maximum load at failure (kN)		1091	1147							
Compressive strength (N/mm <sup>2</sup> )		47.8	50.2							
Mean compressive strength (N/mm <sup>2</sup> )		49.0								
Satisfactory fracture (CS1:2010 Figure 13) (Y=Yes; N=No)		Y	Y							
Equipment used:-										
1) Cube dimension caliper I.D.: CON/CU-DC/01					4) Balance I.D.: CON/EB/02					
2) Compression machine I.D.: CON/CTM/02					5) Water curing tank I.D.: CON/CT/02					
3) Feeler gauge I.D.: CON/FG/02					6) Cube checking jig I.D.: CON/CU-CJ/01					
Remark(s) :-										
1. The test result is related to the test specimen only.										
2. Test specimen was cured in water tank at temperature of 24 to 30°C in accordance with CS1 : 2010 Section 10 until testing.										
Approved Signatory:										
<input type="checkbox"/> Lam Kin Sun, Ringo										
<input checked="" type="checkbox"/> Law Wai Kin										
- End of report -										

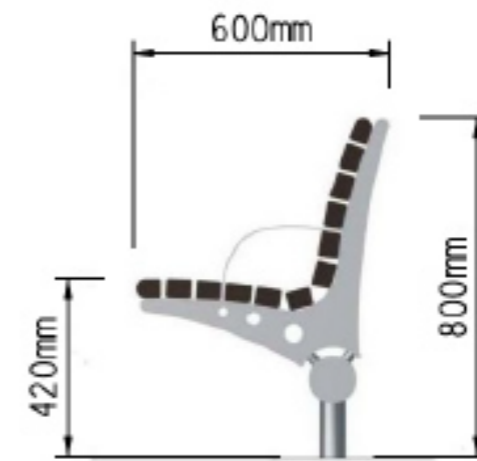
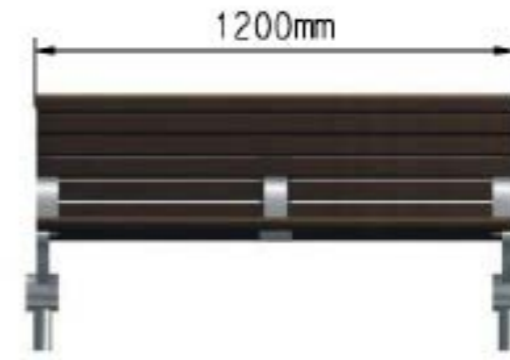
\* Relevant test reports carried out by Public Works Laboratories which confirm the proposed grass paver is a proprietary product purposed for heavy standard vehicular traffic. For reference only.



sitting-out area    1.2m (H.) thematic railing    thematic planting    proposed wetland



\* Aesthetic appearance subject to further coordination with AFCD



**2-seaters bench**

- Approx. 1200 x 600 x 800 mm

## Sitting-out Area & Thematic Planting

Figure No.: C6/C00/WL-013

**LEGEND**

**Matrix Planting (6 Types) in the main wetland area**

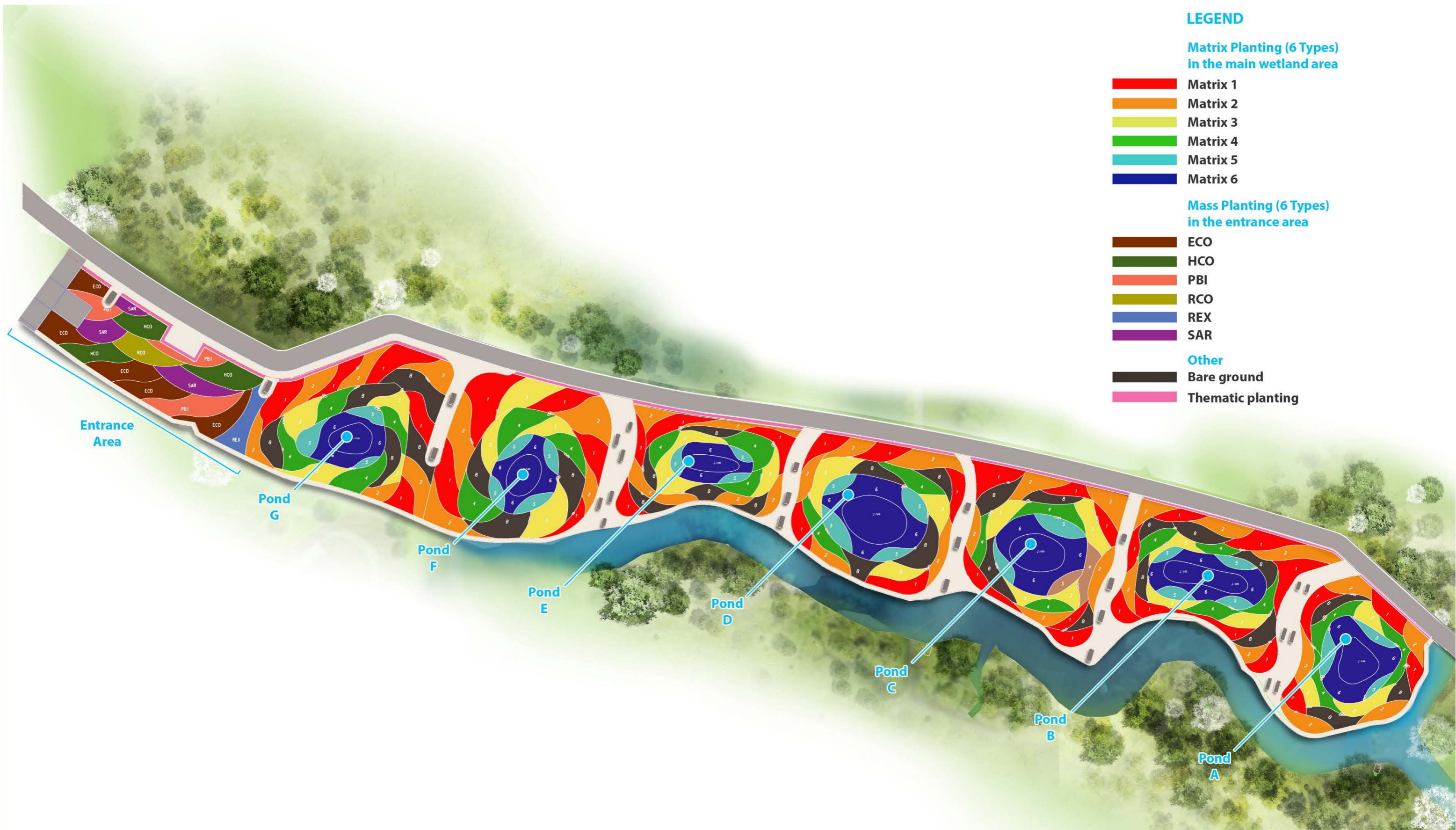
- Matrix 1
- Matrix 2
- Matrix 3
- Matrix 4
- Matrix 5
- Matrix 6

**Mass Planting (6 Types) in the entrance area**

- ECO
- HCO
- PBI
- RCO
- REX
- SAR

**Other**

- Bare ground
- Thematic planting



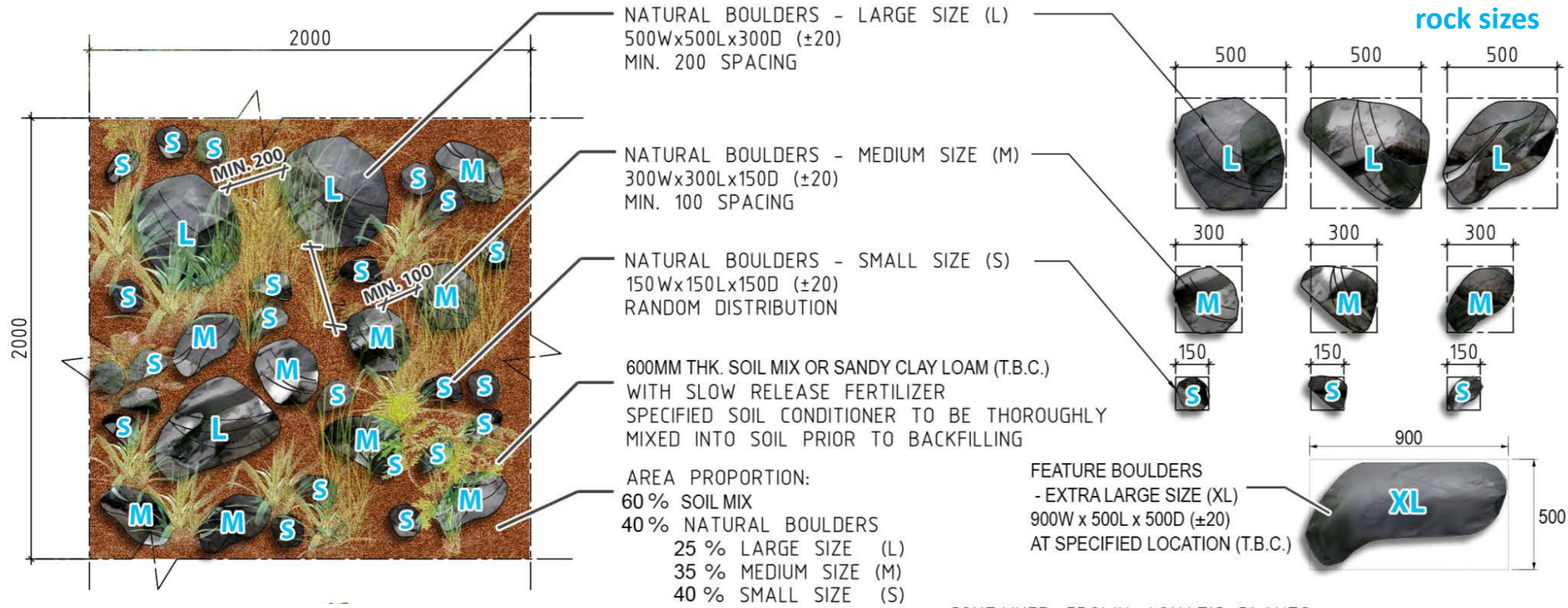
\* Subject to market availability of materials

**Planting Plan**

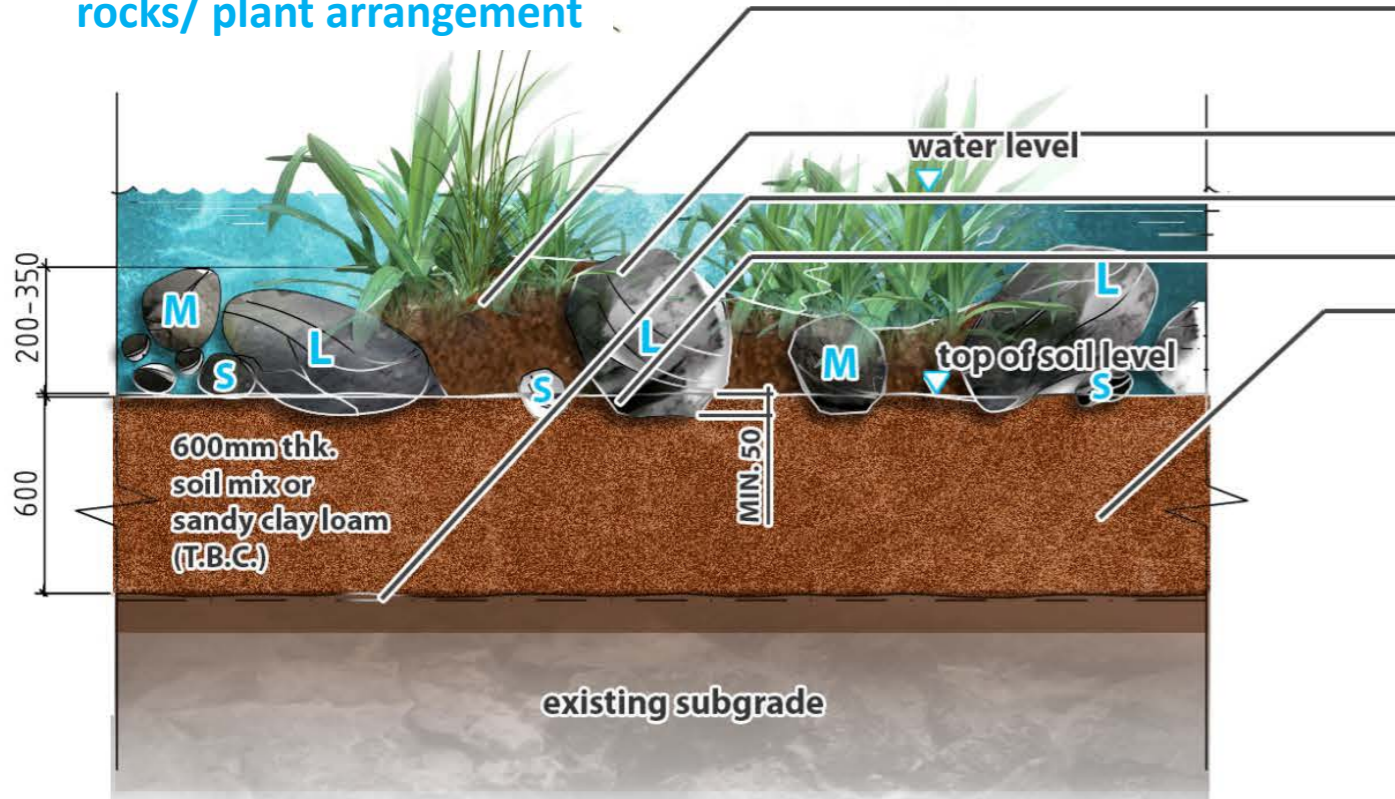
Figure No.: C6/C00/WL-014



\* Subject to market availability of materials



**rocks/ plant arrangement**



**pond section**

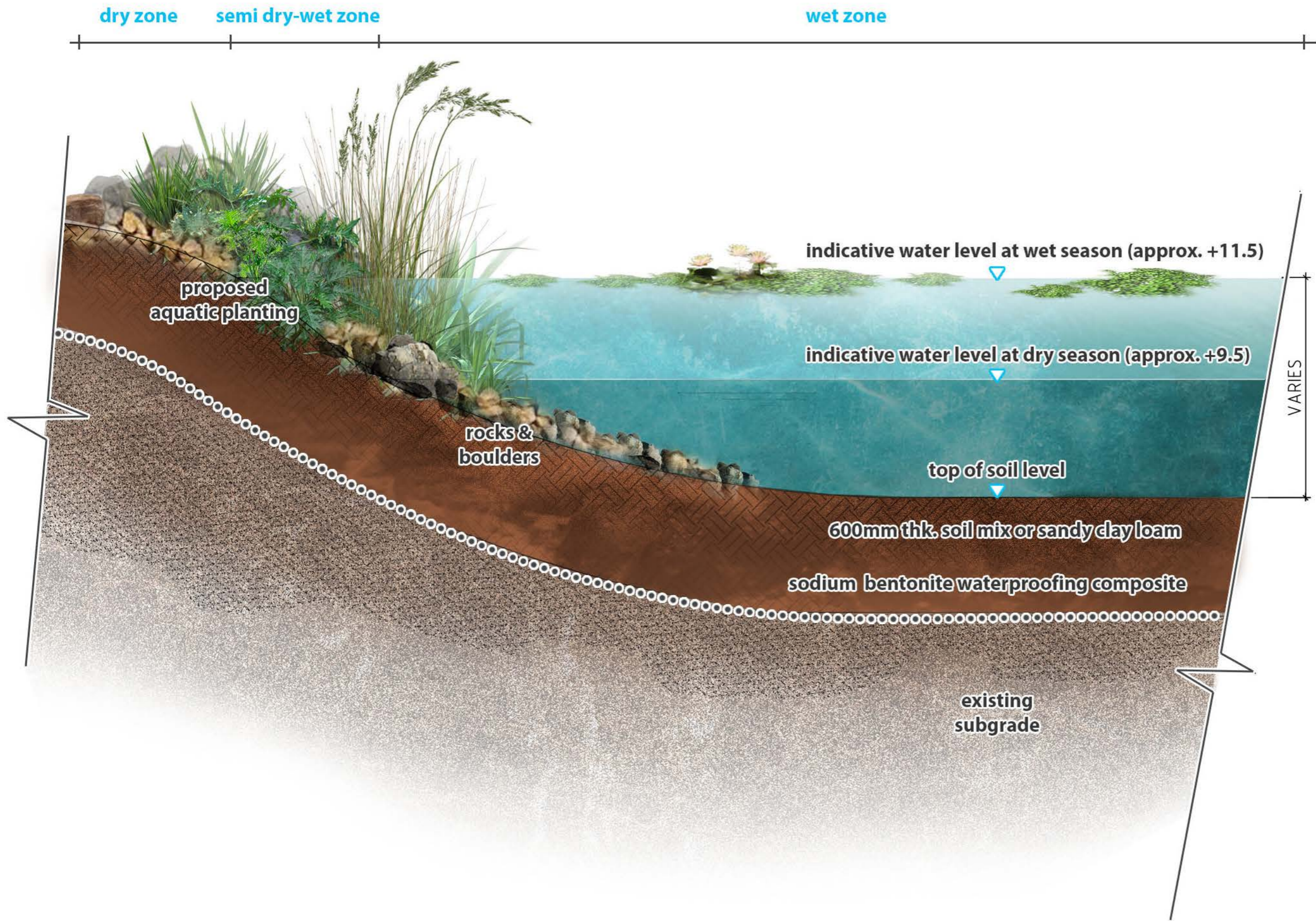
CONTAINER GROWN AQUATIC PLANTS  
- LOOSEN ROOTS AT EDGE OF ROOT BALL  
B&B AQUATIC PLANTS  
- CUT AND REMOVE BURLAP FROM TOP 1/3 OF BALL  
NATURAL BOULDERS AS SPECIFIED  
SODIUM BENTONITE WATERPROOFING COMPOSITE  
MIN. 50MM EMBEDDED INTO FABRICATED SOIL  
600MM THK. SOIL MIX OR SANDY CLAY LOAM (T.B.C.)  
WITH SLOW RELEASE FERTILIZER  
SPECIFIED SOIL CONDITIONER TO BE THOROUGHLY  
MIXED INTO SOIL PRIOR TO BACKFILLING



**reference image**

**Typical Plant Pocket at the semi-dry-wet zone**

Figure No.: C6/C00/WL-015



## Typical Pond Edge Treatment

Figure No.: C6/C00/WL-016



\* Subject to market availability of materials



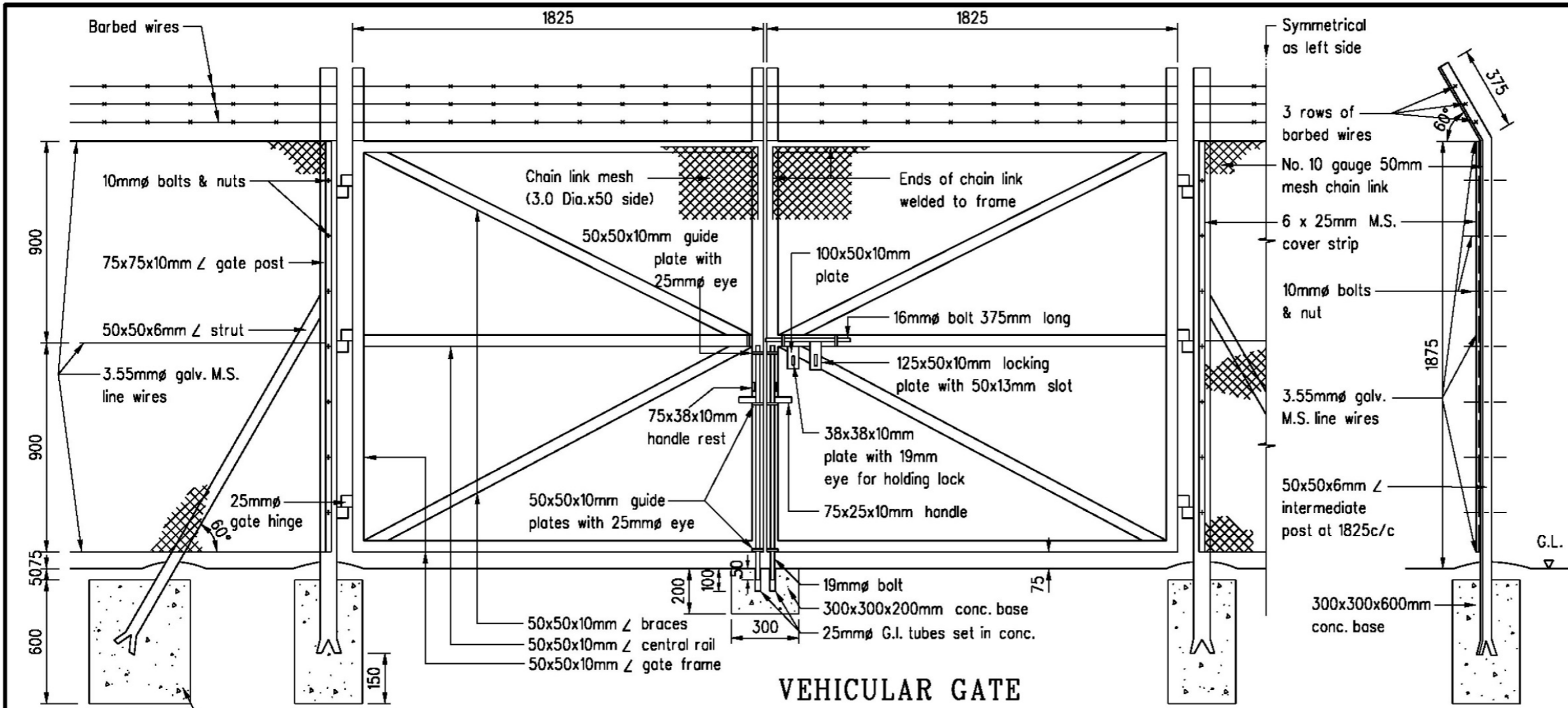
CODE	BOTANICAL NAME	CHINESE NAME	SIZE(mm) HEIGHT (H) x SPREAD (S)	SPACING (mm)	% MIX	QUANTITY
<b>MATRIX 1</b>						
CES	<i>Colocasia esculenta</i>	芋	300x200	500	10%	977
CIN	<i>Cyperus involucratus</i>	風車草	300x200	500	10%	977
KSP	<i>Kyllinga spp.</i>	水蜈蚣屬	100x100	300	80%	21,698
<b>MATRIX 2</b>						
HCO	<i>Hedychium coronarium</i>	薑花	300x300	500	35%	3,087
RCO	<i>Ruellia coerulea</i>	蘭花草	300x300	500	35%	3,087
ICH	<i>Impatiens chinensis</i>	華鳳仙	300x200	500	30%	2,646
<b>MATRIX 3</b>						
AMA	<i>Alocasia macrorrhizos</i>	海芋	300x200	500	35%	1,255
CMA	<i>Cyperus malaccensis</i>	茳芏	200x100	500	35%	1,255
JEF	<i>Juncus effusus</i>	燈心草	200x100	500	30%	1,076
<b>MATRIX 4</b>						
CLA	<i>Coix lacryma-jobi</i>	薏苡	200x100	300	35%	3,618
CSP	<i>Cyperus spp.</i>	莎草屬	200x100	300	35%	3,618
PAU	<i>Phragmites australis</i>	蘆葦	200x200	300	30%	3,102
<b>MATRIX 5</b>						
BMO	<i>Bacopa monnieri</i>	假馬齒莧	200x100	300	35%	3,336
EDU	<i>Eleocharis dulcis</i>	荸薺	200x100	300	35%	3,336
STR	<i>Sagittaria trifolia L. subsp. leucopetala</i>	慈姑	200x100	300	30%	2,860
<b>MATRIX 6</b>						
HVE	<i>Hydrocotyle verticillata</i>	銅錢草	200x200	300	25%	4,147
LAD	<i>Ludwigia adscendens</i>	水龍	200x200	300	25%	4,147
MSP	<i>Murdannia spp.</i>	水竹葉屬	200x200	300	25%	4,147
NYP	<i>Nymphaea spp.</i>	睡蓮屬	200x200	300	25%	4,147
<b>THEMATIC PLANTING</b>						
RCO	<i>Ruellia coerulea</i>	蘭花草	300x300	500	-	1,391
<b>ENTRANCE AREA</b>						
ECO	<i>Excoecaria cochinchinensis</i>	紅背桂	500x400	500	-	1,922
HCO	<i>Hedychium coronarium</i>	薑花	300x300	500	-	1,234
PBI	<i>Philodendron bipinnatifidum</i>	春羽	500x400	500	-	1,113
RCO	<i>Ruellia coerulea</i>	蘭花草	300x300	500	-	416
REX	<i>Rhapis excelsa</i>	棕竹	1000x500	500	-	439
SAR	<i>Schefflera arboricola</i>	鵝掌藤	500x400	500	-	892



## Planting Schedule

Figure No.: C6/C00/WL-017





**VEHICULAR GATE**

**INTERMEDIATE POST**

- Notes :
1. Dimensions are in millimetres.
  2. All welds to be ground smooth.
  3. Steel to be grade 43 BS 4360.

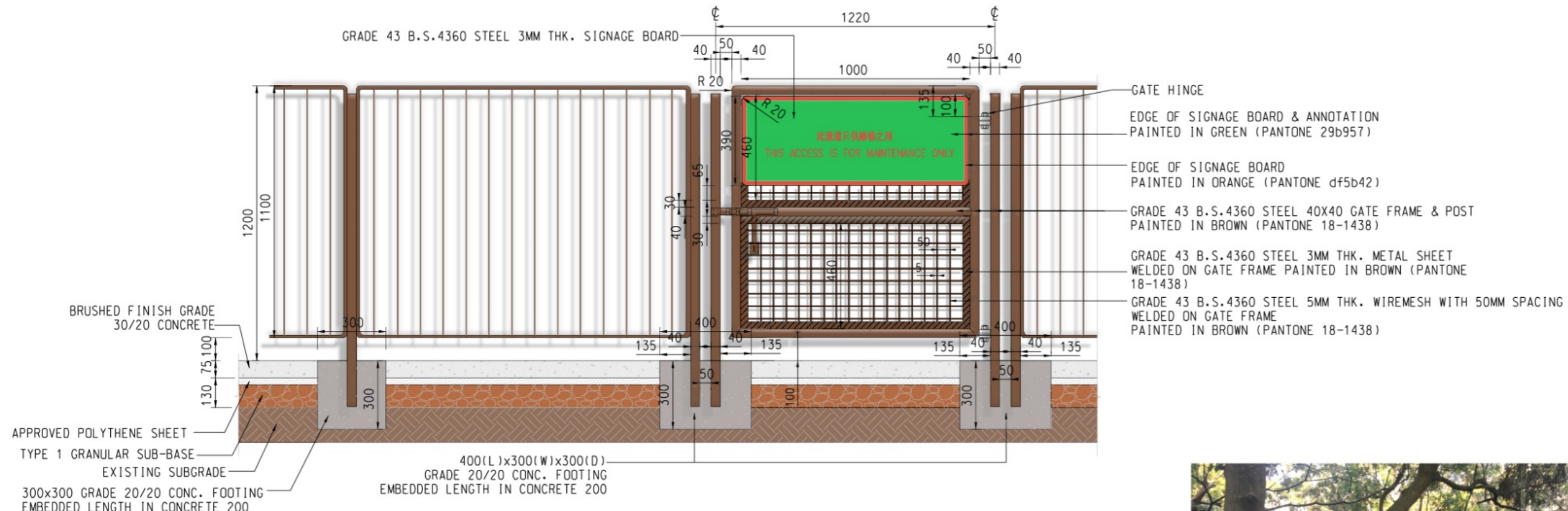
4. All site welds to be treated with two coats of zinc rich paint before application of paint system.
5. Steelwork for fencing including wires to be hot dip galvanized to BS EN ISO 1461 : 1999.
6. Chain link mesh to be zinc coated type GLS180 of BS1722 Part 1.
7. Concrete to be grade 30/20.
8. Where the concrete footing is located in block paved footpath, the footing should be lowered to allow for the paving blocks and the sand course.

B	Note 5 updated		Sep 07
A	Note 8 added		Nov 99
	Former Drg. No. H6005/1		Jun 94
REF.	REVISION	SIGNATURE	DATE

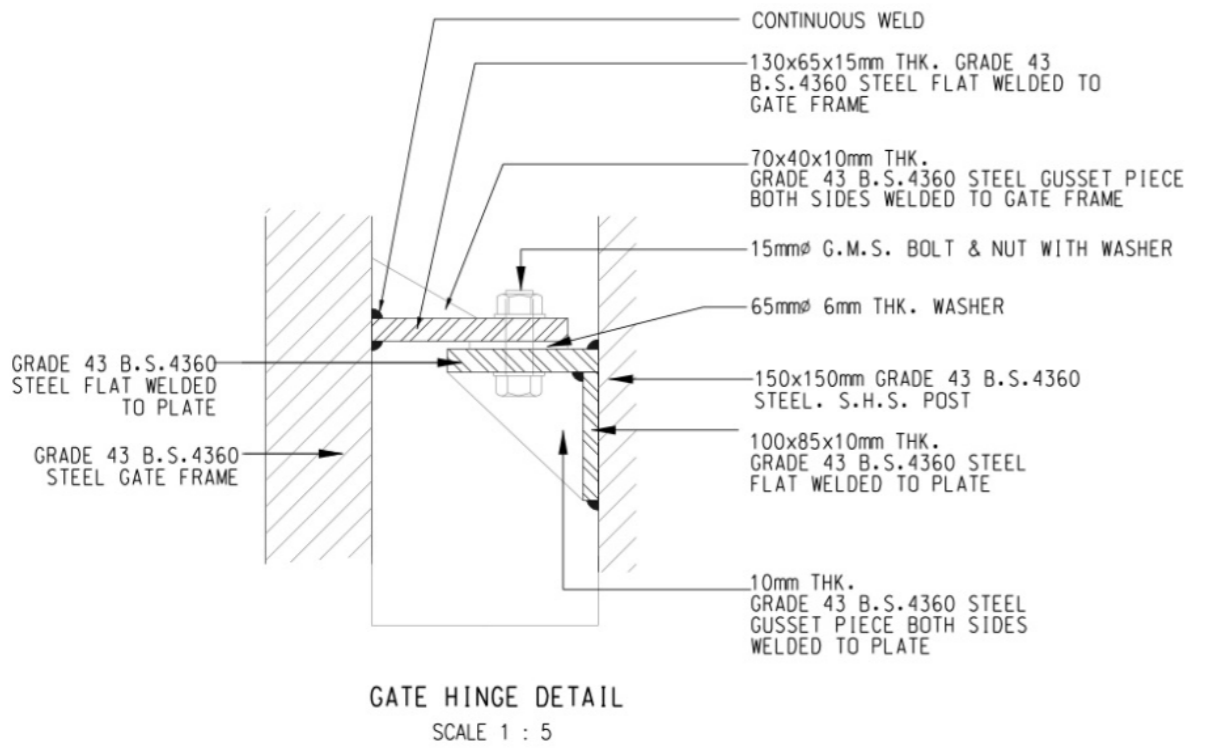
**CHAIN LINK FENCE  
(SHEET 1 OF 2)**

<b>HIGHWAYS DEPARTMENT</b>			
REFERENCE	HH 4935	DRAWING No.	CAD
SCALE	1 : 25	<b>H 6121B</b>	

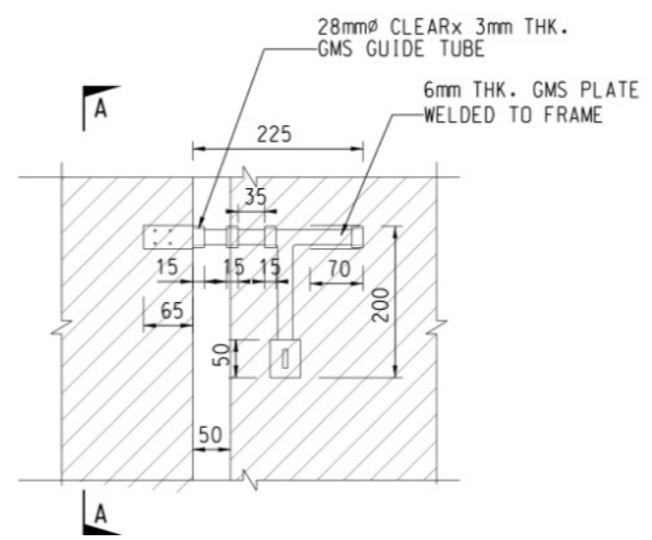
**Typical HyD Standard Vehicular Gate**  
Figure No.: C6/C00/WL-018



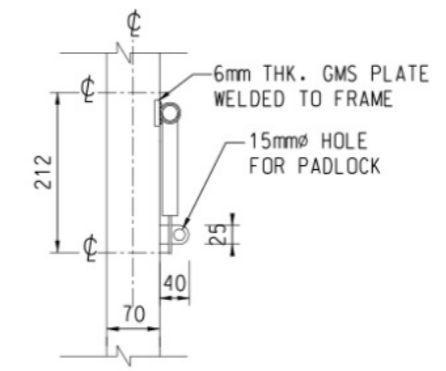
TYPICAL INTERFACE BETWEEN ACCESS GATE AND RAILING  
SCALE 1 : 20



GATE HINGE DETAIL  
SCALE 1 : 5



PADLOCK ELEVATION  
SCALE 1 : 5

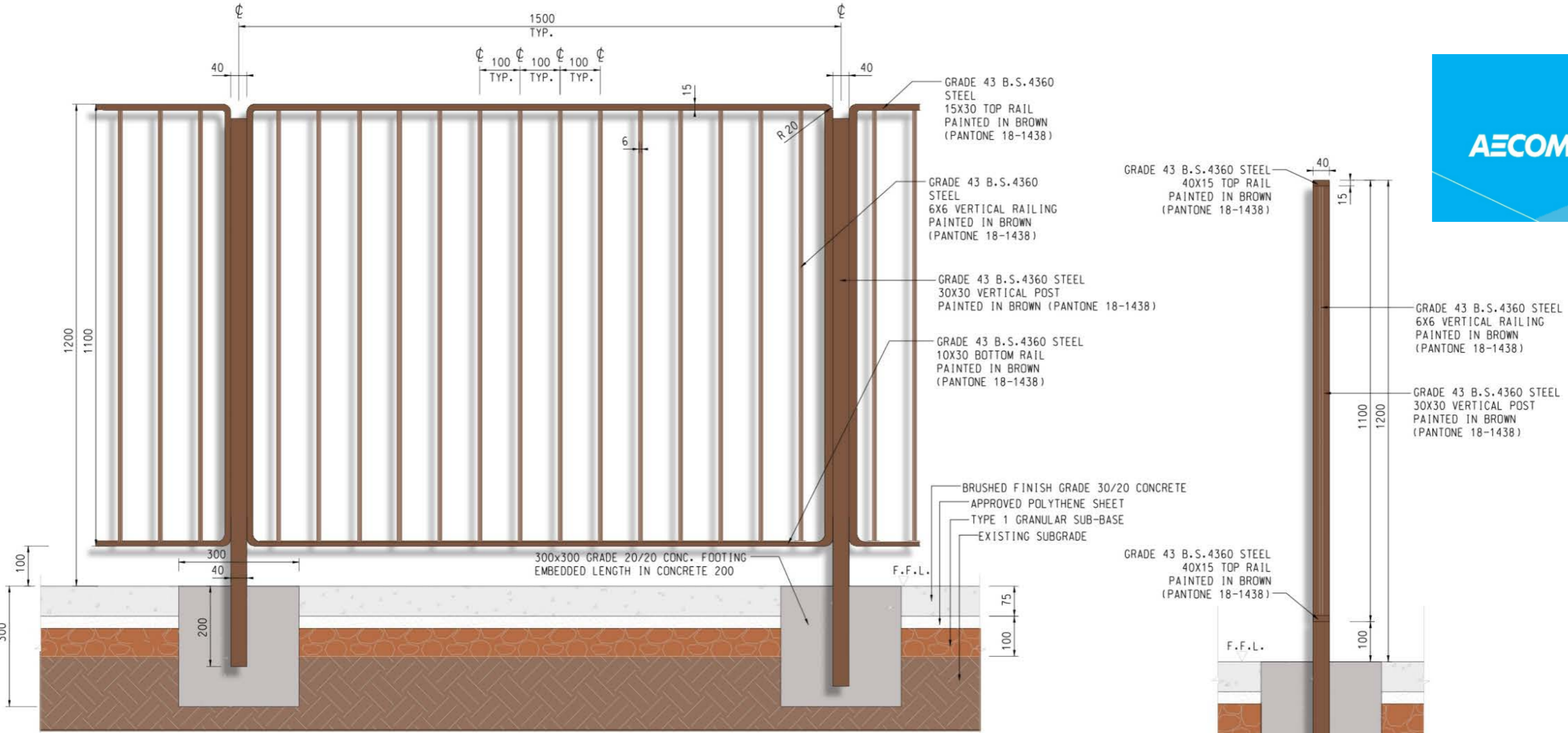


SECTION A - A  
SCALE 1 : 5

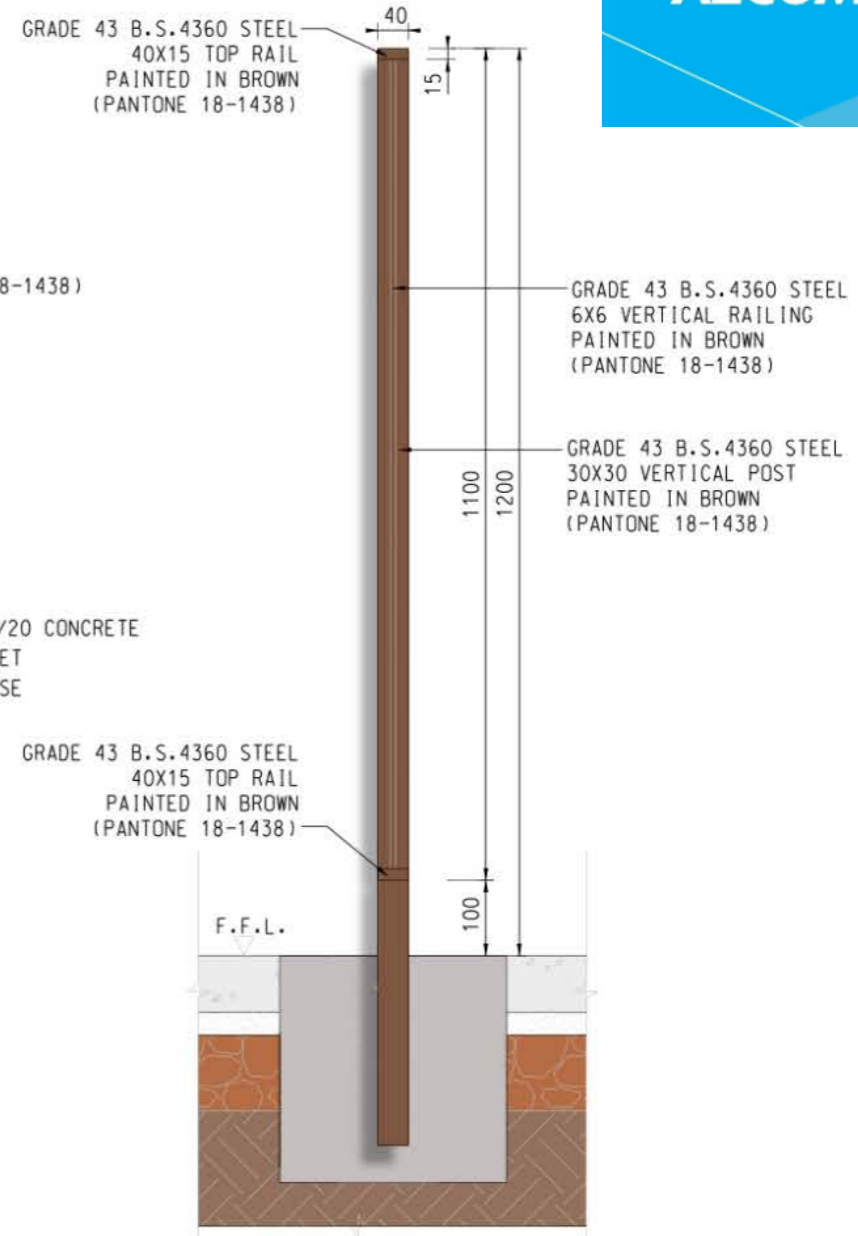


REFERENCE IMAGE  
N.T.S.

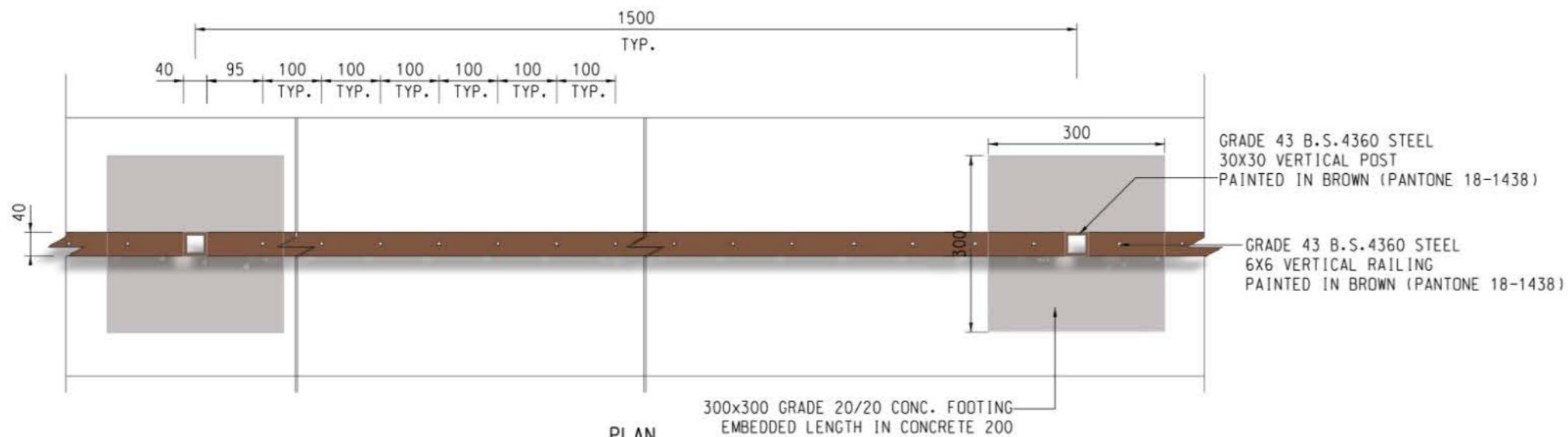
\* Aesthetic appearance subject to further coordination with AFCD



SECTION A - A  
SCALE 1 : 10



SECTION B - B  
SCALE 1 : 10



PLAN  
SCALE 1 : 10

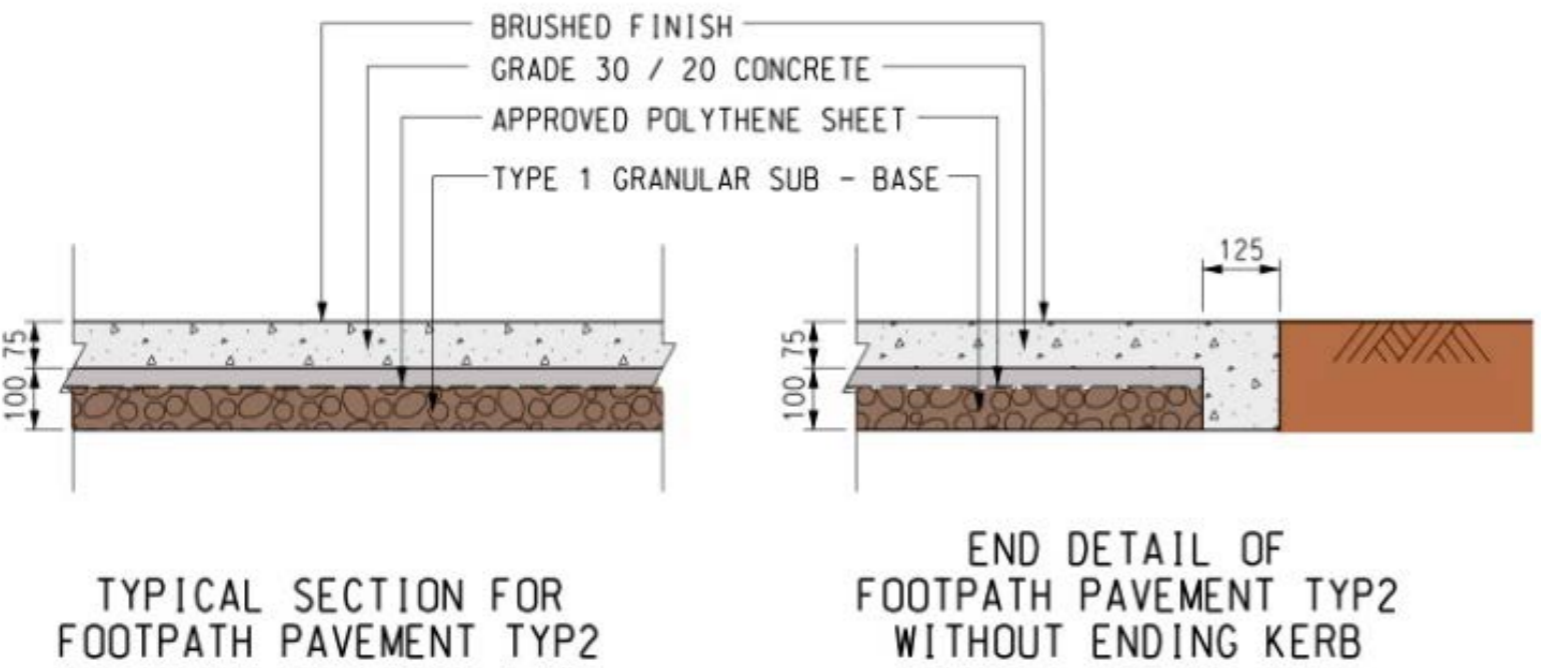
**HyD Standard Type 2 Railing**  
• 1.2m (H), painted in brown

\* Aesthetic appearance subject to further coordination with AFCD

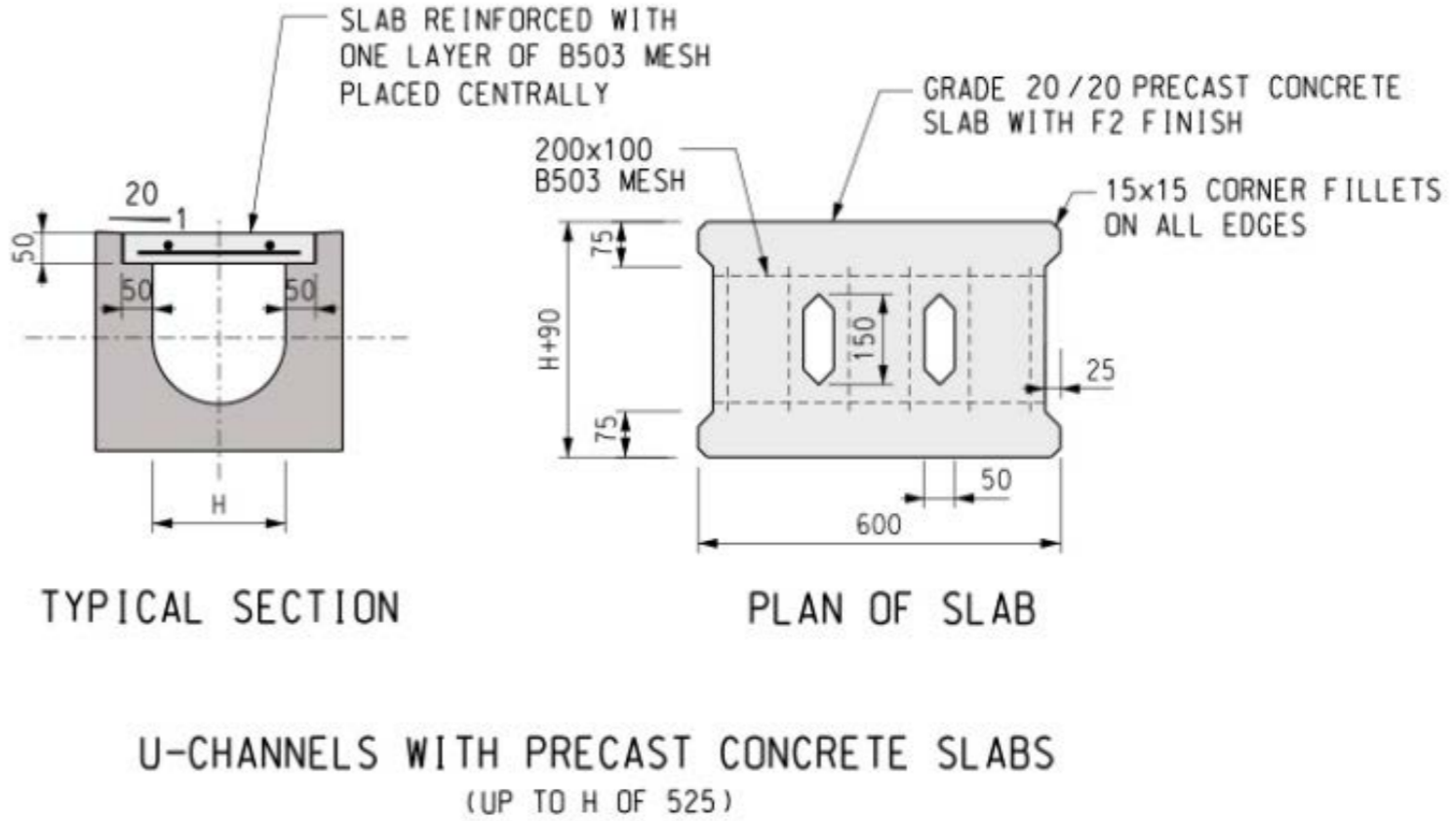
# Typical HyD Standard Type 2 Railing

Figure No.: C6/C00/WL-020

\* Please note that all dimensions to be confirmed.



Typical Details of Maintenance Path



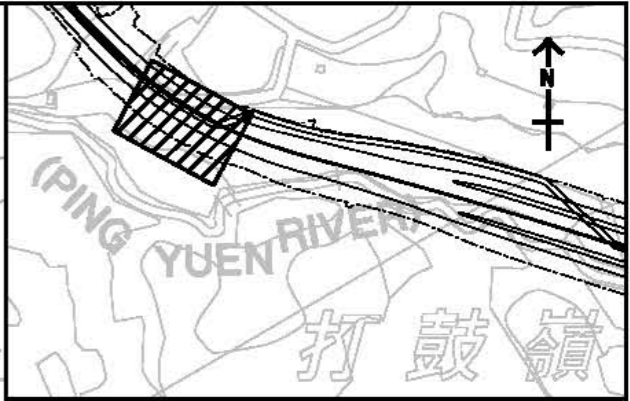
Typical Details of U-channel

Typical Details of Maintenance Path and U-channel

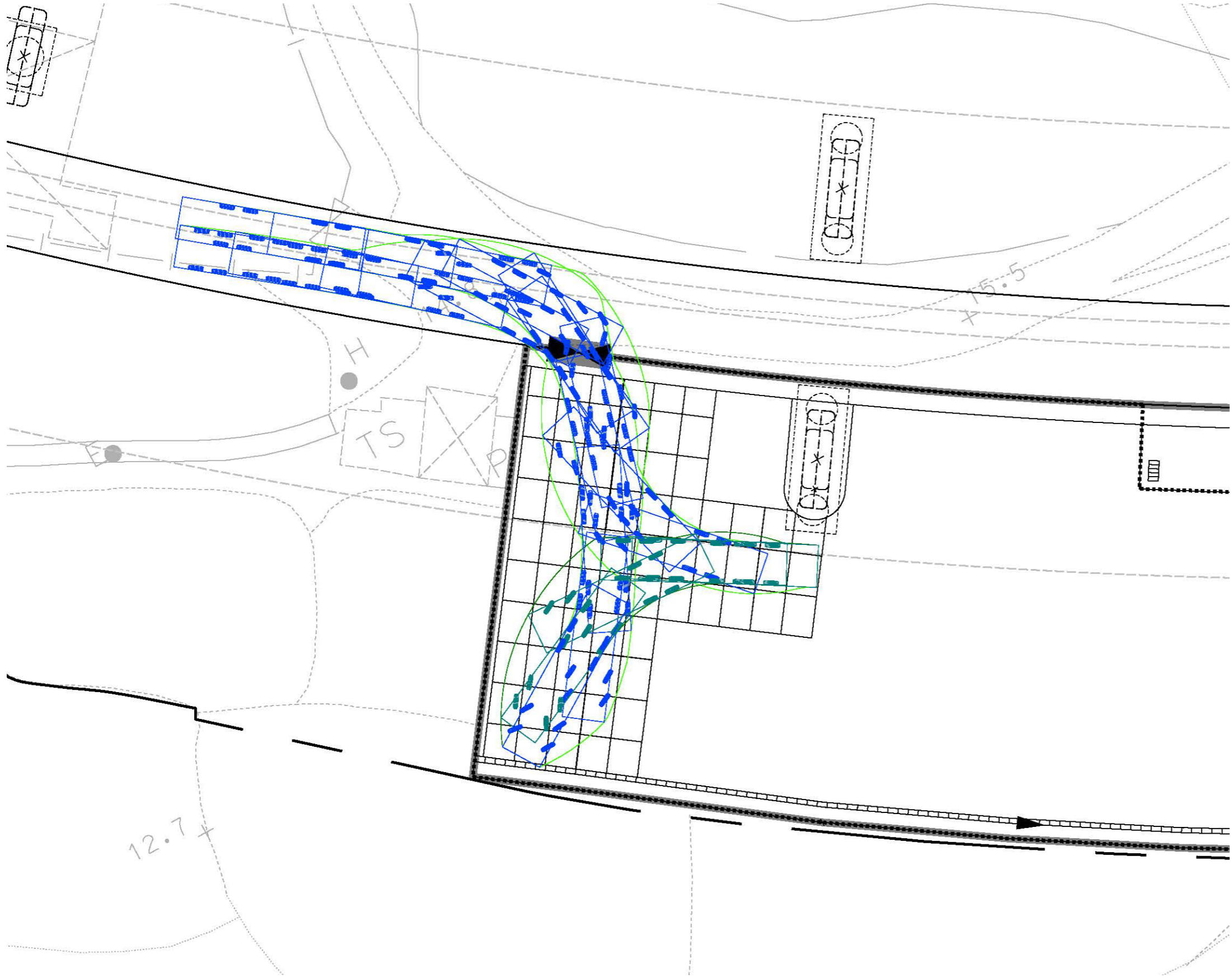
Figure No.: C6/C00/WL-021



\* Please note that all dimensions to be confirmed.



Key Plan

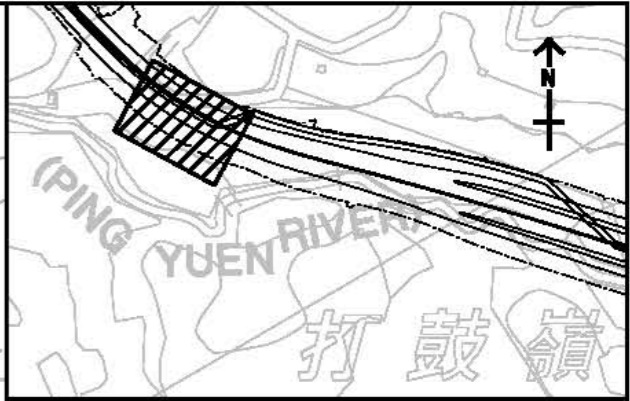


Swept path of 11m lorry

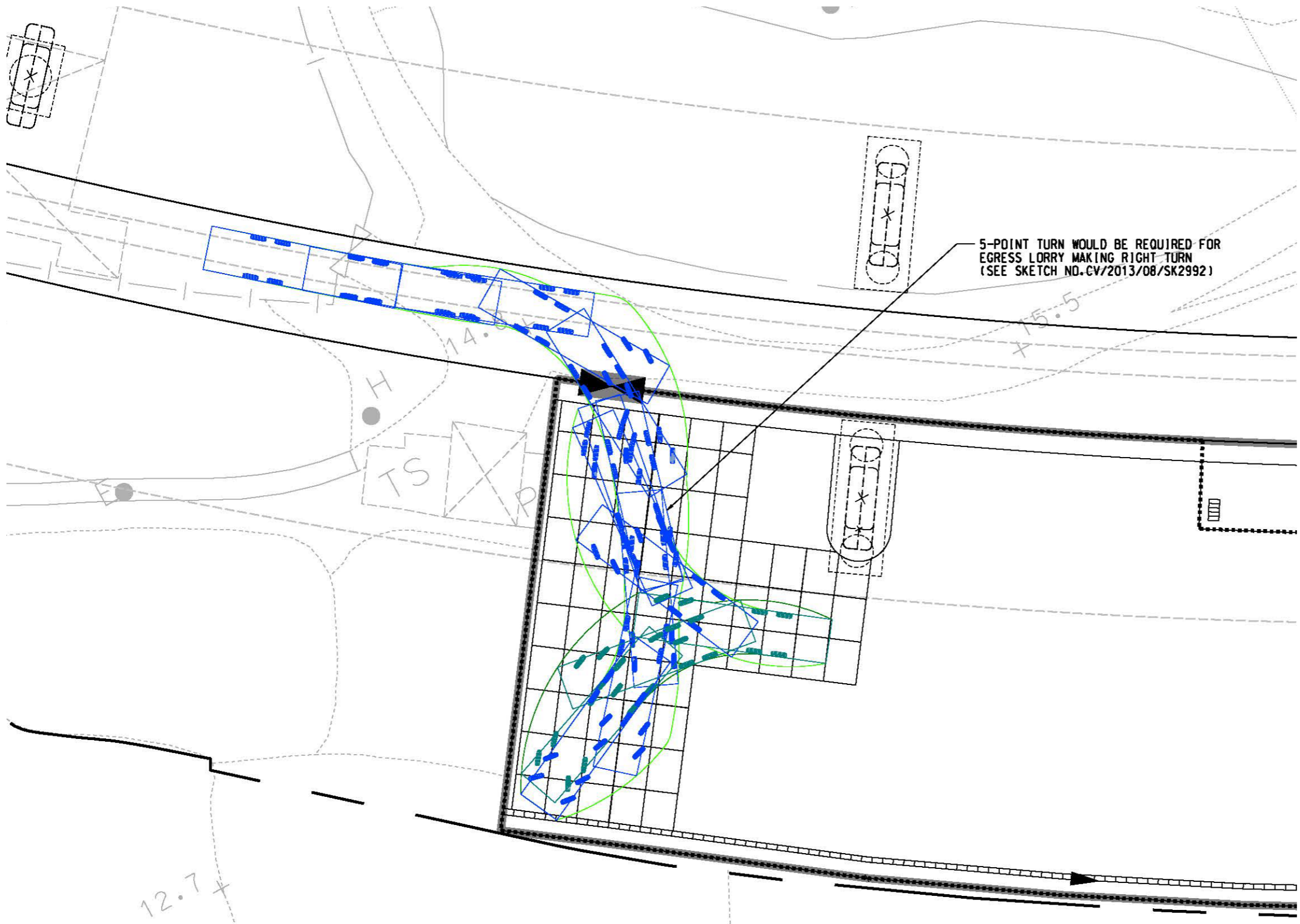
Figure No.: C6/C00/WL-022



\* Please note that all dimensions to be confirmed.



Key Plan

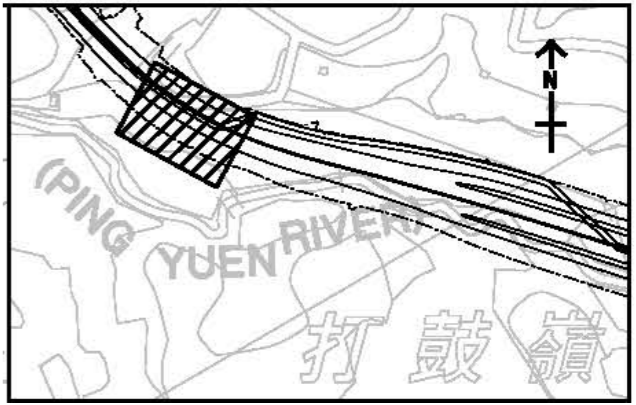


Swept path of 11m lorry

Figure No.: C6/C00/WL-023



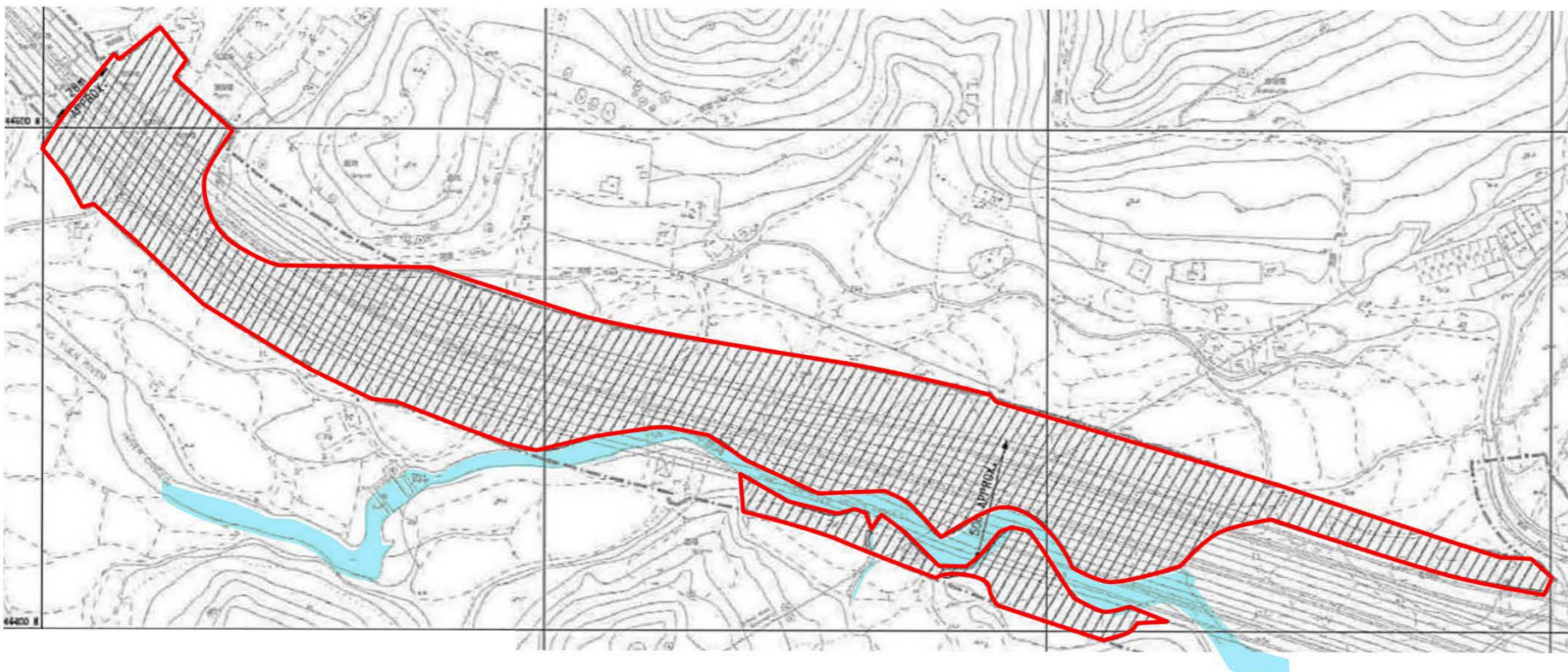
\* Please note that all dimensions to be confirmed.



Key Plan

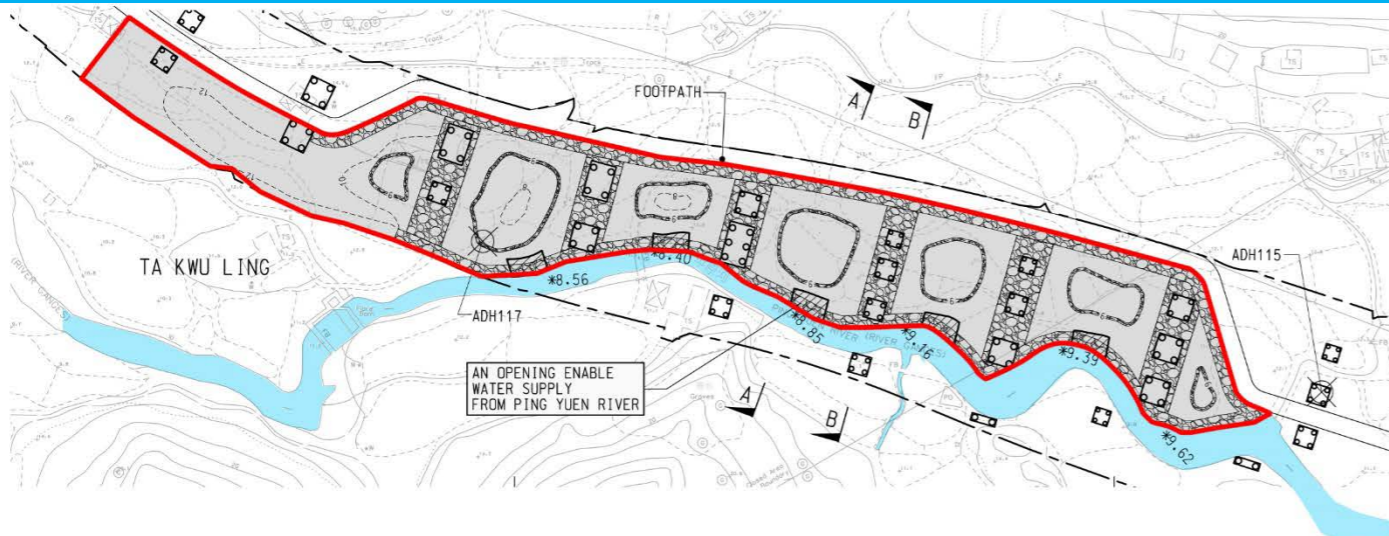
Swept path of 11m lorry

Figure No.: C6/C00/WL-024



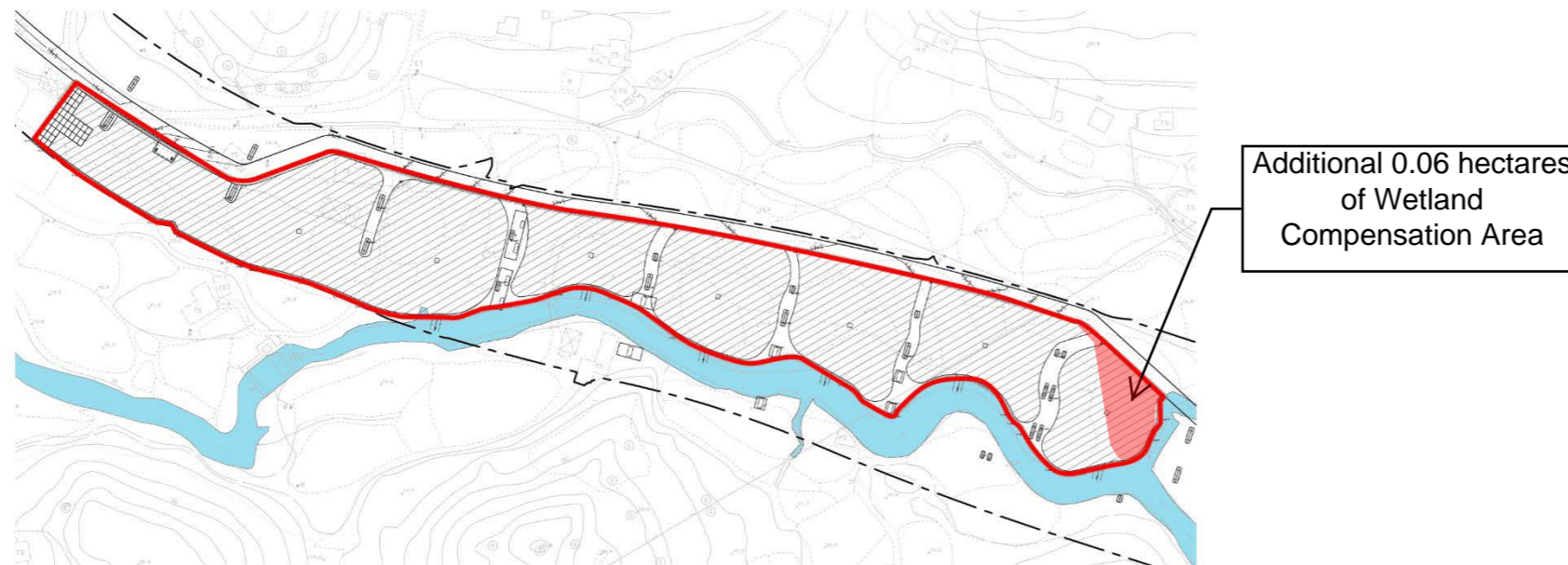
Site boundary of EP-404/2011/D (Figure 2b).

Area is not less than 1.4 hectares.



Site boundary of Habitat Creation and Management Plan (Revision 2) – approved by EPD on 26 November 2015.

Area is approximately 1.42 hectares.



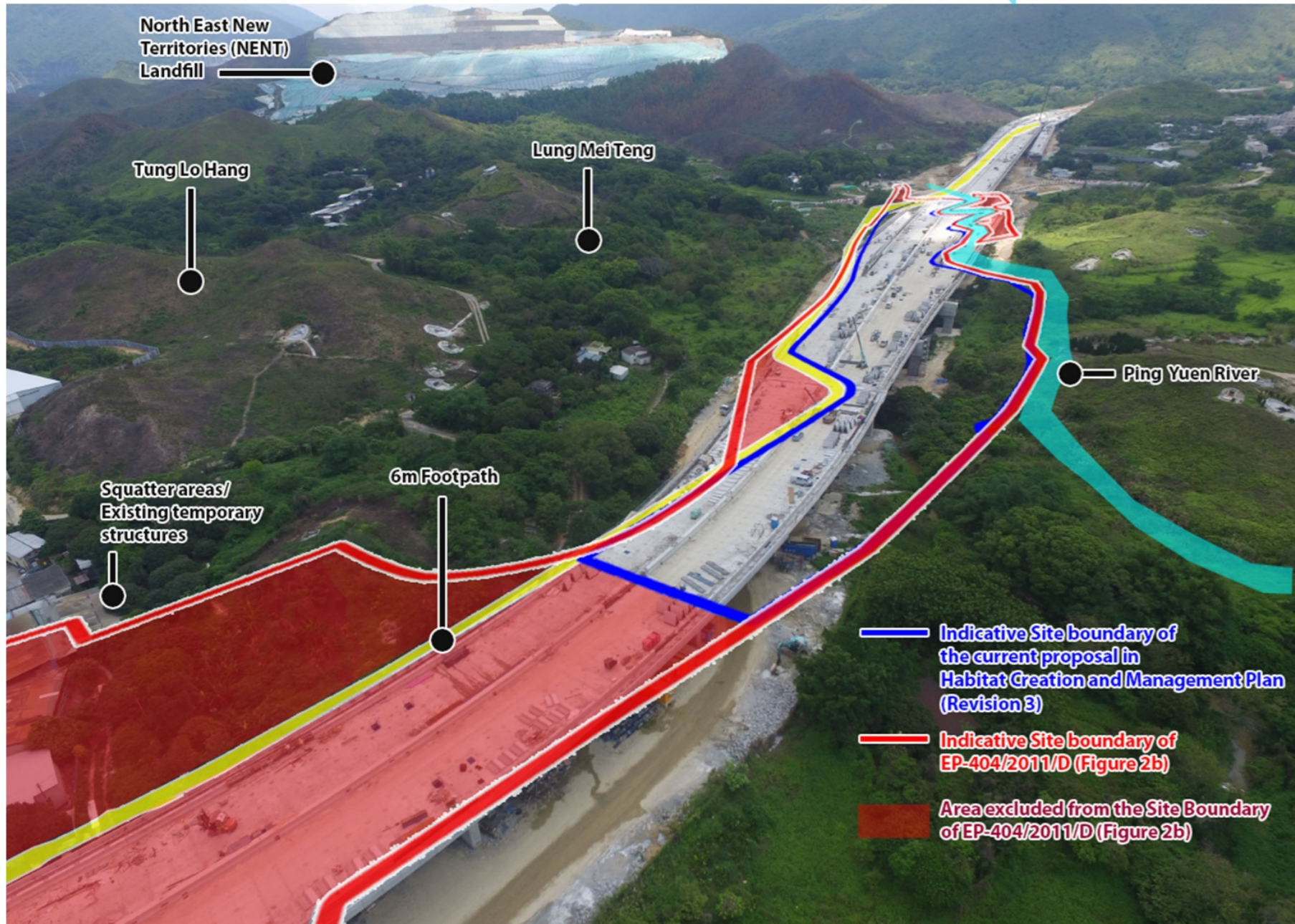
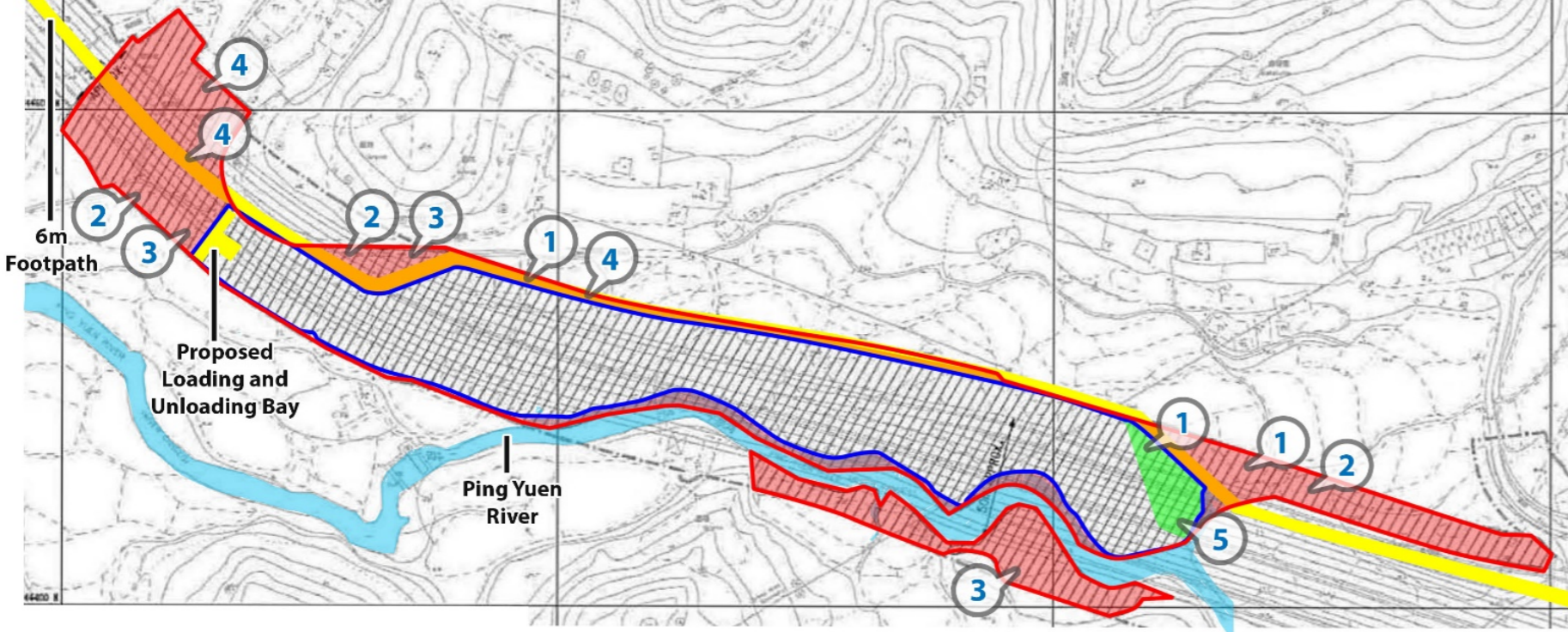
Site boundary of Habitat Creation and Management Plan (Revision 3)

Area is approximately 1.48 hectares.

## Site boundary comparison of compensation wetland

Figure No.:C6/C00/WL-025A





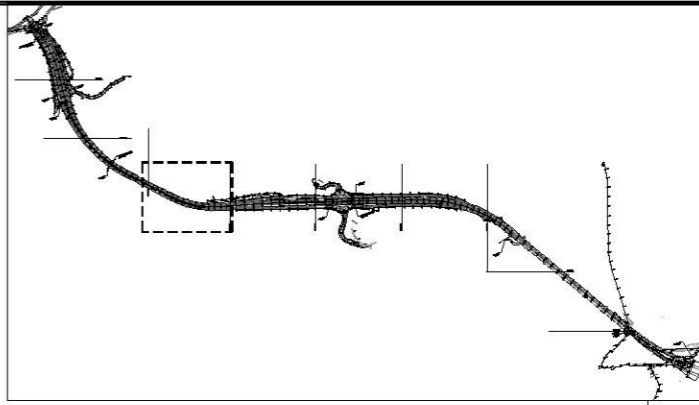
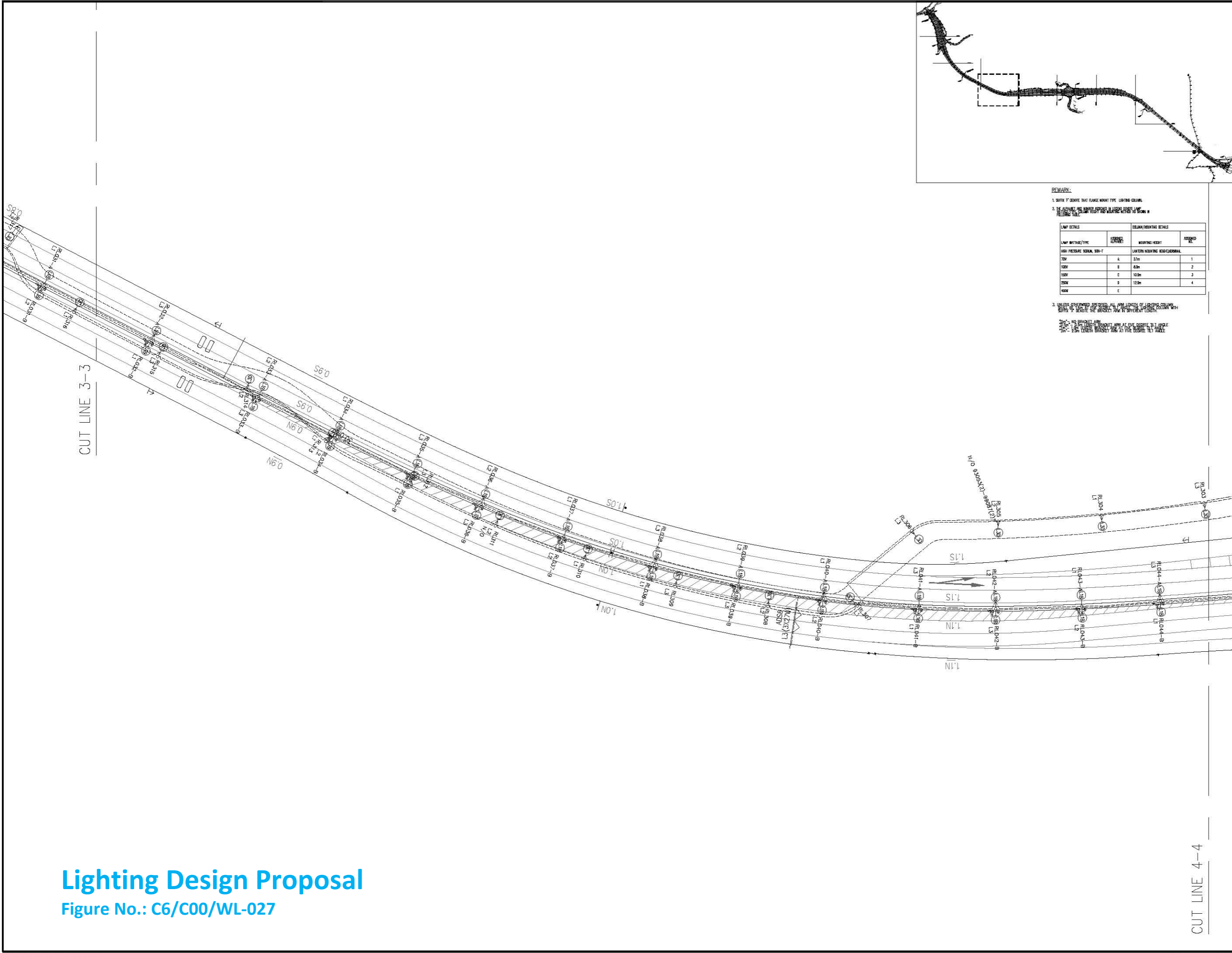
- 1 The actual landform in relation to the formation of the Created Wetland**  
 The proposed wetland should be designed in relatively “round” shape for better water retention, those areas in narrow or odd shape are not suitable to be converted as wetland.
- 2 The distance of water supply from the Ping Yeung River**  
 According to the approved HCMP, Ping Yuen River serves as the main water supply source for the Created Wetland, area located far from Ping Yuen River was actually not feasible to be converted as wetland since there was technical constraint to discharge water from the Ping Yuen River to the area which was not directly attached to the river.
- 3 Some existing site levels are higher than the designed pond level of the wetland**  
 The area opposite the Ping Yuen River was actually much higher than the design level of the Created Wetland and also there was an existing hill at the western side of the Created Wetland, where had been determined as not suitable for the construction of Wetland. Therefore, those area were omitted from the approved HCMP rev. 2.
- 4 The 6m hard paved path confined the extent of wetland**  
 After the commencement of the Contract, an additional 6m hard paved path was provisioned through the Created Wetland and it physically divided the wetland in 2 parts. Further site analysis was conducted in later stage and it determined that the wetland located at northern side of the 6m hard paved path was not suitable to be converted as wetland, since it involved substantial construction cost and time implication, and it eventually weakened the cost effectiveness of the wetland.
- 5 Actual alignment of Ping Yuen River was further verified on site**  
 The actual alignment of the Ping Yuen River was verified on site after the commencement of the Contract, the works boundary of the Created Wetland was therefore slightly adjusted to tally with the actual site context.

## Justifications for the change of Site boundary

Figure No.: C6/C00/WL-026

# Lighting Design Proposal

Figure No.: C6/C00/WL-027



REMARK:

1. DIMEN. T. DENOTE THAT FLANGE MOUNT TYPE LIGHTING COLUMN.
2. THE ALPHABETICAL NUMBERING SYSTEM IS USED TO IDENTIFY THE LIGHTING COLUMN WITH REFERENCE TO THE DRAWING SHEET AND ALIGNED WITH THE ROAD CENTER LINE.

LAMP DETAILS	COLUMN/MOUNTING DETAILS
LAMP NUMBER/TYPE	MOUNTING HEIGHT
10W (18X3500mA LED) ROAD LIGHTING	2.7m
15W (18X3500mA LED) ROAD LIGHTING	3.0m
20W (18X3500mA LED) ROAD LIGHTING	3.3m
25W (18X3500mA LED) ROAD LIGHTING	3.6m

3. UNLESS OTHERWISE SPECIFIED, ALL LAMP LENGTH OF LIGHTING COLUMN SHALL BE 1000MM. THE COLUMN SHALL BE POSITIONED WITH THE FOLLOWING DIMENSIONS:

- 100mm - 100mm BRACKET ARM
- 200mm - 200mm BRACKET ARM AT 90 DEGREE TO LAMP
- 300mm - 300mm BRACKET ARM AT 45 DEGREE TO LAMP

- LEGENDS:
- (L1) 18W (18X3500mA LED) ROAD LIGHTING AMPERA MAXI 5141 357212
  - (L2) 15W (18X3500mA LED) ROAD LIGHTING AMPERA MAXI 5102 345652
  - (L3) 174W (112X500mA LED) ROAD LIGHTING AMPERA MAXI 5136 357132
  - (L4) 174W (112X500mA LED) ROAD LIGHTING AMPERA MAXI 5098 356612
  - (L5) 245W (112X700mA LED) ROAD LIGHTING AMPERA MAXI 5136 357172
  - (L6) 198W (128X500mA LED) ROAD LIGHTING AMPERA MAXI 5140 357192
  - (L7) 174W (112X500mA LED) ROAD LIGHTING AMPERA MAXI 5136 357182
  - (L8) 174W (112X500mA LED) ROAD LIGHTING AMPERA MAXI 5119 357072
  - (L9) 138W (164X700mA LED) ROAD LIGHTING AMPERA MDT 5136 351512
  - (L10) 108W (164X700mA LED) ROAD LIGHTING AMPERA MDT 5117 351412
  - (L11) 80W (164X500mA LED) ROAD LIGHTING AMPERA MDT 5136 351552
  - (L12) 70W (164X500mA LED) ROAD LIGHTING AMPERA MDT 5136 351572
  - (L13) 75W (164X500mA LED) ROAD LIGHTING AMPERA MDT 5137 351532
  - (L14) 75W (164X500mA LED) ROAD LIGHTING AMPERA MDT 5136 351512
  - (L15) 51W (32X200mA LED) ROAD LIGHTING AMPERA MDT 5117 351412
  - (L16) 138W (164X700mA LED) ROAD LIGHTING AMPERA MDT 5136 351572
  - (L17) 138W (164X700mA LED) ROAD LIGHTING AMPERA MDT 5136 351522
  - (L18) 75W (164X500mA LED) ROAD LIGHTING AMPERA MDT 5118 351432
  - (L19) 70W (164X500mA LED) ROAD LIGHTING AMPERA MDT 5136 351552
  - (L20) 20W (18X3500mA LED) ROAD LIGHTING AMPERA MINI 5098 356492
  - (L21) 28W (18X3500mA LED) ROAD LIGHTING AMPERA MINI 5136 356542
  - (L22) 38W (24X500mA LED) ROAD LIGHTING AMPERA MINI 5098 356382
  - (L23) 28W (18X3500mA LED) ROAD LIGHTING AMPERA MINI 5102 356542
  - (L24) 38W (24X500mA LED) ROAD LIGHTING AMPERA MINI 5088 356382
  - (L25) 75W 500mA T-8 8500K CURVED GLASS SINGLE ARM 10m W/H 1.3m DUTCHBAY
  - (L26) X.Ym HIGH DOUBLE ARM ROAD LIGHTING WITH 1.5m PROJECT BRACKET ARM UNLESS OTHERWISE SPECIFIED
  - (L27) X.Ym HIGH SINGLE ARM ROAD LIGHTING WITH 1.5m PROJECT BRACKET ARM UNLESS OTHERWISE SPECIFIED
  - (L28) LIGHTING COLUMN WITH FLANGE BASE
  - (L29) EXISTING ROAD LIGHT
  - (L30) ROAD LIGHTING CABLE LAID IN 100MM DIA. UPVC DUCT
  - (L31) (1X25MM<sup>2</sup> XLPE/SWA/PVC CU CABLE FOR ROAD LIGHTING TRAMP KIT/SWA/PVC CU CABLE FOR ILLUMINATED TRAFFIC BOLLARD)
  - (L32) PUBLIC LIGHTING GROUND MOUNTED PILLAR WITH 1.5m PROJECT BRACKET ARM UNLESS OTHERWISE SPECIFIED
  - (L33) TRAFFIC BOLLARD
  - (L34) GANTRY SIGN LIGHTING
  - (L35) NORMAL OPEN POINT OF BACKFEED CIRCUIT INSIDE LIGHTING COLUMN

- FILE'S COPY
- SUBMISSION FOR APPROVAL
- DESIGN DRAWING

Rev.	Date	Description	CHK.	APP.
B	29 AUG 18	THIRD ISSUE	JT	SHL
A	12 JUL 18	SECOND ISSUE	JT	SHL
O	8 MAY 18	FIRST ISSUE	JT	SHL

Contractor: **CLP 中電**

Project: Contract No. CV/2013/08  
Liantang/Heung Yuen Wai Boundary Control Point  
Site Formation and Infrastructure Work -  
Contract 6  
Permanent Road Lighting

Drawing Title: NORTH PORTION (NORTH PORTAL, BRIDGE B, C & D, PING YEUNG ROAD)  
-LED LIGHTING LAYOUT AND CABLE ROUTING LAYOUT (SHEET 4 OF 10)

Tender Drawing ref.: NIL  
Date: 29 AUG 18 Approved By: S.H. LUN  
Prepared By: K.Y. LAU Checked By: JOHN TSANG  
Drawing No.: 2016-48-S-026 Scale: N.T.S.

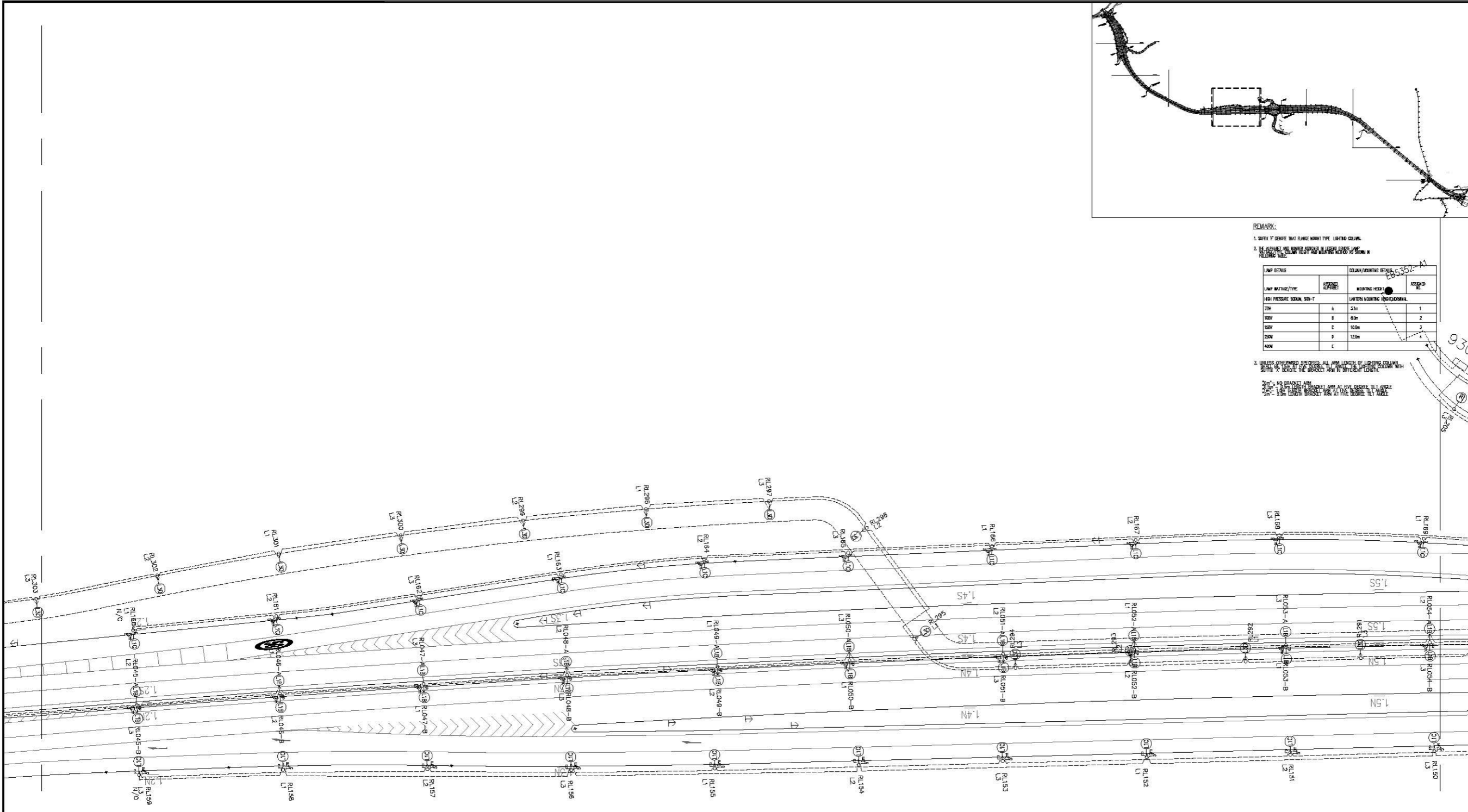
CUT LINE 4-4

CUT LINE 3-3

CUT LINE 4-4

# Lighting Design Proposal

Figure No.: C6/C00/WL-028



REMARKS:

- DIFFER 'T' DENOTE THAT FLANGE MOUNT TYPE LIGHTING COLUMN.
- BE AWARE FOR LAMP HEIGHT AS SHOWN IN THE DRAWING. THE LAMP HEIGHT SHALL BE ADJUSTED TO SUIT THE ROAD WIDTH.

LAMP DETAILS	COLUMN/ROUTING DETAILS	ASSIGNED
LAMP NUMBER/TYPE	HEIGHT/HEIGHT	
MINI PICTURE SIGNAL, 500-T	LAMP HEIGHT	
20W	2.7m	1
20W	6.0m	2
20W	12.0m	3
20W	12.0m	4
20W	6.0m	

3. UNLESS OTHERWISE SPECIFIED, ALL LAMP HEIGHTS OF LIGHTING COLUMN SHALL BE HEIGHT OF COLUMN AND NOT HEIGHT OF LAMP.

NOTE: NO BRACKET ARM  
 20W - 1500mm BRACKET ARM AT 90° ANGLE TO THE CABLE  
 20W - 1500mm BRACKET ARM AT 45° ANGLE TO THE CABLE

- LEGENDS:
- 198W (128-500mA LED) ROAD LIGHTING AMPERA MAXI 5141 357212
  - 198W (128-500mA LED) ROAD LIGHTING AMPERA MAXI 5102 345652
  - 174W (112-500mA LED) ROAD LIGHTING AMPERA MAXI 5136 357132
  - 124W (112-500mA LED) ROAD LIGHTING AMPERA MAXI 5098 356612
  - 245W (112-500mA LED) ROAD LIGHTING AMPERA MAXI 5140 357172
  - 198W (128-500mA LED) ROAD LIGHTING AMPERA MAXI 5140 357192
  - 174W (112-500mA LED) ROAD LIGHTING AMPERA MAXI 5136 357182
  - 174W (112-500mA LED) ROAD LIGHTING AMPERA MAXI 5119 357072
  - 138W (84X700mA LED) ROAD LIGHTING AMPERA MDT 5136 351512
  - 106W (48X700mA LED) ROAD LIGHTING AMPERA MDT 5117 351412
  - 80W (64X500mA LED) ROAD LIGHTING AMPERA MDT 5136 351552
  - 70W (48X500mA LED) ROAD LIGHTING AMPERA MDT 5136 351572
  - 75W (48X500mA LED) ROAD LIGHTING AMPERA MDT 5137 351532
  - 70W (48X500mA LED) ROAD LIGHTING AMPERA MDT 5136 351512
  - 70W (64X350mA LED) ROAD LIGHTING AMPERA MDT 5117 351412
  - 51W (32X200mA LED) ROAD LIGHTING AMPERA MDT 5117 351412
  - 138W (84X700mA LED) ROAD LIGHTING AMPERA MDT 5136 351572
  - 138W (84X700mA LED) ROAD LIGHTING AMPERA MDT 5136 351522
  - 75W (48X500mA LED) ROAD LIGHTING AMPERA MDT 5118 351432
  - 70W (64X350mA LED) ROAD LIGHTING AMPERA MDT 5136 351552
  - 20W (16X350mA LED) ROAD LIGHTING AMPERA MINI 5098 356492
  - 26W (16X350mA LED) ROAD LIGHTING AMPERA MINI 5136 356612
  - 38W (24X500mA LED) ROAD LIGHTING AMPERA MINI 5098 356382
  - 26W (16X350mA LED) ROAD LIGHTING AMPERA MINI 5102 356542
  - 38W (24X500mA LED) ROAD LIGHTING AMPERA MINI 5098 356382
  - 75W 500-T-85502 CURVED GLASS SINGLE ARM 10m W/H 1.3m BUTTERFLY
  - X.3m HIGH DOUBLE ARM ROAD LIGHTING WITH 1.5M PROJECT BRACKET ARM UNLESS OTHERWISE SPECIFIED
  - X.3m HIGH SINGLE ARM ROAD LIGHTING WITH 1.5M PROJECT BRACKET ARM UNLESS OTHERWISE SPECIFIED
  - FP LIGHTING COLUMN WITH FLANGE BASE
  - EXISTING ROAD LIGHT
  - ROAD LIGHTING CABLE LAID IN 100MM DIA. UPVC DUCT
  - (1X25MM<sup>2</sup> XLPE/SWA/PVC CU CABLE FOR ROAD LIGHTING TRUNKING AND 1X16MM<sup>2</sup> PVC CU CABLE FOR ILLUMINATED TRAFFIC BOLLARD)
  - PUBLIC LIGHTING GROUND MOUNTED PILLAR AS PER REF TO THE DEPARTMENT OF TRANSPORTS AND INFRASTRUCTURE DEPARTMENT LIGHTING DIVISION STANDARD DRAWINGS IN DRAWING NO. 2016-48-302
  - TRAFFIC BOLLARD
  - GANTRY SIGN LIGHTING
  - NORMAL OPEN POINT OF BACKFEED CIRCUIT INSIDE LIGHTING COLUMN

FILE'S COPY  
 SUBMISSION FOR APPROVAL  
 DESIGN DRAWING

Rev.	Date	Description	CHK.	APP.
B	29 AUG 18	THIRD ISSUE	JT	SHL
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O	8 MAY 18	FIRST ISSUE	JT	SHL

Contractor: **CLP 中電**

Project: Contract No. CV/2013/08  
 Liantang/Heung Yuen Wai Boundary Control Point  
 Site Formation and Infrastructure Work –  
 Contract 6  
 Permanent Road Lighting

Drawing Title: NORTH PORTION (NORTH PORTAL, BRIDGE B, C & D, PING YEUNG ROAD)  
 -LED LIGHTING LAYOUT AND CABLE ROUTING LAYOUT (SHEET 5 OF 10)

Tender Drawing ref.: NIL

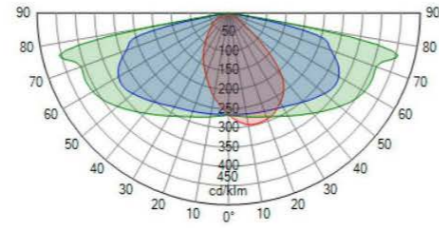
Date: 29 AUG 18 Approved By: S.H. LUN

Prepared By: K.Y. LAU Checked By: JOHN TSANG

Drawing No.: 2016-48-S-027 Scale: N.T.S.

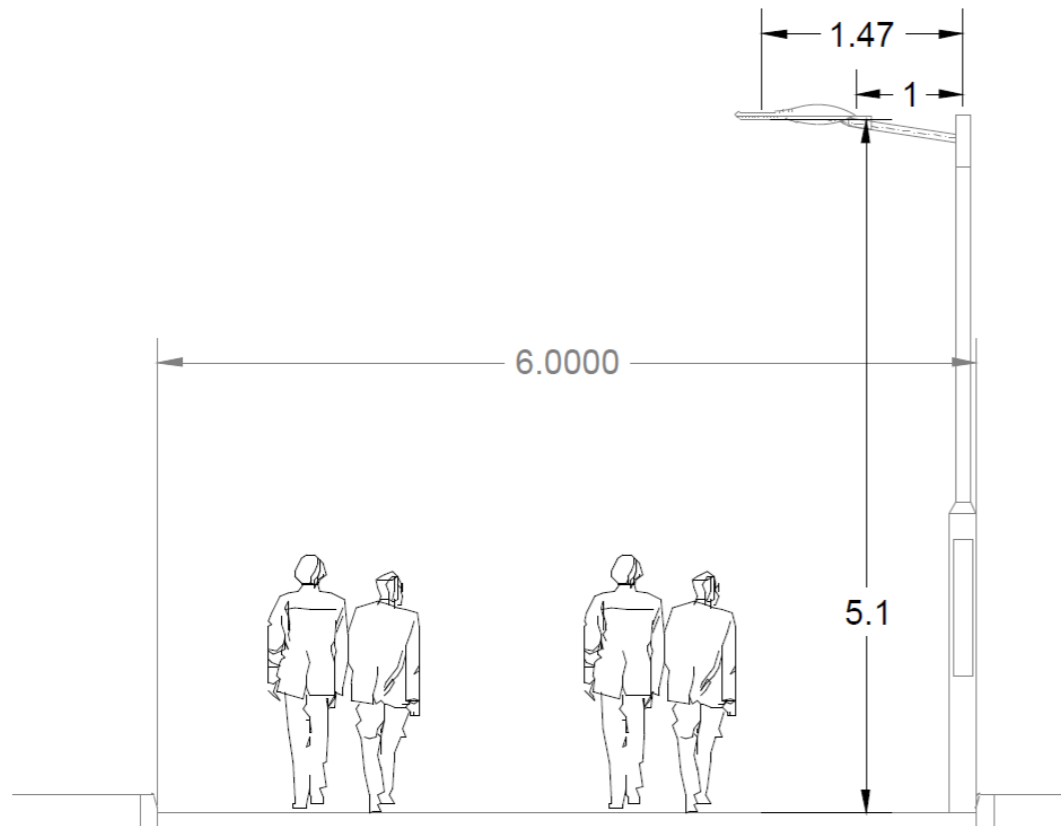
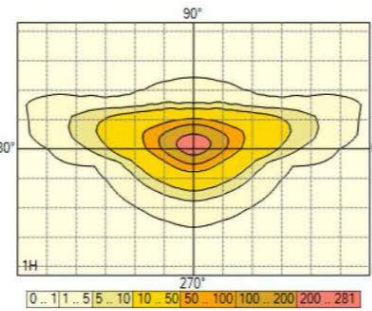
### 3.1. Standard summary

1.1. AMPERA MINI 16 LEDs 500mA WW Flat, Glass Extra Clear, Smooth 5102 356542



Type	AMPERA MINI
Reflector	5102
Source	16 LEDs 500mA WW
Protector	Flat, Glass Extra Clear, Smooth
Setting	
Source flux	3.2 klm
G-Class	Unclassified

Luminaire wattage	26.0 W
Source wattage	26.0 W
Efficacy	105 lm/W
Luminaire flux	2.726 klm
MF	0.85
Matrix	356542



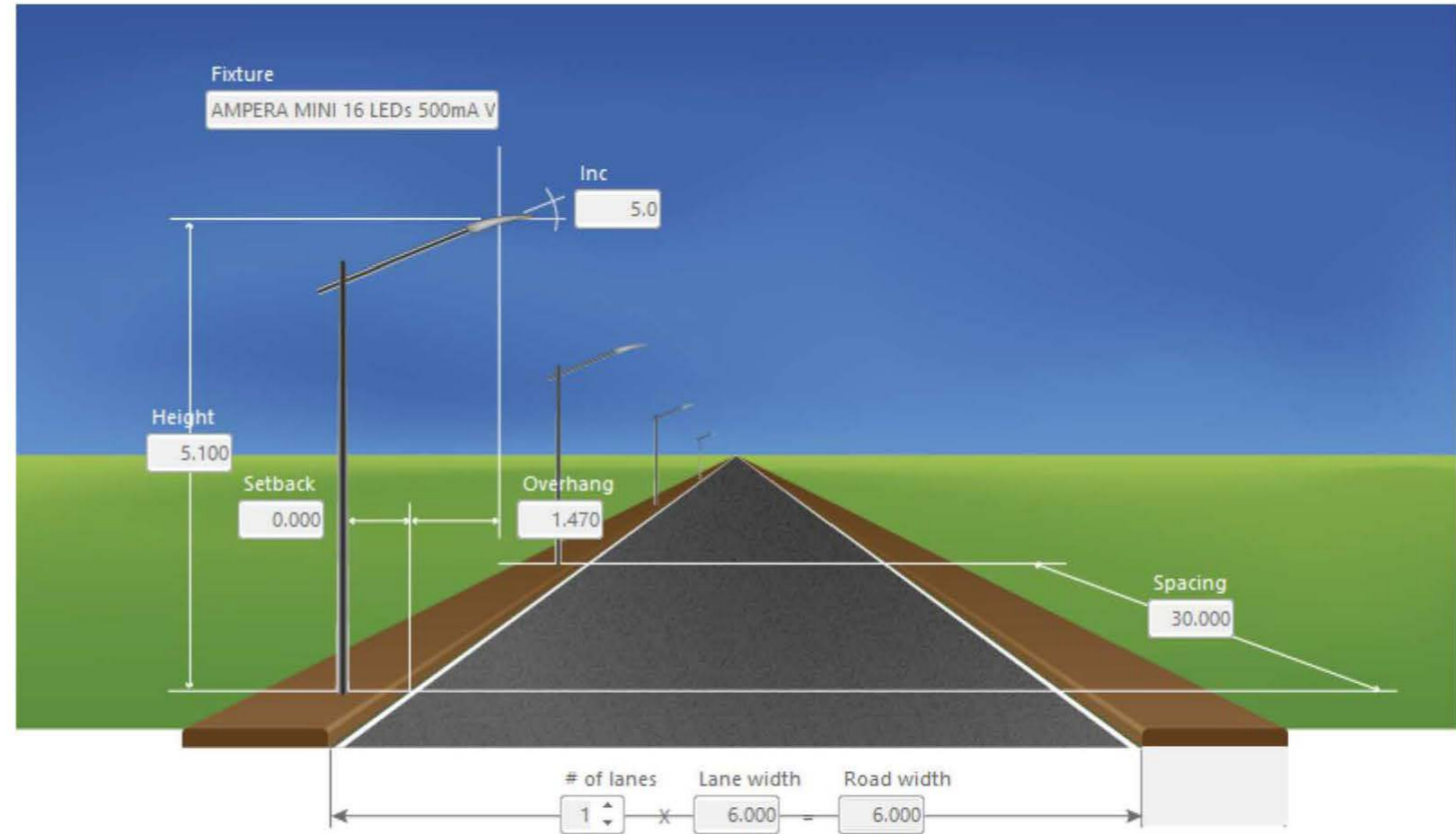
Calculations according to : CEN 13201 : 2003

Selected lighting class : PLDM (2016) S4

Constraints : IL : Min = 1.00 lux Ave = 5.00 lux

Selected lighting class (HS) : -

Constraints (HS) : -



### 3.2. Results

Power per km : 0.867 kW

- Road (IL-HS) - PLDM (2016) S4

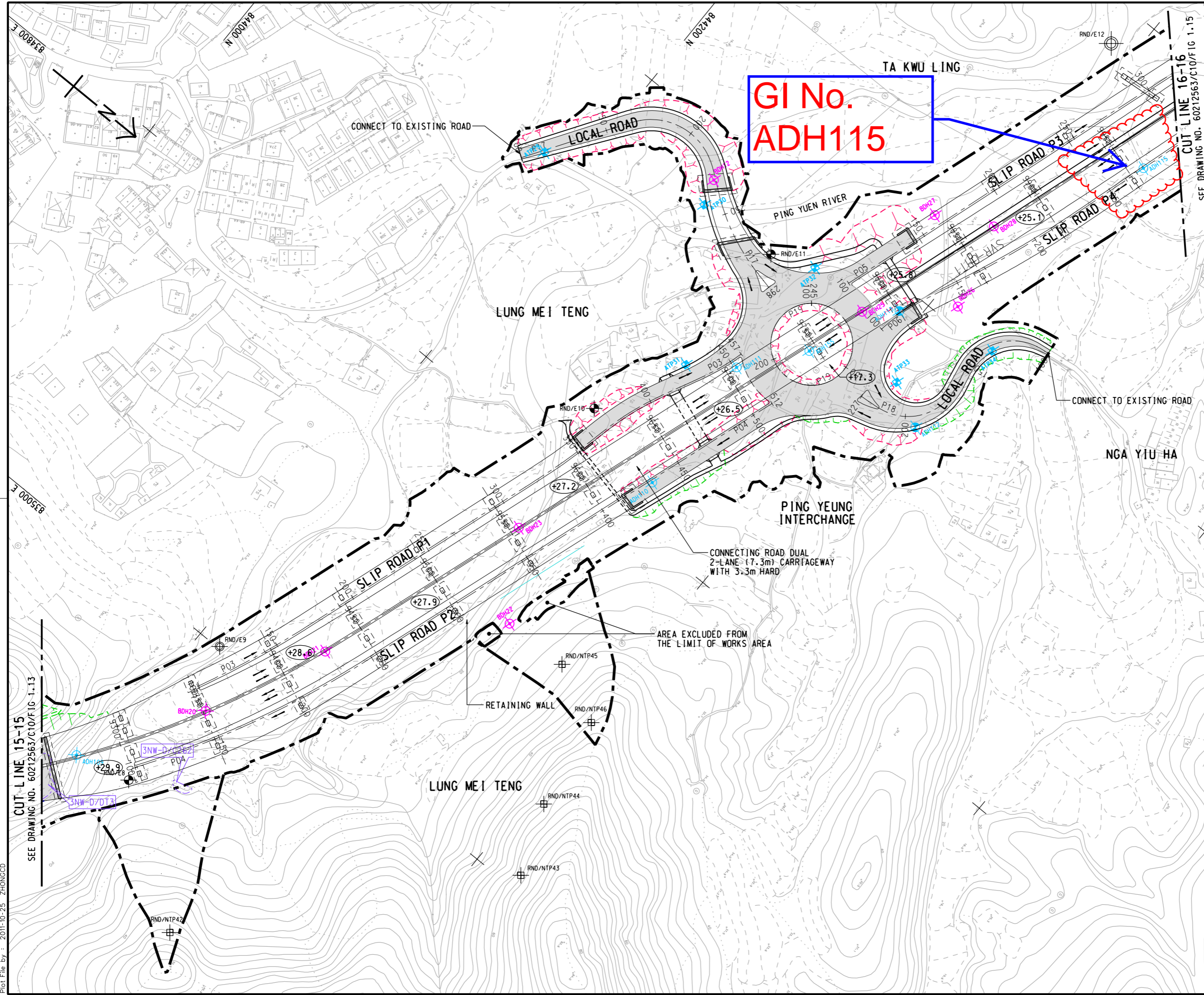
#### Illuminance

Ave	8.8 lux	✓	5.0 lux
Min	1.4 lux	✓	1.0 lux
Uo	16 %	N/A	

## Lighting Details

Figure No.: C6/C00/WL-029

## **Appendix 1 Groundwater Monitoring Locations and Results**



**NOTE:**

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60212563/C10/FIG 1.1.

CUT LINE 15-15  
SEE DRAWING NO. 60212563/C10/FIG 1.13

CUT LINE 16-16  
SEE DRAWING NO. 60212563/C10/FIG 1.15

REV.	DESCRIPTION	DATE	BY	CHECKED	DATE

**CEDD** 土木工程拓展署  
Civil Engineering and Development Department

LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS (SITE FORMATION AND INFRASTRUCTURES) - DESIGN AND CONSTRUCTION

**GENERAL LAYOUT (PING YEUNG INTERCHANGE)**  
SHEET 14 OF 18

**AECOM**

DRG. NO. 60212563/C10/FIG 1.14  
圖紙編號

CHECK BY 校核	CONTRACT NO. 合約編號	P. DIR. APPROVED 負責人
SCALE 比例	STATUS 狀態	
DIMENSIONS ARE IN METRES 尺寸單位	© COPYRIGHT RESERVED 版權所	

Plot File by : 2011-10-25\_ZHONGCD

p:\projects\60212563\drawing\report\c10\c10\_914.dgn



## STANDPIPE / PIEZOMETER MONITORING

**CONTRACT NO. : CV/2011/03**

HOLE No.

**ADH115**

**Piezometer : P1**

**Project :** Liantang / Heung Yuen Wai Boundary Control Point - Ground Investigation for Site Formation and Infrastructure Works

<b>Project No. :</b> J3430	<b>Date of Installation :</b> 30/05/2012 <b>(Piezometer)</b>
<b>Piezometer No. :</b> ADH115-P1	<b>Pipe Top Level (mPD) :</b> +11.92 <b>mPD</b>
<b>Base of Drillhole (mPD) :</b> -14.40 <b>mPD</b>	<b>Ground Level (mPD) :</b> +11.87 <b>mPD</b>
<b>Response Zone (m) :</b> 16.80 <b>To</b> 19.80 <b>m</b>	<b>Tip Level (mPD) :</b> -7.43 <b>mPD</b>
<b>Depth of Buckets (if any) :</b> 1.00 <b>To</b> 10.00 <b>m bgl</b> at 0.50 <b>m spacing</b>	<b>Co-ordinates of Instrument :</b> <b>Easting:</b> 834469.22 <b>Northing:</b> 844433.27

**Taken and Reported by :** W H NG **Checked by :** T T FUNG

Date & Time	Ground Water Level		Highest Bucket with Entrapped Water (if any)		Obtained Rainfall (mm) (Ta Kwu Ling)	Remarks
	Depth Below Pipe Top (m)	Elevation (mPD)	Depth Below Pipe Top (m)	Elevation (mPD)		
04/06/2012	1.29	+10.63			0.0	Bucket was installed at 17/07/2012
05/06/2012	1.32	+10.60			0.0	
06/06/2012	1.33	+10.59			0.0	
07/06/2012	1.33	+10.59			0.0	
08/06/2012	1.34	+10.58			0.0	
09/06/2012	1.33	+10.59			39.0	
11/06/2012	1.32	+10.60			15.5	
16/06/2012	1.06	+10.86			28.0	
18/06/2012	0.60	+11.32			16.0	
29/06/2012	1.27	+10.65			2.5	
03/07/2012	1.36	+10.56			0.0	
12/07/2012	1.40	+10.52			0.0	
27/07/2012	0.49	+11.43	1.00	+10.92	14.5	
02/08/2012	1.14	+10.78	1.00	+10.92	0.0	
09/08/2012	1.35	+10.57	1.00	+10.92	1.5	
14/08/2012	1.38	+10.54	1.00	+10.92	0.0	
20/08/2012	1.36	+10.56	1.00	+10.92	0.0	
27/08/2012	1.40	+10.52	2.00	+9.92	0.0	
04/09/2012	1.68	+10.24	1.50	+10.42	6.0	
14/09/2012	1.38	+10.54	1.50	+10.42	0.0	
21/09/2012	1.37	+10.55	1.50	+10.42	0.0	
29/09/2012	1.42	+10.50	1.50	+10.42	0.0	
06/10/2012	1.80	+10.12	2.00	+9.92	0.0	

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## STANDPIPE / PIEZOMETER MONITORING

CONTRACT NO. : CV/2011/03

HOLE No.

ADH115

Piezometer : P1

**Project :** Liantang / Heung Yuen Wai Boundary Control Point - Ground Investigation for Site Formation and Infrastructure Works

**Project No. :** J3430 **Date of Installation :** 30/05/2012 **(Piezometer)**

**Piezometer No. :** ADH115-P1 **Pipe Top Level (mPD) :** +11.92 **mPD**

**Base of Drillhole (mPD) :** -14.40 **mPD** **Ground Level (mPD) :** +11.87 **mPD**

**Response Zone (m) :** 16.80 **To** 19.80 **m** **Tip Level (mPD) :** -7.43 **mPD**

**Depth of Buckets (if any) :** 1.00 **To** 10.00 **m bgl** **Co-ordinates of Instrument :**  
**at** 0.50 **m spacing** **Easting:** 834469.22 **Northing:** 844433.27

**Taken and Reported by :** W H NG **Checked by :** T T FUNG

Date & Time	Ground Water Level		Highest Bucket with Entrapped Water (if any)		Obtained Rainfall (mm) (Ta Kwu Ling)	Remarks
	Depth Below Pipe Top (m)	Elevation (mPD)	Depth Below Pipe Top (m)	Elevation (mPD)		
11/10/2012	1.82	+10.10	2.00	+9.92	0.0	
17/10/2012	1.64	+10.28	2.00	+9.92	0.0	
26/10/2012	1.68	+10.24	2.00	+9.92	4.5	
03/11/2012	1.63	+10.29	2.00	+9.92	0.0	
10/11/2012	1.59	+10.33	2.00	+9.92	0.0	
16/11/2012	1.82	+10.10	2.00	+9.92	0.5	
23/11/2012	1.88	+10.04	2.00	+9.92	40.5	
30/11/2012	1.85	+10.07	2.00	+9.92	5.5	
06/12/2012	1.94	+9.98	2.00	+9.92	0.0	
20/12/2012	2.05	+9.87	2.00	+9.92	0.0	
29/12/2012	2.08	+9.84	2.00	+9.92	10.5	
04/01/2013	2.10	+9.82	2.00	+9.92	0.0	
10/01/2013	2.31	+9.61	2.00	+9.92	0.0	
18/01/2013	2.35	+9.57	2.00	+9.92	0.0	
25/01/2013	2.33	+9.59	2.50	+9.42	0.0	
02/02/2013	2.35	+9.57	2.50	+9.42	0.0	
08/02/2013	2.37	+9.55	2.00	+9.92	0.5	
23/02/2013	2.38	+9.54	2.00	+9.92	0.0	
02/03/2013	2.40	+9.52	2.00	+9.92	1.0	
05/03/2013	2.36	+9.56	2.00	+9.92	0.0	
14/03/2013	2.43	+9.49	2.00	+9.92	0.0	
18/03/2013	2.51	+9.41	2.00	+9.92	0.0	
25/03/2013	2.54	+9.38	2.00	+9.92	0.0#	

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# STANDPIPE / PIEZOMETER MONITORING

**CONTRACT NO. : CV/2011/03**

HOLE No.

**ADH115**

**Piezometer : P1**

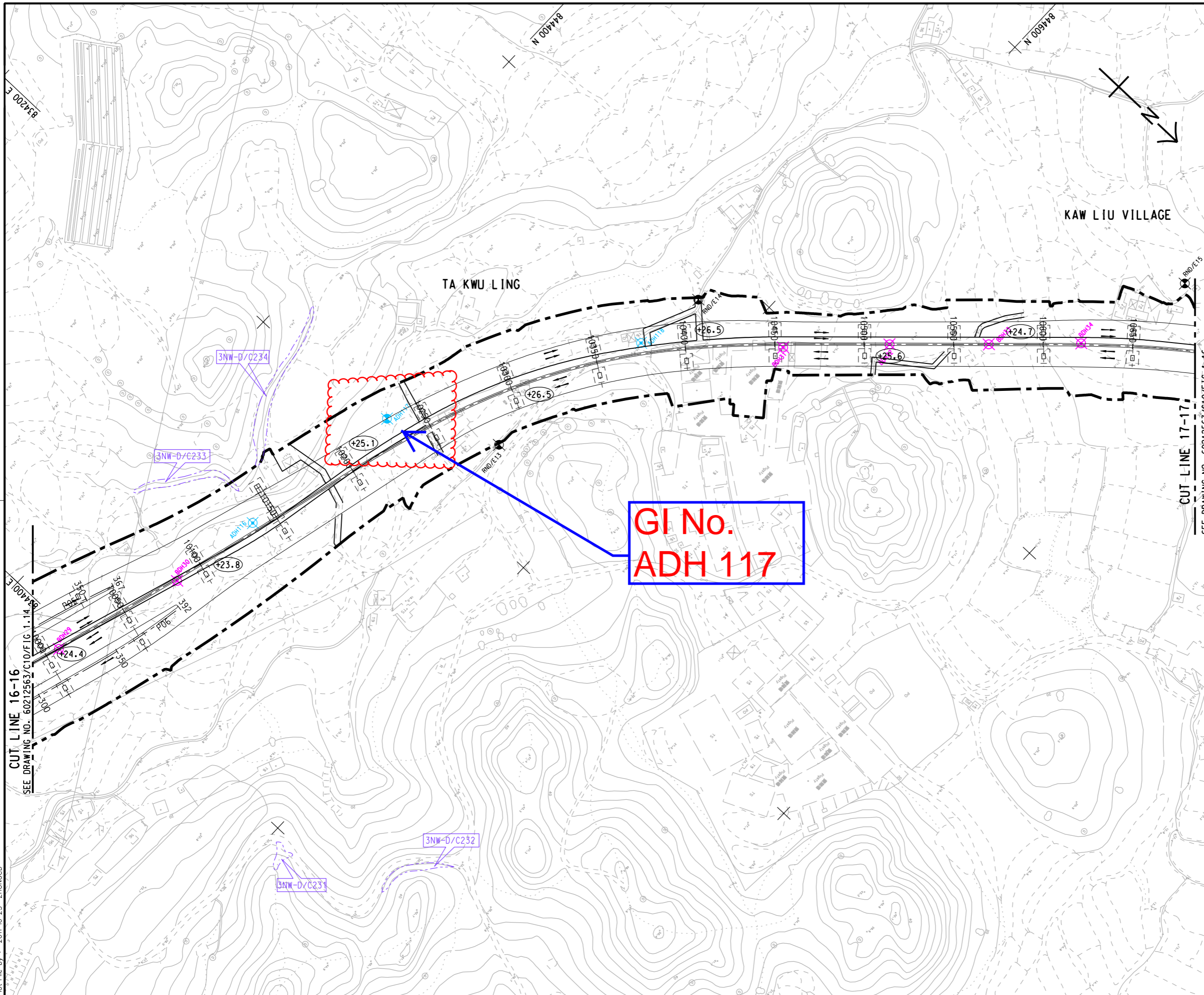
**Project :** Liantang / Heung Yuen Wai Boundary Control Point - Ground Investigation for Site Formation and Infrastructure Works

<b>Project No. :</b> J3430	<b>Date of Installation :</b> 30/05/2012 <b>(Piezometer)</b>
<b>Piezometer No. :</b> ADH115-P1	<b>Pipe Top Level (mPD) :</b> +11.92 <b>mPD</b>
<b>Base of Drillhole (mPD) :</b> -14.40 <b>mPD</b>	<b>Ground Level (mPD) :</b> +11.87 <b>mPD</b>
<b>Response Zone (m) :</b> 16.80 <b>To</b> 19.80 <b>m</b>	<b>Tip Level (mPD) :</b> -7.43 <b>mPD</b>
<b>Depth of Buckets (if any) :</b> 1.00 <b>To</b> 10.00 <b>m bgl</b> at 0.50 <b>m spacing</b>	<b>Co-ordinates of Instrument :</b> <b>Easting:</b> 834469.22 <b>Northing:</b> 844433.27

**Taken and Reported by :** W H NG **Checked by :** T T FUNG

Date & Time	Ground Water Level		Highest Bucket with Entrapped Water (if any)		Obtained Rainfall (mm) (Ta Kwu Ling)	Remarks
	Depth Below Pipe Top (m)	Elevation (mPD)	Depth Below Pipe Top (m)	Elevation (mPD)		
02/04/2013	2.48	+9.44	2.00	+9.92	13.3	
12/04/2013	2.32	+9.60	1.50	+10.42	2.1	
18/04/2013	2.31	+9.61	1.50	+10.42	8.2	

# missing (less than 24 hourly observations a day)  
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**NOTE:**

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60212563/C10/FIG 1.1.

CUT LINE 16-16  
SEE DRAWING NO. 60212563/C10/FIG 1.14

CUT LINE 17-17  
SEE DRAWING NO. 60212563/C10/FIG 1.16

**GI No.  
ADH 117**

REV.	DESCRIPTION	DATE

**CEDD** 土木工程拓展署  
Civil Engineering and  
Development Department

LIANTANG/HEUNG YUEN WAI BOUNDARY  
CONTROL POINT AND ASSOCIATED WORKS  
(SITE FORMATION AND INFRASTRUCTURES)  
- DESIGN AND CONSTRUCTION

**GENERAL LAYOUT**

SHEET 15 OF 18

**AECOM**

DRG. NO. 60212563/C10/FIG 1.15  
圖紙編號

CHECK BY 校核	CONTRACT NO. 合約編號	P. DIR. APPROVED 負責人
DRAWN BY 繪圖	STATUS 狀態	
SCALE 比例		
DIMENSIONS ARE IN 尺寸單位		

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## STANDPIPE / PIEZOMETER MONITORING

CONTRACT NO. : CV/2011/03

HOLE No.

ADH117

Piezometer : P1

**Project :** Liantang / Heung Yuen Wai Boundary Control Point - Ground Investigation for Site Formation and Infrastructure Works

<b>Project No. :</b> J3430	<b>Date of Installation :</b> 10/04/2012 <b>(Piezometer)</b>
<b>Piezometer No. :</b> ADH117-P1	<b>Pipe Top Level (mPD) :</b> +12.41 <b>mPD</b>
<b>Base of Drillhole (mPD) :</b> -10.94 <b>mPD</b>	<b>Ground Level (mPD) :</b> +12.36 <b>mPD</b>
<b>Response Zone (m) :</b> 12.00 <b>To</b> 17.00 <b>m</b>	<b>Tip Level (mPD) :</b> -4.14 <b>mPD</b>
<b>Depth of Buckets (if any) :</b> 1.00 <b>To</b> 6.50 <b>m bgl</b> at 0.50 <b>m spacing</b>	<b>Co-ordinates of Instrument :</b> <b>Easting:</b> 834189.39 <b>Northing:</b> 844483.55

**Taken and Reported by :** T K HO **Checked by :** T T FUNG

Date & Time	Ground Water Level		Highest Bucket with Entrapped Water (if any)		Obtained Rainfall (mm) (Ta Kwu Ling)	Remarks
	Depth Below Pipe Top (m)	Elevation (mPD)	Depth Below Pipe Top (m)	Elevation (mPD)		
12/04/2012	3.27	+9.14			-	Buckets was installed at 05/05/2012
13/04/2012	3.28	+9.13			2.5	
14/04/2012	3.26	+9.15			-	
16/04/2012	3.27	+9.14			7.0	
17/04/2012	3.25	+9.16			11.5	
18/04/2012	3.26	+9.15			-	
19/04/2012	3.27	+9.14			44.5	
27/04/2012	3.18	+9.23			38.5	
05/05/2012	2.31	+10.10	2.00	+10.41	10.5	
12/05/2012	2.15	+10.26	2.00	+10.41	0.0	
19/05/2012	2.15	+10.26	2.00	+10.41	33.5	
25/05/2012	2.18	+10.23	2.50	+9.91	0.5	
01/06/2012	2.30	+10.11	2.50	+9.91	0.0	
07/06/2012	2.35	+10.06	2.50	+9.91	0.0	
16/06/2012	2.10	+10.31	2.00	+10.41	28.0	
18/06/2012	1.63	+10.78	1.50	+10.91	16.0	
28/06/2012	2.15	+10.26	1.50	+10.91	0.5	
03/07/2012	2.17	+10.24	2.50	+9.91	0.0	
12/07/2012	2.40	+10.01	2.50	+9.91	0.0	
23/07/2012	1.57	+10.84	1.50	+10.91	107.5	
02/08/2012	1.63	+10.78	1.50	+10.91	0.0	
09/08/2012	1.69	+10.72	1.50	+10.91	1.5	
13/08/2012	1.89	+10.52	1.00	+11.41	10.5	

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## STANDPIPE / PIEZOMETER MONITORING

**CONTRACT NO. : CV/2011/03**

HOLE No.

**ADH117**

**Piezometer : P1**

**Project :** Liantang / Heung Yuen Wai Boundary Control Point - Ground Investigation for Site Formation and Infrastructure Works

**Project No. :** J3430 **Date of Installation :** 10/04/2012 **(Piezometer)**

**Piezometer No. :** ADH117-P1 **Pipe Top Level (mPD) :** +12.41 **mPD**

**Base of Drillhole (mPD) :** -10.94 **mPD** **Ground Level (mPD) :** +12.36 **mPD**

**Response Zone (m) :** 12.00 **To** 17.00 **m** **Tip Level (mPD) :** -4.14 **mPD**

**Depth of Buckets (if any) :** 1.00 **To** 6.50 **m bgl** **Co-ordinates of Instrument :**  
**at** 0.50 **m spacing** **Easting:** 834189.39 **Northing:** 844483.55

**Taken and Reported by :** T K HO **Checked by :** T T FUNG

Date & Time	Ground Water Level		Highest Bucket with Entrapped Water (if any)		Obtained Rainfall (mm) (Ta Kwu Ling)	Remarks
	Depth Below Pipe Top (m)	Elevation (mPD)	Depth Below Pipe Top (m)	Elevation (mPD)		
20/08/2012	2.68	+9.73	2.00	+10.41	0.0	
27/08/2012	3.17	+9.24	3.00	+9.41	0.0	
04/09/2012	3.49	+8.92	3.50	+8.91	6.0	
14/09/2012	3.28	+9.13	3.50	+8.91	0.0	
21/09/2012	3.29	+9.12	3.50	+8.91	0.0	
29/09/2012	3.30	+9.11	3.50	+8.91	0.0	
05/10/2012	3.35	+9.06	3.50	+8.91	0.0	
12/10/2012	3.38	+9.03	3.50	+8.91	0.0	
20/10/2012	3.31	+9.10	3.50	+8.91	0.0	
27/10/2012	3.36	+9.05	3.50	+8.91	5.5	
03/11/2012	3.30	+9.11	3.50	+8.91	0.0	
10/11/2012	3.25	+9.16	3.50	+8.91	0.0	
16/11/2012	3.51	+8.90	3.50	+8.91	0.5	
21/11/2012	3.58	+8.83	3.50	+8.91	0.5	
30/11/2012	3.53	+8.88	3.50	+8.91	5.5	
06/12/2012	3.58	+8.83	3.50	+8.91	0.0	
22/12/2012	3.27	+9.14	3.50	+8.91	0.0	
28/12/2012	3.30	+9.11	3.50	+8.91	0.0	
05/01/2013	3.32	+9.09	3.50	+8.91	0.0	
11/01/2013	3.60	+8.81	3.00	+9.41	0.0	
18/01/2013	3.63	+8.78	3.00	+9.41	0.0	
23/01/2013	3.65	+8.76	4.00	+8.41	0.0	
01/02/2013	3.68	+8.73	4.00	+8.41	0.0	

# missing (less than 24 hourly observations a day)

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### STANDPIPE / PIEZOMETER MONITORING

CONTRACT NO. : CV/2011/03

HOLE No.

ADH117

Piezometer : P1

**Project :** Liantang / Heung Yuen Wai Boundary Control Point - Ground Investigation for Site Formation and Infrastructure Works

<b>Project No. :</b> J3430	<b>Date of Installation :</b> 10/04/2012 (Piezometer)
<b>Piezometer No. :</b> ADH117-P1	<b>Pipe Top Level (mPD) :</b> +12.41 mPD
<b>Base of Drillhole (mPD) :</b> -10.94 mPD	<b>Ground Level (mPD) :</b> +12.36 mPD
<b>Response Zone (m) :</b> 12.00 To 17.00 m	<b>Tip Level (mPD) :</b> -4.14 mPD
<b>Depth of Buckets (if any) :</b> 1.00 To 6.50 m bgl at 0.50 m spacing	<b>Co-ordinates of Instrument :</b> <b>Easting:</b> 834189.39 <b>Northing:</b> 844483.55

**Taken and Reported by :** T K HO                                      **Checked by :** T T FUNG

Date & Time	Ground Water Level		Highest Bucket with Entrapped Water (if any)		Obtained Rainfall (mm) (Ta Kwu Ling)	Remarks
	Depth Below Pipe Top (m)	Elevation (mPD)	Depth Below Pipe Top (m)	Elevation (mPD)		
08/02/2013	3.65	+8.76	3.00	+9.41	0.5	
21/02/2013	3.68	+8.73	3.00	+9.41	0.0	
02/03/2013	3.70	+8.71	3.00	+9.41	1.0	
08/03/2013	3.54	+8.87	3.00	+9.41	0.0	
14/03/2013	3.51	+8.90	3.00	+9.41	0.0	
18/03/2013	3.53	+8.88	3.00	+9.41	0.0	
25/03/2013	3.79	+8.62	4.00	+8.41	0.0#	
02/04/2013	3.57	+8.84	3.50	+8.91	13.3	
12/04/2013	3.49	+8.92	3.00	+9.41	2.1	
18/04/2013	3.46	+8.95	3.00	+9.41	8.2	

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## **Appendix 2 - Wetland Compensation Area - Site Photos**



Wetland Compensation Area – Site Photos taken on 7 July 2015







**Photo No. 1**



**Photo No. 2**



**Photo No. 3**



**Photo No. 4**



**Photo No. 5**



**Photo No. 6**



**Photo No. 7**

## **Appendix 3 Flora Species Recorded within Site Boundary**

### Flora Species Recorded within Site Boundary

Common Name	Scientific Name	中文名	Abundance
Big-leaved Acacia	<i>Acacia mangium</i>	大葉相思	+
Lebeck Tree	<i>Albizia lebeck</i>	大葉合歡	+
Giant Alocasia	<i>Alocasia macrorrhizos</i>	海芋	++
Water Hyssop <sup>(1)</sup>	<i>Bacopa monnieri</i>	假馬齒莧	++
-	<i>Bidens alba</i>	白花鬼針草	++
Blunt Signal-grass <sup>(1)</sup>	<i>Brachiaria mutica</i>	巴拉草, 爬拉草	+++
Pop-gun Seed	<i>Bridelia tomentosa</i>	土蜜樹, 逼迫仔	++
Paper Mulberry	<i>Broussonetia papyrifera</i>	構, 楮桑	+
Corniculate Cayratia	<i>Cayratia corniculata</i>	角花烏蘘莓	+
Chinese Hackberry	<i>Celtis sinensis</i>	朴樹	+
Pummelo	<i>Citrus maxima</i>	柚	+
Mandarin	<i>Citrus reticulata</i>	柑橘	+
Wampi	<i>Clausena lansium</i>	黃皮	+
Taro <sup>(1)</sup>	<i>Colocasia esculenta</i>	芋	++
Diffuse Day-flower <sup>(1)</sup>	<i>Commelina diffusa</i>	節節草	+++
Wood-fern	<i>Cyclosorus parasiticus</i>	華南毛蕨, 密毛小毛蕨	++
Laxspiculate Galingale <sup>(1)</sup>	<i>Cyperus distans</i>	疏穗莎草, 疏穎莎草	+
Umbrella Plant <sup>(1)</sup>	<i>Cyperus involucratus Rottb</i>	風車草	++
Dianella	<i>Dianella ensifolia</i>	山菅蘭	+
Longan	<i>Dimocarpus longan</i>	龍眼	+
India-rubber Tree	<i>Ficus elastica</i>	印度榕, 印度橡樹	+
Opposite-leaved Fig	<i>Ficus hispida</i>	對葉榕, 牛乳樹	++
Chinese Banyan	<i>Ficus microcarpa</i>	榕樹, 細葉榕	+
Creeping Fig	<i>Ficus pumila</i>	薜荔, 文頭郎	+
Annual Bluegrass , Imperial Japanese Morning Glory	<i>Ipomoea cairica</i>	五爪金龍	+
-	<i>Ipomoea obscura</i>	小心葉薯, 紫心牽牛	++
Short-leaved Kyllinga <sup>(1)</sup>	<i>Kyllinga brevifolia</i>	短葉水蜈蚣	++
Lantana	<i>Lantana camara</i>	馬纓丹	++
White Popinac	<i>Leucaena leucocephala</i>	銀合歡	+++
Chinese Privet	<i>Ligustrum sinense</i>	山指甲	+
Lychee	<i>Litchi chinensis</i>	荔枝	+
Climbing Fern	<i>Lygodium japonicum</i>	海金沙, 羅網藤	+
Elephant's Ear	<i>Macaranga tanarius</i>	血桐	++
Turn-in-the-wind	<i>Mallotus paniculatus</i>	白楸	+
China-berry	<i>Melia azedarach</i>	楝, 苦楝, 森樹	+
Mile-a-minute Weed	<i>Mikania micrantha</i>	薇甘菊	++
-	<i>Mimosa diplotricha</i>	巴西含羞草	++
Common Banana	<i>Musa x paradisiaca</i>	大蕉, 甘蕉	++++
Guinea Grass	<i>Panicum maximum</i>	大黍	++++

Hilo Grass	<i>Paspalum conjugatum</i>	兩耳草	++
Hairy Knotweed <sup>(1)</sup>	<i>Polygonum barbatum</i>	毛蓼	++
Chinese Knotweed	<i>Polygonum chinense</i>	火炭母, 五毒草	+
Guava	<i>Psidium guajava</i>	番石榴	++
Bracken Fern	<i>Pteridium aquilinum</i> Kuhn var. <i>latiusculum</i>	蕨	+++
Wild Kudzu Vine	<i>Pueraria phaseoloides</i>	三裂葉野葛	++
Sumac	<i>Rhus hypoleuca</i>	白背鹽膚木, 白背漆	+
Reed-like Sugarcane	<i>Saccharum arundinaceum</i>	斑茅, 大密	+
-	<i>Wedelia trilobata</i>	三裂葉蟛蜞菊	++
Indian Wikstroemia	<i>Wikstroemia indica</i>	了哥王, 山雁皮	+
Shiny-leaved Prickly Ash	<i>Zanthoxylum nitidum</i>	兩面針, 入地金牛	+
Weaver's Bamboo	<i>Bambusa textilis</i>	青皮竹	++

Notes:

<sup>(1)</sup> Wetland dependent species.

[The wetland dependent species was assessed with reference to Yip, Y., Yip, K. L., Liu, K. U., Ngar Y. N. and Lai, C. C. (2010). *A Floristic Survey of Marshes in Hong Kong*. Hong Kong Biodiversity. Agriculture, Fisheries and Conservation Department Newsletter Issue No. 19.]

Code for Abundance: +++++=dominant; ++++=abundant; +++=frequent; ++=occasional; +=scarce