

Agreement No. CE 65/2006 (DS)
Port Shelter Sewerage
Stage 2 and Stage 3 –
Design and Construction

Sewage Pumping Station
at Tseng Lan Shue
Project Profile

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1. BASIC INFORMATION

1.1 Project Title

1.1.1 Sewage Pumping Station (SPS) at Tseng Lan Shue (hereinafter referred to as the “Project”).

1.2 Purpose and Nature of the Project

1.2.1 In November 1989, Environmental Protection Department (EPD) commissioned a consultancy study entitled “Port Shelter Sewerage Master Plan Study” to develop a Sewerage Master Plan (SMP) for the provision of adequate sewerage and sewage treatment and disposal facilities in Sai Kung Port Shelter areas. The SMP was completed in March 1991. The SMP revealed that sewage generated from the unsewered premises in Port Shelter and adjoining areas was only partially treated mostly by septic tanks and soakaway systems, and being discharged to local watercourses, resulting in water pollution to the surrounding water bodies. The Project is part of the on-going implementation of the SMP.

1.2.2 The Project is an environmental improvement project. The purpose of the Project is to convey sewage collected from the unsewered villages in Tseng Lan Shue to sewage treatment works (STW) for treatment and disposal. With the implementation of the Project, water quality in surrounding water bodies of Tseng Lan Shue will be improved. The key element of the Project comprise the construction of a SPS at Tseng Lan Shue with an average dry weather flow (ADWF) of about 3,337m³/day.

1.3 Name of the Project Proponent

1.3.1 Drainage Services Department (DSD) is the project proponent of this designated project.

1.4 Location and Scale of the Project and History of Site

1.4.1 The Project is located at Tseng Lan Shue in Sai Kung. The Project involves the construction of the Tseng Lan Shue SPS. *Figure 1* shows the general location of the Project. *Figure 2* shows the works area for the proposed SPS. *Figure 3* shows the existing site conditions of the proposed SPS. Access to the SPS will be via Clear Water Bay Road (CWBR), the existing village access road and village footpath of Tseng Lan Shue.

1.4.2 The Tseng Lan Shue SPS building comprises an underground covered inlet chamber, screen chambers with mechanical screens, wet wells with submersible pumps, valve chamber, control panel & switchboard, ventilation systems, deodorization (DO) unit and a transformer room. The SPS building is a fully enclosed single-storey concrete structures. The SPS building with its external fence walls occupies an area of approximately 450m². The SPS building will be about 20.1m in length, 15.2m in width and 5.1m in height while the transformer room occupies an area of about 10.2m in length, 5.5m in width. The ADWF of the SPS is approximately 3,337m³/day, including 1,145m³/day from upstream planned Pak Shek Toi Road SPS and 448m³/day from upstream planned Au Tau SPS. The preliminary layout of the SPS is shown in *Appendix D*. The proposed SPS could serve for an ultimate population of about 12,000 in Tseng Lan Shue and nearby areas. The upstream planned Pak Shek Toi Road SPS and Au Tau SPS will be subject to the availability of resources.

1.4.3 Extent of the works area for the SPS including its external fence walls is approximately 450m². A small site near the village access road of approximately 60m² is proposed as a temporary works area for storage of construction equipment and materials of not more than 2m in height (*Figure 2*). To the south of the temporary works area, there is an existing car parking area. To the east of the temporary works area is an existing village footpath. The existing village footpath will be used as temporary construction access during construction of the SPS.

1.4.4 The site of the SPS is currently vacant and covered by common species of vegetation. The temporary works areas are all concrete paved areas. The site of the SPS is a piece of abandoned agricultural land (unoccupied). There is no structure or building at the site. According to historical aerial photographs, Tseng Lan Shue was generally village type development with nearby land use mainly as agricultural fields. The SPS site was not inhabited and was used as agricultural field during the 1960s. Thereafter the site was left abandoned.

1.5 Number and Type of Designated Project covered by the Project Profile

1.5.1 The proposed Tseng Lan Shue SPS is a designated project under F.3(b)(i) of Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO)(Cap.499), since the SPS has an installed capacity of more than 2,000m³ per day and a boundary of which is less than 150m from an existing residential area (“Village Type Development” zone) in the approved Tseng Lan Shue Outline Zoning Plan (OZP) – S/SK-TLS/8.

1.6 Name and Telephone Number of Contact Person

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2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Planning and Implementation

2.1.1 EPD is the client department and the DSD is the works agent. The Consultant of Agreement No. CE 65/2006(DS) has been employed by DSD to carry out the design of the Project. The Electrical & Mechanical Projects (E&MP) Division of DSD will carry out the detailed E&M design of the SPS. Contractor will be employed to construct the Project under the supervision of the Consultant. The Sewage Treatment Division 1(ST1) of DSD will be responsible for operating and maintaining the Project. The Project will be implemented as Port Shelter Sewerage Stage 3, Package 2 under PWP Item No.4273DS.

2.2 Need of the Project

2.2.1 Tseng Lan Shue is not served by public sewer. At present, sewage from unsewered areas in Tseng Lan Shue is often treated and disposed of by means of septic tanks and soakaway systems. These facilities might however become ineffective in removing pollutants due to their proximity to watercourses or inadequate maintenance. Sewage from such unsewered areas has therefore been identified as a source of water pollution to nearby watercourses and the receiving waters of Junk Bay.

2.2.2 The aforesaid situation will persist unless sewage infrastructure is made available to collect and treat sewage from these areas properly. EPD has formulated as a long-term measure a programme under the Port Shelter SMP to expand the public sewerage in the Port Shelter catchment.

2.2.3 DSD proposed the provision of a SPS in Tseng Lan Shue. The sewage collected from Tseng Lan Shue will be conveyed to the Stonecutters Island STW via the East Kowloon Sewerage System for treatment before discharge. This will minimise the release of pollutants into the environment and bring sustainable improvement to the water quality of the nearby waterbodies. Hence, the Project is an environmental improvement project.

2.3 Benefits of the Project

2.3.1 Upon completion of the Project, sewage from the unsewered village at Tseng Lan Shue will be collected and conveyed to STW for proper treatment via the proposed SPS. The Tseng Lan Shue stream and its associated stream ecosystem will be benefited by the improvement in water quality.

2.4 Consideration of Alternatives

Consideration of 'Without Project' Alternative

2.4.1 Currently, sewage from Tseng Lan Shue is only partially treated by septic tank and discharged to nearby water bodies resulting in water pollution. If the Project is not implemented, partially treated sewage will continue to be discharged into nearby water bodies affecting the water quality and downstream ecosystem.

Consideration of Alternative Design

2.4.2 The use of other option to eliminate the need for SPS has been considered. The trunk sewer currently under construction is located along CWBR which is at an elevation of about 194-202mPD. The village houses where the sewers are laid are generally located at a lower elevation of 188-190mPD. A SPS is therefore required to pump the collected sewage to the trunk sewer at CWBR.

2.4.3 The use of a small sewage treatment plant to treat the collected sewage locally without the need to pump the sewage to other location for treatment has been explored. However, it was considered not practicable since a treatment plant with a larger footprint than the proposed SPS will need to be constructed. Moreover discharging the sewage to the trunk sewer at CWBR is in line with Government's sewage treatment and disposal strategies, hence a SPS is proposed.

Consideration of Alternative Location of the SPS

2.4.4 In general, the location of the SPS need to be located in a relative low level to effectively collect the sewage by gravity sewers and to avoid deep excavation works. The site selection process for the proposed SPS has avoided the following areas as far as possible due to potential adverse environmental impacts or causing major inconvenience to the villagers/public (see *Appendix A – Figure A*):

- Build up areas such as main village area, residential development;
- Conservation Area (CA) zone;
- Woodland habitat or wooded area where substantial tree felling is required; and
- Private land requiring resumption of buildings / structures.

2.4.5 Based on the above restrictions, the available land of adequate size for the SPS will be agricultural land and vacant land in the study area (**Appendix A – Figure A**). Several potential sites were considered and carefully evaluated in terms of environmental impacts, engineering constraints, landuse matters and stakeholder engagement. The evaluation is presented in **Appendix A – Table A1**. Although the sites close to CWBR are preferred from construction and access point of view, they are located at higher elevation. Substantial deep excavation of gravity sewers in excess of 6m and wet well in excess of 15m below ground level would be required. Construction of deep sewers within the villages is not feasible due to limited space of the alleys. The evaluation indicated Site 1 is the preferred location for the proposed SPS and it is the only proposed option supported by the local villagers of Tseng Lan Shue. Photos showing the existing condition of the potential sites are shown in **Appendix A – Table A2**.

2.4.6 In summary, locating the SPS to other nearby locations is not feasible as the SPS needs to be located at a flat area and low point to effectively collect village sewage by gravity sewers as much as possible. A review of the study area indicated most of the vacant and flat lands are located at a higher elevation than the proposed site. The proposed SPS site has avoided impacting the nearby woodland area. The proposed site will only affect some common species of vegetation and a tree in an abandoned agricultural land. The design of the SPS has been adjusted to avoid affecting existing trees as far as possible. Lastly, the proposed SPS site has been agreed with the village representative. The sewerage scheme for Tseng Lan Shue including the SPS was gazetted and authorized under the Roads (Works, Use and Compensation) Ordinance (Cap.370) on 6 June 2014.

Consideration of Avoiding and Minimizing Emergency Sewage Bypass

2.4.7 Implementation of the Project will enhance the water quality of the surrounding environment and will not cause any adverse impacts during normal operation. In the unlikely event such as prolonged power failure or equipment failure, emergency sewage bypass into existing box culvert, which is 100m upstream of Tseng Lan Shue stream, may be necessary. Given the semi-natural state of the stream, a two-pronged design approach has been considered to first ‘avoid’ the need for emergency bypass and if unavoidable to ‘minimize’ the amount of discharge to an absolute minimum.

Need for Emergency Sewage Bypass

2.4.8 The need for emergency sewage bypass may arise due to prolonged power failure or equipment failure. The proposed SPS will be connected to CLP grid which has a supply reliability of >99.99%. Nonetheless, dual-power supply will be provided to further enhance supply security and reliability. Standby pump and screen will be provided such that continuous operation of the SPS can be maintained in case of equipment failure or maintenance. Supervisory Control and Data Acquisition system (SCADA) will be installed such that any irregularities or any operational problems can be relay to manned stations for timely rectification. Such system is very reliable and used in other SPSs operated by DSD. Un-interruptible power system to power the SCADA system for at least 2hours after the failure of power supply will be provided. In addition, emergency buffer storage of incoming sewage has been included in the design. The need for emergency sewage bypass due to prolonged power failure or equipment failure is therefore unlikely. (see **Section 5.3** for details)

Discharge Location and Volume

2.4.9 The study has considered intercepting and diverting sewage from Tseng Lan Shue village located near CWBR eastbound to the existing drainage system including the storm drains and the box culvert along CWBR during emergency, and Tseng Lan Shue Stream is the ultimate discharge point of the existing box culvert. If the SPS could not be restored before the emergency storage is used up (3.5 hours peak flow) in an emergency event which is a very unlikely event based on DSD’s past records, the SPS maintenance team would switch the stoplogs at the special manholes to temporary bypass the sewage from the Tseng Lan Shue village located in the vicinity of CWBR westbound to the existing box culvert and concrete channel (see **Figure 20**), located about 100m and 20m away from the Tseng Lan Shue stream. . To further minimise the chance and the amount of temporary sewage bypass to the stream, the feasibility of tankering away the sewage has been considered. Since it typically takes around 30 minutes to fill up a tanker due to site constraint, tankering away the sewage could not avoid temporary bypass of sewage. Nevertheless, tankers will be provided as an additional measure so that the buffer

time with emergency storage could be further increased and discharge volume can be minimised up to 1/3 as far as practicable.

- 2.4.10 As per the detailed discussion of sewage bypass and the related preventive / mitigation measures in **Section 5.3**, the need for emergency sewage bypass is highly unlikely. However, eliminating the design of emergency bypass is not preferred from a safety point of view.

Tanker Away Arrangement

- 2.4.11 Notwithstanding the need for emergency sewage bypass due to prolonged power failure or equipment failure is highly unlikely, it would be possible to deploy tankers to transport away the part of the sewage from TLS SPS to nearby existing sewerage to further increase the buffer time for emergency storage and in turn further reduce the chance for using emergency bypass. Assuming 2 tankers are deployed, about 24m³ of sewage could be transported away in an hour (which is about 1/3 of the incoming sewage under average flow) and the buffer time with emergency storage could be further increased and hence the chance for emergency bypass would be further reduced.

Consideration of Alternative Construction Methods and Construction Sequence

- 2.4.12 Construction method that avoid disturbance to existing stream is strictly required for construction of the SPS. A clearance of about 2m will be maintained from the SPS and the stream. Layout of the SPS is shown on **Appendix A – Sketch no.209**. The wet well which will require deeper excavation has been located as far away from the stream as possible (at least 9m). For the excavation work of the wet well, shallow excavation (Stage I) with hand held devices will be adopted until excavation reaches the streambed level (around 1.5m deep). Stage II excavation will be carried out by mini-excavator. Each stage of excavation will be limited to 1.7m depth. Temporary supporting sheet piles and struts will be provided to retain the surrounding soil and prevent seepage. Sections showing the proposed excavation works are shown on **Appendix A – Sketch nos.210 to 212**.
- 2.4.13 For the other locations, shallow (Stage I) excavation of 1.6m~2.4m deep will be divided into stages and each stage of excavation will not exceed 800mm depth. Temporary supporting sheet piles will be installed for each stage of excavation to retain the surrounding soil and prevent seepage. Section showing the proposed excavation works is shown on **Appendix A – Sketch no.211**.
- 2.4.14 Upon completion of the excavation works, the SPS will be constructed by conventional method in the sequence of basement, ground floor and roof. Potential alternative construction method includes offsite precast structures for the SPS. However, heavy machineries will be required to deliver and handle these precast structures. Given the severe site constraint, this construction option is not practicable. Although in-situ construction could pose environmental nuisance such as constructional noise, dust and water quality impacts, it is expected that the duration and extent of the impacts are temporary and localized given the small scale works involved. It is anticipated that the potential environmental impacts can be alleviated by proper implementation of appropriate preventive / mitigation measures. Therefore, conventional construction method of *in-situ* construction of the SPS is considered more suitable and practical and will be adopted.

2.5 Project Timetable

- 2.5.1 The tentative Project implementation programme is shown below in **Table 2.1**.

Table 2.1--Project Implementation Programme

Stage	Time Period (tentative)
Design phase	On-going
Tender phase	Jul--Dec 2019
Construction phase	Dec 2019 – Dec 2024
Testing and commissioning	Around 2023
Operation and maintenance phase	Around 2024

2.6 Interactions with Broader Programme or Other Projects

- 2.6.1 In general, construction of the village sewerage at the south of Tseng Lan Shue will commence when the superstructure of the SPS has been substantially completed. Due to site constraints and small scale works involved, sewers within the village area will generally be constructed in short sections manually or using small hand-held tools. Sewers to be constructed along the village access road of Tseng Lan Shue will not overlap with the SPS construction to maintain access of construction traffic. Adverse cumulative construction impact is therefore not expected with the implementation of standard pollution control measures during construction.

- 2.6.2 Sewers located north of CWBR may be constructed concurrently with the SPS. These will be constructed in short section at any one time to minimise public disturbance from closure and diversion of footpaths. As these village sewers are located more than 200m away from the SPS and will be shielded by natural topography, adverse cumulative construction impact is also not expected with the implementation of standard pollution control measures during construction.
- 2.6.3 Construction of the village sewerage will generally start at the downstream sections to facilitate the collection of sewage. There are no other major projects in the vicinity of the Project with overlapping implementation programmes that will have significant environmental impacts due to cumulative effects. The trunk sewers along CWBR currently under construction (PWP Item No. 4382DS) is expected to be completed before commencement of works for this Project.

3. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

3.1 Existing and Planned Sensitive Receivers and Sensitive Parts of the Natural Environment

3.1.1 The proposed Tseng Lan Shue SPS is located in a vacant land currently zoned as green belt (GB) under the approved Tseng Lan Shue OZP – S/SK-TLS/8 (*Figure 4*). Nearby landuse include village (V) and residential (R(C)3). There is no school within the study area. There is no known planned development near the proposed SPS.

3.1.2 According to the OZP, the Tseng Lan Shue is bisected by CWBR and is characterised by a variety of land uses including low density residential development, village housing, horticulture and crop cultivation. The area is characterised by steep terrain and hill slopes, covered with natural vegetation and mature woodland.

Noise

- 3.1.3 The existing noise environment within the study area is dominated by traffic noise along the CWBR, birds and insects' sound and noise from villagers' activities. Noise measurement was conducted at Tseng Lan Shue near the proposed SPS site to obtain the prevailing background noise level. The measured noise levels range from 49-59dB(A) during daytime (0700 to 1900 hours), to 54-61dB(A) during evening (1900 to 2300 hours) and 51-58dB(A) during night time (2300 to 0700 hours).
- 3.1.4 Due to shielding from surrounding topography, the closest sensitive receivers to the proposed SPS site are the few nearby low-rise village houses. The identified representative Noise Sensitive Receivers (NSRs) are listed in *Table 3.1* and shown in *Figure 5*.

Table 3.1--Representative Noise Sensitive Receivers

ID	Description	No. of floors	Approx. distance to the proposed SPS / transformer room (m)	Approx. distance to the temporary works area (m)
NSR1	House no.50, Tseng Lan Shue	3	17 / 24	85
NSR2	House no.2C, Tseng Lan Shue	1	19 / 33	138
NSR3	House no.116, Kam Shue Road	3	66 / 60	105
NSR4	House no.99, Tseng Lan Shue	3	120 / 119	20

Air Quality

3.1.5 The Project is located in a rural area in Sai Kung. Apart from vehicular emission along CWBR and local roads, there are no major air pollutant sources in the vicinity. There are no air quality monitoring station in Sai Kung, the nearest air quality monitoring station operated by EPD is located in Tseung Kwan O. The 2-year average concentrations of air pollutants calculated from the annual average pollutant concentrations from 2016 to 2017 at the Tseung Kwan O air monitoring station is presented in *Table 3.2*.

Table 3.2--2-year Average Pollutant Concentrations at Tseung Kwan O Air Quality Monitoring Station

Pollutants	2-year Annual Average Concentration ⁺ (µg/m ³)	HKAQOs* (µg/m ³)
Sulphur dioxide – SO ₂	8	125 (based on averaging time of 24 hours)
Nitrogen dioxide – NO ₂	29	40
Respirable Suspended Particulates – RSP (PM10)	29	50
Fine Suspended Particulates – FSP (PM2.5)	18	35

Notes: *HKAQOs = Hong Kong Air Quality Objectives

⁺ Based on Air Quality in Hong Kong 2016 – 2017 (EPD)

*Annual average unless stated otherwise

3.1.6 The identified representative Air Sensitive Receivers (ASRs) are listed in **Table 3.3** and shown in **Figure 5**.

Table 3.3--Representative Air Sensitive Receivers

ID	Description	No. of floors	Approx. distance to the proposed SPS (m)	Approx. distance to the temporary works area (m)
ASR1	Village house at no. 50 Tseng Lan Shue	3	17	85
ASR2	Village house at no. 2C Tseng Lan Shue	1	19	138
ASR3	House no. 116 at Kam Shue Road	3	66	105
ASR4	Village house at no. 99 Tseng Lan Shue	3	120	20

Water Quality

3.1.7 The nearest water sensitive receiver is the Tseng Lan Shue stream (**Figure 5**), and it is a semi-natural stream course which comprises of box culvert, channelized sections, and weirs. The stream is adjacent to the SPS site which ultimately drains into Junk Bay near Tseung Kwan O. The stream consists of several small tributaries, most of which especially near village area are already channelised. The stream bank near the site was observed to be partly channelised. The stream bank downstream of the site is of natural stream bed.

3.1.8 Tseng Lan Shue stream water quality has been regularly monitored by EPD. The monitoring station JR3 is located near the proposed SPS site. The upstream monitoring station (JR3) located near the village of Tseng Lan Shue was graded “Fair” in 2016¹. It is noted that high level of *E.coli* was recorded (39,000cfu/100ml) likely due to discharges from unsewered villages in the catchment area. In terms of Water Quality Objectives (WQOs) compliance rate, the overall compliance rate of Tseng Lan Shue Stream was 92% in 2016. Data of key water quality parameters measured in 2016 and the 10 year trend at JR3 are presented in **Table 3.4**. The 10 year trend indicated consistently high level of *E. coli* exceeding the relevant WQO.

Table 3.4--Summary of Water Quality Monitoring Data for Tseng Lan Shue Stream (JR3)

Parameters	Junk Bay WQOs	Monitoring Data for Station JR3 in 2016	10 Year Monitoring Data for Station JR3 from 2007-2016
Dissolved oxygen (DO)	≥ 4 mg/L	7.5 mg/L	5.9 – 7.5 mg/L
pH	6.0 – 9.0	7.3	7.2 – 7.4
Suspended solids	≤ 25 mg/L	5 mg/L	5 – 8 mg/L
5-day Biochemical Oxygen Demand (BOD ₅)	≤ 5 mg/L	6 mg/L	5 – 14 mg/L
Chemical Oxygen Demand (COD)	≤ 30 mg/L	13 mg/L	13 – 35 mg/L
<i>E. coli</i>	1,000 cfu/100mL	39,000 cfu/100mL	10,000 – 120,000 cfu/100mL
Ammonia-nitrogen (NH ₃ -N)	N/A	3.15 mg/L	2.8 – 6.1 mg/L

Notes: Source: EPD River Water Quality in Hong Kong. Data presented are in annual medians of monthly samples;

except those for *E. coli* which are in annual geometric means.

cfu: colony forming unit; underlined figures: non-compliance of WQO.

Ecology

3.1.9 A 4-months ecological survey (Sep 2016 ~ Dec 2016) was conducted in 2016 within the 500m study area of the proposed SPS. Survey dates are summarized in **Table B7** in **Appendix B**. The extent of the ecological study area and survey routes are indicated in **Figure 6** and **Figure B1 (Appendix B)** respectively. Habitat map is illustrated in **Figure 6** and species recorded in the study area are presented in **Appendix B**. There were no recognised sites of conservation importance within the study area. According to AFCD, Tseng Lan Shue stream is not identified as an Ecologically Important Stream (EIS). An EIS is defined as natural streams/rivers with important ecological functions such as providing habitats for diverse or rare animal or plant communities, in accordance with ETWB TCW No. 5/2005.

Habitat &Vegetation

3.1.10 Habitat types recorded within the assessment area included Woodland, Shrubland/Grassland, Agricultural Land (abandoned and active), Watercourse and Developed Area (**Figure 6**). Size of the corresponding habitat is shown in **Table 3.5**.

¹ EPD (2017) River Water Quality in Hong Kong in 2016

Table 3.5---Habitats Recorded with the Study Area and the Project Site

Habitat	Study Area		Project Site
	Size (ha/km)	Percentage (%)	Size (ha)
Agricultural Land (abandoned and active)	13.78 ha	16.81	0.045*
Developed Area	22.05 ha	26.90	-
Shrubland/Grassland	1.12 ha	1.37	-
Watercourse	2.24 ha (3.28 km)	2.73	-
Woodland	42.77 ha	52.18	-

* The Project Site is covered by abandoned agricultural land

- 3.1.11 Within the Study Area, a total of 315 plant species were recorded, 193 of which are native species (**Table B1** of **Appendix B**). 8 plant species of conservation importance were cumulatively recorded, all of which were outside the Project Site. These included *Aquilaria sinensis*, *Artocarpus hypargyreus*, *Artabotrys hongkongensis*, *Alsophila spinulosa*, *Cibotium barometz*, *Diospyros vaccinioides*, *Pavetta hongkongensis* and *Rhododendron simsii*. Locations of species of conservation importance are shown in **Figure 6**, and their photos are shown in **Figure B3**. Their conservation status were summarised in **Table 3.12**.
- 3.1.12 Woodland was the dominated habitat recorded within the Study Area. The canopy height ranged from 6-15m. It was fairly natural and composed of a moderate diversity plant species. Woodland canopy was composed of a variety of native tree species including *Machilus chekiangensis*, *Endospermum chinense*, *Symplocos glauca*, *Viburnum odoratissimum*, *Syzygium levinei*, *Schefflera heptaphylla* and *Cratoxylum cochinchinensis*. The middle canopy and understory was colonised with a variety of young trees, shrubs and herbs, including *Psychotria asiatica*, *Ligustrum sinensis*, *Ilex asprella*, *Uvaria macrophylla* and *Alocasia macrorrhiza*. 7 species of conservation importance, *Aquilaria sinensis*, *Artocarpus hypargyreus*, *Artabotrys hongkongensis*, *Alsophila spinulosa*, *Cibotium barometz*, *Pavetta hongkongensis* and *Rhododendron simsii* were recorded in woodland habitat. Many individuals of *Aquilaria sinensis* were damaged or fell by illegal exploitation.
- 3.1.13 Small patches of shrubland/grassland were recorded uphill at the fringe of the study area. Species recorded are commonly and typically found in this habitat, including *Rhodomertus tomentosa*, *Dicranopteris pedata*, *Ilex asprella*, *Aster baccharoides*, *Microstegium ciliatum* and *Aporosa dioica*. No plant species of conservation importance was recorded in this habitat.
- 3.1.14 Most of the agricultural land recorded in the Study Area were abandoned. Active agricultural land included nurseries along Clearwater Bay Road and some small patches of farm near village house and Little Hawaii Trail. Abandoned agricultural land was composed of weeds and natural colonised species including *Microstegium ciliatum*, *Kyllinga polyphylla*, and *Boehmeria nivea*. Remnants of crops and landscape species including *Colocasia esculenta*, *Dillenia indica* and *Dypsis lutescens* were occasionally recorded. A variety of fruit trees and crops including *Musa x paradisiaca*, *Carica papaya* and *Hibiscus sabdariffa* were planted in active agricultural land. *Aquilaria sinensis* of conservation importance was recorded in agricultural land near Clear Water Bay Road.
- 3.1.15 The watercourse within the Study Area was basically formed of one mainstream section and its tributaries. The section downstream of the Project Site was natural in steep terrain with some old weirs along. The section near Tseung Kwan O village downstream was channelised and flowed into underground culvert outside the Study Area. Common native riparian and woodland tree species including *Sterculia lanceolata*, *Cleistocalyx nervosum*, *Ficus fistulosa*, *Adina pilulifera* and *Ficus subpisocarpa* were recorded along the bank of natural section of the watercourse. Native herb species including *Alocasia macrorrhizos* and *Acorus gramineus* were also commonly found in the understory and stream bed respectively. The section of watercourse upstream of the Project Site and the remaining tributaries ran through village areas or cultivated lands and were either channeled or more or less modified. Species recorded are mainly composed of common grasses or weeds including *Microstegium ciliatum*, *Boehmeria nivea*, and *Bidens alba*. No plant species of conservation importance was recorded in this habitat.
- 3.1.16 Developed Area included existing roads, residential area and villages. Vegetation recorded was mainly composed of landscape and roadside planting and weeds. Example included *Melaleuca cajuputi* subsp.

Cumingiana, *Acacia confusa*, *Araucaria heterophylla*, *Lantana camara*, and *Bidens alba*. A few individual of a plant species of conservation importance, *Diospyros vaccinioides* was recorded in landscape area of Sham Long Village. Because of its limited availability in commercial market, it is possible that they were transplanted by villagers from the nearby hillside.

- 3.1.17 The Project Site is dominated by abandoned agricultural land. All plant species recorded are common, including *Erythrina crus-galli*, *Dypsis lutescens*, *Microstegium ciliatum*, *Kyllinga polyphylla* and *Mikania micrantha*. The temporary works area is near the entrance of a car park and is paved and void of vegetation.

Mammals

- 3.1.18 4 species of mammal were observed in the Study Area (**Table B2** of **Appendix B**). All the recorded non-volant mammal species are common and widespread in Hong Kong. None of these species is considered of conservation importance. 2 unidentified bats were recorded in woodland and developed area outside Project Site during night surveys. All bats are protected under WAPO in Hong Kong.

Avifauna

- 3.1.19 45 species of bird were recorded in the Study Area (**Table B3** of **Appendix B**). Most are common and widely distributed in Hong Kong. Abundance and species richness of bird were low to moderate in agricultural land and woodland, low in watercourse and developed area, and very low in shrubland/grassland. Both abundance and species richness of bird were very low in the Project Site.

- 3.1.20 Among the recorded species, 7 species were considered of conservation importance. These included Black-crowned Night Heron *Nycticorax nycticorax*, Little Egret *Egretta garzetta*, Black Kite, Grey-chinned Minivet *Pericrocotus solaris*, Chinese Hwamei, and Ashy Drongo *Dicrurus leucophaeus*. Locations of records of these species are shown in **Figure 6**.

- 3.1.21 Black-crowned Night Heron was recorded in watercourse upstream of Project Site. This species is considered as “local concern” by Fellowes *et al.* (2002). Little Egret was recorded in watercourse upstream of Project Site. This species is considered as “potential regional concern” by Fellowes *et al.* (2002). Breeding/roosting sites of Little Egret is considered as “regional concern” (Fellowes *et al.* 2002). Black Kite was recorded in woodland outside Project Site. This species is Class 2 Protected Animal of the China and listed in Appendix 2 of CITES. Breeding/roosting sites of Black Kite is considered as “regional concern”. Grey-chinned Minivet was recorded in woodland outside Project Site. This species is considered as “local concern” by Fellowes *et al.* (2002). Chinese Hwamei was recorded in woodland outside Project Site. This species is listed in Appendix 2 of CITES. Ashy Drongo was recorded in agricultural land outside Project Site. This species is a scarce winter visitor, and considered as “local concern” by Fellowes *et al.* (2002).

Herpetofauna

- 3.1.22 6 species of reptile were observed in the Study Area (**Table B2** of **Appendix B**). All are widely distributed in Hong Kong. None of the recorded species was considered of conservation importance.

- 3.1.23 5 species of amphibian were observed in the Study Area (**Table B2** of **Appendix B**). Among the recorded species, Hong Kong Newt was considered of conservation importance. Hong Kong Newt was recorded in a section of watercourse near Siu To Yuen village, over 300m upstream of the Project Site. This species is protected under WAPO and considered of “potential global concern” by Fellowes *et al.* (2002).

Dragonfly and Butterfly

- 3.1.24 17 species of dragonfly were recorded in the Study Area (**Table B4** of **Appendix B**). All are common and widespread in Hong Kong. Abundance and species richness of dragonfly were low in agricultural land and watercourse, very low in woodland, developed area and shrubland/grassland. Both abundance and species richness of dragonfly were very low in the Project Site. Among the recorded species, Ruby Darter *Rhodothemis rufa* was considered of conservation importance. This dragonfly species was recorded in modified watercourse in Tseng Lan Shue, upstream of the Project Site. Ruby Darter is considered as “local concern” by Fellowes *et al.* (2002).

- 3.1.25 38 species of butterfly were recorded in the Study Area (**Table B5** of **Appendix B**). Most are common/very common and widespread in Hong Kong. Abundance and species richness of butterfly were low to moderate in woodland, low in other habitats. Both abundance and species richness of butterfly were low in the Project Site. Among the recorded species, Grass Demon *Udaspes folus* was considered of conservation importance. This butterfly species was recorded in agricultural land outside

the Project Site. Grass Demon is rare in Hong Kong (Chan *et al.* 2011).

Freshwater community

- 3.1.26 A total of 13 and 9 freshwater fauna were recorded in the sampling points A – J within the Study Area during wet season and dry season, respectively. They included fishes, crustaceans, and insects (**Tables B6a and 6b** of **Appendix B**). In general, the diversity was higher in wet season than in dry season. Diversity of freshwater fauna was relatively similar between upstream and downstream of the Project Site, while the diversity in sampling points A and B (just at the downstream of the Project Site) were low. Most species recorded in the surveys were common and widespread in Hong Kong, except 1 species of conservation importance Predaceous Chub (*Parazacco spilurus*) (**Figure B3** of **Appendix B**) was recorded. Locations of this species of conservation importance are shown in **Figure 6**.
- 3.1.27 *Predaceous Chub*, though common and widespread in Hong Kong and, occurring in most unpolluted hill streams, its number is declining in Mainland China because of habitat loss and destructive fishing activities. This fish species is considered as “Vulnerable” in China (Lee *et al.* 2004). It was found during both wet and dry seasons, most of them were recorded upstream of the Project Site.
- 3.1.28 The ecological importance of the habitats within the Study Area was evaluated in accordance with the criteria stipulated in Annex 8 of EIAO(TM) (**Table 3.6~Table 3.10**). The ecological importance of the Project Site was evaluated in **Table 3.11**.
- 3.1.29 In accordance with Table 3, Annex 8 of the EIAO(TM), the ecological value of species was assessed in terms of protection status (e.g. fauna protected under WAPO (except birds), and flora and fauna protected under regional/global legislation/conventions), species distribution (e.g. endemic), and rarity (e.g. rare or restricted). Flora and fauna of conservation importance recorded within the Study Area are evaluated according to the EIAO(TM) in **Table 3.12** and **Table 3.13** respectively.

Table 3.6---Evaluation of Woodland within the Study Area

Criterion	Description
Naturalness	Fairly natural, composed mainly of native species except at the woodland fringe or near roadside which were interplanted with exotic species
Size	42.77 ha
Diversity	Moderate plant diversity. Low to moderate bird and butterfly diversity, very low dragonfly diversity
Rarity	Plant species of conservation importance included <i>Aquilaria sinensis</i> , <i>Artocarpus hypargyreus</i> , <i>Artabotrys hongkongensis</i> , <i>Alsophila spinulosa</i> , <i>Cibotium barometz</i> , <i>Pavetta hongkongensis</i> and <i>Rhododendron simsii</i> . Fauna species of conservation importance included Black Kite, Chinese Hwamei, Grey-chinned Minivet
Re-creatability	Difficult to re-create
Fragmentation	Fairly intact on hillsides
Ecological linkage	Linked to nearby woodland outside Study Area
Potential value	High with protection to allow natural succession
Nursery/breeding ground	Not significant observation, but can provide breeding habitats for mammal, bird, reptile and butterfly
Age	Moderate, about 30-40 years
Abundance/richness of wildlife	Low to moderate bird and butterfly abundance, very low dragonfly abundance
Overall ecological value	Moderate to high

Table 3.7---Evaluation of Shrubland/Grassland within the Study Area

Criterion	Description
Naturalness	Semi-natural, constantly affected by hill fire possibly from grave sites
Size	1.12 ha
Diversity	low plant and butterfly diversity, very low bird and dragonfly diversity
Rarity	None recorded for plant and fauna species
Re-creatability	Easy to recreate
Fragmentation	Isolated patches on hillside near grave sites
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Limited due to frequent hillfire
Nursery/breeding ground	Not significant observation, but can provide breeding habitats for mammal, bird, reptile and butterfly
Age	N/A
Abundance/richness of wildlife	low butterfly abundance, very low bird and dragonfly abundance
Overall ecological value	Low

Table 3.8---Evaluation of Agricultural Land (Abandoned and Active) within the Study Area

Criterion	Description
Naturalness	Man-made
Size	13.78 ha
Diversity	Low to moderate bird diversity, low dragonfly and butterfly diversity
Rarity	Plant species <i>Aquilaria sinensis</i> of conservation importance recorded. Fauna species of conservation importance included Ashy Drongo and Grass Demon
Re-creatability	Easy to re-create
Fragmentation	Mostly fairly large contiguous stands within the Study Area
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low
Nursery/breeding ground	Not significant observation, but abandoned agricultural land can provide breeding habitats for bird, reptile and butterfly
Age	N/A
Abundance/richness of wildlife	Low to moderate bird abundance, low dragonfly and butterfly abundance
Overall ecological value	Low

Table 3.9---Evaluation of Watercourse within the Study Area

Criterion	Description	
	Natural Section	Modified Section
Naturalness	The main watercourse section of downstream and some section of upstream of the Project Site were natural/ semi-natural (i.e. natural / slightly modified stream)	Most of the watercourse section of upstream of the Project Site and the tributaries were either channeled or highly modified
Size	2.24 ha (3.28 km)	
Diversity	Low plant, bird, dragonfly and butterfly diversity	
Rarity	Fauna species of conservation importance included Little Egret, and Predaceous Chub	Fauna species of conservation importance included Little Egret, Black-crowned Night Heron, Hong Kong Newt, Predaceous Chub, Ruby Darter
Re-creatability	Difficult to re-creatable	Easy to recreate
Fragmentation	Fairly continuous except at the weir sections	Fragmented by road and underground culvert
Ecological linkage	Ecologically linked with riparian vegetation of the woodland	Not observed.
Potential value	Provide habitat for some species of conservation importance	Provide habitat for some species of conservation importance
Nursery/ breeding ground	Not significant observation, but can provide breeding habitats for amphibian, dragonfly and aquatic fauna	Modified section at Siu To Yuen Village provided breeding habitat and stable population for Hong Kong Newt
Age	N/A	N/A
Abundance/ richness of wildlife	Low bird, dragonfly and butterfly abundance, low to moderate abundance of aquatic fauna	Low bird, dragonfly and butterfly abundance, moderate abundance of aquatic fauna
Overall ecological value	Moderate	Moderate(for section at Siu To Yuen Village). Low for remaining sections

Table 3.10---Evaluation of Developed Area within the Study Area

Criterion	Description
Naturalness	Man-made
Size	22.05 ha
Diversity	Low bird and butterfly diversity, very low dragonfly diversity
Rarity	Plant species of conservation importance included <i>Diospyros vaccinioides</i>
Re-creatability	Easy to re-create
Fragmentation	None
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low
Nursery/breeding ground	Not significant observation, and limited as breeding habitat for fauna due to high level of disturbance
Age	N/A
Abundance/richness of wildlife	Low bird and butterfly abundance, very low dragonfly abundance
Overall ecological value	Minimal

Table 3.11---Evaluation of Project Site

Criterion	Description
Naturalness	Man-made
Size	0.045 ha
Diversity	low butterfly diversity, very low plant, bird and dragonfly diversity
Rarity	None
Re-creatability	Easy to re-create
Fragmentation	Small isolated patch of abandoned agricultural land along footpath
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low
Nursery/breeding ground	No significant observation
Age	N/A
Abundance/richness of wildlife	Low butterfly abundance, very low bird and dragonfly abundance
Overall ecological value	Low

Table 3.12---Evaluation of Flora Species of Conservation Importance Recorded within the Study Area

Common name	Scientific Name	Locations	Protection / Conservation Status	Distribution	Rarity
Incense Tree	<i>Aquilaria sinensis</i>	Woodland and Agricultural land outside the Project Site	Cap 586, Listed in Rare and Precious Plants of Hong Kong Category II nationally protected species in China; Listed as vulnerable in the China Plant Red Data Book and by IUCN (2015).	Lowland forests and fung shui woods	Locally common
Lamb of Tartary	<i>Cibotium barometz</i>	Woodland outside the Project Site	Cap 586, listed in Rare and Precious Plants of Hong Kong Status in China: VU	Forest and shrubland	Very common
Pavetta	<i>Pavetta hongkongensis</i>	Woodland outside the Project Site	Cap 96A	Thickets and forests	Common
Red Azalea	<i>Rhododendron simsii</i>	Woodland outside the Project Site	Cap 96A	Secondary shrubland on hillsides and along streams	Very common
Small persimmon	<i>Diospyros vaccinioides</i>	Developed Area outside Project Site	Listed as Critically Endangered by IUCN (2015)	Thin forests and thickets in ravines or on hillslopes	Very common
Silver-back Artocarpus	<i>Artocarpus hypargyreus</i>	Woodland outside the Project Site	Listed in Rare and Precious Plants of Hong Kong Status in China: NT	Lowland forest	Common
Spiny Tree-fern	<i>Alsophila spinulosa</i>	Woodland outside the Project Site	Cap 96 and Cap 586 Listed in Rare and Precious Plants of Hong Kong Status in China: VU Listed as vulnerable in the China Plant Red Data Book	Forest	Restricted
Hong Kong Eagle's Claw	<i>Artabotrys hongkongensis</i>	Woodland outside the Project Site	Listed in Rare and Precious Plants of Hong Kong Status in China: LC	Lowland forest	Restricted

Table 3.13---Evaluation of Faunal Species of Conservation Importance Recorded within the Study Area

Common name	Locations	Protection status / Conservation Status / Level of Concern 1 2 3 4 5	Distribution ¹	Rarity ¹
Birds				
Black-crowned Night Heron	Watercourse upstream of Project Site	Fellowes <i>et al.</i> (2002): (LC)	Mainly found in low lying wetlands and coastal areas with mangroves	Common resident and winter visitor

Common name	Locations	Protection status / Conservation Status / Level of Concern <small>1 2 3 4 5</small>	Distribution ¹	Rarity ¹
Little Egret	Watercourse upstream of Project Site	Fellowes <i>et al.</i> (2002): PRC, (RC)	Widely distributed in low-lying wet or coastal areas in Hong Kong	Common resident
Black Kite	Woodland outside Project Site	Class 2 Protected Animal of the China; Appendix 2 of CITES; Listed in Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586); Fellowes <i>et al.</i> (2002): (RC)	Widely distributed in Hong Kong, occurs in many types of habitats	Common in Hong Kong
Grey-chinned Minivet	Woodland outside Project Site	Fellowes <i>et al.</i> (2002): LC	Common in winter, scarce in summer	Found in Tai Po Kau, Shing Mun, Ho Chung, Kadoorie Farm and Botanic Garden, Tung Ping Chau.
Chinese Hwamei	Woodland outside Project Site	Listed in Appendix 2 of CITES; Listed in Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)	Common resident	Widely distributed in hillside shrubland throughout Hong Kong.
Ashy Drongo	Agricultural land outside Project Site	Fellowes <i>et al.</i> (2002): LC	Scarce winter visitor	Found in Shing Mun, Tai Po Kau
Amphibian				
Hong Kong Newt	Watercourse near Siu To Yuen (upstream of Project Site)	IUCN: Near-threatened WAPO; Fellowes <i>et al.</i> (2002): PGC	Common	Widely distributed in Hong Kong
Dragonfly				
Ruby Darter	Watercourse upstream of Project Site	Fellowes <i>et al.</i> (2002): LC	Widely distribute in ponds and marshes throughout Hong Kong	Common
Butterfly				
Grass Demon	Agricultural land outside the Project Site	-	Widely distributed in agricultural field throughout Hong Kong	Rare
Aquatic Fauna				
Predaceous Chub	Upstream of the Project Site	“Vulnerable” in China	Widespread in most unpolluted hill streams in both upper and lower courses	Common

1: AFCD (2016), 2: Fellowes *et al.* (2002), 3: Wang (1998), 4: IUCN (2016), 5: Yue and Chen (1998)

Level of concern: LC = local concern, PRC = potential regional concern, RC = regional concern, GC = global concern; Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence (Fellowes *et al.*, 2002)

Cultural Heritage

3.1.30 There are no heritage sites, i.e. all declared monuments, proposed monuments, graded historic sites / buildings, sites of archaeological interest and Government historic sites in the vicinity of the proposed SPS. There are also no built heritage resources, such as pre-1950 buildings and structures; post-1950 buildings and structures of high architectural and historical significance and interest; and cultural landscapes in the vicinity of the SPS. According to the historical aerial photographs, the SPS site was mainly used as agricultural land.

Landscape and Visual

Baseline Landscape Conditions

- 3.1.31 The broad statutory planning framework of the study area is currently covered by the approved Tseng Lan Shue OZP No.S/SK-TLS/8 (**Figure 4**). The proposed SPS site is currently an abandoned agricultural land zoned as GB. Its vicinity consists of wooded knolls, abandoned agricultural land, stream, village area and roads. The proposed temporary works site is currently a concrete paved parking area zoned as village use. Its vicinity consists of concrete channel, village area and village access road.
- 3.1.32 A broad brush tree survey (including understorey vegetation) was undertaken within the study area. Except 1 tree located at the proposed SPS, none of the trees identified within the broad brush tree survey are anticipated to be impacted by the proposed works. A total of 93 tree species were surveyed within the study area. Dominant tree species commonly observed are native such as *Machilus chekiangensis*, *Endospermum chinense*, *Symplocos glauca*, *Viburnum odoratissimum*, *Syzygium levinei*, *Schefflera heptaphylla* and *Cratoxylum cochinchinensis*. The middle canopy and understorey was colonised with a variety of young trees, shrubs and herbs, including *Psychotria asiatica*, *Ligustrum sinensis*, *Ilex asprella*, *Uvaria macrophylla* and *Alocasia macrorrhiza*. Along the bank of the natural section of watercourse, common native tree species observed including *Sterculia lanceolata*, *Cleistocalyx nervosum*, *Ficus fistulosa*, *Adina pilulifera* and *Ficus subpisocarpa*. Native herb species including *Alocasia macrorrhizos* and *Acorus gramineus* were commonly found in the understorey and stream bed respectively.
- 3.1.33 The following species of conservation importance are recorded in the study area:
- Tree species, *Aquilaria sinensis* and *Artocarpus hypargyreus*;
 - Climber species, *Artabotrys hongkongensis*;
 - Fern species, *Alsophila spinulosa*;
 - Herb species, *Cibotium barometz*; and
 - Shrub species, *Diospyros vaccinioides*, *Pavetta hongkongensis* and *Rhododendron simsii*.
- No “Old and Valuable Trees” as defined under ETWB TC(W)29/2004 or listed in the LCSD OVT Register, and no potential OVTs or “Important Trees” as defined by DEVB TC(W) 7/2015 were identified within the survey area, although the absence of such species cannot be absolutely confirmed in a broad brush survey.
- 3.1.34 A detailed individual tree survey was undertaken for the area of the proposed SPS. Tree survey plan, tree assessment schedule and tree compensation plan are provided in **Appendix E**. No rare or endangered species and no “Old and Valuable Trees” as defined under ETWB TC(W) 29/2004 or listed in the LCSD OVT Register, and no potential OVTs or “Important Trees” as defined by DEVB TC(W) 7/2015 were identified within the tree survey area.
- 3.1.35 The landscape resources (LR) in the vicinity as shown in **Figure 7** are:
- LR1 – *Woodland*. This LR contains natural wooded hill slopes supporting small to large sized trees, shrubs and herbs species. Plant species found in the woodland comprised mainly native species such as *Machilus chekiangensis*, *Endospermum chinense*, *Symplocos glauca*, *Viburnum odoratissimum*, *Syzygium levinei*, *Schefflera heptaphylla* and *Cratoxylum cochinchinensis*(**Appendix B**). Flora species of conservation importance (*Aquilaria sinensis* and *Artocarpus hypargyreus*) were found in a wooded knoll about 20m away from the SPS site. This LR is of high landscape value and sensitivity to change. The Project will not encroach into any parts of this woodland area.
 - LR2 – *Active/Abandoned agricultural land*. This LR contains largely abandoned agricultural land with small localised patches of active agricultural land scattered within the study area. The abandoned agricultural land consists of common native and exotic shrubs/herbs species such as *Microstegium ciliatum*, *Kyllinga polyphylla*, and *Boehmeria nivea*. The proposed SPS is located in abandoned agricultural land covered with *Erythrina crus-galli*, *Dypsis lutescens*, *Microstegium ciliatum*, *Kyllinga polyphylla* and *Mikania micrantha*. Some native and exotic tree species such as *Macaranga tanarius* and *Ulmus parvifolia* can be found. This LR is of medium landscape value and sensitivity to change.
 - LR3 – *Stream*. This LR is the Tseng Lan Shue stream including its various tributaries. The upstream portion of this stream especially near village area has been channelised and paved with concrete

(LR3a). This LR is largely void of stream side vegetation. A few common grasses or weeds including *Microstegium ciliatum*, *Boehmeria nivea*, and *Bidens alba* are observed at the bank. The water in LR3a is fair and discharges from village houses to LR3a are observed. LR3a is of low landscape value and sensitivity to change. The downstream section of the stream away from village area is generally semi-natural to natural (LR3b). The stream bank near the SPS has been partly lined with concrete. Common native riparian and woodland tree species including *Sterculia lanceolata*, *Cleistocalyx nervosum*, *Ficus fistulosa*, *Adina pilulifera* and *Ficus subpisocarpa* were recorded along the bank of natural section of the watercourse. Native herb species including *Alocasia macrorrhizos* and *Acorus gramineus* were also commonly found in the understorey and stream bed respectively. LR3b is of medium landscape value and sensitivity to change.

- LR4 – *Roadside planting*. This LR consists mainly of the mature tree species *Melaleuca cajuputi* subsp along CWBR. This LR is of medium landscape value and sensitivity to change.
- LR5 – *Developed area*. This LR includes roadside amenity plantings, landscape plantings in residential development and public recreational areas such as parks and playground located in residential areas dominated by village houses. This LR is characterized by largely paved areas and building structures. Most of the vegetated areas in this LR are purposively planted and regularly maintained. Vegetation recorded was mainly composed of landscape and roadside planting and weeds. Example included *Melaleuca cajuputi* subsp. *Cumingiana*, *Acacia confusa*, *Araucaria heterophylla*, *Lantana camara*, and *Bidens alba*. A few individual of a plant species of conservation importance, *Diospyros vaccinioides* was recorded in landscape area of Sham Long Village. The sensitivity of this LR is low.

3.1.36 The landscape character area (LCA) in the vicinity of the Project is shown in **Figure 8** and described below.

- LCA1 – *Woodland Landscape*. This LCA is essentially the natural area comprising hillslopes and supporting small to large sized trees, shrubs and herbs species. According to the ecological survey, plant species found comprised mainly native species. Some species of conservation importance such as *Aquilaria sinensis*, *Artocarpus hypargyreus*, *Artabotrys hongkongensis*, *Alsophila spinulosa*, *Cibotium barometz*, *Pavetta hongkongensis* and *Rhododendron simsii* were recorded in this LCA. This LCA dominates the general landscape to the south and east of the SPS. The wooded hillslopes form a scenic backdrop surrounding the southern part of Tseng Lan Shue. This LCA is of high landscape value and sensitivity to change.
- LCA2 – *Active/Abandoned Agricultural Land Landscape*. This LCA contains largely abandoned agricultural land with small localised patches of active agricultural land scattered within the study area. This LCA is of medium landscape value and sensitivity to change.
- LCA3 – *Stream Landscape*. This LCA encompasses the Tseng Lan Shue stream with several tributaries. The upstream sections (LCA3a) north of CWBR and near village area have been channelised and paved with concrete. LCA3a is of low landscape value and sensitivity to change. The downstream sections (LCA3b) away from village area are semi-natural to natural stream with vegetation between banks. LCA3b is of medium landscape value and sensitivity to change.
- LCA4 – *Rural Development Area Landscape*. This LCA refers to the various village areas of Tseng Lan Shue, Tan Shan and Sun Tei Village as well as low-rise residential development at Ka Shue Road and Kam Shue Road. Only limited tree and vegetation of common species can be found. This LCA is of low landscape value and sensitivity to change.
- LCA5 – *Major Transport Corridor Landscape*. This LCA refers to CWBR with roadside amenity planting consisting mostly of *Melaleuca cajuputi* subsp. Although the road itself is highly modified and can easily accommodate change, the mature trees lining the central divider are of medium landscape value and sensitivity to change.

Baseline Visual Conditions

3.1.37 The works area of the proposed SPS site is located at Tseng Lan Shue about 200m southeast of CWBR. It is located within GB zone at an elevation of 188mPD. A semi-natural stream can be found running

west to east along the north side of the SPS site. A village access footpath which is also Section 3 of Wilson Trail traverses along the south side of the site at a same level. The site is surrounded by hilly grounds with trees and dense vegetation cover. Majority of the village houses in Tseng Lan Shue, Sam Long and Sun Tei Village are shielded by wooded knolls of approximately 206~217mPD. Only a few close proximity village houses at about 194mPD will have view of the SPS site. The temporary works area is located at the end of the village access road next to the channelized section of Tseng Lan Shue stream. It is located within V zone at an elevation of 190mPD. The site is currently used by villagers for parking. The visual envelopes (zone of visual influence) are therefore restricted to the footpath and a few village houses close to the SPS and temporary works area. Due to shielding by existing topography and vegetation, the visual envelop of the SPS and temporary works area will not overlap. These visual sensitive receivers (VSRs) are shown in **Figure 9**.

Proposed SPS

- **VSR1 – Users of the nearby footpath and Wilson Trail.** The footpath serves as access path between CWBR and Sun Tei Village and Section 3 of Wilson Trail. This VSR includes the villagers and hikers. The footpath is adjacent to the proposed SPS site. The VSR has full and occasional view of the site. The view towards the SPS is dominated by the vegetated abandoned agricultural land with existing trees screening some of the view. The existing view is of fair quality and good alternative view of nearby woodland is available. The numbers of users are relatively few in numbers and are considered to have medium sensitivity.
- **VSR2– Residents of nearby village houses.** This VSR includes a house near the site (about 20m away). The VSR has full and frequent view of the site. The view towards the SPS is dominated by the vegetated abandoned agricultural land with existing trees screening some of the view. The existing view is of fair quality and good alternative view of nearby woodland is available. The number of residents are very few in numbers and are considered to have medium sensitivity.
- **VSR3 – Residents of houses at Kam Shue Road.** This VSR is further away from the site (about 60m away). A large portion of these residential VSRs will be screened off by the surrounding topography and vegetation. Only the top floor will have full and frequent view of the site. The view towards the SPS is dominated by the surrounding vegetation. The existing view is of fair quality and good alternative view of nearby woodland is available. The number of residents are very few in numbers and are considered to have medium sensitivity.

Temporary Works Area

- **VSR4 – Residents of nearby village houses.** This VSR includes some village houses near the site (about 20m away). The VSR has full and frequent view of the site. The view towards the temporary works area is dominated by the concrete drainage channel, village access road and car park with existing trees screening some of the view. The existing view is of fair quality and good alternative view of nearby woodland is available. The nos. of residents are medium in numbers and are considered to have medium sensitivity.
- **VSR5 – Users of the nearby footpath and Wilson Trail.** The footpath serves as access path between CWBR and Sam Long, Sun Tei Village and Section 3 of Wilson Trail. This VSR includes the villagers and hikers. The footpath is adjacent to the temporary works area. The VSR has full and occasional view of the site. The view towards the temporary works area is dominated by the concrete drainage channel, village access road and car park. The existing view is of fair quality and good alternative view of nearby woodland is available. The nos. of users are relatively few in numbers and are considered to have medium sensitivity.
- **VSR6 – Residents of nearby village houses.** This VSR includes some village houses near the site (about 45m away). The VSR has full and frequent view of the site. The view towards the temporary works area is dominated by the concrete drainage channel, village access road and car park with existing trees screening some of the view. The existing view is of fair quality and good alternative view of nearby woodland is available. The nos. of residents are medium in numbers and are considered to have medium sensitivity.

3.2 Major Elements of Surrounding Environment and Land Uses

- 3.2.1 The proposed SPS will be located in land use zone annotated as GB under the approved Tseng Lan Shue OZP – S/SK-TLS/8. The temporary works area will be located in V zone.

4. POSSIBLE IMPACTS ON THE ENVIRONMENT

4.1 Outline of Processes Involved

Construction Phase

- 4.1.1 The proposed SPS and transformer room will be constructed by conventional building construction method. Major construction activities will include earthworks, building construction and installation of electrical and mechanical equipment.
- 4.1.2 The proposed SPS is located about 2m away from an existing semi-natural stream. In order to avoid affecting the stream during construction of the SPS, initial manual excavation with sufficient temporary support particularly along the side of the natural stream will be carried out until reaching below the streambed level. Mini excavator will then be used for excavation below the streambed level. The construction sequence to minimize adverse impact to the stream is described in **Section 2.4.12. Sketch nos.209 - 212** provided the layout plan of the SPS and sections showing the excavation sequences are enclosed in **Appendix A**.
- 4.1.3 The existing village footpath will be used as temporary construction access for mini excavator and small village vehicles. A site of approximately 60m² near the village access road is proposed as a temporary works area for storage of construction equipment and materials for the SPS construction. Location of the temporary works area is shown in **Figure 2**.

Operational Phase

- 4.1.4 Sewage collected from Tseng Lan Shue will be conveyed to the proposed SPS via gravity sewers. Sewage entering the SPS will first pass through a screening chamber where a screen will be installed to remove large objects in the sewage to avoid damaging the pumps. The screened sewage will then enter into a wet well where the sewage will be pumped by centrifugal submersible pumps out of the SPS to the existing trunk sewer at CWBR and ultimately to Stonecutters Island STW via the East Kowloon Sewerage System for treatment and disposal.
- 4.1.5 The proposed SPS comprises an underground covered inlet chamber, screen chamber with mechanical screen, wet well with 3 submersible pumps (2 duty and 1 standby), an underground flow meter & valve chamber, control panel & switchboard, ventilation systems, odour control facilities and a transformer room. The SPS will be fully enclosed by a single-storey concrete structure. As confirmed by the design engineer and DSD, permanent road access to the SPS is not required. Access to the SPS will be via the existing village footpath.
- 4.1.6 The Project would impose environmental impacts during its construction and operation phases as described below.

4.2 Possible Environmental Impacts during Construction Phase

Noise

- 4.2.1 Potential noise impact is expected during construction of the SPS. Given the small works area available, overlapping of construction activities or concurrent usage of several PMEs is not expected. No construction works will be carried out during restricted hours. As access to the SPS site will be via the existing village footpath, only small size construction equipment such as mini excavator and small village vehicles will be used in the SPS site. Conventional construction equipment such as dump truck, concrete lorry mixer, etc. will be located at the temporary works area. Such arrangements have been reviewed by the design engineer and confirmed to be feasible in constructing the SPS with a view to avoiding impacts to the nearby stream habitat.
- 4.2.2 An assessment of the construction noise impact for the SPS based on two work fronts is provided in **Appendix C1**. According to the predicted results, exceedance of the EIAO-TM daytime construction noise standard is envisaged. Preventive / Mitigation measures as stipulated in **Section 5** will be implemented.

Air Quality

- 4.2.3 Dust may be generated during construction which would have potential impact to nearby air quality sensitive receivers, in particular during excavation, handling and transportation of excavated materials.

However, given the small Project area it is expected that only a small amount of excavated materials would be generated (about 1,700m³) from the SPS site. Dust suppression measures as stipulated in the Air Pollution Control (Construction Dust) Regulation is expected to be effective in controlling dust on site. No adverse dust impact would be expected at nearby air sensitive receivers.

Water Quality

4.2.4 The proposed SPS site is located adjacent to an existing stream and potential impact to the stream may exist during construction. The layout of the SPS has been carefully designed such that works requiring deeper excavation (e.g. wet well) is located as far from the stream as possible. In order to avoid affecting the stream during construction of the SPS, initial manual excavation with sufficient temporary steel sheet piles support particularly along the side of the natural stream will be carried out until reaching below the streambed level. The potential water quality impacts during the construction phase include site runoff from construction works, sewage generated from construction workforce and spillage/leakage of chemicals entering into the Tseng Lan Shue stream. The recommended best management practices as stipulated in ProPECC PN1/94 – “Construction Site Drainage” is expected to avoid and minimise the potential water quality impact. No adverse water quality impact is expected.

Waste Management

4.2.5 During the construction phase, construction and demolition (C&D) materials such as broken pieces of concrete, asphalt, soil and rock will be generated from ground breaking and excavation works. The estimated volume of C&D materials generated is presented in **Table 4.1**. The surplus inert C&D materials will be disposed of at public fill reception facilities. In addition, small amount of C&D waste such as vegetation, wood/metal scraps, packaging materials and general refuse will be generated. Small amount of chemical waste may also be generated. C&D materials and wastes if not properly stored, handled and disposed will give rise to environmental impacts, such as dust, odour, windblown litter, water quality impacts if waste enters water bodies and visual impact.

Table 4.1--Estimated Quantities of C&D Materials and Different Types of Waste during Construction

Scope of Works	Inert C&D Materials (soft fill) (m ³)	Other Inert C&D Materials (e.g. broken concrete, asphalt) (m ³)	Inert C&D Materials Reuse in the Project (m ³)	Surplus Inert C&D Materials (m ³) for Off-site Disposal	C&D Waste (m ³)	General Refuse (kg/day)
SPS	1,700	30	0	1,730	100 (See note 1)	6.5 (see notes 2 & 3)
Total	1,700	30	0	1,730	100	13

Notes:

- All C&D waste should be sorted, reused and recycled as far as possible before disposal at designated landfill.
- The amount of general refuse will depend on the contractor’s operating procedures and housekeeping practices as well as the size of the workforce on-site. All such waste should be sorted, reused and recycled before disposal at designated landfill. General refuse will be generated throughout the construction period.
- Assuming up to 10 workers will be working on site at any one time, with a general refuse generation rate of 0.65kg per worker per day.

4.2.6 The proposed SPS site is a piece of abandoned agricultural land and unoccupied. There are no structures or buildings at the site. According to historical aerial photographs, Tseng Lan Shue was generally village type development with nearby land use mainly as agricultural fields. The SPS site was not inhabited and was used as agricultural field during the 1960s. Thereafter the site was left abandoned. No contaminated land issue is therefore expected.

Landscape and Visual

Landscape change before Mitigation in Construction Phase

4.2.7 The magnitude of change, before implementation of preventive / mitigation measures, on the LRs and LCAs that would occur in the Construction Phase is summarized below. All impacts are adverse unless otherwise stated. The landscape impact plan is shown on **Figure 22**.

LR1 – *Woodland*. There will be no impact to LR1 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LR2 – *Active/Abandoned agricultural land*. The proposed SPS will require vegetation clearance of about 450m² of common vegetation in an abandoned agricultural land (LR2). The potential impact on landscape resources is the loss of common species of herbs, shrubs and a tree from LR2. With reference

to the tree survey as shown in **Appendix E**, 1 no. of tree is in conflict with the SPS structure and required to be felled, the remaining 13 nos. of trees (*Ficus microcarpus*, *Garcinia subelliptica*, *Ulmus parvifolia* *Erythrina crista-galli*, *Ficus hispida* and *Citrus maxima*) nearby the SPS could be retained. The tree to be felled (*Ulmus parvifolia*) is a common exotic species in Hong Kong. Transplantation is not recommended due to its poor survival rate after transplantation and lack of access for tree transplantation machinery. The magnitude of change is Intermediate. The impact significance is Moderate.

LR3a – *Stream (channelized)*. There will be no impact to LR3a and the magnitude of change is Negligible. The impact significance is Insubstantial.

LR3b – *Stream (semi-natural to natural)*. As the proposed SPS is 1.2m to 2m to the stream, there will be risk of construction dust, water or waste entering into the stream. The magnitude of change is Intermediate. The impact significance is Moderate.

LR4 – *Roadside planting*. There will be no impact to LR4 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LR5 – *Developed area*. The temporary works area will be located in paved concrete car park. No impact to vegetation and trees is expected. The magnitude of change is Negligible. The impact significance is Insubstantial.

LCA1 – *Woodland Landscape*. There will be no impact to LCA1 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LCA2 – *Active/Abandoned agricultural land landscape*. The proposed SPS will require vegetation clearance of about 450m² of common vegetation in an abandoned agricultural land (LCA2). The potential impact on landscape resources is the loss of common species of herbs, shrubs and a tree from LCA2. With reference to the tree survey as shown in **Appendix E**, 1 no. of tree is in conflict with the SPS structure and required to be felled, the remaining 13 nos. of trees (*Ficus microcarpus*, *Garcinia subelliptica*, *Ulmus parvifolia* *Erythrina crista-galli*, *Ficus hispida* and *Citrus maxima*) nearby the SPS could be retained. The tree to be felled (*Ulmus parvifolia*) is a common exotic species in Hong Kong. Transplantation is not recommended due to its poor survival rate after transplantation and lack of access for tree transplantation machinery. The magnitude of change is Intermediate. The impact significance is Moderate.

LCA3a – *Stream (channelized) landscape*. There will be no impact to LCA3a and the magnitude of change is Negligible. The impact significance is Insubstantial.

LCA3b – *Stream (semi-natural to natural)*. As the proposed SPS is 1.2m to 2m to the stream, there will be risk of construction dust, water or waste entering into the stream. The magnitude of change is Intermediate. The impact significance is Moderate.

LCA4 – *Roadside planting*. There will be no impact to LCA4 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LCA5 – *Developed area*. The temporary works area will be located in paved concrete car park. No impact to vegetation and trees is expected. The magnitude of change is Negligible. The impact significance is Insubstantial.

4.2.8 Preventive / Mitigation measures as recommended in **Section 5** will be implemented to mitigate the expected landscape impact to acceptable level.

Visual Impact

4.2.9 During construction, temporary visual impact is expected from removal of existing vegetation, excavated trenches, temporary stockpiles of excavated and building materials, presence of construction equipment, the SPS and temporary works areas and the night-time security lighting for the site. The construction site for the proposed SPS will be small. The impact arising during construction phase is expected to be localised and transient. The magnitude of change to the visual environment is considered to be intermediate due to small scale of the proposed works and short duration of the construction. The resulting impact significance threshold (before mitigation) of the proposed SPS to the identified VSRs during construction is considered as **moderate adverse**. While the resulting impact significance

threshold (before mitigation) of the proposed temporary works area to the identified VSRs during construction is considered as **slight adverse**.

- 4.2.10 Preventive / Mitigation measures as recommended in **Section 5** will be implemented to mitigate the expected visual impact during construction to acceptable level.

Ecology

- 4.2.11 The works area of the SPS is adjacent to the Tseng Lan Shue stream and is currently an abandoned agricultural land surrounded by woodland habitat. There will be no direct impact on the nearby woodland and stream habitat.
- 4.2.12 The main ecological impacts are associated with the permanent loss of a small area of abandoned agricultural land (approximately 450m²) and removal of 1 no. of existing tree (*Ulmus parvifolia*), which is a common exotic species in Hong Kong. 3 nos. of heavy standard native trees (*Viburnum odoratissimum*) will be proposed for compensatory planting such that there is no net loss in quality and quantity of trees. In addition, there are some indirect impacts (construction noise, dust and water quality) due to construction activities.
- 4.2.13 No flora species of conservation importance were recorded in the proposed works area.
- 4.2.14 All the 8 recorded flora species of conservation importance (*Diospyros vaccinioides*, *Aquilaria sinensis*, *Artocarpus hypargyreus*, *Artabotrys hongkongensis*, *Alsophila spinulosa*, *Cibotium barometz*, *Pavetta hongkongensis* and *Rhododendron simsii*) are located outside the proposed project limit, and therefore will not be directly affected by the proposed SPS works. The proposed SPS, temporary works area, existing footpath for temporary construction access and the above-mentioned recorded flora species in the close vicinity of the works area are shown on **Figure 2**. There is sufficient clearance between the recorded flora species of conservation importance and the works area / construction access. As such, the record flora species of conservation importance will not be affected by the construction activities.
- 4.2.15 No fauna species of conservation importance were recorded in the proposed works area and its close proximity.
- 4.2.16 The recorded fauna species of conservation importance, *Paramesotriton hongkongensis* (Hong Kong Newt), was found in an upstream tributary of Tseng Lan Shue stream which is located over 300m away from the proposed works area. With the implementation of preventive / mitigation measures as stated in **Section 5.2**, and good site practice to prevent site runoff, no adverse ecological impact on this species is anticipated during construction.
- 4.2.17 The recorded fauna species of conservation importance, *Predaceous Chub*, was found in upstream of the Tseng Lan Shue stream. With the implementation of preventive / mitigation measures as stated in **Section 5.2**, and good site practice to prevent site runoff, no adverse ecological impact on this species is anticipated during construction.
- 4.2.18 The ecological impact during construction of the SPS would therefore be minor.
- 4.2.19 The temporary works area is all located on paved car park. Given the small scale works involved and disturbed nature of the affected area, no ecological impact is therefore expected during the construction of the temporary works area.

Cultural Heritage

- 4.2.20 The proposed SPS is situated on a small pocket of alluvium that was previously used for cultivation purposes. A stream is located in its immediate north. Although Tseng Lan Shue is a historical village, the proposed temporary works area and sewer alignments will be located on existing paved car park, roads and village access road with extensive disturbance from previous utility works. There are no known archaeological sites in the Project area. The Project is therefore evaluated as having no potential archaeological impact. There are also no built heritage resources, such as pre-1950 buildings and structures; post-1950 buildings and structures of high architectural and historical significance and interest; and cultural landscapes in the vicinity of the Project. No cultural heritage impact is therefore expected during the construction phase.

4.3 Possible Environmental Impacts during Operational Phase

Noise

- 4.3.1 The mechanical screen, submersible pumps, exhaust fan and transformer of the proposed SPS and transformer room are the potential noise sources during operation of the Project. However, the screen

and pump sets will all be housed at the underground level and inside the reinforced concrete structure of the SPS. The transformer will also be totally enclosed within a reinforced concrete structure. The exhaust fan will be located within the reinforced concrete structure of the SPS. (see drawing no. 382770/BVHKL/PS/01/005 in *Appendix D*) The exhaust fan will have no direct line of sight to the nearby close proximity NSRs. The measured background noise level at Tseng Lan Shue ranges from 49-61dB(A). The 5dB(A) below the appropriate night time noise level for the Area Sensitivity Rating under the TM for the Assessment of Noise From Places other than Domestic Premises, Public Places or Construction Sites was used as noise criteria, i.e. 45dB(A). The predicted operational noise levels generated from the Project (ranging from 27~43dB(A)) are provided in *Appendix C2*. The results indicated that the operational noise level will be within the noise criteria specified in the EIAO-TM.

Air Quality

- 4.3.2 According to the Project Profile for Public Housing Development at Lin Cheung Road Site – Temporary Sewage Pumping Station and Associated Sewer Pipes (DIR-239/2014), a review of the effectiveness of odour removal facilities was conducted based on the existing Cheung Sha Wan Sewage Pumping Station (CSWSPS) that with designed ADWF of 349,386m³/day (in Year 2012). Similar to the proposed SPS, all odour sources of the existing CSWSPS are housed inside the reinforced concrete structure and installed with DO units with odour removal efficiency up to 95%. A reference odour perception was conducted at the existing CSWSPS in September 2014 and the results indicated that no odour was detected around the CSWSPS's site boundary, except slight odour was detected at the location which was 10m away from the exhaust fan. Hence, the existing odour mitigation measures (i.e. activated carbon deodorizers with regular maintenance) for CSWSPS are considered effective. As the scale of the proposed SPS is much smaller (design ADWF of 3,337m³/day) compared to the CSWSPS and the horizontal distance from the exhaust outlet of the proposed SPS to the nearest air sensitive receiver is about 30m (see *Figure 5*), with the implementation of similar odour preventive / mitigation measures (i.e. activated carbon or other equivalent odour techniques with odour removal efficiency of 99.5%), no adverse odour impact would be anticipated for the proposed SPS. Preventive / Mitigation measures would be provided as mentioned in *Section 5*. There are no other odour emission sources within the 500m study area of the Project, no cumulative odour impact is therefore expected.

Water Quality

- 4.3.3 The washing water during cleaning of the SPS in particular the screening area will pose potential water quality impact if it is discharged without treatment. By ensuring all washing water is collected and conveyed back to the sewerage network, no water quality impact is expected.
- 4.3.4 The Project will convey sewage collected from surrounding unsewered village houses to the existing STW for treatment and disposal. Implementation of the Project will enhance the water quality of the surrounding environment, and will not cause any adverse impacts during normal operation.
- 4.3.5 In the unlikely event such as prolonged power failure or equipment failure, sewage bypass into existing drainage box culvert may occur. The design of the SPS will include measures such as dual-feed power supply, standby equipment, telemetry warning system, stopping incoming sewage at upstream SPSs and provide emergency buffer storage of incoming sewage to prevent emergency bypass. With the implementation of such measures as recommended in *Section 5.3*, the chance of sewage bypass will be extremely remote.

Waste Management

- 4.3.6 Mechanical screen will be installed at the inlet chamber to prevent large solid materials in the influent from entering the pumps and causing damage. A small quantity of screenings will be generated. The screenings will be properly packed and handled within the SPS structure to avoid odour and hygiene nuisance. The screenings will then be transported to landfills for disposal. Small amount of the spent treatment media (e.g. activated carbon) of the DO unit will be generated. These will also be properly packed within the SPS and disposed to landfill. No adverse waste impact is expected during operation phase.

Landscape and Visual

Landscape change before Mitigation in Operation Phase

- 4.3.7 The magnitude of change, before implementation of preventive / mitigation measures, on the LRs and LCAs that would occur in the Operation Phase is summarized below. All impacts are adverse unless otherwise stated. The landscape impact plan is shown on *Figure 22*.

LR1 – *Woodland*. There will be no impact to LR1 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LR2 – *Active/Abandoned agricultural land*. The vegetation clearance of about 450m² of common vegetation (including 1 no. of tree) for the SPS construction results in a magnitude of change of Intermediate. The impact significance is Moderate.

LR3a – *Stream (channelized)*. There will be no impact to LR3a and the magnitude of change is Negligible. The impact significance is Insubstantial.

LR3b – *Stream (semi-natural to natural)*. There will be no impact to LR3b and the magnitude of change is Negligible. The impact significance is Insubstantial.

LR4 – *Roadside planting*. There will be no impact to LR4 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LR5 – *Developed area*. There will be no impact to LR5 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LCA1 – *Woodland Landscape*. There will be no impact to LCA1 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LCA2 – *Active/Abandoned agricultural land landscape*. The vegetation clearance of about 450m² of common vegetation (including 1 no. of tree) for the SPS construction results in a magnitude of change of Intermediate. The impact significance is Moderate.

LCA3a – *Stream (channelized) landscape*. There will be no impact to LCA3a and the magnitude of change is Negligible. The impact significance is Insubstantial.

LCA3b – *Stream (semi-natural to natural)*. There will be no impact to LCA3b and the magnitude of change is Negligible. The impact significance is Insubstantial.

LCA4 – *Roadside planting*. There will be no impact to LCA4 and the magnitude of change is Negligible. The impact significance is Insubstantial.

LCA5 – *Developed area*. The temporary works area will be located in paved concrete car park. No impact to vegetation and trees is expected. The magnitude of change is Negligible. The impact significance is Insubstantial.

Visual Impact

- 4.3.8 Since the SPS is largely shielded by topography and surrounding trees, only a few VSRs will have view of the site. The current abandoned agricultural land will be constructed with small building structures similar in size to a village house found in the area. The master layout plan and general elevation of the SPS is indicated in **Figures 10-12**. Such small structures will not obstruct key landscape features or views such as surrounding wooded knolls, and will not create massing effect. The SPS will be visible to hikers passing through the area but the effect will only be transient and the visual impact to the occasional hikers will be minimal. The magnitude of change for VSR 1 and VSR 2 due to the presence of small low-rise buildings and the associated compound is considered to be intermediate, resulting in impact significance threshold (before mitigation) of **moderate adverse** impact. The magnitude of change for VSR3 is considered to be small due to its distance separation and screening by the existing vegetation, resulting in impact significance threshold (before mitigation) of **slight adverse** impact. Preventive / Mitigation measures as recommended in **Section 5** will be implemented to mitigate the expected impact during construction and operation. The planting plan as depicted in **Figure 13** will be adopted to enhance the overall landscape and visual quality. The coloured elevations of the proposed SPS are shown in **Figures 14-15**. The material schedule is shown in **Figure 16**.

Ecology

- 4.3.9 Potential impact may arise in the unlikely event of emergency sewage bypass leading to impact on aquatic organisms of the Tseng Lan Shue stream. With the implementation of preventive measures and emergency arrangements as recommended in **Section 5.3** for water quality impact, the chance of sewage bypass will be extremely remote and thus no ecological impact is expected during operation phase. It should be noted that upon completion of the Project, sewage from the unsewered village at Tseng Lan Shue will be collected for proper treatment and disposal. The Tseng Lan Shue stream and its associated stream ecosystem will be benefited by the improvement in water quality. Hence, the Project is an environmental improvement project.

Cultural Heritage

4.3.10 No cultural heritage impact is expected during operation phase.

Others

4.3.11 Night-time construction – There will be no construction works carried out during restricted hours.

4.3.12 Traffic generation – no traffic impact is expected.

4.3.13 Dangerous goods – no dangerous goods will be involved.

4.3.14 Impact to hikers – hikers utilising the Wilson Trail (also a village access road) will be temporarily affected during construction of the SPS and village sewers. The contractor will be required to maintain safe access at all times. Adequate safety barrier and signage will be provided.

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

5.1 General

5.1.1 Construction clauses will be included in the works contracts to ensure the recommended preventive / mitigation measures are properly implemented.

5.1.2 The contractor will be required to prepare and implement an Environmental Management Plan (EMP) in accordance with ETWB TC(W) No.19/2005 – “Environmental Management on Construction Sites”. The EMP should provide details on the approach which the contractor plans to adopt in managing and controlling potential environmental impacts from construction activities of the Project, and to ensure their adherence to all the environmental requirements.

5.2 Preventive / Mitigation Measures during Construction Phase

Noise

5.2.1 The contractor will be required to devise, arrange working methods and carry out the works in such a manner so as to minimise noise impacts on the surrounding environment and to provide experienced personnel with suitable training to ensure that these measures are implemented. The contractor will be required to use quiet powered mechanical equipment during construction. Details of the recommended quiet powered mechanical equipment are shown in **Appendix C1**.

5.2.2 Temporary noise barrier will be erected to protect the sensitive receivers from excessive noise during construction of the proposed SPS. This will be in the form of purposely-built site hoarding constructed from appropriate materials with a minimum superficial density of 7kg/m² or other equivalent form with similar noise reductions. It will have a minimum height of 3m with a small cantilevered upper portion if necessary to ensure the operating equipment can be shielded from the view of NSRs 1 and 2. The temporary noise barrier will have no gaps or opening at joints facing the sensitive receivers. For the temporary works area, temporary noise barrier in the form of site hoarding of 2.4m tall will be erected to protect NSR4 from excessive construction noise. The contractor will be required to regularly inspect and maintain the noise barrier to ensure its effectiveness.

5.2.3 The construction noise levels under scenarios Unmitigated, Mitigated 1 (with quiet powered mechanical equipment adopted) and Mitigated 2 with quiet powered mechanical equipment and temporary noise barrier adopted) are shown in **Appendix C1**. The range of noise levels for Mitigated 1 is from 66~76 dB(A) while for Mitigated 2 is from 61~70dB(A). Mitigated 2 (i.e. both of the preventive / mitigation measures in **Sections 5.2.1** and **5.2.2** adopted) will be adopted for the proposed SPS. Details of the calculations and the sound power level of the quiet powered mechanical equipment are shown in **Appendix C1**.

5.2.4 EPD’s standard pollution control clauses will be included in the works contracts to ensure the recommended preventive / mitigation measures are properly implemented. In addition, the contractor will be required to adopt the following good site practices during the construction phase:

- Only well-maintained plant should be operated on-site and plant should be serviced regularly;
- Silencers or mufflers on construction plant should be utilised;
- Mobile plant should be sited as far away from sensitive receivers as possible;
- Machines and plant that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum;
- Plant known to emit noise strongly in one direction should, where possible, be orientated so that noise is directed away from the nearby sensitive receivers;

- Material stockpiles and other structures such as site hoarding should be effectively utilised to screen noise from on-site construction activities;
- Noisy construction activities such as ground breaking, should be scheduled to less sensitive hours during the day, e.g. midday; and
- Liaise with the affected noise sensitive receivers on the anticipated construction activities, possible impacts, expected duration and communication channel with the project office.

5.2.5 With the implementation of these measures, construction noise level would be controlled to within the EIAO-TM daytime noise standard.

Air Quality

5.2.6 The effect of dust generated from the construction works is expected to be insignificant with the implementation of proper preventive / mitigation measures. The impacts will be minimised by measures such as regularly water spraying of exposed site surface and covering of any dusty material stockpiles to reduce dust emissions. The contractor will be required to comply with the control measures stipulated in the Air Pollution Control (Construction Dust) Regulation and implement all the required preventive / mitigation measures. With the implementation of these measures, dust levels would be controlled to within the acceptable levels.

Water Quality

5.2.7 The contractor will be required to properly protect the semi-natural stream next to the works area of the SPS throughout the construction stage. No construction works will be allowed in the stream. Prior to excavation by machine, the SPS site will be excavated manually up to the streambed level with sufficient steel sheet pile temporary support. All surplus spoil will be removed from the SPS site as soon as possible, preferably within 1 day.

5.2.8 The contractor will be required to provide silt removal facilities so as to remove any silt before discharge of site runoff. The design of temporary on-site drainage and silt removal facilities will follow the guidelines stipulated in EPD's ProPECC PN1/94 – "Construction Site Drainage". Open stockpiles of construction materials on-site will be covered with tarpaulin or similar fabric during rainstorms to prevent erosion. In addition, sandbag upstand will be provided surrounding the excavation pit to prevent surface runoff and infiltration of rainwater. (see *Appendix A – Sketch no.212, Detail "A"*) The excavation works will be carried out in dry season as far as possible.

5.2.9 Temporary drains with silt traps will be constructed at the boundary of the SPS site prior to commencement of any earthworks. Regular cleaning of the silt traps will be carried out to ensure they are functioning properly at all times.

5.2.10 Adequate number of portable chemical toilets will be provided to collect domestic wastewater generated by on-site workforce. The collected wastewater will be disposed to Government STW by licensed collector. All fuel tanks and chemicals will be securely stored on-site on paved areas and away from water bodies as far as possible. The storage area should be surrounded by bunds with a capacity of equal to 110% of the storage capacity of the largest tank to prevent spilled fuel and chemicals from reaching the nearby water bodies.

5.2.11 No excavated material, silt, debris, rubbish, cement slurry or such construction waste should be deposited into the nearby stream. The contractor will be required to submit preventive measures to prevent soil/mud from slipping into the nearby stream to the Engineer for agreement before commencement of construction works.

5.2.12 With the implementation of these measures, no adverse water quality impact during the construction phase is expected.

Waste Management

5.2.13 The contractor will be required to sort all C&D materials and waste into different categories for reuse on site, recycling and disposal at designated public fill reception facilities or landfills. Suitable excavated materials will be reused on-site as backfill as far as possible. Disposal of C&D materials will be managed through the trip-ticket system. Recyclable materials in C&D waste and general refuse will be separated for recycling. The non-recyclable materials will be stored in enclosed bins or skips and collected by licensed collector for disposal at designated landfills. Such waste will be removed from site on a daily basis or at least every 2 days by the contractor. All chemical waste will be handled,

stored and disposed of in accordance with the requirements of the Waste Disposal (Chemical Waste) Regulation. Chemical waste will be collected by licensed collector.

- 5.2.14 With proper implementation of the recommended waste management measures, no adverse waste impact during the construction phase is expected.

Landscape and Visual

- 5.2.15 A number of landscape and visual preventive / mitigation measures are identified below to further prevent / mitigate adverse impacts and promote beneficial impacts. The proposed landscape and visual preventive / mitigation measures for potential impacts generated during the construction phases together with the associated funding, implementation, management and maintenance agencies are described below in **Table 5.1** and illustrated on **Figure 13**.

Table 5.1—Proposed Construction Phase Landscape and Visual Preventive / Mitigation Measures

ID No.	Landscape and Visual Preventive / Mitigation Measure	Landscape measure	Visual measure	Funding Agency	Implementation Agency
CM1	Construction area and contractor’s temporary works areas should be minimized to avoid impact on adjacent landscape.	✓	✓	DSD	Contractor
CM2	Reduction of construction period to practical minimum		✓	DSD	Contractor
CM3	Erect site hoarding compatible with the surrounding environment for the SPS works area (3m height) and temporary works area (2.4m height) to fully enclose the works areas as far as possible (see Appendix F – Figure F1 for example).		✓	DSD	Contractor
CM4	Retain and protect existing vegetation and trees near the works site. All trees earmarked for retention will be properly preserved and protected. The contractor will be required to comply with the General Specification for Civil Engineering Works, which include specifications on preservation and protection of trees. Reference also make to DEVB TCW No.7/2015 – Tree Preservation. If necessary, tree pruning will be conducted with reference to Development Bureau’s General Guidance on Tree Pruning. The tree pruning will be carried out by appropriate qualified personnel employed by the contractor. The contractor will be required to appoint a competent member of the site supervisory staff with arboriculture knowledge or a tree specialist to supervise the works.	✓	✓	DSD	Contractor
CM5	Avoidance of excessive height and bulk of SPS		✓	DSD	Design Engineer
CM6	Control of night-time security lighting to minimise night-time glare to nearby village houses.		✓	DSD	Contractor
CM7	Maintain site cleanliness and tidiness in accordance with the requirements stipulated in DEVB TCW No. 8/2010.	✓	✓	DSD	Contractor
CM8	Stockpiling height of not more than 2m at the temporary works area.		✓	DSD	Contractor
CM9	Promptly reinstate each portion of works and temporary works area upon completion of construction.		✓	DSD	Contractor
CM10	The contractor will be required to properly protect the semi-natural stream next to the works area of the SPS throughout the construction stage. No construction works will be allowed in the stream. Prior to excavation by machine, the SPS site will be excavated manually up to the streambed level with sufficient steel sheet pile temporary support (see Appendix A – Sketch nos.209-212). All surplus spoil will be removed from the SPS site as soon as possible, preferably within 1 day. The contractor will be required to provide silt removal facilities so as to remove any silt before discharge of site runoff. The design of temporary on-	✓	✓	DSD	Contractor

ID No.	Landscape and Visual Preventive / Mitigation Measure	Landscape measure	Visual measure	Funding Agency	Implementation Agency
	site drainage and silt removal facilities will follow the guidelines stipulated in EPD’s ProPECC PN 1/94 – “Construction Site Drainage”. Open stockpiles of construction materials on-site will be covered with tarpaulin or similar fabric during rainstorms to prevent erosion. In addition, sandbag upstand will be provided surrounding the excavation pit to prevent surface runoff and infiltration of rainwater. (see <i>Appendix A – Sketch no.212, Detail“A”</i>) The excavation works will be carried out in dry season as far as possible. No excavated material, silt, debris, rubbish, cement slurry or such construction waste should be deposited into the nearby stream. The contractor will be required to submit preventive measures to prevent soil / mud from slipping into the nearby stream to the Engineer for agreement before commencement of construction works.				

5.2.16 With the implementation of these measures, residual landscape and visual impact as summarised in *Table 5.2* and *Table 5.3* is expected to be slight adverse during construction.

Table 5.2--Summary of Residual Landscape Impact during Construction Phase of the SPS

LCA / LR ID No.	Sensitivity to Change	Magnitude of Change	Impact Significance Threshold (Before Mitigation)	Recommended Preventive / Mitigation Measures	Residual Impact Significance Threshold (After Mitigation)
LR1	High	Negligible	Insubstantial	N/A	Insubstantial
LR2	Medium	Intermediate	Moderate adverse	CM1, CM4, CM7	Slight adverse
LR3a	Low	Negligible	Insubstantial	N/A	Insubstantial
LR3b	Medium	Intermediate	Moderate adverse	CM7, CM10	Insubstantial
LR4	Medium	Negligible	Insubstantial	N/A	Insubstantial
LCA1	High	Negligible	Insubstantial	N/A	Insubstantial
LCA2	Medium	Intermediate	Moderate adverse	CM1, CM4, CM7	Slight adverse
LCA3a	Low	Negligible	Insubstantial	N/A	Insubstantial
LCA3b	Medium	Intermediate	Moderate adverse	CM7, CM10	Insubstantial
LCA4	Low	Negligible	Insubstantial	N/A	Insubstantial
LCA5	Medium	Negligible	Insubstantial	N/A	Insubstantial

Table 5.3--Summary of Residual Visual Impact during Construction Phase of the SPS

VSR ID No.	Sensitivity to Change	Magnitude of Change	Impact Significance Threshold (Before Mitigation)	Recommended Preventive / Mitigation Measures	Residual Impact Significance Threshold (After Mitigation)
VSR 1	Medium	Intermediate	Moderate adverse	CM1 – CM10	Slight adverse
VSR 2	Medium	Intermediate	Moderate adverse	CM1 – CM10	Slight adverse
VSR3	Medium	Intermediate	Slight adverse	CM1 – CM10	Insubstantial
VSR4	Medium	Intermediate	Slight adverse	CM1 – CM10	Insubstantial
VSR5	Medium	Intermediate	Slight adverse	CM1 – CM10	Insubstantial
VSR6	Medium	Intermediate	Slight adverse	CM1 – CM10	Insubstantial

Ecology

5.2.17 No direct adverse ecological impact is expected during construction of the SPS.

5.2.18 The following preventive measures will be implemented:

- Works area will be clearly demarcated. Construction activities will be restricted within the demarcated works area to prevent disturbance to the offsite vegetation.
- No construction activities will be conducted on the nearby natural stream bed and bank.
- The contractor will be required to assign supervisory staff to station on site to closely supervise and monitor the works to ensure no adverse impact to the nearby stream.

5.2.19 Pollution control measures for construction noise, dust and water quality as recommended in **Section 5** will be undertaken to reduce indirect ecological impact during construction.

Cultural Heritage

5.2.20 As no cultural heritage impact is expected during construction phase, no preventive / mitigation measure is necessary.

5.3 Preventive / Mitigation Measures during Operational Phase

Noise

5.3.1 To minimise potential noise impact during the operation of the SPS, all the screen, submersible pumps and transformer will be totally enclosed inside the building structure. The reinforced concrete structure of the building will shield most of the noise. The fan of the DO unit will be installed inside the building structure and the exhaust will be located with no direct line of sight to the nearby NSRs and will be fitted with acoustic louver/silencer. All openings for ventilation and machine room doors will be located away from the sensitive receivers as far as practicable and if not feasible will be fitted with acoustic louvers and acoustic doors respectively. Good housekeeping practices, such as regular maintenance/servicing of the equipment and ensuring the machine room doors are closed at all time will also be implemented to minimise noise nuisance to the nearby NSRs.

5.3.2 The measured background noise level at Tseng Lan Shue ranges from 49-61dB(A). The 5dB(A) below the appropriate night time noise level for the Area Sensitivity Rating under the TM for the Assessment of Noise From Places other than Domestic Premises, Public Places or Construction Sites was used as noise criteria, i.e.45dB(A). According to the operational noise assessment (**Appendix C2**), the predicted noise level is expected to be within the noise criteria specified in the EIAO-TM.

Air Quality

5.3.3 To minimise the potential odour impact, the inlet chamber and wet well will be located underground with air-tight multi-part cover and enclosed by a reinforced concrete structure. In addition, a DO unit using activated carbon or other equivalent odour removal techniques with odour removal efficiency of 99.5% will be installed to remove the odour, avoiding potential adverse odour impacts due to the proposed SPS affecting the nearby ASRs. The exhaust outlet of the proposed DO unit will be located in a direction away from the nearby ASRs, with a view to maximizing the separation distance between the exhaust outlet and the nearest ASR. The sewage screenings at the inlet chamber of the SPS will be properly stored in covered containers, packed and handled within the SPS structure which will be connected to a DO unit to avoid odour nuisance. The screenings will then be transported to designated landfills for disposal as soon as possible. Performance check and monitoring system for the DO unit will be carried out to ensure its removal efficiency of 99.5%.

5.3.4 With the implementation of the above measures, no adverse air quality impact is expected during operation of the proposed SPS.

Water Quality

5.3.5 All washing water will be collected and conveyed back to the sewerage network of the SPS for treatment and disposal at STW. To minimise the chance of sewage bypass, standby pump and screen will be provided to cater for breakdown and maintenance of the equipment. Regular maintenance works will be carried out to prevent equipment failure and to maintain normal operation. In order to minimise the chance of power failure, backup power supply in the form of dual-feed power supply will be provided which further enhances the supply security and reliability. In addition, SCADA system will also be provided for active monitoring in order to transmit signals showing irregularity or any operational problem of the SPS to the nearby STW or other manned SPS such that immediate actions can be taken in case of emergency. Un-interruptible power system to power the SCADA system for at least 2hours after the failure of power supply will be provided.

5.3.6 The chances of both duty and standby pump fail and pipe burst are very unlikely as regular inspection, checking and maintenance will be provided for both duty and standby pumps. Once both duty pump and standby pump fail, the control office will be notified by SCADA system and DSD Contractor will carry out emergency repair works as soon as practicable. On the other hand, pipe bursting is considered unlikely as the downstream rising mains would be newly laid and would be fully tested before commissioning. Besides, twin pipes would be provided for rising mains so chance of both pipes burst at the same time is considered very unlikely. Each rising main will be designed for the peak flow capacity of Tseng Lan Shue SPS such that sewage at Tseng Lan Shue SPS could be conveyed through one rising

main while the other rising main was fail. For the upstream gravity sewer pipe, pipe bursting is considered unlikely as the pipe is not pressurized and even bursting of the upstream pipe occurs, the operation of SPS would not be affected and would not lead to emergency sewage bypass at the SPS

- 5.3.7 As long as dual power supply is provided for the SPS, chance of power failure is very low (the reliability of electricity supply of CLP >99.99%). In case of power failure happen, CLP pledges to restore the electricity supply after fault outage within 2hours on average. Therefore, prolonged electrical power failure is not expected. Even in the rare case that CLP fails to resume power supply within short period, DSD will able to provide emergency generator within 2hours after the power failure occur. The SPS is monitored by SCADA system, for which is a real-time monitoring and warning system such that the control center could be notified immediately once failure of the SPS occur. Once warning signal from the SPS is received through the SCADA System, the DSD will be notified within 10 minutes for carrying out the repair works. Assuming the DSD Contractor located in Tsuen Wan district (the worst scenario in Mainland South Region) when power failure occur, the DSD Contractor could deliver emergency generator to the SPS within 1.5hour after the power failure. Additional 0.5hour is allowed for adverse traffic condition. Therefore, it is expected that the DSD Contractor could deliver the emergency generator to the SPS within 2hours after the power failure.
- 5.3.8 Repair time would vary case by case, though in case of power failure which is the most likely event of plant failure, the DSD will deliver an emergency generator to the SPS within 2 hours from the start of the event and restoring temporary power at the SPS generally requires <30min. For pump failure, switching to the standby pump can be done automatically.
- 5.3.9 Some of the sewage flow (1,593m³/day in ADWF) entering the Tseng Lan Shue SPS is come from upstream Au Tau SPS and Pak Shek Toi Road SPS. (see **Figure 21** for the locations of SPSs) It has been agreed with DSD that in the event of failure at Tseng Lan Shue SPS, the upstream, Au Tau SPS and Pak Shek Toi Road SPS will be stopped to pump and its wet well together with storage tanks will be used an emergency buffer storage. Thus, inflow to Tseng Lan Shue SPS will be greatly reduced from 3,337m³/day to 1,744m³/day in ADWF. As Tseng Lan Shue SPS could be restored by DSD Contractor within 2.5hours, the design emergency storage of Tseng Lan Shue SPS (with storage capacity of 523.4 m³/day) will be volume of flow for first 2.5hours of an emergency event with sewage from the upstream Pak Shek Toi Road SPS and Au Tau SPS intercepted, plus 1 additional hour peak hour remaining sewage flow as the safety margin (i.e. 3.5hours for peak flow with peaking factor as shown in **Figure G4** of **Appendix G** and discounting the upstream intercepted sewage). Detailed calculations of the emergency flow are shown in **Appendix G**. The sewage flow entering Au Tau SPS and Pak Shek Toi Road SPS will be temporarily stored in the emergency storage. (i.e. an emergency buffer of min. 3.5hours at peak hours will be provided for Au Tau SPS and Pak Shek Toi Road SPS.) Overflow of Tseng Lan Shue SPS will only take place once Tseng Lan Shue SPS could not be resumed after 3.5hours with continuous peak flow, which is considered unlikely. Furthermore, sewage will not be directly overflow to the Tseng Lan Shue stream. As shown in **Figure 20**, there are 2 special manholes, namely special manhole A and B, located upstream of Tseng Lan Shue SPS. When Tseng Lan Shue SPS could not be restored 3.5hours after the emergency event, the contractor of DSD will switch the stoplogs of the 2 special manholes to divert the sewage flow to existing box culvert and concrete channel, where is about 100m and 20m upstream of Tseng Lan Shue stream respectively. All sewage from upstream of the 2 special manholes will be diverted to box culvert and concrete channel through the safety outlets of the 2 special manholes by gravity flow (I.L. of box culvert =188.0mPD while I.L. of the safety outlet A = 189.0mPD; I.L. of the concrete channel =187.7mPD while I.L. of the safety outlet B = 188.0mPD). At the same time, Au Tau SPS and Pak Shek Toi Road SPS will be resumed to pump sewage to its downstream sewage network, for which leading to the 2 special manholes and then to existing box culvert and concrete channel. And, sewage (6m³/day in ADWF) from houses group“A” will be discharged to the concrete channel through the special manhole B at this circumstance, no more sewage would flow into Tseng Lan Shue SPS. Equipment damage and flooding on the adjacent roads and / or at village houses could be avoided. Once Tseng Lan Shue SPS is resumed, the stoplogs at the 2 special manholes would be switch again to resume Tseng Lan Shue SPS in normal operation. Tankering away of sewage will be considered and provided as additional measures to increase the buffer time and reduce emergency discharge volume. Up to about 1/3 of the incoming sewage could be tanker away under average flow hence the chance of emergency discharge can be further reduced.
- 5.3.10 In the long run, the water quality of the Tseng Lan Shue area as well as the stream will be improved as pollution generated from existing septic tanks will be minimized and thus the quality of the stream is

expected to be improved. Potential impact may arise in the unlikely event of emergency sewage bypass leading to temporary impact on water quality that may affect downstream aquatic organisms, if any, of the Tseng Lan Shue stream. With the implementation of preventive measures and emergency arrangements, the chance of sewage bypass will be extremely remote and thus no adverse ecological impact is expected during operation phase.

Waste Management

- 5.3.11 The screenings of sewage at the inlet chamber of the SPS and the treatment media of the DO unit will be properly stored in covered containers, packed in plastic bags and handled within the SPS structure to avoid odour nuisance. These will then be transported to designated landfills for disposal as soon as possible.
- 5.3.12 No adverse waste impact is expected during operation of the Project.

Landscape and Visual

- 5.3.13 The requirements in DSD’s “Guidelines on Aesthetic Design of SPS Buildings” will be considered in the design of the SPS. Landscape and visual enhancement measures proposed to improve the overall landscape and visual quality of the proposed SPS are listed in **Table 5.4**:

Table 5.4—Proposed Operation Phase Landscape and Visual Preventive / Mitigation Measures

ID No.	Landscape and Visual Preventive / Mitigation Measure	Landscape measure	Visual measure	Funding Agency	Implementation Agency	Maintenance Agency	Management Agency
OM1	Minimize outdoor lighting		✓	DSD	Design Engineer	Building Operator	DSD
OM2	Avoidance of excessive height and bulk of SPS		✓	DSD	Design Engineer	Building Operator	DSD
OM3	To mitigate for the loss of a tree, compensatory planting of 3 nos. of heavy standard native trees (<i>Viburnum odoratissimum</i>) will be provided in the SPS. For the loss of vegetation in the SPS site, landscape planting in terms of ground covers, shrubs planting and vertical greening will be provided in the landscape design of the SPS.	✓	✓	DSD	Contractor	Building Operator	DSD
OM4	Selection of colours, materials and finishes that complement and in harmony with the surrounding environment.		✓	DSD	Design Engineer	Building Operator	DSD

- 5.3.14 With the implementation of these measures, residual landscape impact during operation as summarised in **Table 5.5** is expected to be negligible with slight adverse impact to LR2/LCA2. The residual visual impact as summarised in **Table 5.6** is also expected to be slight adverse during operation.
- 5.3.15 The recommended planting for the SPS site is shown in **Figure 13**. Detail of the finishing proposal is shown in **Figure 16**. Photomontages of view points from VSR2 and VSR1 (**Figure 17**) before and after the Project are shown in **Figures 18a,b** and **19a,b** respectively.

Table 5.5--Summary of Residual Landscape Impact during Operation Phase of the SPS

LCA / LR ID No.	Sensitivity to Change	Magnitude of Change	Impact Significance Threshold (Before Mitigation)	Recommended Preventive / Mitigation Measures	Residual Impact Significance Threshold (After Mitigation)	
					Day 1	Year 10

LCA / LR ID No.	Sensitivity to Change	Magnitude of Change	Impact Significance Threshold (Before Mitigation)	Recommended Preventive / Mitigation Measures	Residual Impact Significance Threshold (After Mitigation)	
					Day 1	Year 10
LR1	High	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial
LR2	Medium	Intermediate	Moderate adverse	OM3	Slight adverse	Slight adverse
LR3a	Low	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial
LR3b	Medium	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial
LR4	Medium	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial
LCA1	High	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial
LCA2	Medium	Intermediate	Moderate adverse	OM3	Slight adverse	Slight adverse
LCA3a	Low	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial
LCA3b	Medium	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial
LCA4	Low	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial
LCA5	Medium	Negligible	Insubstantial	N/A	Insubstantial	Insubstantial

Table 5.6--Summary of Residual Visual Impact during Operation Phase of the SPS

VSR ID No.	Sensitivity to Change	Magnitude of Change	Impact Significance Threshold (Before Mitigation)	Recommended Preventive / Mitigation Measures	Residual Impact Significance Threshold (After Mitigation)	
					Day 1	Year 10
VSR 1	Medium	Intermediate	Moderate adverse	OM1 to OM4	Slight adverse	Slight adverse
VSR 2	Medium	Intermediate	Moderate adverse	OM1 to OM4	Slight adverse	Slight adverse
VSR3	Medium	Intermediate	Slight adverse	OM1 to OM4	Insubstantial	Insubstantial

5.3.16 Overall, the residual landscape and visual impact of the Project is considered to be **acceptable with preventive / mitigation measures** during construction and operation phases.

Ecology

5.3.17 With the implementation of preventive measures and emergency arrangements as discussed in **Section 5**, emergency sewage bypass is extremely remote. i.e. the risk of ecological impact is unlikely during operation phase.

Cultural Heritage

5.3.18 As no cultural heritage impact is expected during operation phase, no preventive / mitigation measure is necessary.

5.4 Environmental Monitoring and Audit

5.4.1 Adverse environmental impact is not anticipated, therefore specific environmental monitoring is not required.

5.4.2 Monthly site audit will be conducted by an Independent Environmental Checker to ensure implementation of all preventive / mitigation measures recommended in the Project Profile and to confirm full compliance through monthly report to the EPD during and upon completion of the construction work.

5.5 Possible Severity, Distribution and Duration of Environmental Impacts

5.5.1 At present, sewage generated from Tseng Lan Shue is only partially treated mostly by septic tanks and soakaway systems, and discharged into nearby watercourses, resulting in water pollution.

5.5.2 To improve the water quality in the area, proper sewerage network system will need to be provided or upgraded in phases, which will result in various degrees of environmental impacts during its construction and operation. The associated environmental impacts are expected to be small scale, localised and temporary. With the implementation of the recommended preventive / mitigation measures, no adverse residual impacts are expected from this Project. In the long term, the environmental and hygiene conditions in Tseng Lan Shue area will improve. The public and villagers of Tseng Lan Shue can be benefitted from the improved water quality in Tseng Lan Shue as a result of the Project. Hence, the Project is considered as an environmental improvement project.

5.5.3 No adverse residual environmental impacts are anticipated with the implementation of the recommended preventive / mitigation measures.

5.6 Public Consultation to Date

5.6.1 The following parties have been consulted during the course of the Study. All parties expressed support to the Project.

- Tseng Lan Shue Village Representative (Oct 2009, Aug 2012); and
- Housing and Environmental Hygiene Committee of Sai Kung District Council (15 April 2008, 14 March 2013).

5.6.2 The sewerage scheme for Tseng Lan Shue including the SPS was gazetted and authorised under the Roads (Works, Use and Compensation) Ordinance (Cap.370) on 6 June 2014.

6. SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS AND PREVENTIVE / MITIGATION MEASURES

6.1 Summary of Environmental Impacts and Preventive / Mitigation Measures

6.1.1 The potential environmental impacts and preventive / mitigation measures to be incorporated into the design, construction and operation of the Project are summarised in *Table 6.1* below.

Table 6.1--Summary of Potential Environmental Impacts and Proposed Preventive / Mitigation Measures in Construction Phase

Potential Environmental Impacts	Summary of Preventive / Mitigation Measures	Implementation Agent	Relevant Section in the Project Profile	Funding Agency
General	•To include the recommended preventive / mitigation measures into the works contracts	DSD (design engineer)	5.1.1	DSD
	•To prepare and implement an Environmental Management Plan	Contractor	5.1.2	DSD
Construction noise	<ul style="list-style-type: none"> •Use of quiet powered mechanical equipment •Use of temporary noise barrier, mobile barrier •Adopt good site practices •Include EPD's standard pollution control cause in the works contract 	Contractor	5.2.1 – 5.2.2 and 5.2.4	DSD
Construction dust	<ul style="list-style-type: none"> •Regular water spraying of exposed site surfaces •Covering of dust material stockpiles •Comply with the control measures in the Air Pollution Control (Construction Dust) Regulation 	Contractor	5.2.6	DSD
Water quality impact	<ul style="list-style-type: none"> •Properly protect the nearby stream •Initial manual excavation to streambed level prior machine excavation •Surplus spoil remove away from site •Provide silt removal facilities •Follow guidelines in ProPECC PN 1/94 •Temporary drains with silt traps •Properly collect and dispose site effluent •Proper storage of chemicals •Preventive measures to prevent soil from slipping into the stream •Provide sandbag upstrand surrounding excavation pit 	Contractor	5.2.7 – 5.2.12	DSD
Waste - generation of C&D materials	<ul style="list-style-type: none"> •Sort all C&D materials and waste •Reuse of excavated materials as backfill •Implement trip ticket system for disposal of C&D materials; Separate recyclable materials for recycling •Proper storage, handling and disposal of chemical waste 	Contractor	5.2.13 – 5.2.14	DSD
Landscape and visual impact	<ul style="list-style-type: none"> •Properly protect the nearby stream •Compensatory plantings incorporated into the landscape design •Specifications for tree preservation and protection •Proper tree pruning by qualified personnel •Minimise construction works to a practical minimum •Retain and protect existing vegetation and trees 	Contractor	5.2.15 – 5.2.16	DSD

Potential Environmental Impacts	Summary of Preventive / Mitigation Measures	Implementation Agent	Relevant Section in the Project Profile	Funding Agency
	near the works site •Demarcation of tree protection zone for retained trees •Erect site hoarding compatible with the surrounding environment for the SPS works area (3m height) and temporary works area (2.4m height) to fully enclose the works areas as far as possible •Maintain site cleanliness and tidiness in accordance with the requirements stipulated in DEVB TCW No.8/2010 •Properly manage construction waste in the works area •Minimise the number and size of temporary works area •Stockpiling height of not more than 2m at the temporary works area •Promptly reinstate each portion of works and temporary works area upon completion of construction •Control of night-time security lighting to minimise night-time glare to nearby village houses			
Ecology	•Clear demarcated of works area. Restrict construction activities within demarcated works area •No construction activities on nearby stream bed and bank •Supervisory staff to supervise and monitor works •Pollution control measures for construction noise, dust and water quality	Contractor	5.2.17 – 5.2.20	DSD
Cultural Heritage	No impact	-	-	

Table 6.2--Summary of Potential Environmental Impacts and Proposed Preventive / Mitigation Measures in Operation Phase

Potential Environmental Impacts	Summary of Preventive / Mitigation Measures	Implementation Agent	Relevant Section in the Project Profile	Funding Agency	Management Agent	Maintenance Agent
Operational noise from SPS	• All mechanical equipment to be enclosed inside the building structure • Exhaust fan to be installed facing away from sensitive receivers and fitted with acoustic louver / silencer • Use of acoustic louvers and acoustic doors • Good housekeeping practices	DSD	5.3.1	DSD	DSD	Building Operator
Odour from SPS	• Inlet chamber and wet well to be enclosed inside the SPS • Install DO unit with odour removal efficiency of 99.5% • Exhaust outlet of the DO unit to be located in a direction away from the nearby ASRs, with a view to maximizing the separation distance between the exhaust outlet and the nearest ASR • Handling of screenings inside the SPS and prompt disposal • Performance check and monitoring system to ensure the removal efficiency of the DO unit	DSD	5.3.3	DSD	DSD	Building Operator

Potential Environmental Impacts	Summary of Preventive / Mitigation Measures	Implementation Agent	Relevant Section in the Project Profile	Funding Agency	Management Agent	Maintenance Agent
Washing water Sewage bypass during emergency	<ul style="list-style-type: none"> Collect and convey washing water to sewerage network Provide standby pump and screen Regular maintenance of equipment Provide backup power supply Provide SCADA warning system with 2 hours un-interruptible power system Restrict incoming sewage from upstream SPS in case of emergency Provide to emergency storage capacity for incoming sewage as stated in 5.3.9 and Appendix G. 	DSD	5.3.5 – 5.3.10	DSD	DSD	Building Operator
Generation of waste	<ul style="list-style-type: none"> Handling of waste inside the SPS Prompt disposal of waste 	DSD	5.3.11	DSD	DSD	Building Operator
Landscape and visual impact of SPS	<ul style="list-style-type: none"> Minimise extent of all built structures to a practical minimum Green roof design with shrubs, vertical greenings and ground covers Plant trees, shrubs, ground covers and vertical greenings within the SPS site Minimise outdoor lighting Selection of colours, materials and finishes that complement with the surrounding environment 	DSD	5.3.13	DSD	DSD	Building Operator
Ecology	<ul style="list-style-type: none"> Implement preventive / mitigation measure to prevent emergency bypass 	DSD	5.3.17	DSD	DSD	Building Operator
Cultural Heritage	No impact	-	-			

7. USE OF PREVIOUS APPROVED PROJECT PROFILES

7.1 Project Profiles of Similar Nature Referenced

7.1.1 There are a number of Project Profiles of similar nature to this designated project – SPS, used for direct application of Environmental Permit under the EIAO. Some examples are listed in *Table 7.1* below.

Table 7.1--Previous Direct Application of Environmental Permit for SPSs

EIAO Ref.	Project Profile Title	SPS Capacity (m ³ /day)	*Closest Sensitive Receiver
DIR-138/2006	Ma On Shan Area 108 SPS	14,500 m ³	75 m
DIR-140/2006	Tsing Lung Tau SPS	4,000 m ³	25 m
DIR-161/2007	Tai Po Tai Wo Road SPS	12,100 m ³	12 m
DIR-173/2008	Yuen Long Kau Hui No. 2 SPS	5,900 m ³	30 m
DIR-175/2008	Western Interceptor Sewer SPS	54,630 m ³	61 m
DIR-218/2011	Sewerage Works at Pik Shui Sun Tsuen	216 m ³	17 m
DIR-226/2013	Temporary SPS Ancillary to Tung Chung Area 56 Public Housing Development	2,400 m ³	22 m

* Remark: *Closest Sensitive Receiver* may include receivers other than residential development.

8. CONCLUSION

8.1 Conclusion

8.1.1 The predicted environmental impacts from the implementation of the proposed Project are unlikely to be adverse and the preventive / mitigation measures described in this Project Profile meet the requirements of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

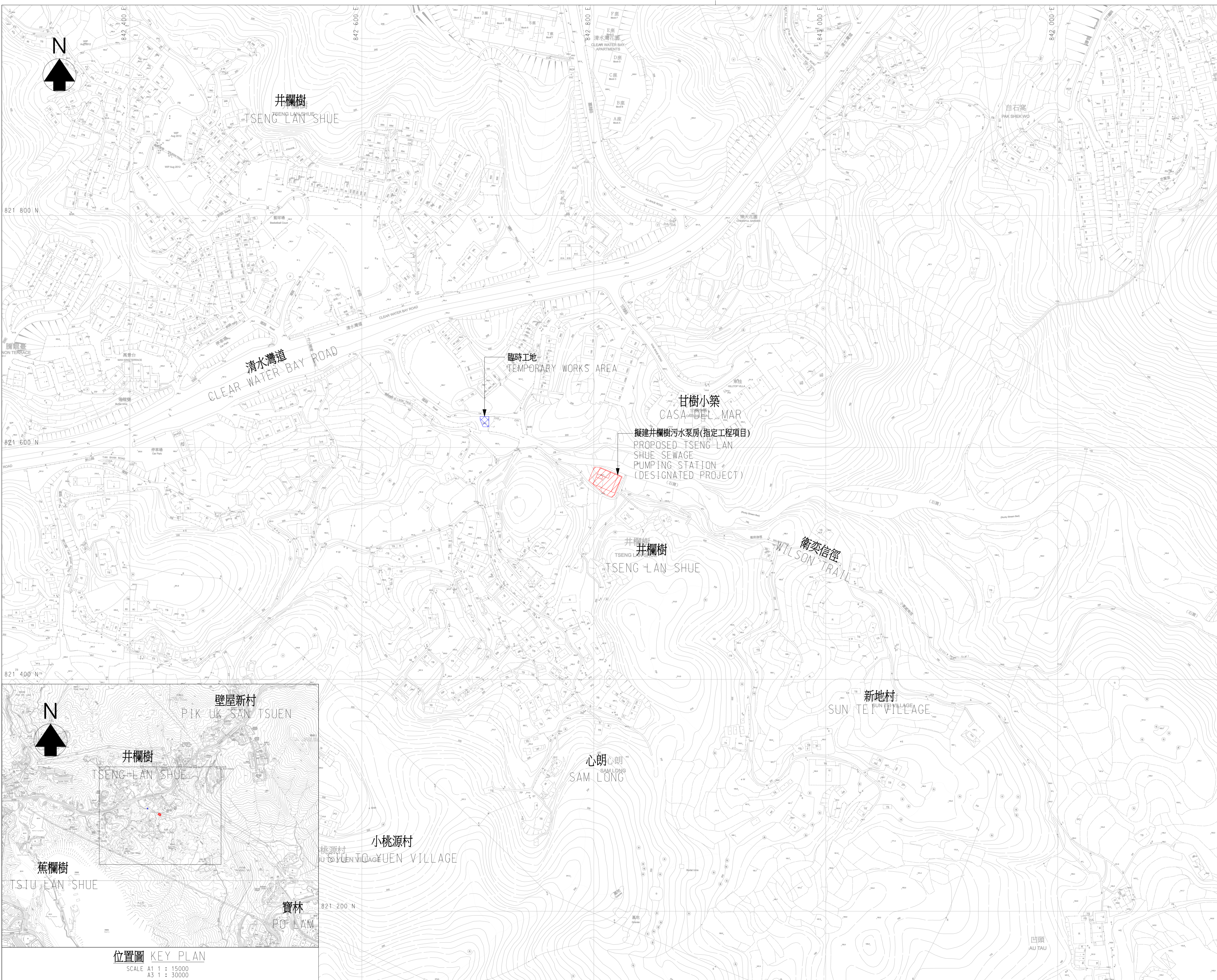
8.1.2 This Project Profile has been prepared to seek permission from the Director of Environmental Protection under Section 5(11) of the EIAO to apply directly for an Environmental Permit.

END OF TEXT

FIGURES

圖例：
LEGEND :

-  擬建井欄樹污水泵房 (指定工程項目)
PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)
-  臨時工地
TEMPORARY WORKS AREA



Revision	Date	Description	Initial
	Designed	Checked	Drawn
Initial	MC	KSC	SZ
Date	08/14	08/14	08/14

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PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二階段及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

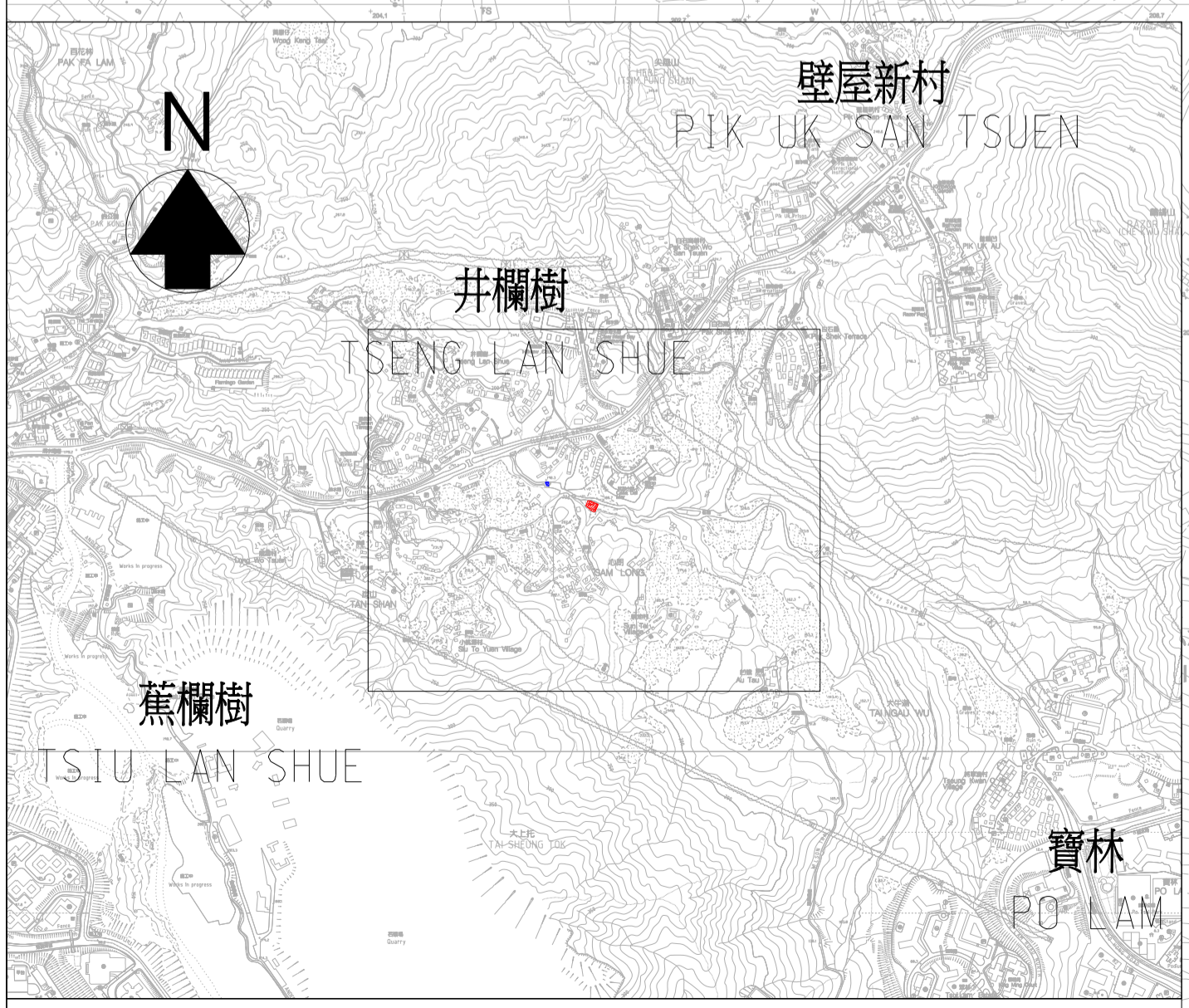
Drawing title
井欄樹污水泵房工程
- 位置圖
PROPOSED SEWAGE PUMPING
STATION AT TSENG LAN SHUE
- GENERAL LOCATION PLAN

Drawing no. 圖一 FIGURE 1	Revision -
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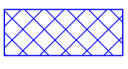

Scale
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A3 1 : 3000

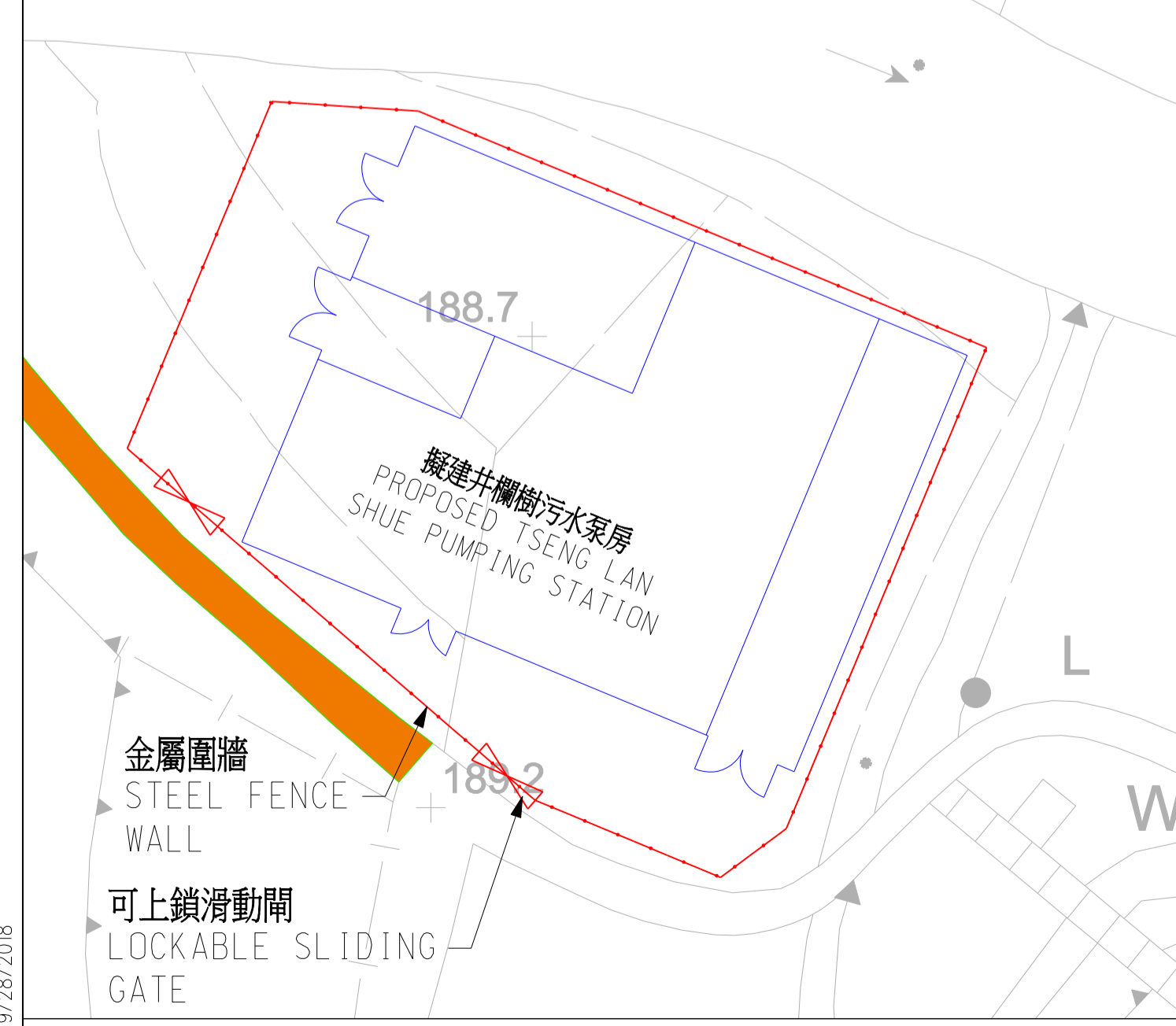
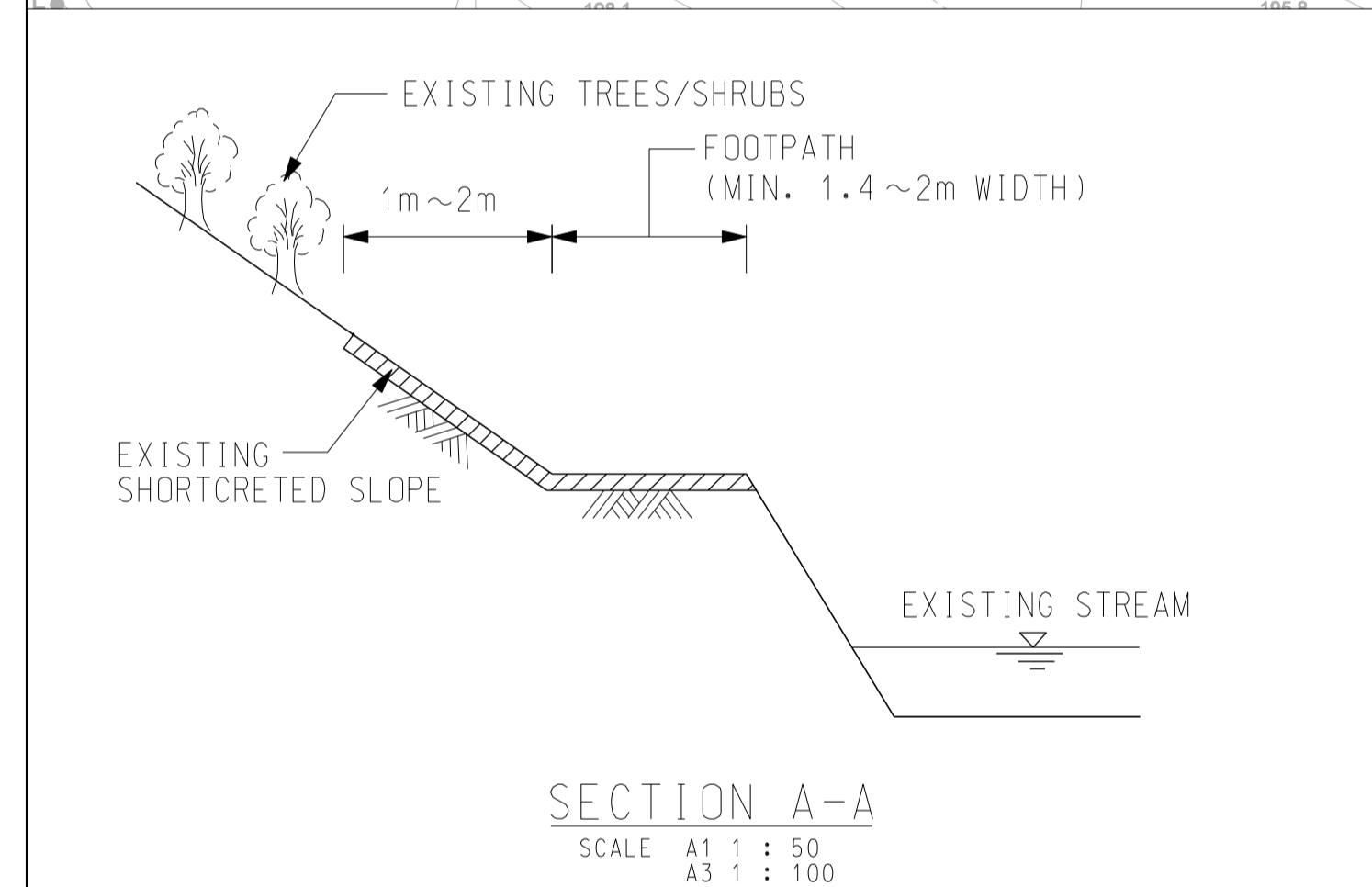
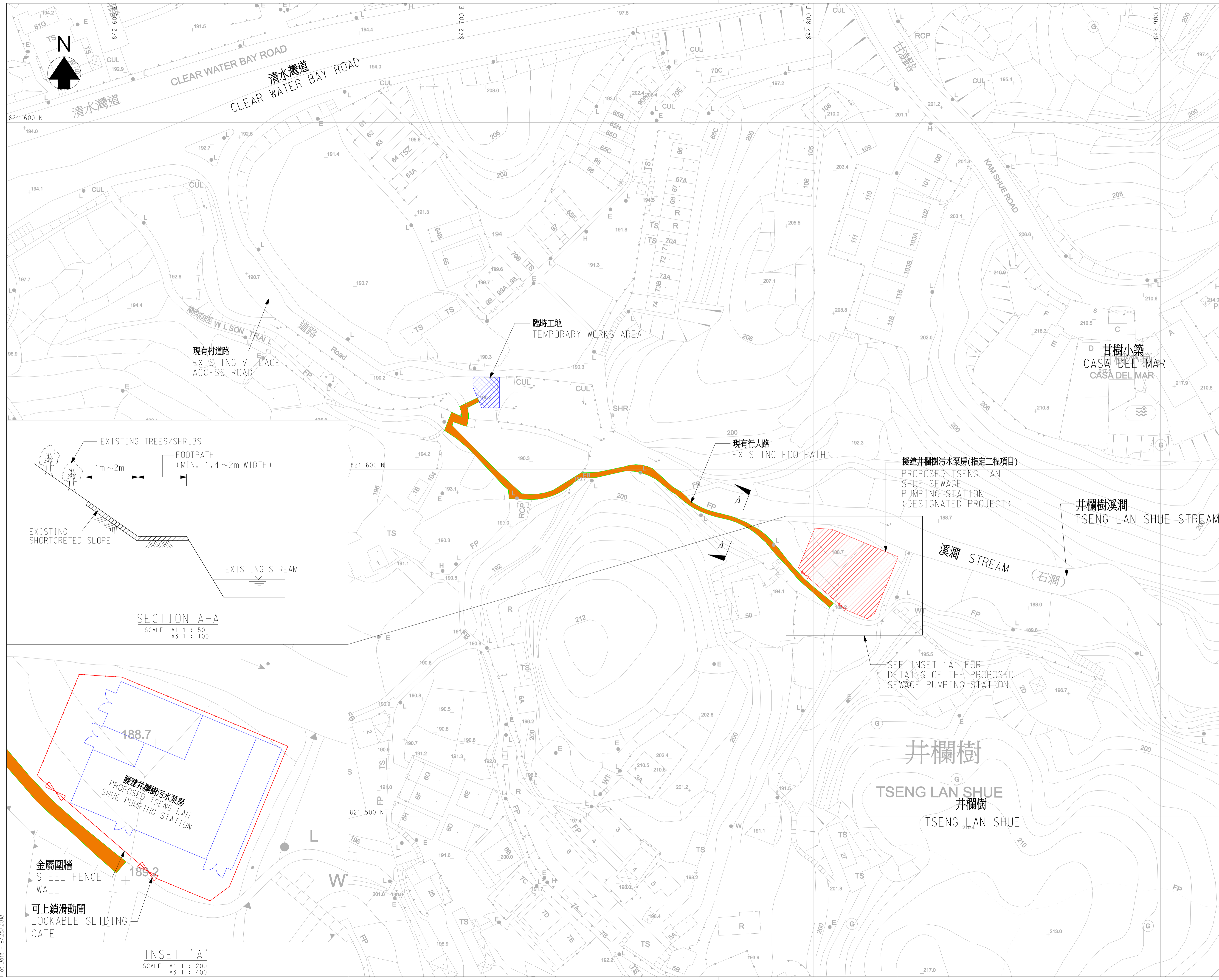
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位置圖 KEY PLAN
SCALE A1 1 : 15000
A3 1 : 30000

- 圖例：
LEGEND：
-  擬建井欄樹污水泵房 (指定工程項目)
PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)
 -  臨時工地
TEMPORARY WORKS AREA
 -  現有行人徑作為暫時建築通道
EXISTING FOOTPATH FOR TEMPORARY CONSTRUCTION ACCESS



Revision	Date	Description			Initial
		Designed	Checked	Drawn	
Initial	08/15	MC	KW	SZ	KW
Date	08/15	08/15	08/15	08/15	08/15

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PRELIMINARY

Contract no. CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
井欄樹污水泵房工程
- 平面圖
PROPOSED SEWAGE PUMPING
STATION AT TSENG LAN SHUE
- LAYOUT PLAN

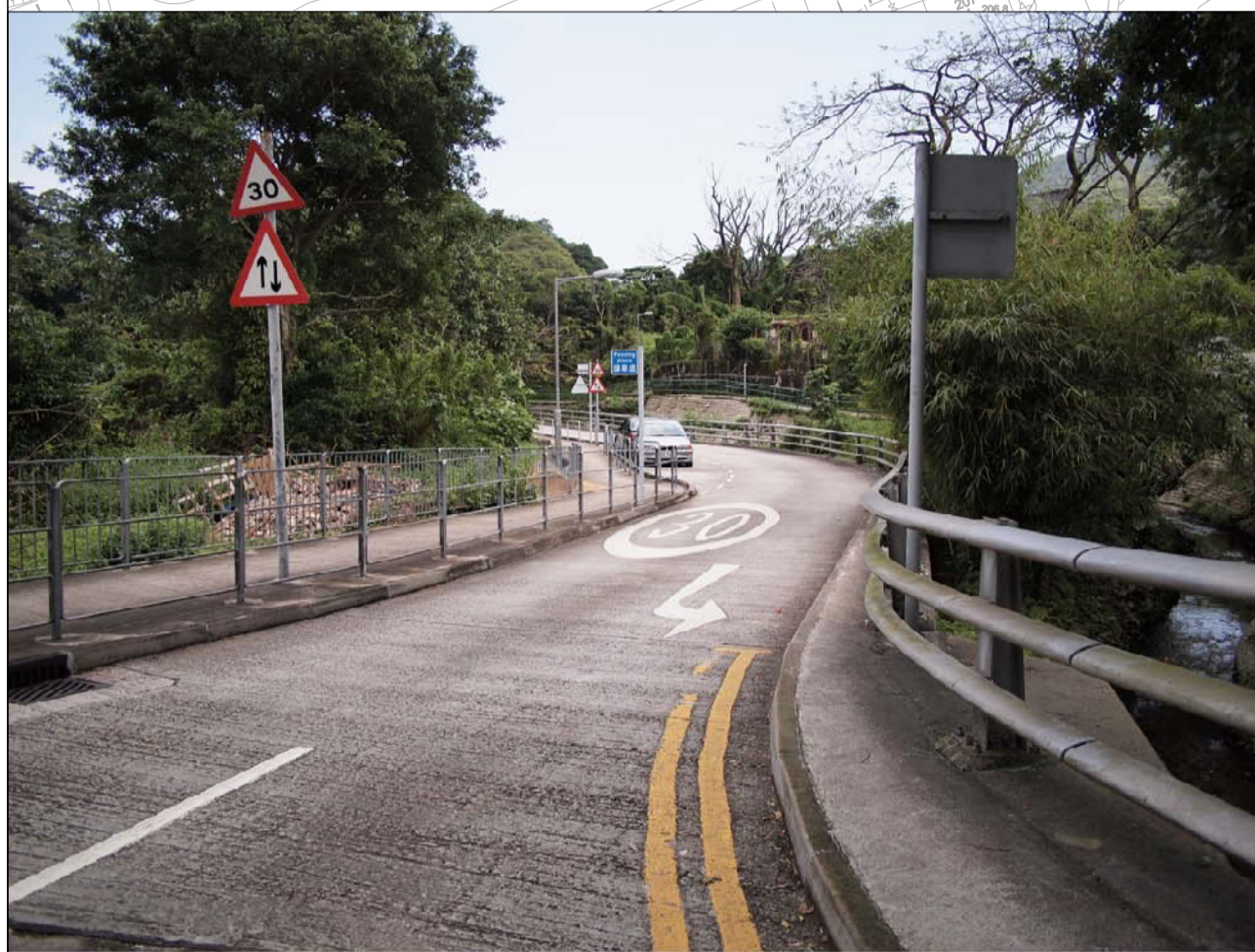
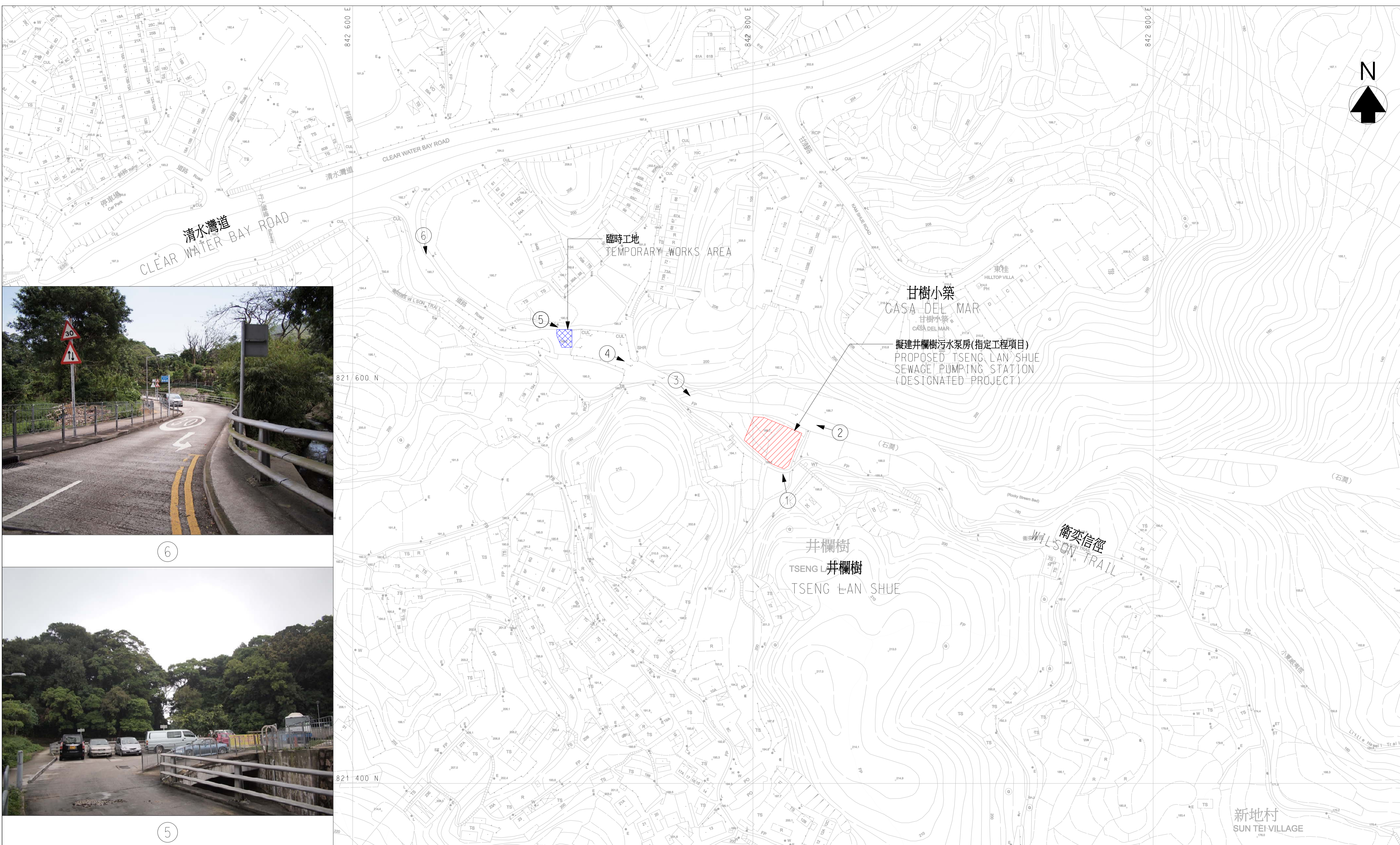
Drawing no. 圖二
FIGURE 2

Scale A1 1 : 500
A3 1 : 1000



圖例：
LEGEND:

-  擬建井欄樹污水泵房 (指定工程項目)
PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)
-  臨時工地
TEMPORARY WORKS AREA



6



5



4



3



2



1

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Initial	MC	KSC	SZ
Initial	MC	KSC	SZ
Date	08/14	08/14	08/14
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Contract no.
CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二階段及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
工程項目的現有狀況
EXISTING SITE CONDITIONS

Drawing no.
圖三
FIGURE 3

Scale
A1 1 : 1000
A3 1 : 2000



註：
NOTE：
分區計劃大綱圖編號：S_SK_TLS_8
OUTLINE ZONING PLAN REFERENCE：
S_SK_TLS_8

- 圖例：
LEGEND：
-  擬建井欄樹污水泵房 (指定工程項目)
PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)
 -  臨時工地
TEMPORARY WORKS AREA
 -  自然保育區
CONSERVATION AREA
 -  G/IC 政府、機構或社區
GOVERNMENT, INSTITUTION OR COMMUNITY
 -  GB 綠化地帶
GREEN BELT
 -  R(C) 住宅 (丙類)
RESIDENTIAL (GROUP C)
 -  R(D) 住宅 (丁類)
RESIDENTIAL (GROUP D)
 -  V 鄉村式發展
VILLAGE

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	MC	KSC	SZ	KSC	
Date	08/14	08/14	08/14	08/14	

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PRELIMINARY

Contract no. CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二階段及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
井欄樹土地用途
LANDUSE ZONING
AT TSENG LAN SHUE

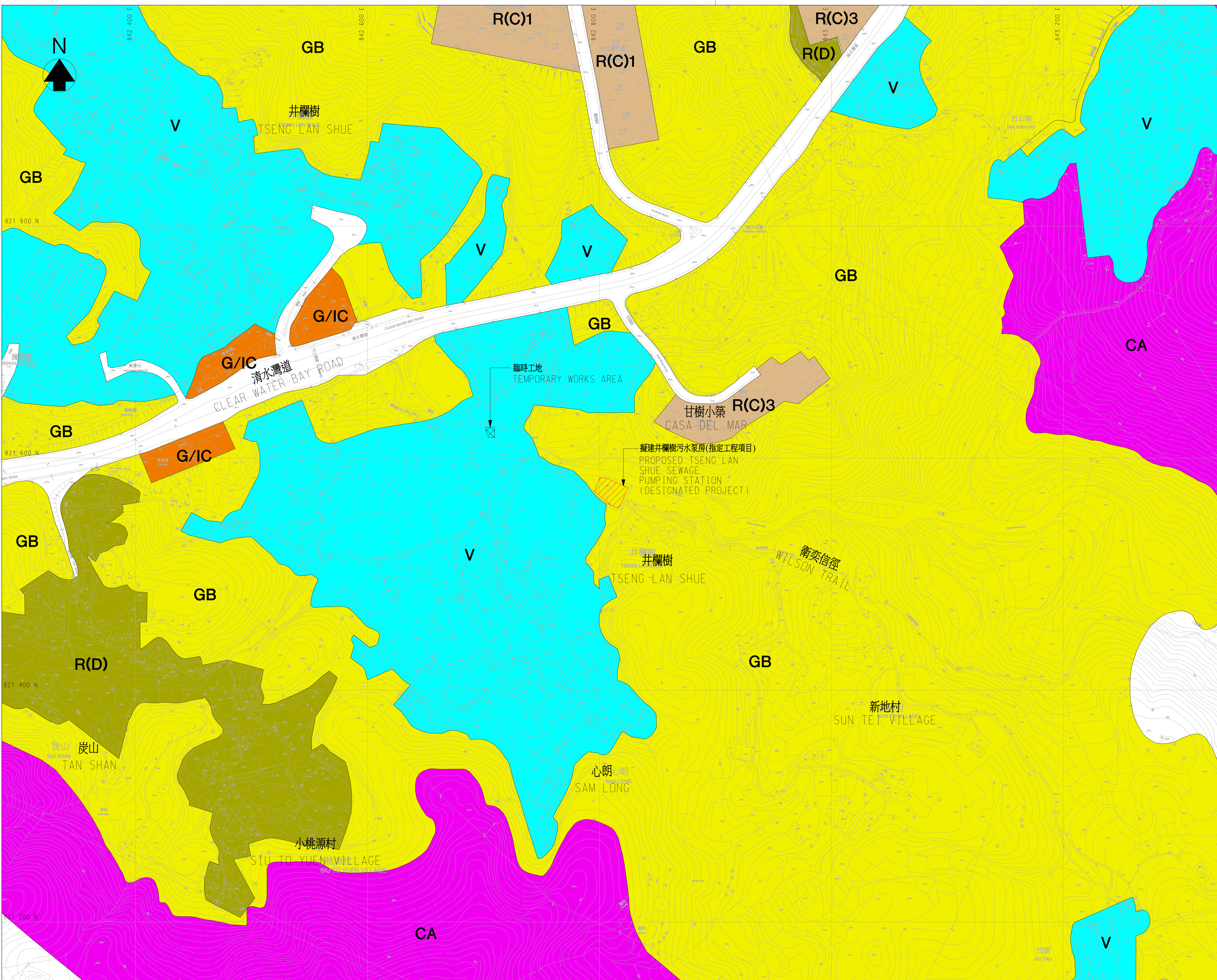
Drawing no. 圖四
FIGURE 4

Revision -

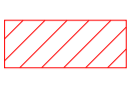
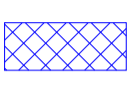


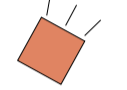
Scale A1 1 : 1500
A3 1 : 3000

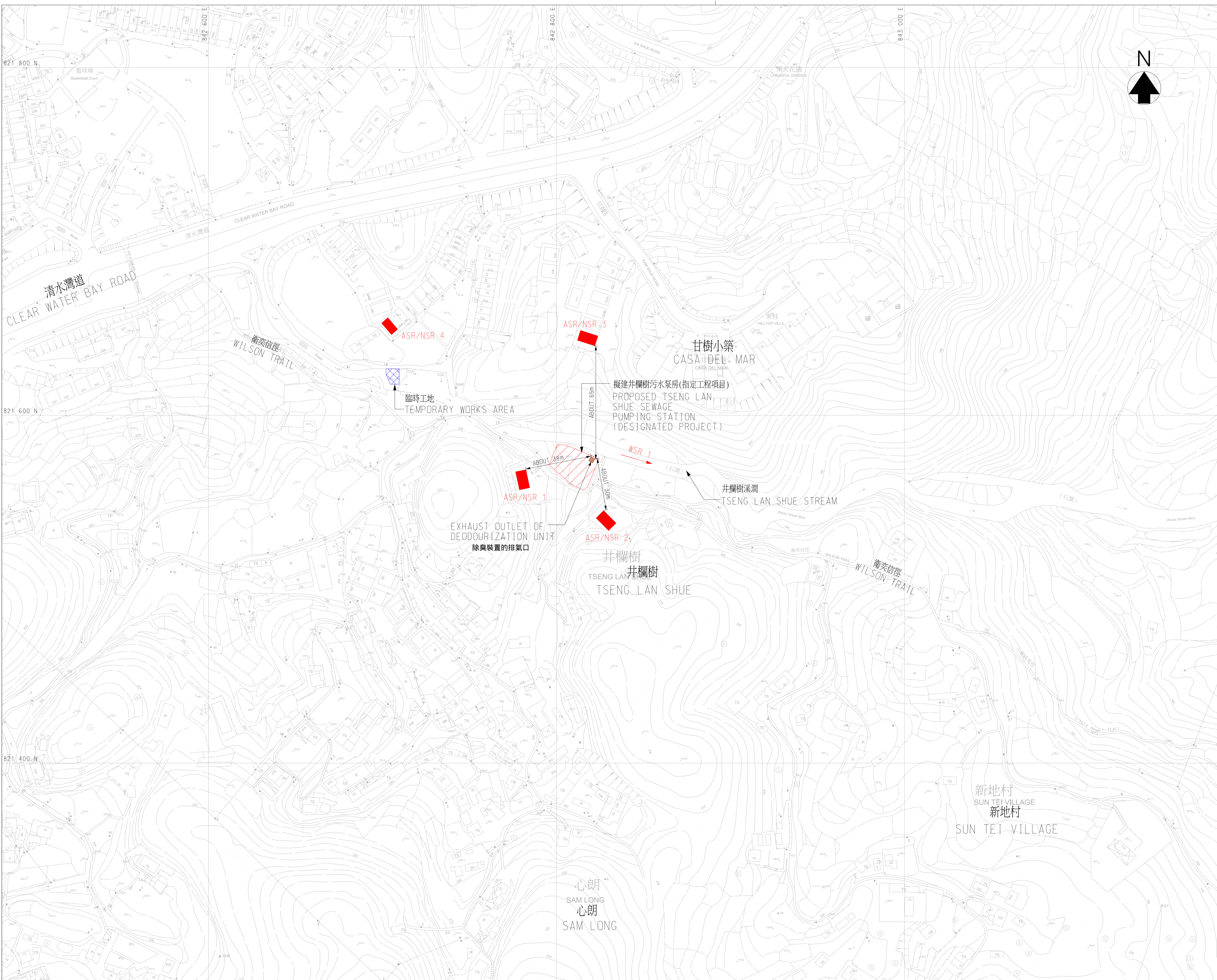
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博威工程顧問有限公司



圖例：
LEGEND :

-  擬建井欄樹污水泵房 (指定工程項目)
PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)
-  臨時工地
TEMPORARY WORKS AREA
-  ASR/NSR 1 空氣/噪音敏感受體
AIR/NOISE SENSITIVE RECEIVER
-  WSR1 水質敏感受體
WATER QUALITY SENSITIVE RECEIVER
-  EXHAUST OUTLET OF DEODORIZATION UNIT
除臭裝置的排氣口



Revision	Date	Description	Initial
Initial	MC	Designed	Checked
Initial	MC	KW	SZ
Initial	MC	KW	KW
Date	08/15	08/15	08/15
Date	08/15	08/15	08/15

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PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二階段及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

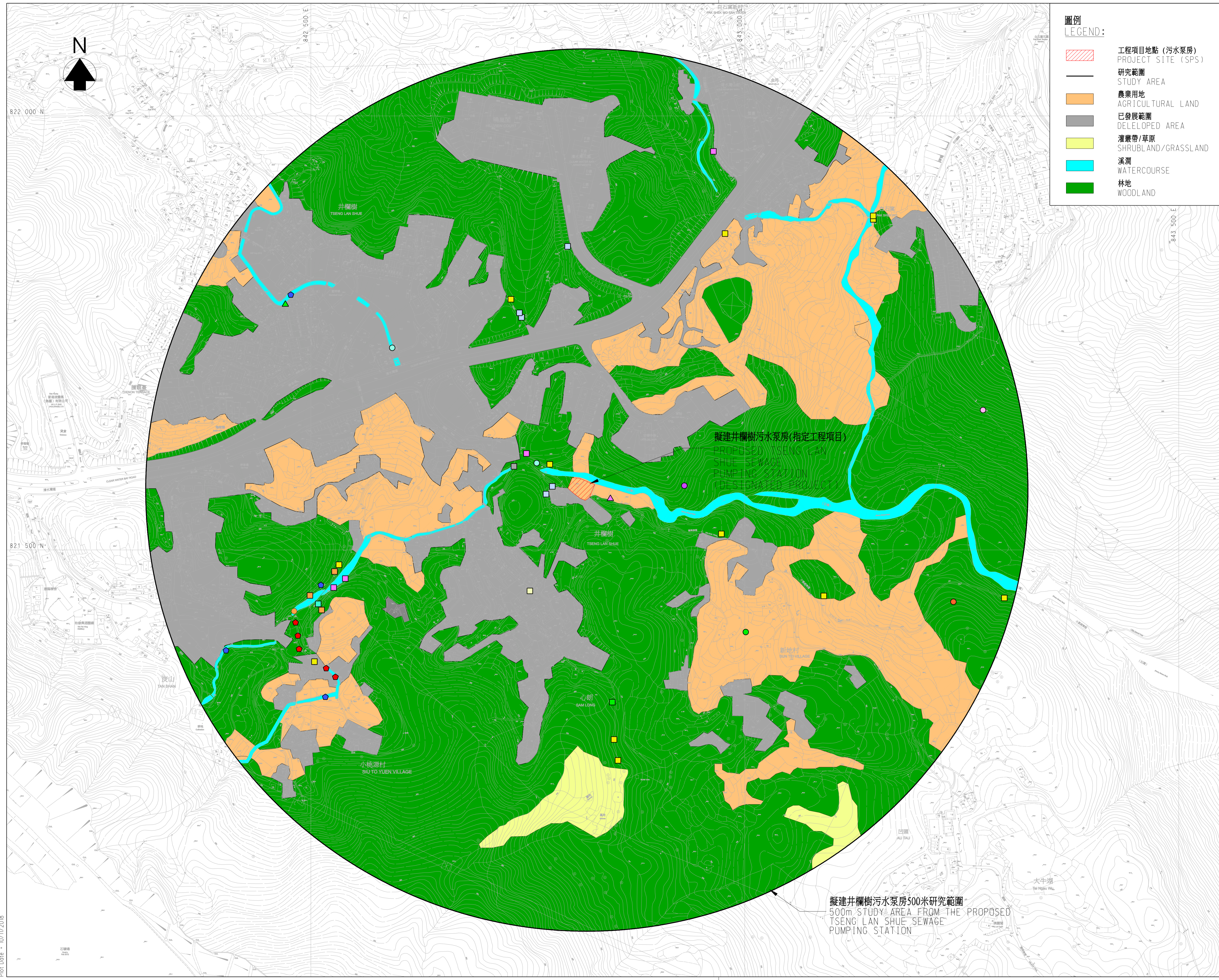
Drawing title
敏感受體位置圖
LOCATION OF SENSITIVE RECEIVERS

Drawing no.
圖五
FIGURE 5

Scale
A1 1 : 1000
A3 1 : 2000

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圖例
LEGEND:

- 工程項目地點 (污水泵房)
PROJECT SITE (SPS)
- 研究範圍
STUDY AREA
- 農業用地
AGRICULTURAL LAND
- 已發展範圍
DEVELOPED AREA
- 灌叢帶/草原
SHRUBLAND/GRASSLAND
- 溪澗
WATERCOURSE
- 林地
WOODLAND

圖例
LEGEND:

- 鳥類 BIRD**
 - 灰卷尾
ASHY DRONGO
 - 黑鳶
BLACK KITE
 - 夜鷺
BLACK-CROWNED NIGHT HERON
 - 畫眉
CHINESE HWAMEI
 - 灰喉山椒鳥
GREY-CHINNED MINIVET
 - 小白鷺
LITTLE EGRET
- 蝴蝶 BUTTERFLY**
 - 薑弄蝶
GRASS DEMON
- 蜻蜓 DRAGONFLY**
 - 紅翅蜻
RUBY DARTER
- 魚類 FISH**
 - 異鱸
PREDACEOUS CHUB
- 兩棲類 AMPHIBIAN**
 - 香港瘰螈
HONG KONG NEWT
- 植物 FLORA**
 - 刺砂椏
ALSOPHILA SPINULOSA
 - 土沉香
AQUILARIA SINENSIS
 - 香港鷹爪花
ARTABOTRYS HONGKONGENSIS
 - 白桂木
ARTOCARPUS HYPARGYREUS
 - 金毛狗
CIBOTIUM BAROMETZ
 - 小果柿
DIOSPYROS VACCINOIDES
 - 香港大沙葉
PAVETTA HONGKONGENSIS
 - 紅杜鵑
RHODODENDRON SIMSII

Revision	Date	Description	Initial
B	09/18	GENERAL REVISION	WLC
A	09/18	GENERAL REVISION	WLC
Initial	Designed	Checked	Drawn
	MC	KW	SZ
Date	08/15	08/15	08/15

Approved

Contract no.
CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
井欄樹研究範圍生境圖及具保育價值的物種
HABITAT MAP AND SPECIES OF
CONSERVATION IMPORTANCE
RECORDED WITHIN THE STUDY
AREA OF TSENG LAN SHUE

Drawing no. **圖六**
FIGURE 6

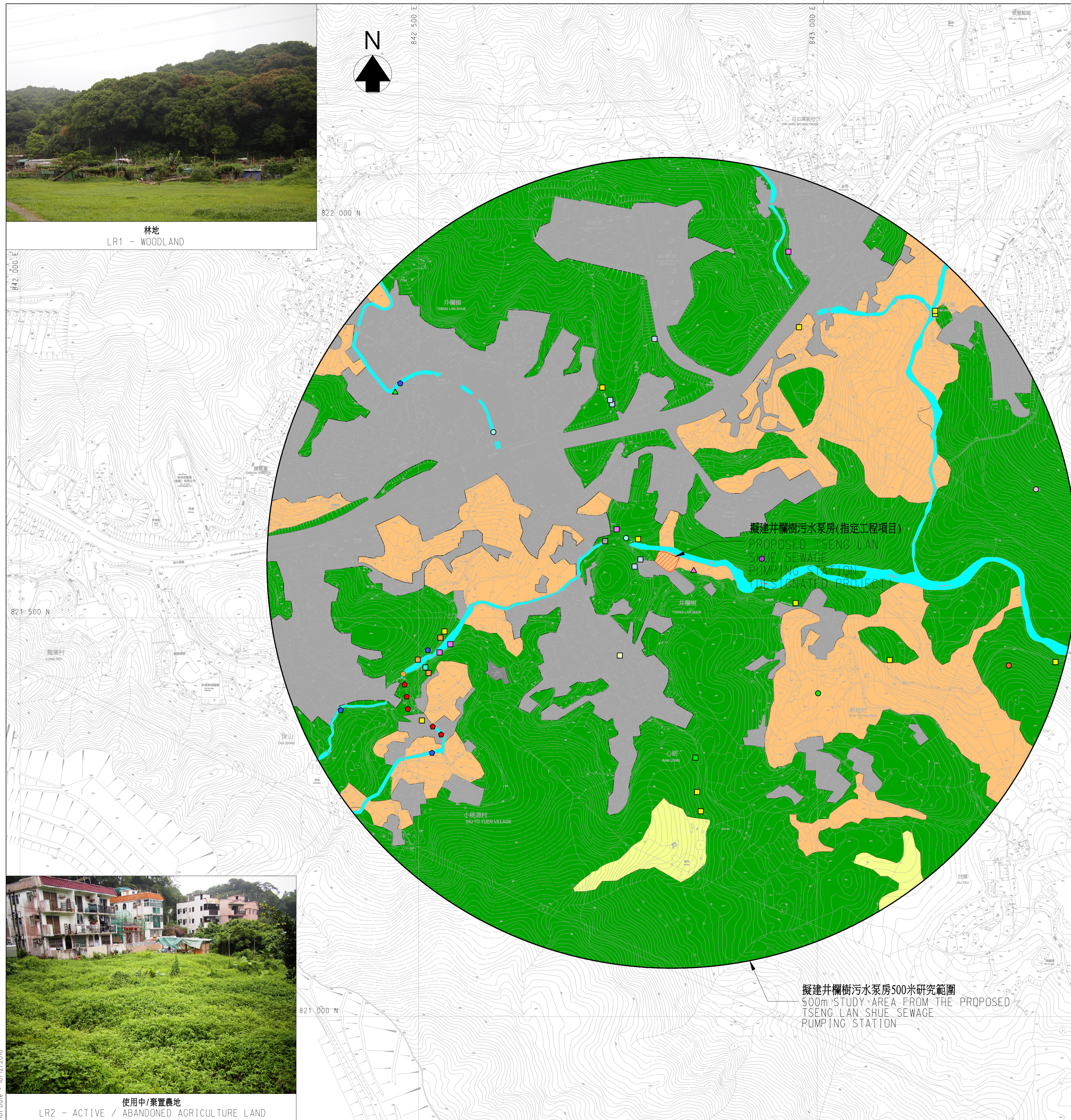
Revision **B**

Scale
A1 1 : 2000
A3 1 : 4000

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擬建井欄樹污水泵房500米研究範圍
500m STUDY AREA FROM THE PROPOSED
TSENG LAN SHUE SEWAGE
PUMPING STATION



圖例
LEGEND:

- 工程項目地點 (污水泵房)
PROJECT SITE (SPS)
- 研究範圍
STUDY AREA
- 農業用地
AGRICULTURAL LAND
- 已發展範圍
DEVELOPED AREA
- 灌叢帶/草原
SHRUBLAND/GRASSLAND
- 溪澗
WATERCOURSE
- 林地
WOODLAND

圖例
LEGEND:

鳥類 BIRD

- 灰卷尾
ASHY DRONGO
- 黑鳶
BLACK KITE
- 夜鷺
BLACK-CROWNED NIGHT HERON
- 畫眉
CHINESE HWAMEI
- 灰喉山椒鳥
GREY-CHINNED MINIVET
- 小白鷺
LITTLE EGRET

蝴蝶 BUTTERFLY

- 薑弄蝶
GRASS DEMON

蜻蜓 DRAGONFLY

- 紅翅蜻
RUBY DARTER

魚類 FISH

- 異鱸
PREDACEOUS CHUB

兩棲類 AMPHIBIAN

- 香港瘰螈
HONG KONG NEWT

植物 FLORA

- 刺砂椏
ALSOPHILA SPINULOSA
- 土沉香
AQUILARIA SINENSIS
- 香港鷹爪花
ARTABOTRYS HONGKONGENSIS
- 白桂木
ARTOCARPUS HYPARGYREUS
- 金毛狗
CIBOTIUM BAROMETZ
- 小果柿
DIOSPYROS VACCINIOIDES
- 香港大沙葉
PAVETTA HONGKONGENSIS
- 紅杜鵑
RHODODENDRON SIMSII

林地
LR1 - WOODLAND



溪澗 (人工化)
LCA3a - STREAM (CHANNELIZED)



溪澗 (半天然/天然)
LCA3b - STREAM (SEMI-NATURAL/NATURAL)



使用中/棄置農地
LR2 - ACTIVE / ABANDONED AGRICULTURE LAND



道路種植
LR4 - ROADSIDE PLANTING

擬建井欄樹污水泵房500米研究範圍
500m STUDY AREA FROM THE PROPOSED
TSENG LAN SHUE SEWAGE
PUMPING STATION

Revision	Date	Description	Initial
B	09/18	GENERAL REVISION	WLC
A	09/18	GENERAL REVISION	WLC
	Designed	Checked	Drawn
Initial	MC	KW	SZ
Date	08/15	08/15	08/15

Contract no.
CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
井欄樹研究範圍的景觀資源
LANDSCAPE RESOURCES (LRs)
WITHIN THE STUDY AREA OF
TSENG LAN SHUE

Drawing no.
圖七
FIGURE 7

Revision
B

Scale
A1 1 : 2500
A3 1 : 5000

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圖例
LEGEND:

- 
 擬建井欄樹污水泵房 (指定工程項目)
 PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)
- 
 臨時工地
 TEMPORARY WORKS AREA
- 
 林地景觀
 LCA1 - WOODLAND LANDSCAPE
- 
 使用中/棄置農地景觀
 LCA2 - ACTIVE/ABANDONED AGRICULTURE LAND LANDSCAPE
- 
 溪澗景觀 (人工化)
 LCA3a - STREAM LANDSCAPE (CHANNELIZED)
- 
 溪澗景觀 (半天然/天然)
 LCA3b - STREAM LANDSCAPE (SEMI NATURAL/NATURAL)
- 
 鄉郊發展地區景觀
 LCA4 - RURAL DEVELOPMENT AREA LANDSCAPE
- 
 主要運輸走廊景觀
 LCA5 - MAJOR TRANSPORT CORRIDOR LANDSCAPE
- 
 土沉香
 AQUILARIA SINENSIS
- 
 白桂木
 ARTOCARPUS HYPARGYREUS
- 
 香港鷹爪花
 ARTABOTRYS HONGKONGENSIS
- 
 刺砂櫨
 ALSOPHILA SPINULOSA

Revision	Date	Description			Initial
		Designed	Checked	Drawn	
Initial	MC	GC	SZ	GC	
Date	08/14	08/14	08/14	08/14	
Approved					

Contract no. CE 65/2006 (DS)

Contract title
 牛尾海污水收集系統
 第二階段及第三階段
 設計及建造
 PORT SHELTER SEWERAGE
 STAGE 2 AND STAGE 3
 DESIGN AND CONSTRUCTION

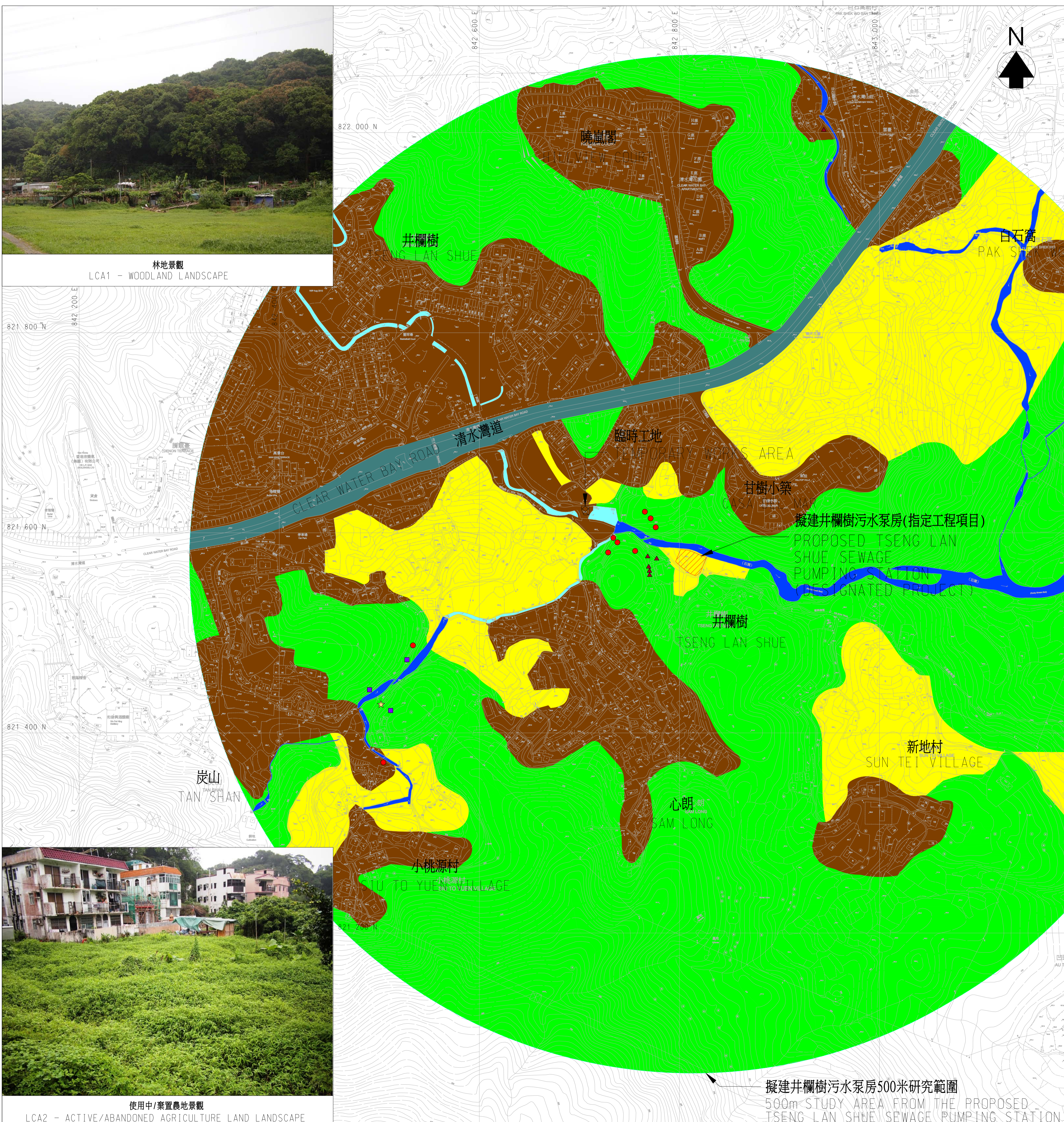
Drawing title
 井欄樹研究範圍的景觀特色區
 LANDSCAPE CHARACTER AREAS
 (LCAs) WITHIN THE STUDY AREA
 OF TSENG LAN SHUE

Drawing no. 圖八
 FIGURE 8

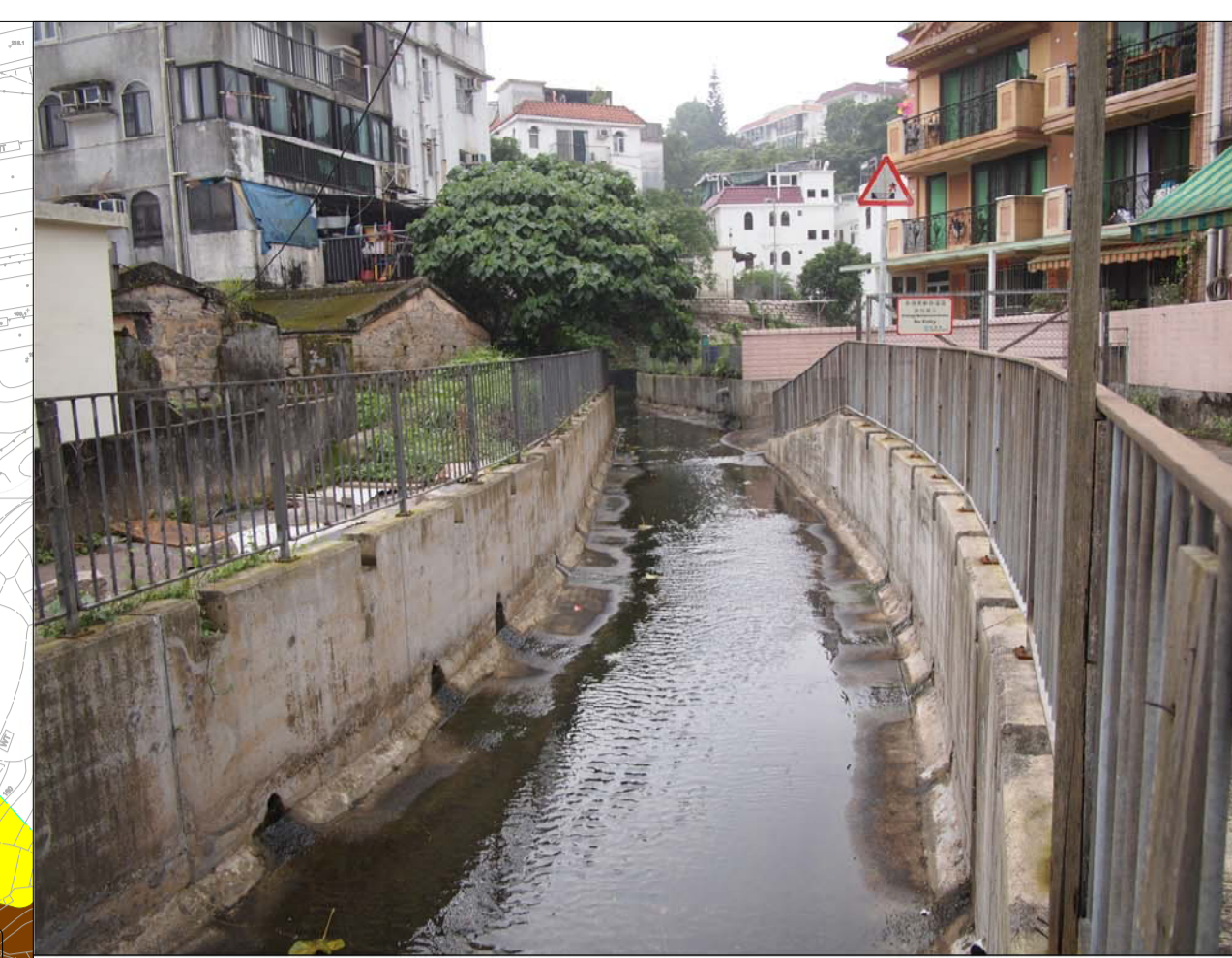
Scale A1 1 : 2000
 A3 1 : 4000

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 博威工程顧問有限公司



林地景觀
LCA1 - WOODLAND LANDSCAPE



溪澗景觀 (人工化)
LCA3a - STREAM LANDSCAPE (CHANNELIZED)



溪澗景觀 (半天然/天然)
LCA3b - STREAM LANDSCAPE (SEMI - NATURAL/NATURAL)



鄉郊發展地區景觀
LCA4 - RURAL DEVELOPMENT AREA LANDSCAPE



主要運輸走廊景觀
LCA5 - MAJOR TRANSPORT CORRIDOR LANDSCAPE



使用中/棄置農地景觀
LCA2 - ACTIVE/ABANDONED AGRICULTURE LAND LANDSCAPE

擬建井欄樹污水泵房500米研究範圍
 500m STUDY AREA FROM THE PROPOSED
 TSENG LAN SHUE SEWAGE PUMPING STATION



VSR 1

VSR 2

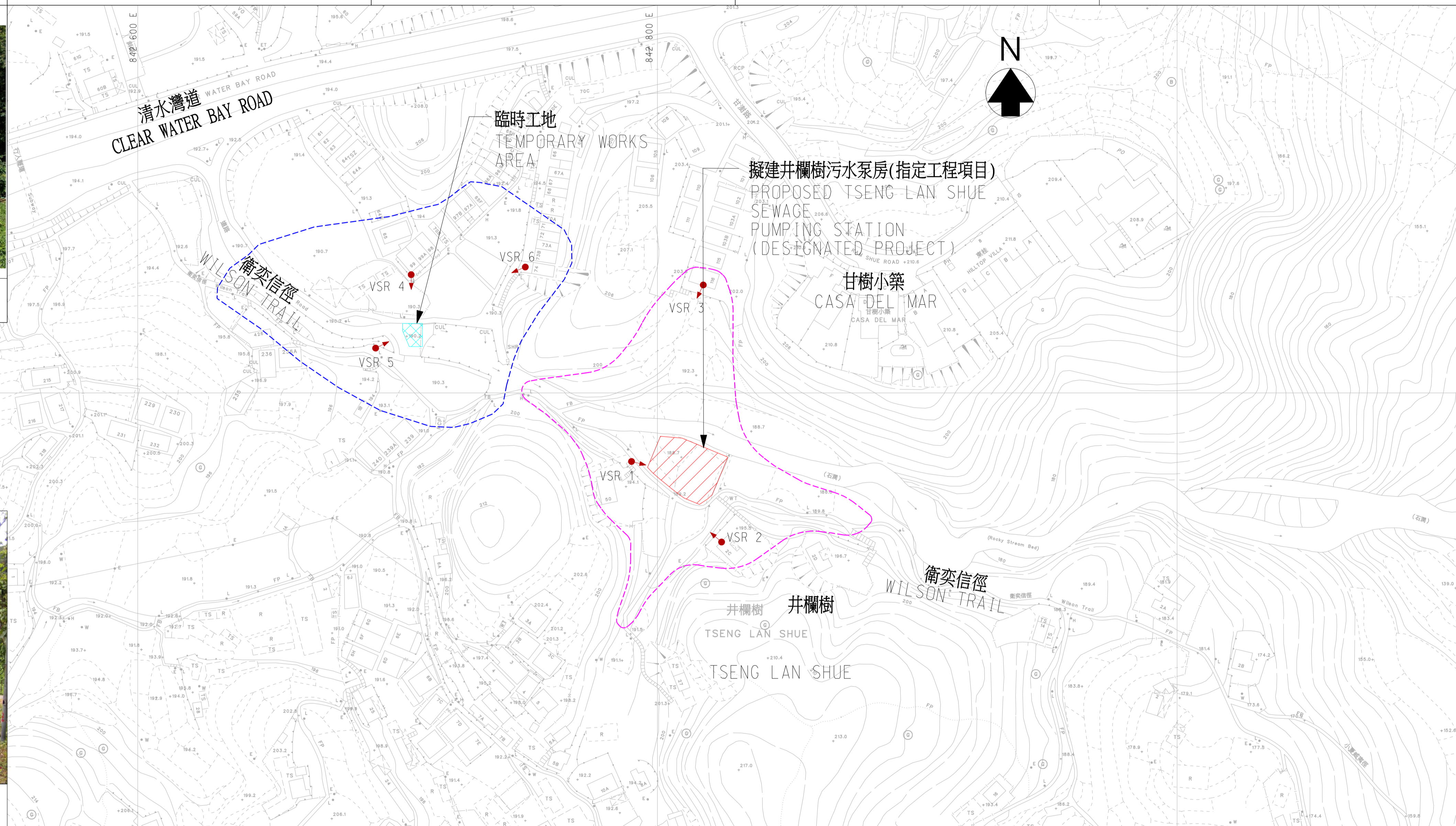
VSR 3

VSR 4

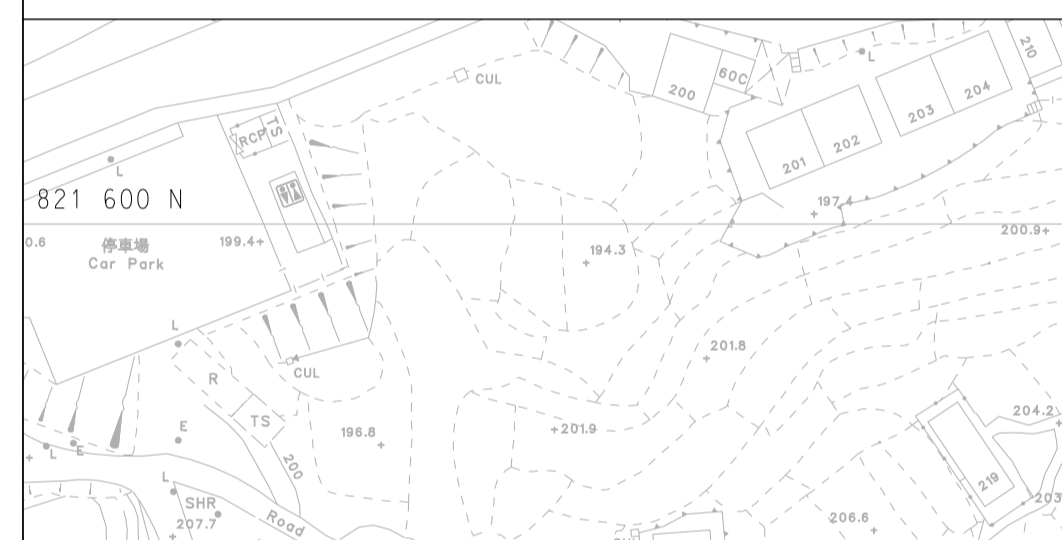
VSR 5



VSR 6



- 圖例**
LEGEND:
- 擬建井欄樹污水泵房 (指定工程項目)
PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)
 - 臨時工地
TEMPORARY WORKS AREA
 - 視覺影響區(污水泵房)
ZONE OF VISUAL INFLUENCE (SEWAGE PUMPING STATION)
 - VSR1 視覺敏感受體
VISUAL SENSITIVE RECEIVER
 - 視覺影響區(臨時工地)
ZONE OF VISUAL INFLUENCE (TEMPORARY WORKS AREA)



擬建污水泵房
PROPOSED SPS

從VSR1望向工程項目
VIEW OF THE SITE FROM VSR 1



擬建污水泵房
PROPOSED SPS

從VSR2望向工程項目
VIEW OF THE SITE FROM VSR 2



擬建污水泵房
PROPOSED SPS

從VSR3望向工程項目
VIEW OF THE SITE FROM VSR 3



臨時工地
TEMPORARY WORKS AREA

從VSR4望向臨時工地
VIEW OF THE TEMPORARY WORKS AREA FROM VSR 4



臨時工地
TEMPORARY WORKS AREA

從VSR5望向臨時工地
VIEW OF THE TEMPORARY WORKS AREA FROM VSR 5



臨時工地(被植物掩蔽)
TEMPORARY WORKS AREA (SHIELDED BY VEGETATION)

從VSR6望向臨時工地
VIEW OF THE TEMPORARY WORKS AREA FROM VSR 6

Revision	Date	Description	Initial
B	11/18	GENERAL REVISION	WLC
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Initial	MC	KW	SZ
Date	08/15	08/15	08/15

Contract no. CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

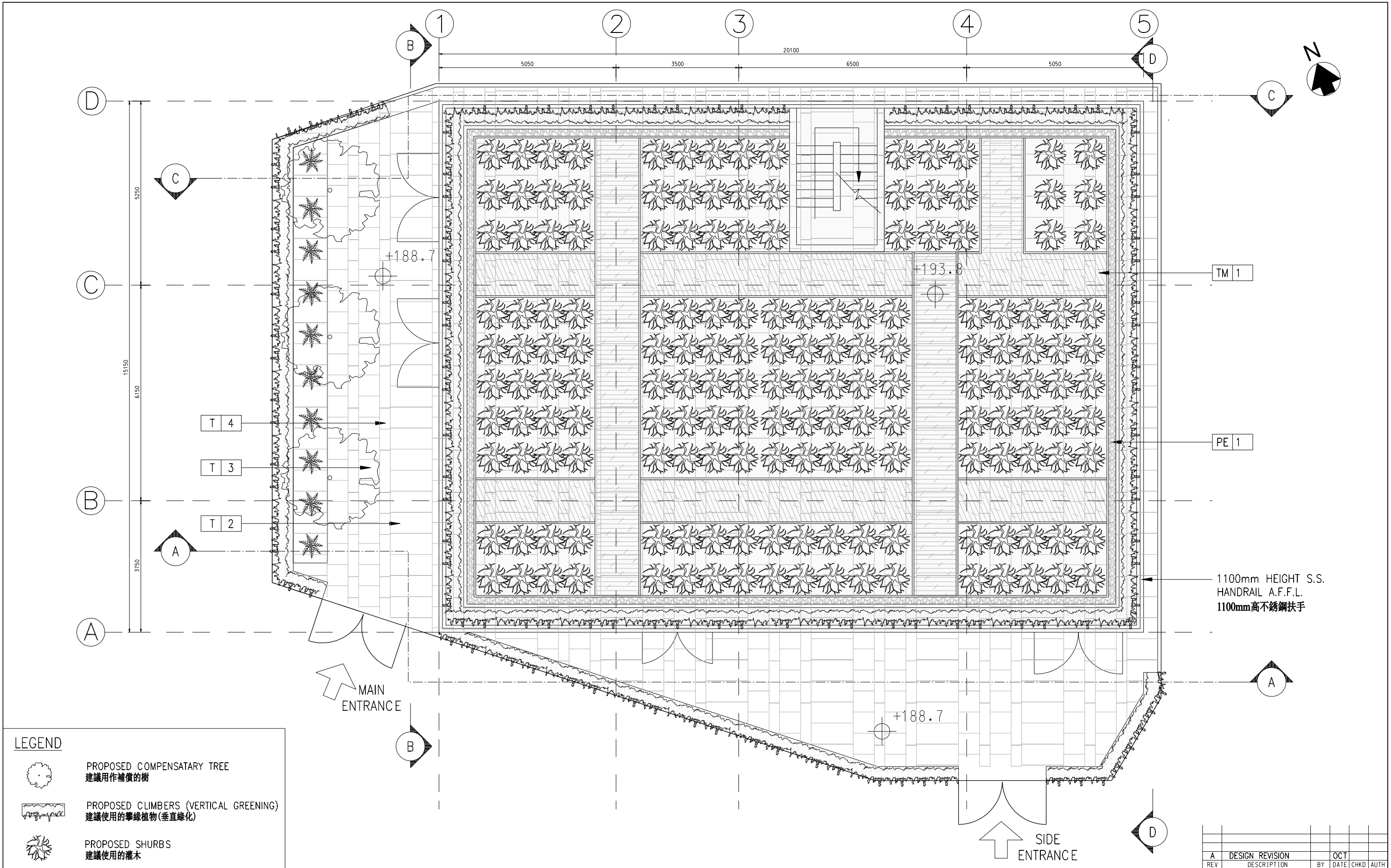
Drawing title
井欄樹研究範圍的
視覺敏感受體和視覺影響區
VISUAL SENSITIVE RECEIVERS
AND ZONE OF VISUAL INFLUENCE
WITHIN THE STUDY AREA OF
TSENG LAN SHUE

Drawing no.	Revision
圖九 FIGURE 9	B
Scale	A1 1 : 1000 A3 1 : 2000




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HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

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CAD Filename = Y:\Daily Work\20180712\FIGURE 10.dgn



LEGEND

-  PROPOSED COMPENSATORY TREE
建議用作補償的樹
-  PROPOSED CLIMBERS (VERTICAL GREENING)
建議使用的攀緣植物(垂直綠化)
-  PROPOSED SHRUBS
建議使用的灌木



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AGREEMENT No. CE 65/2006(DS)
PORT SHELTER SEWERAGE STAGE 2 & STAGE 3
DESIGN AND CONSTRUCTION

牛尾灣污水收集系統
第二及第三階段
設計及建造

MASTER LAYOUT PLAN

總平面圖

REV	DESCRIPTION	BY	DATE	CHKD	AUTH
A	DESIGN REVISION		OCT		
FIGURE NO. FIGURE 10 圖 10					
SCALE A3 1:100					DATE AUG 2014
DESIGNED	AC	CHECKED			GW
REVISION A					

MATERIAL LEGEND

[Pattern]	T 1
[Pattern]	T 2
[Pattern]	T 3
[Pattern]	T 4
[Pattern]	SP 1
[Pattern]	SP 2
[Pattern]	P 1
[Pattern]	P 2

1100mm HEIGHT S.S.
HANDRAIL A.F.F.L.
1100mm高不銹鋼扶手

FFL +193.8mPD

+188.7mPD

SP 1
25x10mm THK S.S.
HORIZONTAL FIN PERIMETER
25x10mm厚不銹鋼橫鐵板圍邊

SP 2
COATING FINISH
COVER MATCHING
P 1

+188.7mPD

1 ELEVATION 立面-A
1:100 @A3

VERTICAL GREEN WALL SYSTEM
垂直綠化牆

GREEN WALL SYSTEM
綠化牆

3 ELEVATION 立面-E
1:100 @A3

SP 1
25x10mm THK S.S.
HORIZONTAL FIN PERIMETER
25x10mm厚不銹鋼橫鐵板圍邊

COATING FINISH
COVER MATCHING
P 1

+188.7mPD

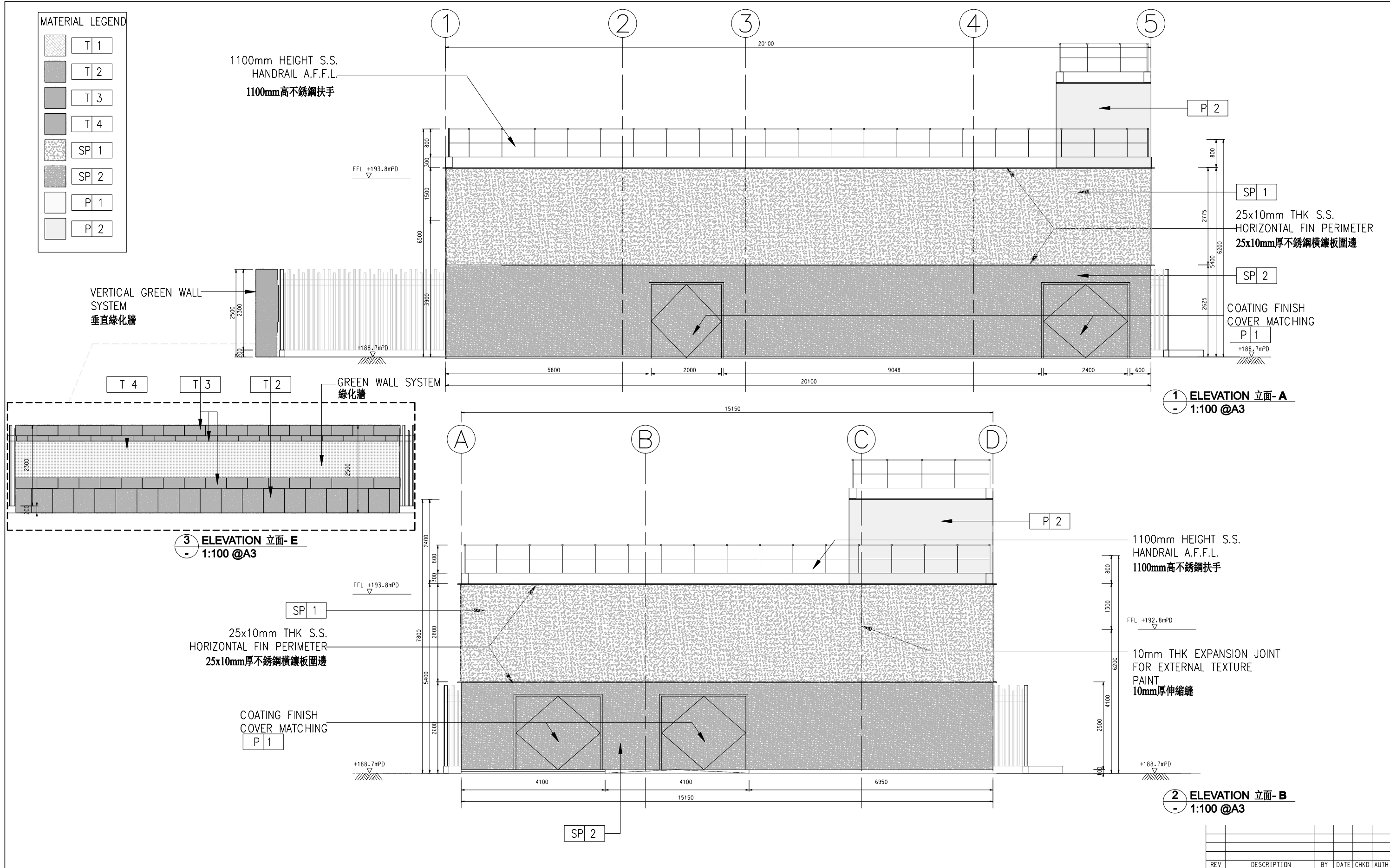
1100mm HEIGHT S.S.
HANDRAIL A.F.F.L.
1100mm高不銹鋼扶手

FFL +192.8mPD

10mm THK EXPANSION JOINT
FOR EXTERNAL TEXTURE
PAINT
10mm厚伸縮縫

+188.7mPD

2 ELEVATION 立面-B
1:100 @A3



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污水工程部
SEWERAGE PROJECTS DIVISION

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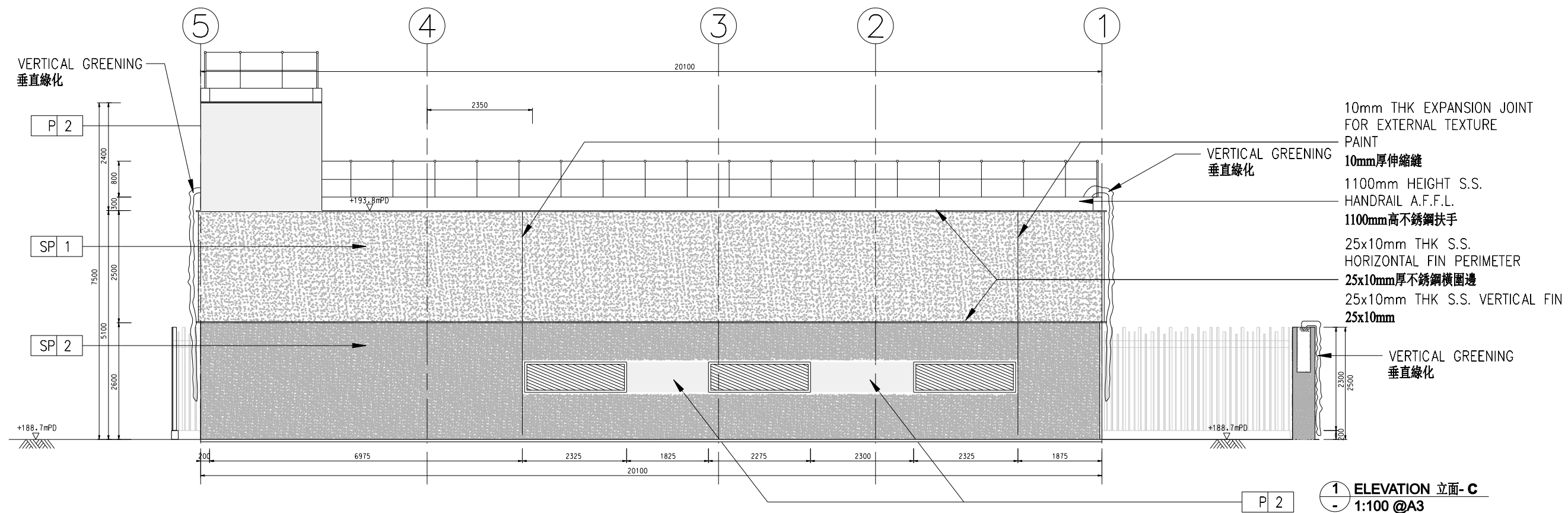
AGREEMENT No. CE 65/2006(DS)
PORT SHELTER SEWERAGE STAGE 2 & STAGE 3
DESIGN AND CONSTRUCTION

ELEVATIONS A & B & E

牛尾灣污水收集系統
第二及第三階段
設計及建造

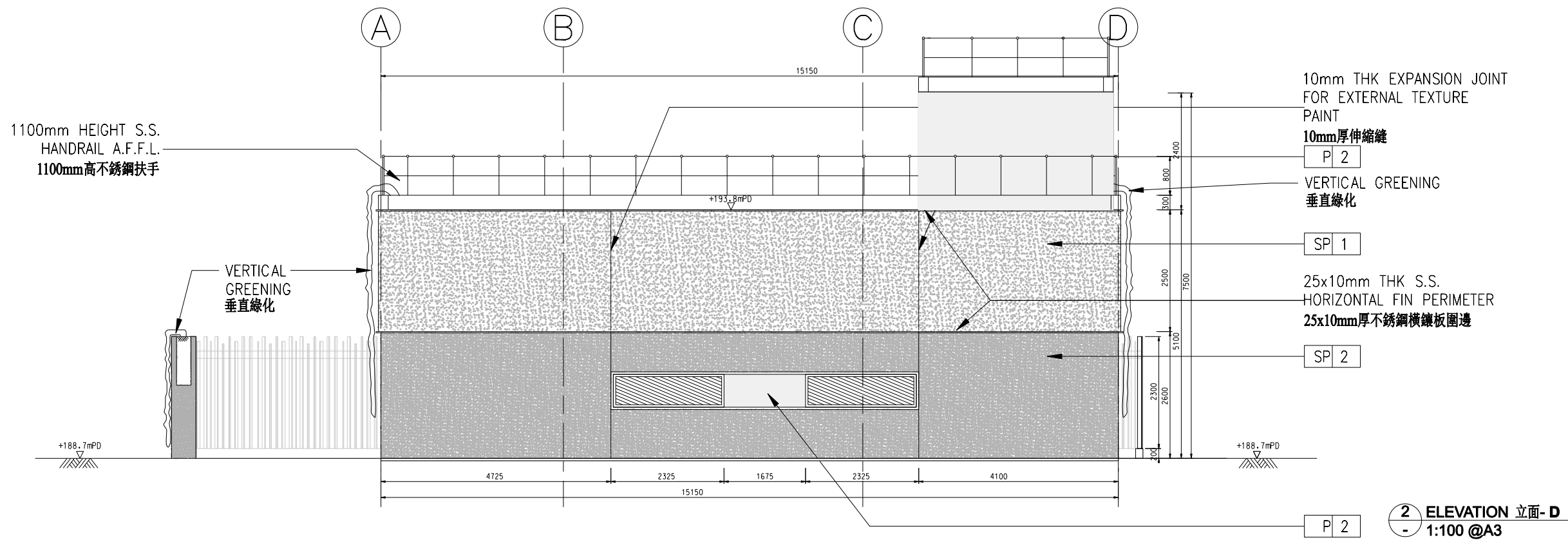
立面A&B&E

REV	DESCRIPTION	BY	DATE	CHKD	AUTH
FIGURE NO.	FIGURE 11 圖 11				
REVISION					
SCALE	A3 1:100	DATE	SEP 2014		
DESIGNED	TKC	CHECKED			KW



MATERIAL LEGEND

[Pattern]	T 1
[Pattern]	T 2
[Pattern]	T 3
[Pattern]	T 4
[Pattern]	SP 1
[Pattern]	SP 2
[Pattern]	P 1
[Pattern]	P 2



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AGREEMENT No. CE 65/2006(DS)
PORT SHELTER SEWERAGE STAGE 2 & STAGE 3
DESIGN AND CONSTRUCTION

牛尾灣污水收集系統
第二及第三階段
設計及建造

立面 C 及 D

ELEVATIONS C & D

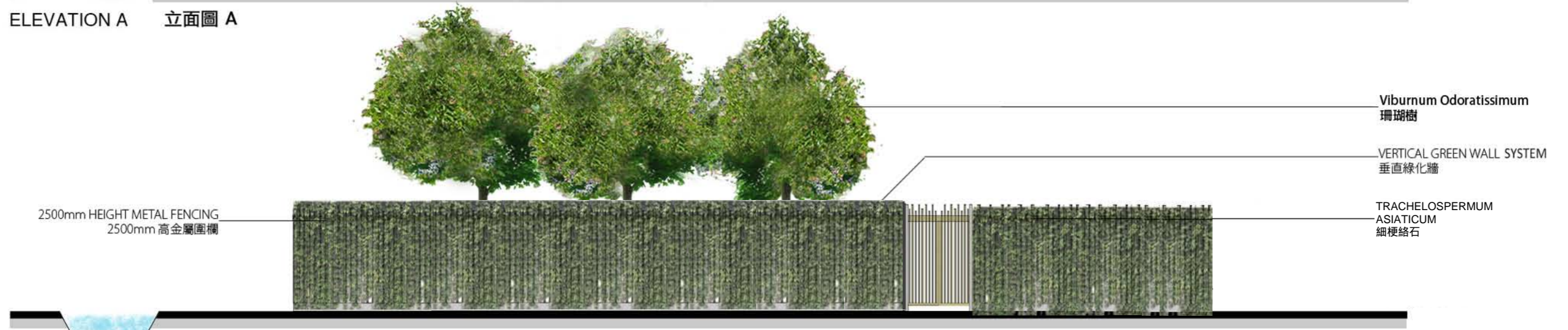
A	DESIGN REVISION		OCT		
REV	DESCRIPTION	BY	DATE	CHKD	AUTH
FIGURE NO.	FIGURE 12 圖 12			REVISION	
SCALE	A3 1:100	DATE	SEP 2014		
DESIGNED	TKC	CHECKED	KW		



REV	DESCRIPTION	BY	DATE	CHKD	AUTH



ELEVATION A 立面圖 A



ELEVATION E 立面圖 B (FACING EXTERIOR 外立面)



ELEVATION B 立面圖 B

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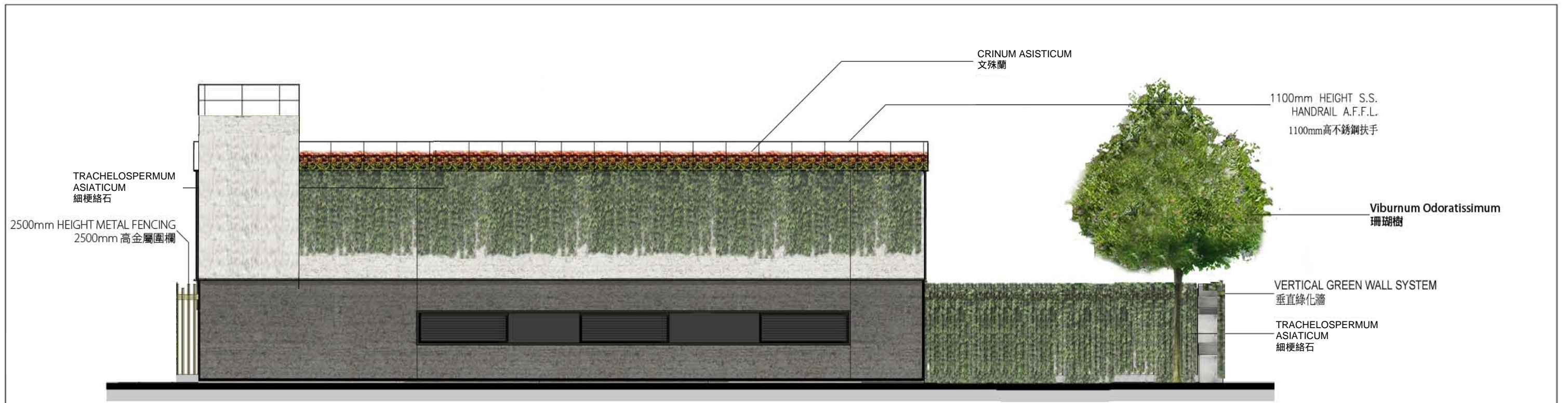
AGREEMENT No. CE 65/2006(DS)
PORT SHELTER SEWERAGE STAGE 2 & STAGE 3
DESIGN AND CONSTRUCTION

COLORED ELEVATIONS A & B

牛尾灣污水收集系統
第二及第三階段
設計及建造

彩色立面圖 A 及 B

REV	DESCRIPTION	BY	DATE	CHKD	AUTH
FIGURE NO.	FIGURE 14 圖十四				
SCALE	A3 1:100	DATE	MAR 2014		
DESIGNED	TKC	CHECKED			KSC



ELEVATION C 立面圖 C



ELEVATION D 立面圖 D



AGREEMENT No. CE 65/2006(DS)
PORT SHELTER SEWERAGE STAGE 2 & STAGE 3
DESIGN AND CONSTRUCTION

牛尾灣污水收集系統
第二及第三階段
設計及建造

REV	DESCRIPTION	BY	DATE	CHKD	AUTH
FIGURE NO.	FIGURE 15 圖十五				REVISION B
SCALE	A3 1:100		DATE	MAR 2014	
DESIGNED	TKC	CHECKED			KSC

COLORED ELEVATIONS C & D

彩色立面圖 C 及 D

污水工程處
SEWERAGE PROJECTS DIVISION

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T1
600x600x10mm thk porcelain tiles flamed finish with 3mm vertical and horizontal joints. Dark patina in color, Italian origin.

600x600x10mm厚瓷瓦
燒面, 3mm接合間隙
有顏色的變化, 意大利製造



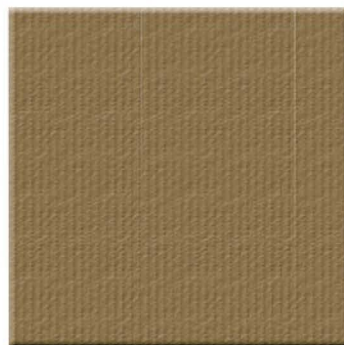
SP1
spray decorative external coating with granite finish, color & pattern to match SKK Sand elegante series EG-001 (white color)

外用仿石材噴漆
SKK系列 # EG-001
(白色)



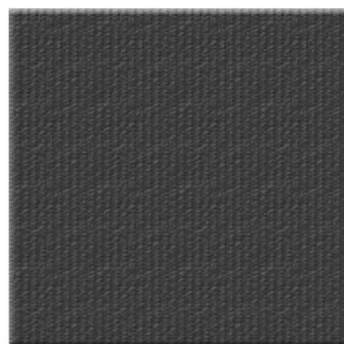
SP2
spray decorative external coating with granite finish, color & pattern to match SKK Sand elegante series EG-004 (grey color)

外用仿石材噴漆
SKK系列 # EG-004
(灰色)



P1
Proprietary SKK external texture paint finish, color matching 20YY 32/494, refer to SKK installation method & specification

外用紋理噴漆
SKK系列 # 同色代碼20YY 32/494
采用SKK標準安裝方法及規格



P2
Proprietary SKK external texture paint finish, color matching 30YY 10/038, refer to SKK installation method & specification

外用紋理噴漆
SKK系列 # 同色代碼30YY 10/038
采用SKK標準安裝方法及規格



T2
600x600x10mm thk porcelain tiles flamed finish with 3mm vertical and horizontal joints. Light beige in color, Italian origin.

600x600x10mm厚瓷瓦
燒面, 3mm接合間隙
有顏色的變化, 意大利製造



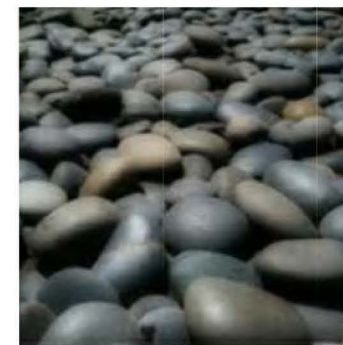
T3
600x600x10mm thk porcelain tiles flamed finish with 3mm vertical and horizontal joints. Dark beige in color, Italian origin.

600x600x10mm厚瓷瓦
燒面, 3mm接合間隙
有顏色的變化, 意大利製造



T4
300x600x10mm thk porcelain tiles glossy finish with 3mm vertical and horizontal joints. Dark gray in color, Italian origin.

600x600x10mm厚瓷瓦
燒面, 3mm接合間隙
有顏色的變化, 意大利製造



PE1
Grey round pebble stone, size ranging. 50-100mm in diameter.


灰色鵝卵石
尺寸50-100mm直徑



TM1
138x2400x25mm thk solid recycle plastic with timber pattern. Dark brown color finish, China origin.

138x2400x25mm厚
茶褐色環保塑料木材
中國製造

REV	DESCRIPTION	BY	DATE	CHKD	AUTH
A	DESIGN REVISION		OCT		
FIGURE NO. FIGURE 16 圖十六					REVISION A
SCALE A3 1:100			DATE OCT 2013		
DESIGNED	AC	CHECKED	GW		

圖例：
LEGEND：
 擬建井欄樹污水泵房 (指定工程項目)
 PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)



Revision	Date	Description			Initial
A	10/18	GENERAL REVISION			MLC
		Designed	Checked	Drawn	Checked
Initial	MC	KW	SZ	KW	
Date	08/15	08/15	08/15	08/15	08/15

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
**牛尾海污水收集系統
第二及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION**

Drawing title
**主要視點及集成照片的位置
LOCATION OF KEY VIEW POINTS
FOR PHOTOMONTAGE**

Drawing no.
**圖十七
FIGURE 17**

Revision
A

Scale
A1 1 : 250
A3 1 : 500

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DRAINAGE SERVICES DEPARTMENT**

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從VSR1望向工程項目
VIEW OF THE SITE FROM VSR1



從VSR2望向工程項目
VIEW OF THE SITE FROM VSR2



EXISTING FOOTPATH
現有的行人道

PROPOSED SEWAGE
PUMPING STATION SITE
擬建的污水泵房

PLEASE REFER TO FIGURE 17 FOR LOCATION OF VIEW POINT.
關於觀點的位置，請參考圖17



污水工程處
SEWERAGE PROJECTS DIVISION



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AGREEMENT No. CE 65/2006(DS)
PORT SHELTER SEWERAGE STAGE 2 & STAGE 3
DESIGN AND CONSTRUCTION

VIEW FROM VSR 2 – BEFORE CONSTRUCTION
(EXISTING CONDITION)

牛尾灣污水收集系統
第二及第三階段
設計及建造

從VSR2 望向工程項目 - 施工前
(現有狀況)

REV	DESCRIPTION	BY	DATE	CHKD	AUTH
A	DESIGN REVISION		OCT		
FIGURE NO.		REVISION			
FIGURE 18a		圖十八a			
SCALE			DATE		
A3 1:100			OCT 2013		
DESIGNED	AC	CHECKED	GW		



EXISTING FOOTPATH
現有的行人道

PROPOSED SEWAGE PUMPING STATION SITE
擬建的污水泵房

LEGEND
圖例

OM1	MITIGATION MEASURES NO. 1 IN OPERATION PHASE 營運階段的第一減緩措施
CM1	MITIGATION MEASURES NO. 1 IN CONSTRUCTION PHASE 建造階段的第一減緩措施

PLEASE REFER TO FIGURE 17 FOR LOATION OF VIEW POINT.
關於觀點的位置，請參考圖17

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污水工程處
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AGREEMENT No. CE 65/2006(DS)
PORT SHELTER SEWERAGE STAGE 2 & STAGE 3
DESIGN AND CONSTRUCTION

VIEW FROM VSR 2 - AFTER CONSTRUCTION
(WITH PREVENTIVE / MITIGATION MEASURES)

牛尾灣污水收集系統
第二及第三階段
設計及建造

從VSR2 望向工程項目 - 施工後
(包括預防 / 緩解措施)

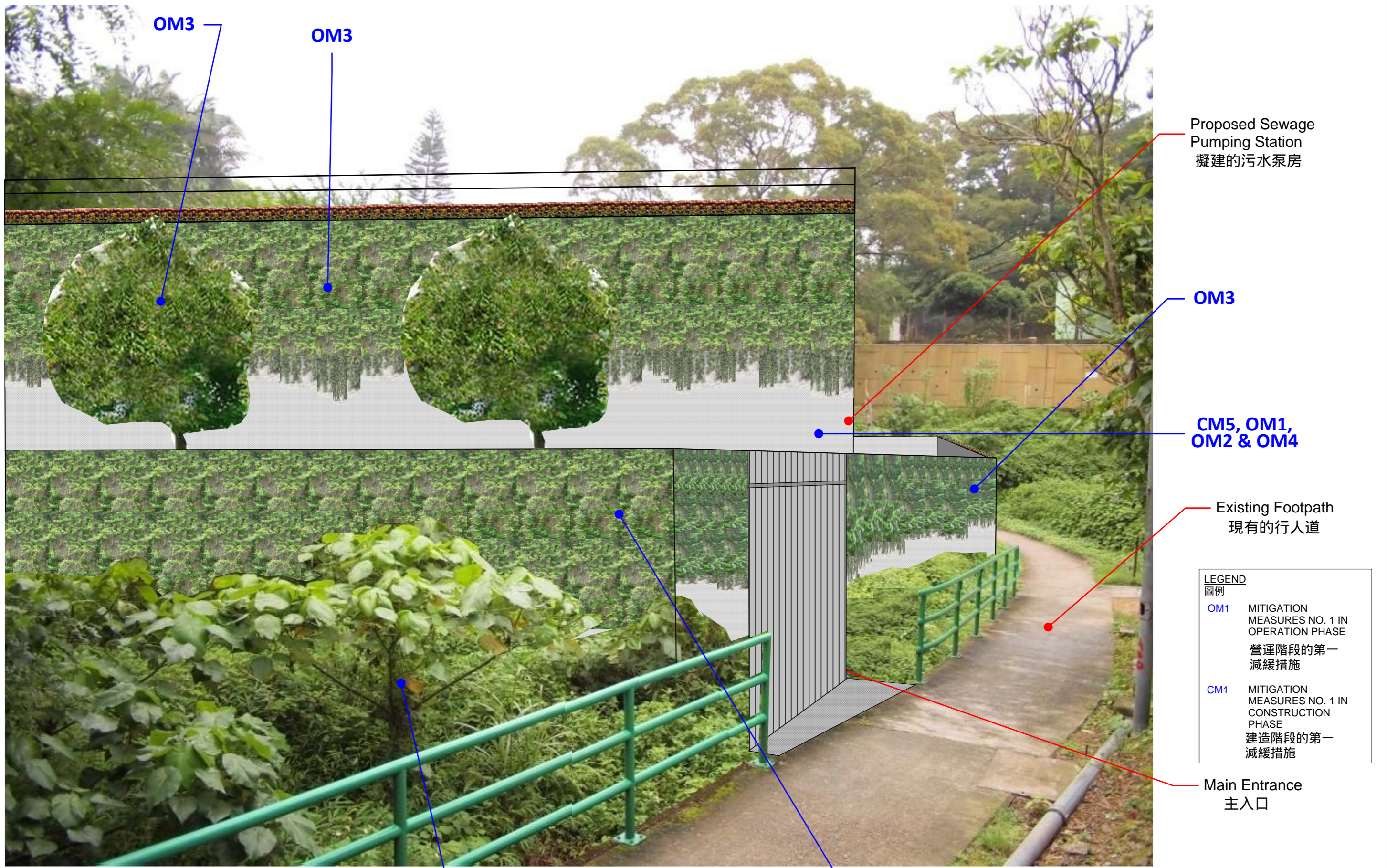
REV	DESIGN REVISION	BY	DATE	CHKD	AUTH
A	DESIGN REVISION		OCT		
FIGURE NO.					REVISION
FIGURE 18b					
圖十八b					
SCALE			DATE		
A3 1:100			OCT 2013		
DESIGNED	AC	CHECKED			GW



Proposed Sewage Pumping Station
 擬建的污水泵房

Existing Footpath
 現有的行人道

FIGURE NO.		FIGURE 19a 圖十九a		REVISION	
SCALE		A3 1:100		DATE	
DESIGNED		AC		OCT 2013	
CHECKED		GW			



Proposed Sewage Pumping Station
擬建的污水泵房

OM3

CM5, OM1, OM2 & OM4

Existing Footpath
現有的行人道

LEGEND
圖例

OM1	MITIGATION MEASURES NO. 1 IN OPERATION PHASE 營運階段的第一減緩措施
CM1	MITIGATION MEASURES NO. 1 IN CONSTRUCTION PHASE 建造階段的第一減緩措施

Main Entrance
主入口

CM4

OM3

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AGREEMENT No. CE 65/2006(DS)
PORT SHELTER SEWERAGE STAGE 2 & STAGE 3
DESIGN AND CONSTRUCTION









VIEW FROM VSR 1 – AFTER CONSTRUCTION
(WITH PREVENTIVE / MITIGATION MEASURES)

牛尾灣污水收集系統
第二及第三階段
設計及建造

從VSR1 望向工程項目 - 施工後
(包括預防 / 緩解措施)

FIGURE NO.	FIGURE 19b 圖十九b	REVISION	
SCALE	A3 1:100	DATE	OCT 2013
DESIGNED	AC	CHECKED	GW

圖例：
LEGEND :

-  擬建井欄樹污水泵房 (指定工程項目)
PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION (DESIGNATED PROJECT)
-  現有渠務署的箱涵
EXISTING DSD BOX CULVERT
-  現有渠務署的明渠
EXISTING DSD OPEN CHANNEL
-  現有混凝土明渠
EXISTING CONCRETE CHANNEL
-  村屋小組 "A"
VILLAGE HOUSE GROUP "A"
-  擬建污水渠 (非指定項目)
PROPOSED SEWER (NOT DESIGNATED PROJECT)
-  安全管道
SAFETY PIPELINE
-  在緊急事件發生後並在水閘關上後的3.5小時，污水的流向
PATHWAY OF SEWAGE FLOW ONCE STOPLOGS ARE SWITCHED 3.5 HOURS AFTER AN EMERGENCY EVENT

Revision	Date	Description	Initial
	Designed	Checked	Drawn
Initial	MC	KSC	SZ
Date	08/14	08/14	08/14

Approved

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二階段及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

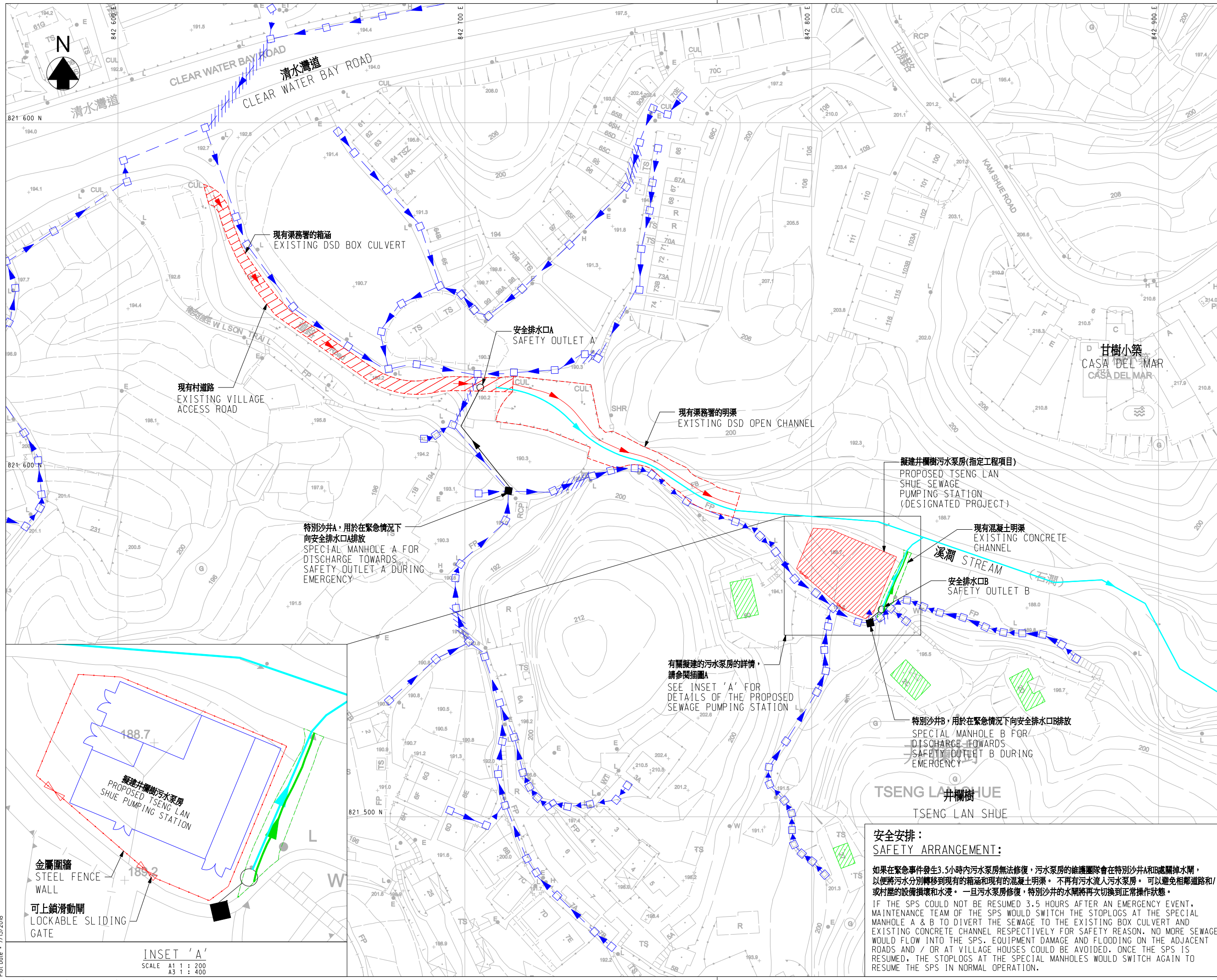
Drawing title
井欄樹污水泵房工程
- 安全安排
PROPOSED SEWAGE PUMPING
STATION AT TSENG LAN SHUE
- SAFETY ARRANGEMENT

Drawing no.
圖二十
FIGURE 20

Scale
A1 1 : 500
A3 1 : 1000



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Plot Date : 7/13/2018

INSET 'A'
SCALE A1 1 : 200
A3 1 : 400

安全安排：
SAFETY ARRANGEMENT:

如果在緊急事件發生3.5小時內污水泵房無法修復，污水泵房的維護團隊會在特別沙井A和B處關掉水閘，以便將污水分別轉移到現有的箱涵和現有的混凝土明渠。不再有污水流入污水泵房。可以避免相鄰道路和/或村屋的設備損壞和水浸。一旦污水泵房修復，特別沙井的水閘將再次切換到正常操作狀態。

IF THE SPS COULD NOT BE RESUMED 3.5 HOURS AFTER AN EMERGENCY EVENT, MAINTENANCE TEAM OF THE SPS WOULD SWITCH THE STOPLOGS AT THE SPECIAL MANHOLE A & B TO DIVERT THE SEWAGE TO THE EXISTING BOX CULVERT AND EXISTING CONCRETE CHANNEL RESPECTIVELY FOR SAFETY REASON. NO MORE SEWAGE WOULD FLOW INTO THE SPS. EQUIPMENT DAMAGE AND FLOODING ON THE ADJACENT ROADS AND / OR AT VILLAGE HOUSES COULD BE AVOIDED. ONCE THE SPS IS RESUMED, THE STOPLOGS AT THE SPECIAL MANHOLES WOULD SWITCH AGAIN TO RESUME THE SPS IN NORMAL OPERATION.

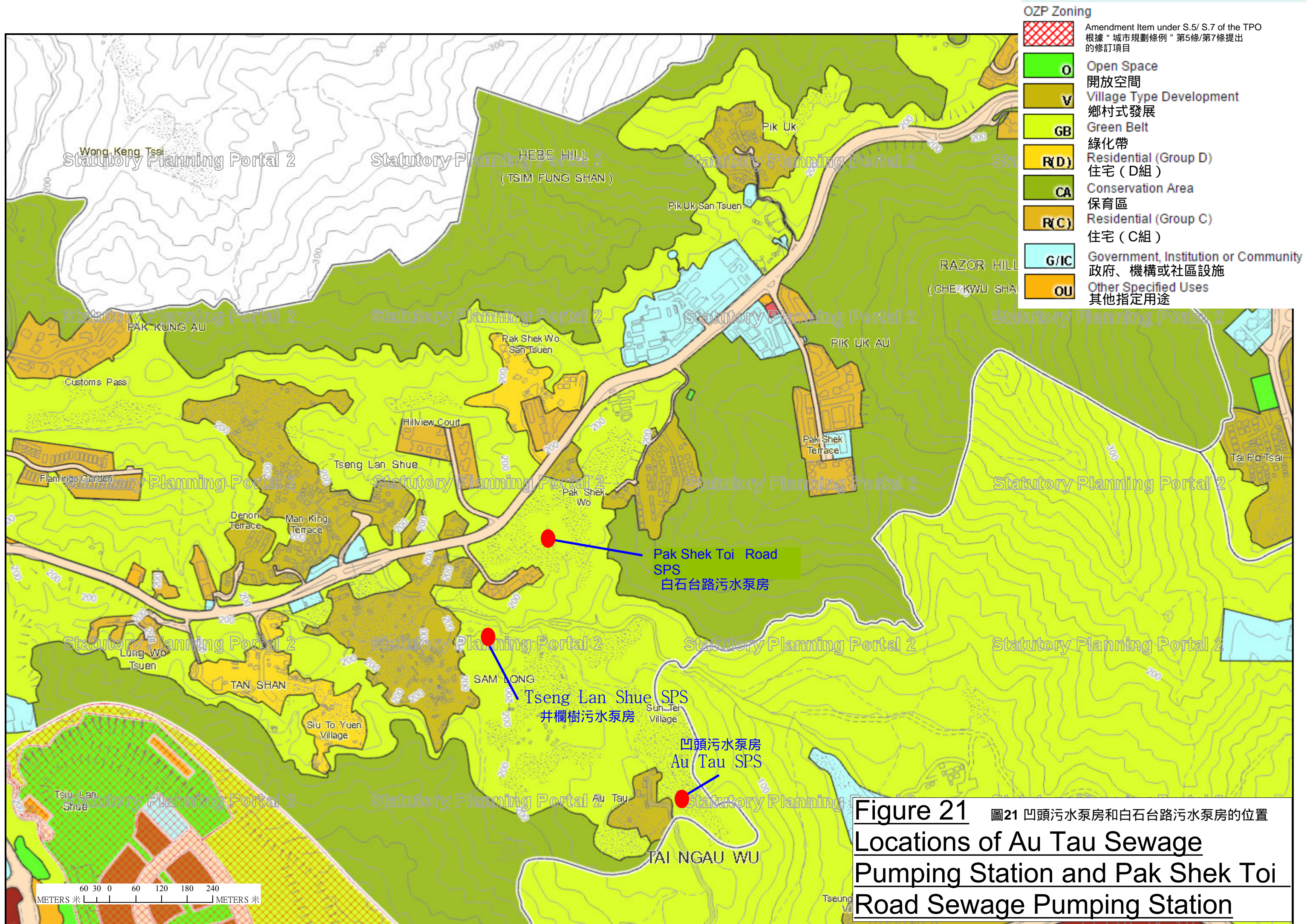
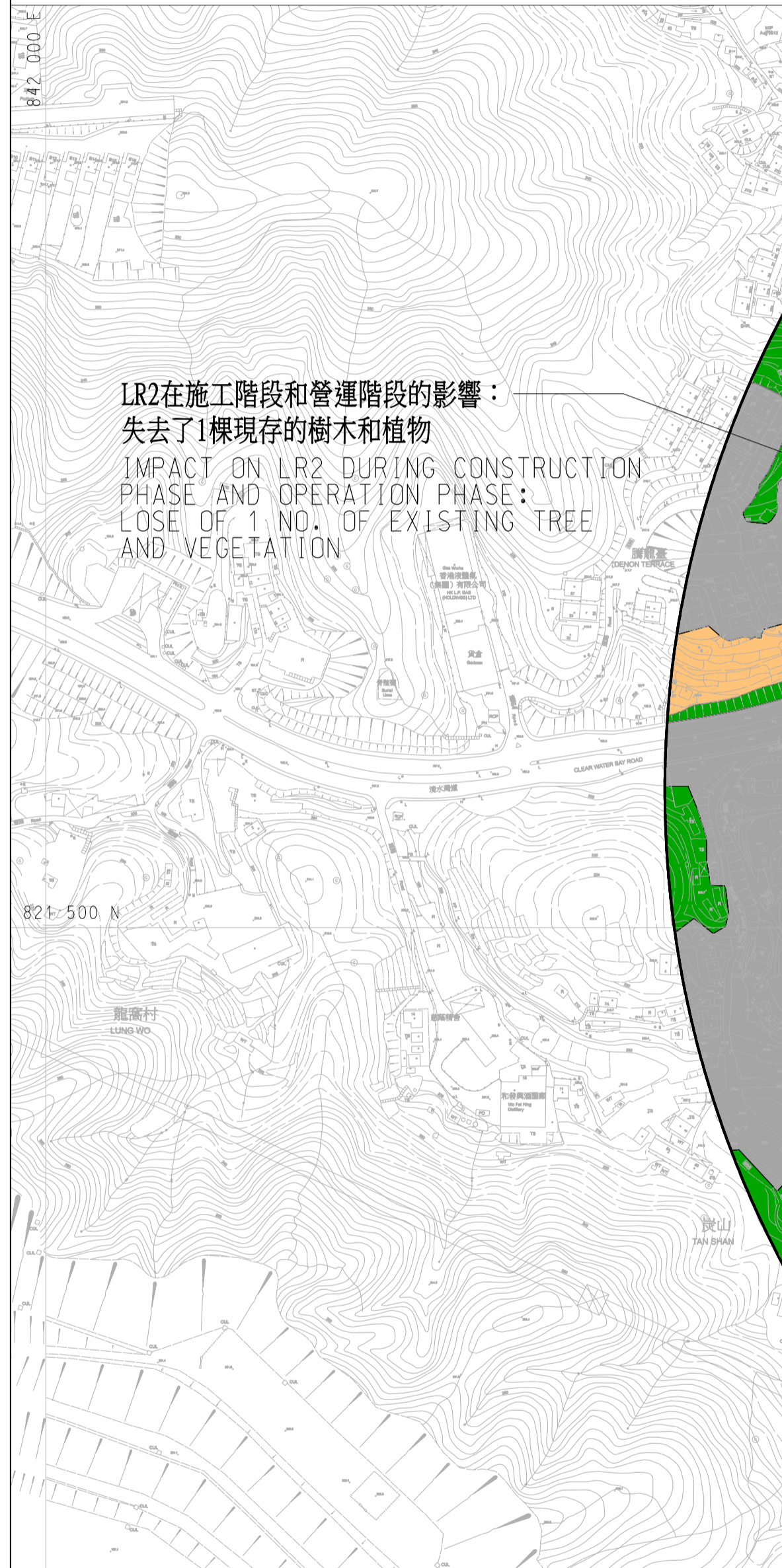


FIGURE 21 圖21



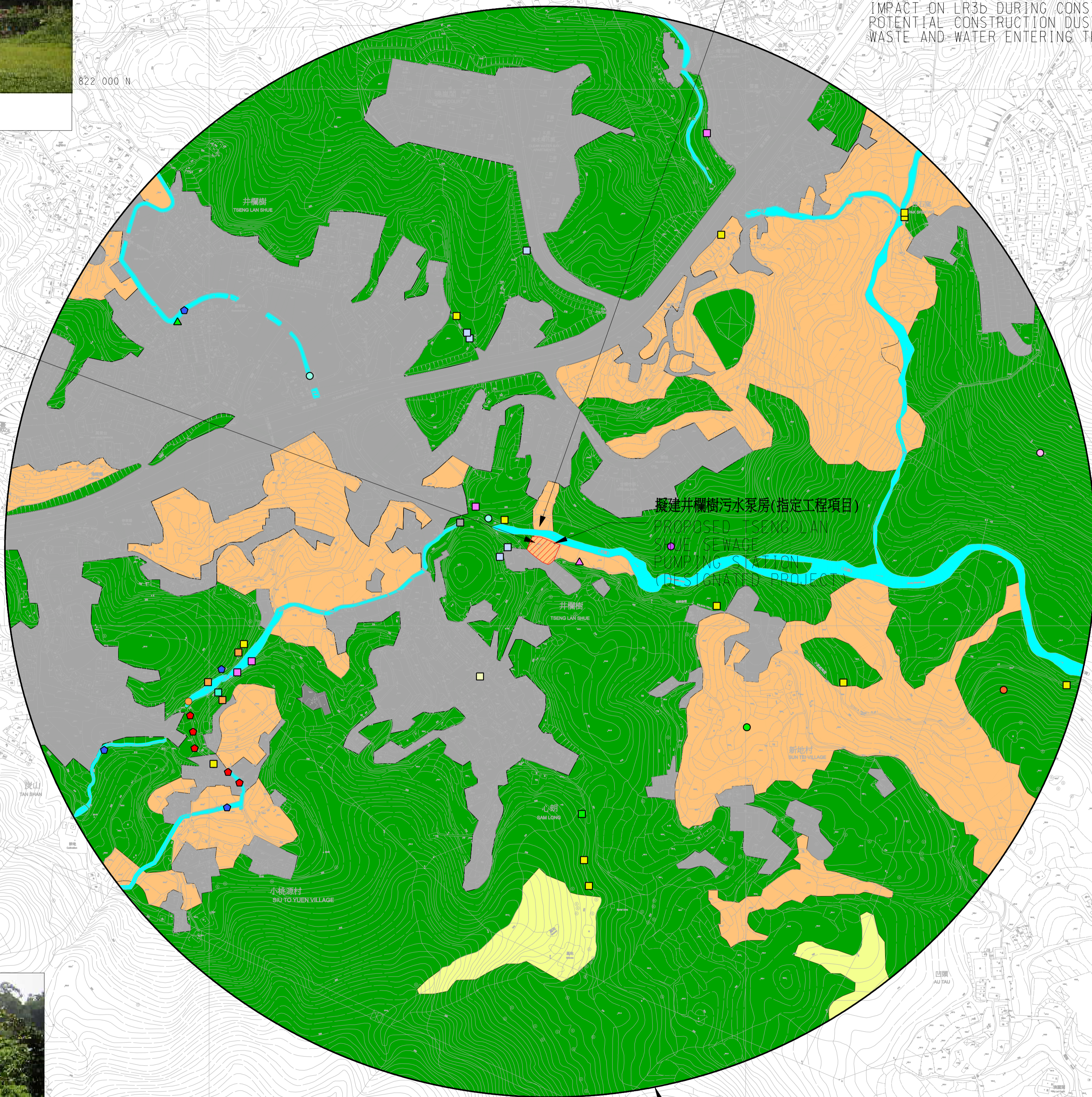
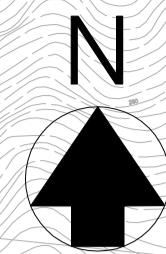
林地
LR1 - WOODLAND



使用中/棄置農地
LR2 - ACTIVE / ABANDONED AGRICULTURE LAND

Plot Date - 10/12/2018

CAD Filename - Y:\Daily Work\20181011\dgn\FIGURE 22.dgn



LR3b在施工程段的影響：
可能有建築灰塵，廢物和污水進入河流
IMPACT ON LR3b DURING CONSTRUCTION PHASE:
POTENTIAL CONSTRUCTION DUST,
WASTE AND WATER ENTERING THE STREAM

LR2在施工程段和營運階段的影響：
失去了1棵現存的樹木和植物
IMPACT ON LR2 DURING CONSTRUCTION
PHASE AND OPERATION PHASE:
LOSE OF 1 NO. OF EXISTING TREE
AND VEGETATION

擬建井欄樹污水泵房500米研究範圍
500m STUDY AREA FROM THE PROPOSED
TSENG LAN SHUE SEWAGE
PUMPING STATION

圖例
LEGEND:

- 工程項目地點 (污水泵房)
PROJECT SITE (SPS)
- 研究範圍
STUDY AREA
- 農業用地
AGRICULTURAL LAND
- 已發展範圍
DEVELOPED AREA
- 灌叢帶/草原
SHRUBLAND/GRASSLAND
- 溪澗
WATERCOURSE
- 林地
WOODLAND

圖例
LEGEND:

- 鳥類 BIRD
 - 灰卷尾
ASHY DRONGO
 - 黑鳶
BLACK KITE
 - 夜鷺
BLACK-CROWNED NIGHT HERON
 - 畫眉
CHINESE HWAMEI
 - 灰喉山椒鳥
GREY-CHINNED MINIVET
 - 小白鷺
LITTLE EGRET
- 蝴蝶 BUTTERFLY
 - 薑弄蝶
GRASS DEMON
- 蜻蜓 DRAGONFLY
 - 紅翅蜻
RUBY DARTER
- 魚類 FISH
 - 異鱸
PREDACEOUS CHUB
- 兩棲類 AMPHIBIAN
 - 香港瘰螈
HONG KONG NEWT
- 植物 FLORA
 - 刺砂椏
ALSOPHILA SPINULOSA
 - 土沉香
AQUILARIA SINENSIS
 - 香港鷹爪花
ARTABOTRYS HONGKONGENSIS
 - 白桂木
ARTOCARPUS HYPARGYREUS
 - 金毛狗
CIBOTIUM BAROMETZ
 - 小果柿
DIOSPYROS VACCINOIDES
 - 香港大沙葉
PAVETTA HONGKONGENSIS
 - 紅杜鵑
RHODODENDRON SIMSII



溪澗 (人工化)
LCA3a - STREAM (CHANNELIZED)



溪澗 (半天然/天然)
LCA3b - STREAM (SEMI-NATURAL/NATURAL)



道路種植
LR4 - ROADSIDE PLANTING

Revision	Date	Description	Initial
	Designed	Checked	Drawn
Initial	MC	KW	SZ
Date	08/15	08/15	08/15

Contract no.
CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
景觀影響示意圖
LANDSCAPE IMPACT PLAN

Drawing no.
圖二十二
FIGURE 22

Scale
A1 1 : 2500
A3 1 : 5000

香港特別行政區政府渠務署
THE GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

APPENDIX A
Consideration of Alternatives & Sequence of Excavation Works

APPENDIX A

TABLE A1 – Comparison of Site Selection for Tseng Lan Shue Sewage Pumping Station

Site	Environmental Considerations	Engineering Considerations	Land Matters / Stakeholder Consultation	Recommendations
Site 1	<p>Pros</p> <ul style="list-style-type: none"> - Located on abandoned agricultural land of low ecological value - Very few village houses nearby - Minimal tree felling <p>Cons</p> <ul style="list-style-type: none"> - Adjacent to semi-natural stream 	<p>Pros</p> <ul style="list-style-type: none"> - Located at a low level <p>Cons</p> <ul style="list-style-type: none"> - Not accessible by public road 	<p>Pros</p> <ul style="list-style-type: none"> - Vacant land - Supported by village representative (VR) - Gazetted and authorized under Roads (Works, Use and Compensation) Ordinance (Cap.370) <p>Cons</p> <ul style="list-style-type: none"> - Nil 	<p>The site is located at a low level to facilitate the conveyance of the collected sewage by gravity sewers. It is currently an abandoned agricultural land covered with common species of vegetation. No objections were raised by the VR. The sewerage scheme was authorized under Cap.370 in June 2014.</p> <p>This option is therefore <u>recommended</u>.</p>
Site 2	<p>Pros</p> <ul style="list-style-type: none"> - Located on developed land of very low ecological value - Very few village houses nearby - Adjacent to concrete channel - No trees affected <p>Cons</p> <ul style="list-style-type: none"> - Nil 	<p>Pros</p> <ul style="list-style-type: none"> - Accessible by public road <p>Cons</p> <ul style="list-style-type: none"> - Located at a higher level, deeper inlet (10m) need to be constructed - Higher construction cost - Deep excavation in the village not feasible due to narrow alley - Insufficient space for the construction of the deep sewers and manholes at the existing narrow alley 	<p>Pro</p> <ul style="list-style-type: none"> - Nil <p>Cons</p> <ul style="list-style-type: none"> - Private lot which is a piece of land owned by Tso Tong (祖堂地) - Used as car parking by villagers - Car park need to be re-provided - VR does not support the construction of pumping station in front of a shrine 	<p>Although the site is easily accessible from public road, the site is located at a high elevation. Deeper underground structures and deeper sewers in the village will need to be constructed. The site involves resumption of a piece of private lot, which is a piece of land owned by Tso Tong (祖堂地), and owned by more than 100 people. According to VR, there is potential development at that piece of land. In addition, VR does not support the construction of pumping station in front of a nearby shrine.</p> <p>To conclude, this option is considered technically infeasible and not cost-effective, therefore, this option is not recommended.</p>
Site 3	<p>Pros</p> <ul style="list-style-type: none"> - Located on developed land of very low ecological value - Very few village houses nearby - Away from natural section of stream - No trees affected <p>Cons</p> <ul style="list-style-type: none"> - Nil 	<p>Pros</p> <ul style="list-style-type: none"> - Accessible by public road <p>Cons</p> <ul style="list-style-type: none"> - Located at a higher level, much deeper inlet (11m) need to be constructed - Deep excavation in the village not feasible due to narrow alley - Insufficient space for the construction of the deep sewers and manholes at the existing narrow alley - Existing drainage channel need to be re-provided - Higher construction cost 	<p>Pros</p> <ul style="list-style-type: none"> - Used as car parking by villagers <p>Cons</p> <ul style="list-style-type: none"> - Car park need to be re-provided - Not supported by VR 	<p>The site is easily accessible from public road, but is located at a high elevation. Deeper underground structures and deeper sewers in the village will need to be constructed. It is currently a developed area used as car parking by the villagers.</p> <p>To conclude, this option is considered technically infeasible and not cost-effective, therefore, this option is not recommended.</p>

Site	Environmental Considerations	Engineering Considerations	Land Matters / Stakeholder Consultation	Recommendations
Site 4	<p>Pros</p> <ul style="list-style-type: none"> - Partly located on developed land of very low ecological value; partly located on plantation area of low ecological value - Away from natural section of stream <p>Cons</p> <ul style="list-style-type: none"> - The main Tseng Lan Shue village is located in close proximity - A number of trees will be need to be felled 	<p>Pros</p> <ul style="list-style-type: none"> - Accessible by public road <p>Cons</p> <ul style="list-style-type: none"> - Located at a higher level, much deep inlet (13m) need to be constructed - Existing slope affected - Deep excavation in the village not feasible due to narrow alley - Insufficient space for the construction of the deep sewers and manholes at the existing narrow alley - Lengthy tree felling application process needed - Higher construction cost 	<p>Pros</p> <ul style="list-style-type: none"> - Used as car parking by villagers <p>Cons</p> <ul style="list-style-type: none"> - Car park need to be re-provided - Not supported by VR 	<p>The site is easily accessible from public road, but is located at a high elevation. Deeper underground structures and deeper sewers in the village will need to be constructed. It is currently used as car parking by the villagers. A slope will be affected and tree felling is required.</p> <p>To conclude, this option is considered technically infeasible and not cost-effective, therefore, this option is not recommended.</p>
Site 5	<p>Pros</p> <ul style="list-style-type: none"> - Located on developed land of very low ecological value - Very few village houses nearby - No tree affected - Away from natural section of stream <p>Cons</p> <ul style="list-style-type: none"> - Nil 	<p>Pros</p> <ul style="list-style-type: none"> - Accessible by public road <p>Cons</p> <ul style="list-style-type: none"> - Located at a higher level, much deeper inlet (19m) need to be constructed - Deep excavation in the village not feasible due to narrow alley - Insufficient space for the construction of the deep sewers and manholes at the existing narrow alley - Higher construction cost 	<p>Pros</p> <ul style="list-style-type: none"> - Used as car parking by villagers <p>Cons</p> <ul style="list-style-type: none"> - Car park need to be re-provided - Not supported by VR 	<p>The site is easily accessible from public road, but is located at a high elevation. Deeper underground structures and deeper sewers in the village will need to be constructed. It is currently a developed area used as car parking by the villagers.</p> <p>To conclude, this option is considered technically infeasible and not cost-effective, therefore, this option is not recommended.</p>
Site 6	<p>Pros</p> <ul style="list-style-type: none"> - Located on abandoned agricultural land of low ecological value - Very few village houses nearby - No tree affected - Further away from Tseng Lan Shue stream <p>Cons</p> <ul style="list-style-type: none"> - Nil 	<p>Pros</p> <ul style="list-style-type: none"> - Located at a low level <p>Cons</p> <ul style="list-style-type: none"> - Not accessible by public road - Further away from public road - Additional 200m length of gravity sewer and rising main need to be constructed - Higher construction cost 	<p>Pros</p> <ul style="list-style-type: none"> - Vacant land <p>Cons</p> <ul style="list-style-type: none"> - Not supported by VR - Private lot 	<p>The site is located at a low level to facilitate the conveyance of the collected sewage by gravity sewers. It is also further away from Tseng Lan Shue stream. However, it is much further away from public road and poses difficulty during construction.</p> <p>To conclude, this option is considered technically infeasible and not cost-effective, therefore, this option is not recommended.</p>

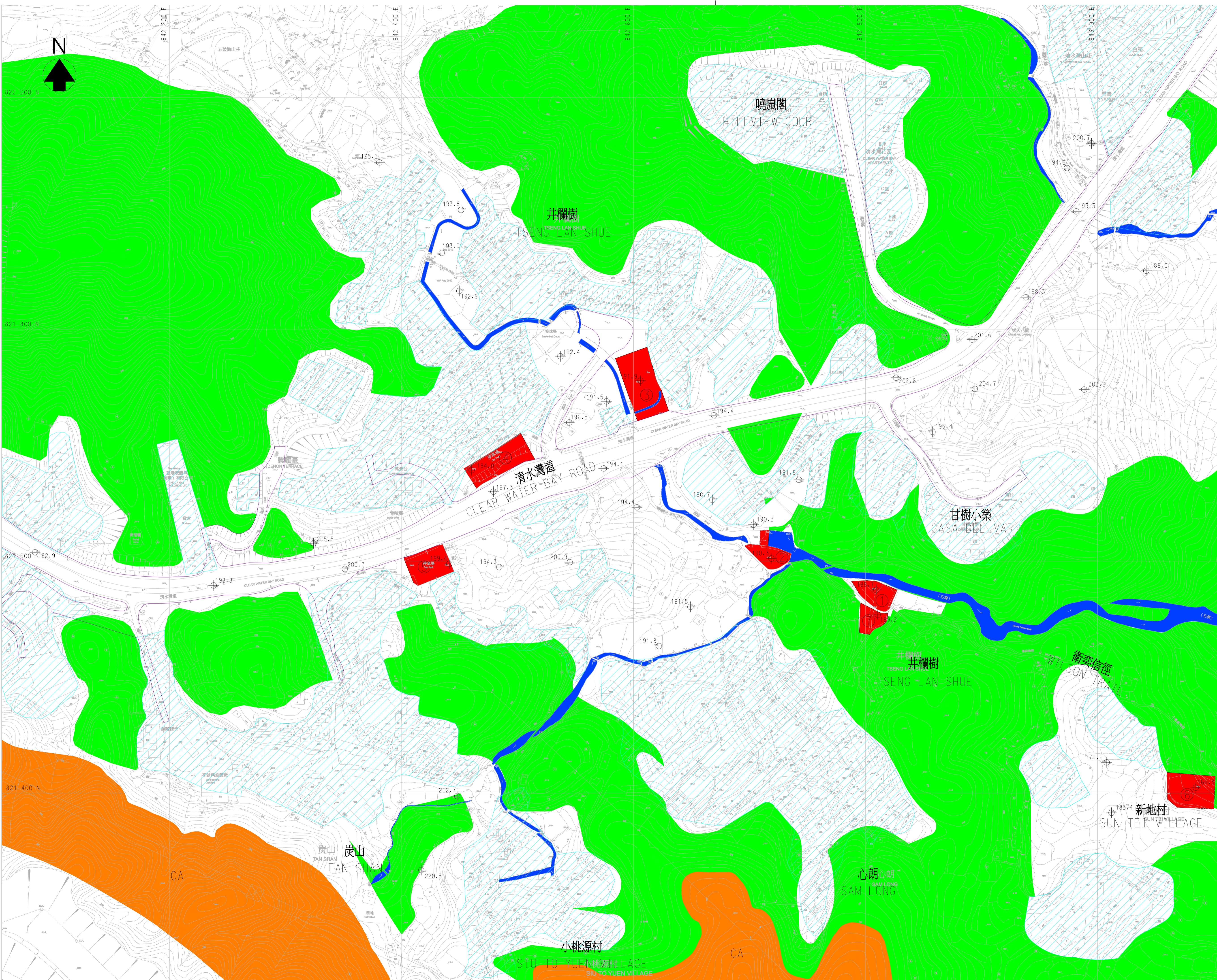
Site	Environmental Considerations	Engineering Considerations	Land Matters / Stakeholder Consultation	Recommendations
Site 7	<p>Pros</p> <ul style="list-style-type: none"> - Located on abandoned agricultural land of low ecological value - Further away from Tseng Lan Shue stream - Very few village houses nearby <p>Cons</p> <ul style="list-style-type: none"> - Some tree felling required - Possible encroachment into the woodland area is required 	<p>Pros</p> <ul style="list-style-type: none"> - Located at a low level <p>Cons</p> <ul style="list-style-type: none"> - Not accessible by public road - Village access road affected - Size of the site is not adequate for the pumping station, and further encroachment into the woodland area is required - Lengthy tree felling application process needed 	<p>Pros</p> <ul style="list-style-type: none"> - Nil <p>Cons</p> <ul style="list-style-type: none"> - Fenced vacant land requiring lengthy land resumption - Not supported by VR 	<p>The site is located at a low level to facilitate the conveyance of the collected sewage by gravity sewers. It is also further away from Tseng Lan Shue stream. However, part of the site has been fenced off by villagers. Land resumption will pose a major constraint. A village access road will be affected. Tree felling at woodland area may raise public concern.</p> <p>To conclude, this option is considered technically infeasible and not cost-effective, therefore, this option is not recommended.</p>

TABLE A2 – Photos of Potential Sites

		
<p>Site 1</p>	<p>Site 2</p>	<p>Site 3</p>
		
<p>Site 4</p>	<p>Site 5</p>	<p>Site 6</p>
		
<p>Site 7</p>		

圖例：
LEGEND :

-  已發展地區
BUILT UP AREAS
-  林木地
WOODED AREA
-  自然保育區
CONSERVATION AREA
-  污水泵房考慮位置
POTENTIAL SITES FOR SEWAGE PUMPING STATION
-  排水渠道/溪澗
DRAINAGE CHANNEL/STREAM



Revision	Date	Description	Initial
Initial	Designed	Checked	Drawn
Initial	MC	KSC	SZ
Initial	07/14	07/14	07/14

Approved

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
牛尾海污水收集系統
第二階段及第三階段
設計及建造
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
井欄樹污水泵房工程
— 選址限制圖
PROPOSED SEWAGE PUMPING
STATION AT TSENG LAN SHUE
— SITE SELECTION
CONSTRAINT MAP

Drawing no.	Revision
FIGURE A	—

Scale
A1 1 : 1500
A3 1 : 3000



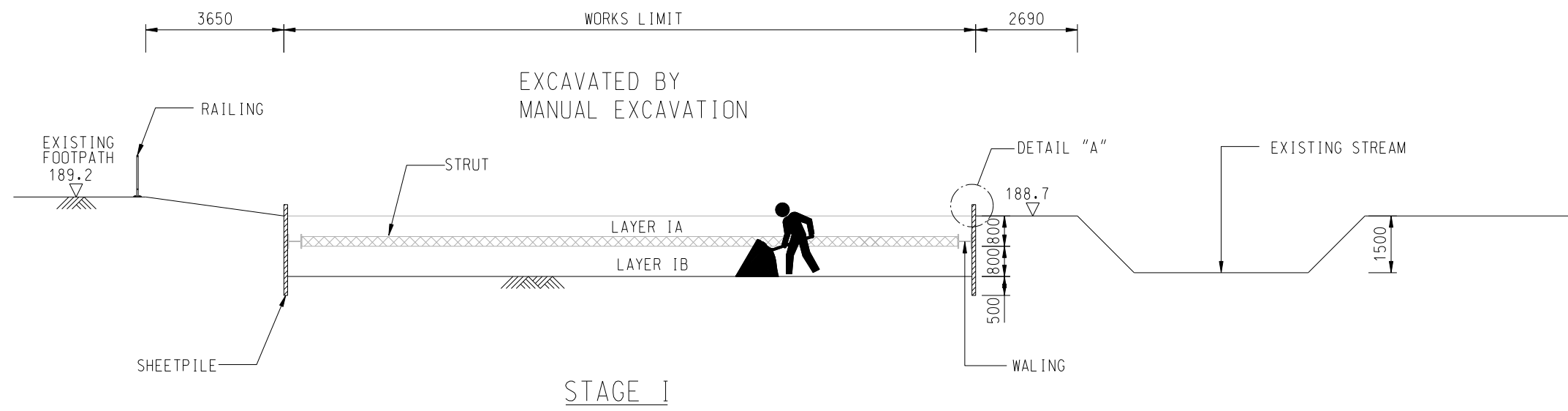


- NOTES:**
1. ALL LEVELS ARE IN METRES ABOVE P.D.H.K.
 2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
 3. GRID LINES ARE HONG KONG GRID 1980.
 4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER REFERANT CIVIL & E&M DRAWINGS.
 5. DETAILS OF LOCKABLE SLIDING GATE SHOULD BE DESIGNED AND SUBMITTED BY THE CONTRACTOR TO THE ENGINEER'S APPROVAL.
 6. THE CONTRACTOR SHALL DESIGN THE STEEL FENCE WALL FOR THE APPROVAL OF THE ENGINEER.

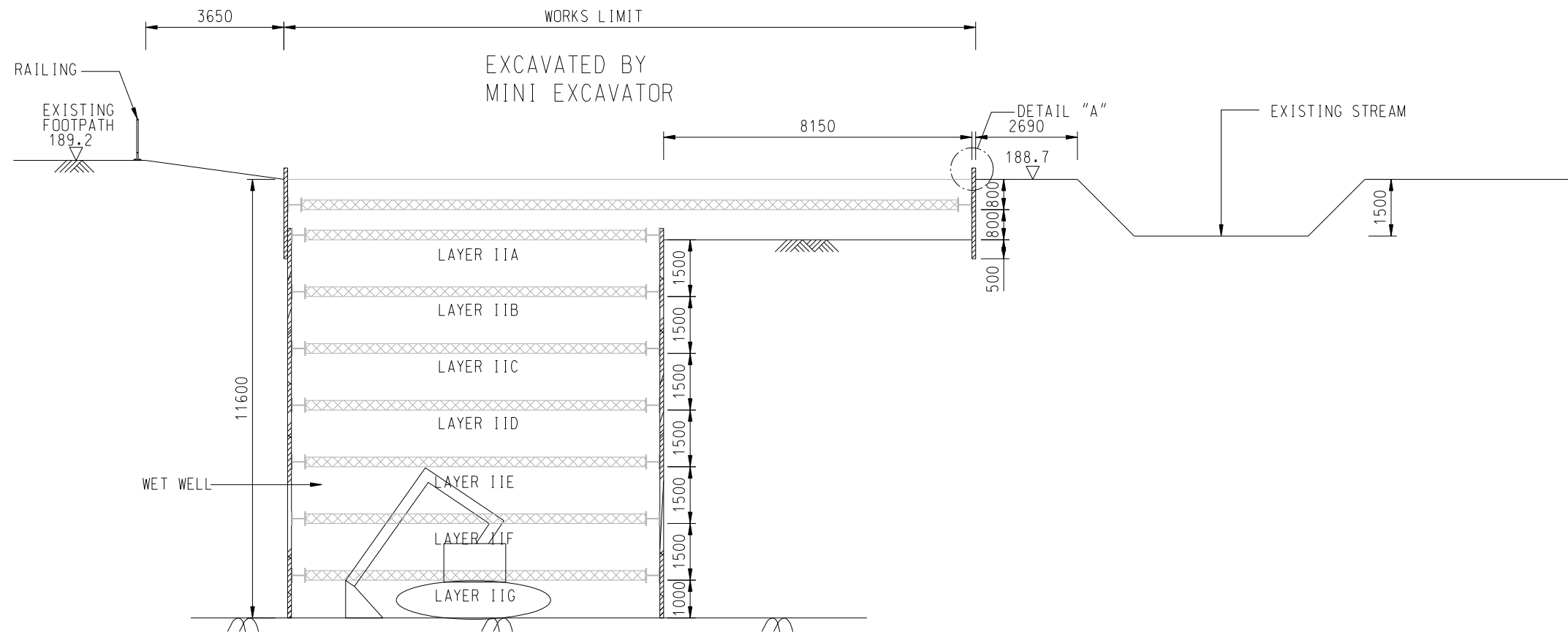
- LEGEND:**
- LOCKABLE SLIDING GATE
 - PROPOSED 225mm U-CHANNEL WITH CAST IRON GRATING IN 1:100 GRADIENT
 - STEEL FENCE WALL (REFER TO ARCHITECTURAL DRAWINGS FOR THE TYPES AND DETAILS)
 - PLANTING AREA FOR TREES / STRUBS
 - WET WELL

- ABBREVIATION:**
- VC : VITRIFIED CLAY
 - DI : DUCTILE IRON
- FOR MULTI-PIPES**
- 2 x 150 DI PIPE MATERIAL, PIPE SIZE (mm), NO. OF PIPES
 - 300 VC PIPE MATERIAL, PIPE SIZE (mm)
- VILLAGE FOOTPATH
 - PROPOSED MANHOLE
 - PROPOSED CATCHPIT
 - PROPOSED FINISH LEVEL (+108.05)
 - EXISTING LEVEL (+106.6)

<p>香港特別行政區政府渠務署 THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION DRAINAGE SERVICES DEPARTMENT</p>	Approved	Contract title	Sketch no. 209	
		PORT SHELTER SEWERAGE STAGE 2 AND STAGE 3 DESIGN AND CONSTRUCTION	Scale A3 1 : 200	
<p>BLACK & VEATCH HONG KONG LIMITED 博威工程顧問有限公司</p>	Contract no.	Drawing title	Prepared FW	Checked
	CE 65/2006 (DS)	TSENG LAN SHUE SEWERAGE PUMPING STATION LAYOUT PLAN	Date 02-4-2014	



STAGE I



STAGE II
SECTION A - A

- LEGEND:
- SHEET PILE
 - STRUT

香港特別行政區政府渠務署
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

Approved
PRELIMINARY

Contract title
**PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION**

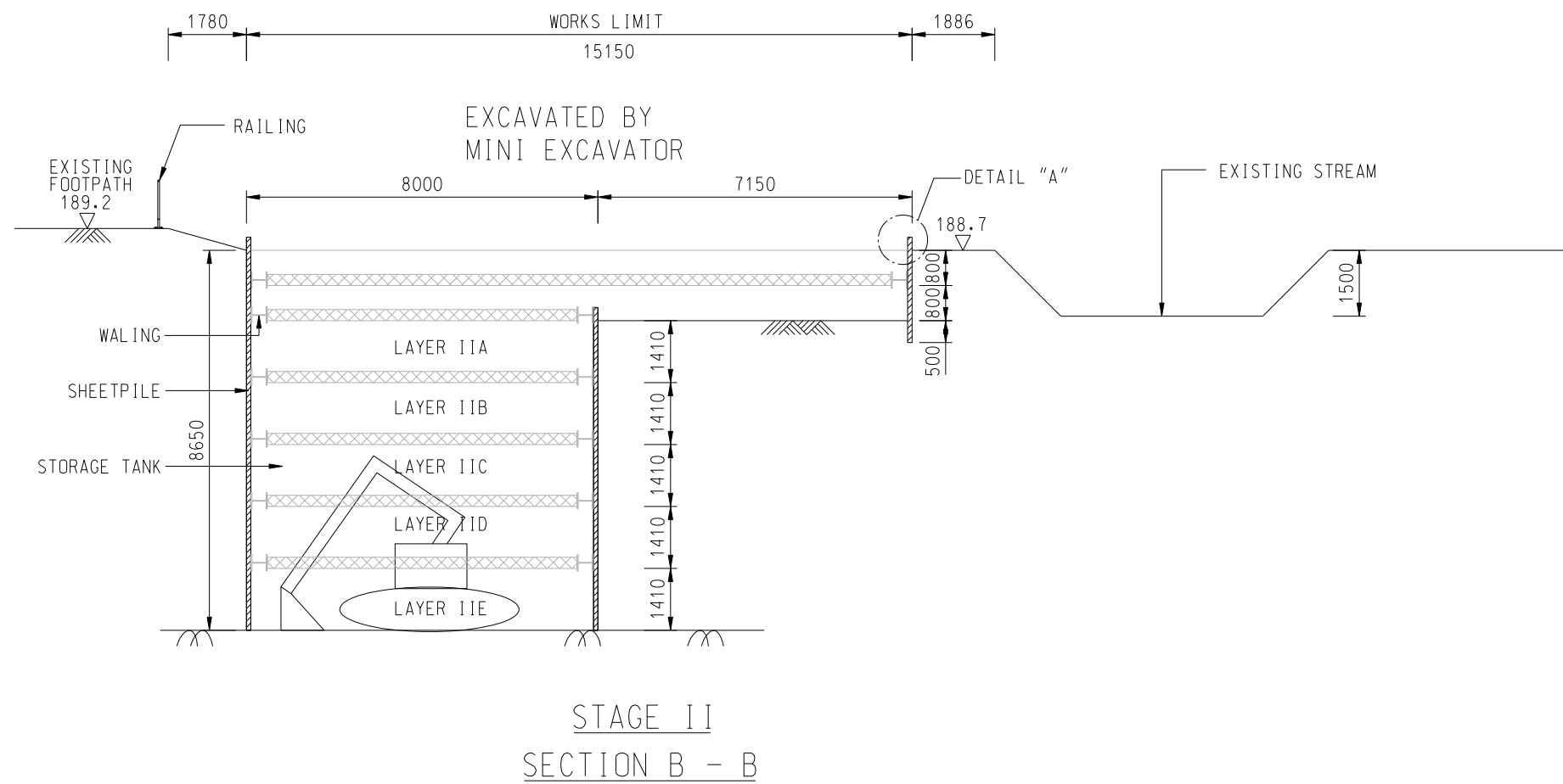
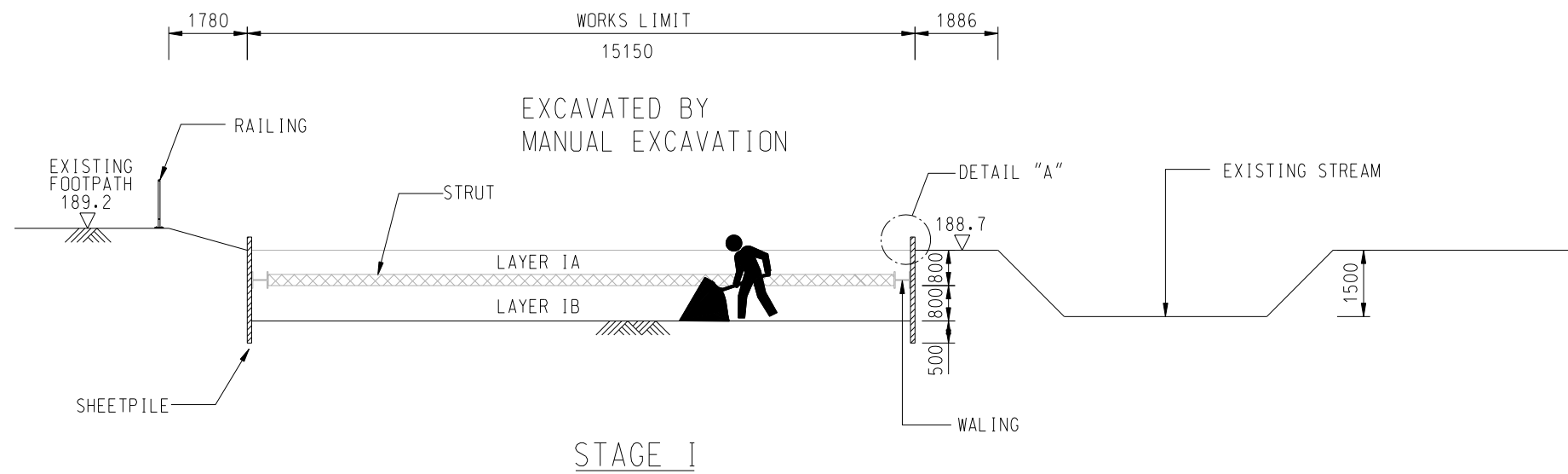
Sketch no. 210
Scale A3 1:150

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Contract no.
CE 65/2006 (DS)

Drawing title
**SEQUENCE OF CONSTRUCTION
OF PUMPING STATION
SECTION A - A**

Prepared FW	Checked KW
Date 4-6-2014	



LEGEND:

-  SHEET PILE
-  STRUT



Approved
PRELIMINARY

Contract title
**PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION**

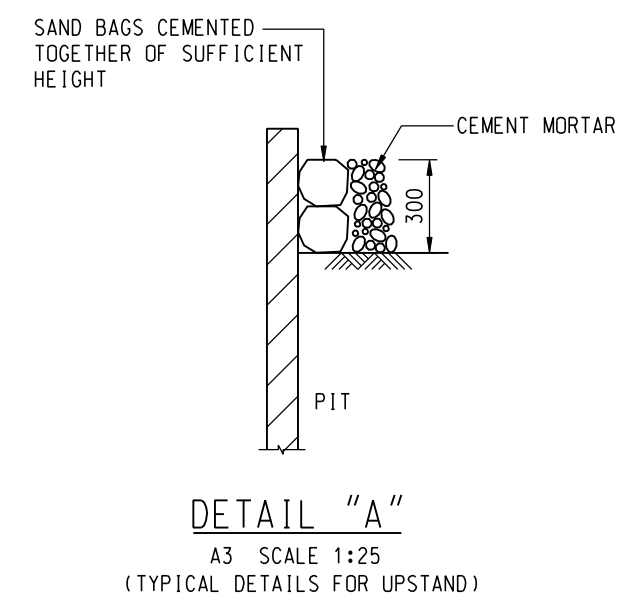
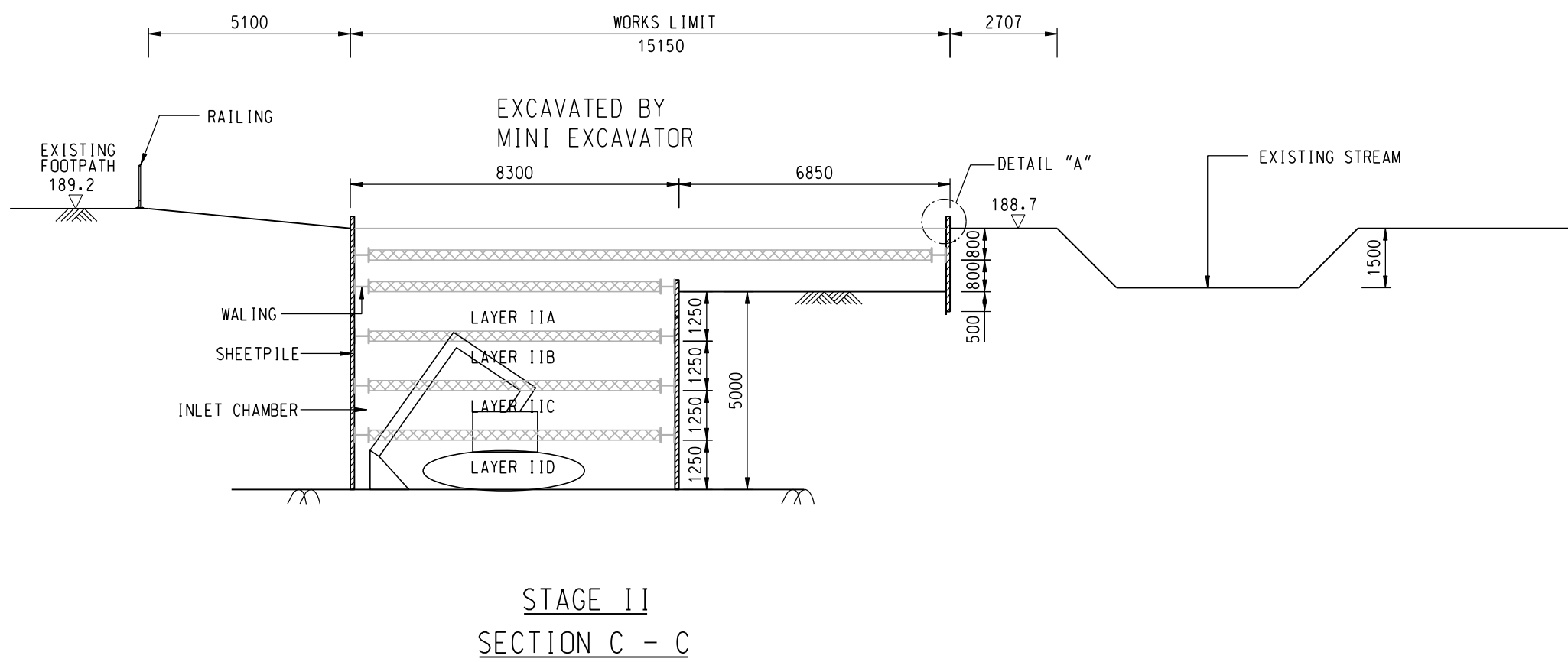
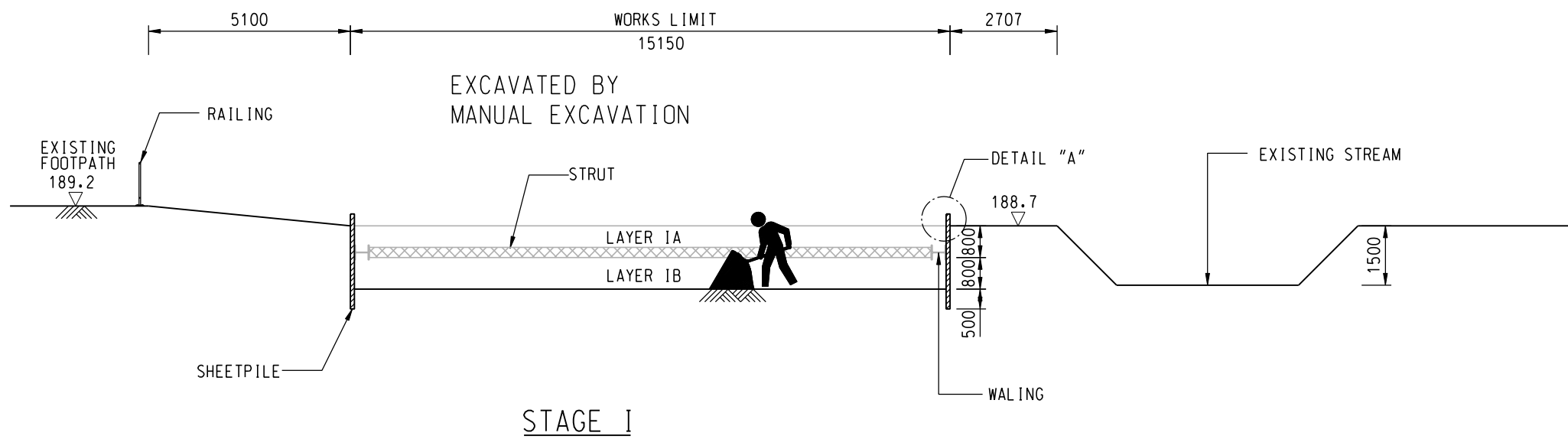
Sketch no. 211
Scale A3 1:150







Contract no.
CE 65/2006 (DS)

Drawing title
**SEQUENCE OF CONSTRUCTION
OF PUMPING STATION
SECTION A - A**

Prepared FW	Checked KW
Date 4-6-2014	



LEGEND:
 SHEET PILE
 STRUT

 香港特別行政區政府渠務署 THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION DRAINAGE SERVICES DEPARTMENT	Approved	Contract title		Sketch no.	
	PRELIMINARY	PORT SHELTER SEWERAGE STAGE 2 AND STAGE 3 DESIGN AND CONSTRUCTION		212	
 BLACK & VEATCH HONG KONG LIMITED 博威工程顧問有限公司	Contract no.	Drawing title		Prepared	Checked
	CE 65/2006 (DS)	SEQUENCE OF CONSTRUCTION OF PUMPING STATION SECTION A - A		FW	KW
				Date	
				4-6-2014	

APPENDIX B
Results of Ecological Survey

Figure B1. Locations of fauna survey transect (black dotted line) and freshwater aquatic assemblages sampling points (red triangles)

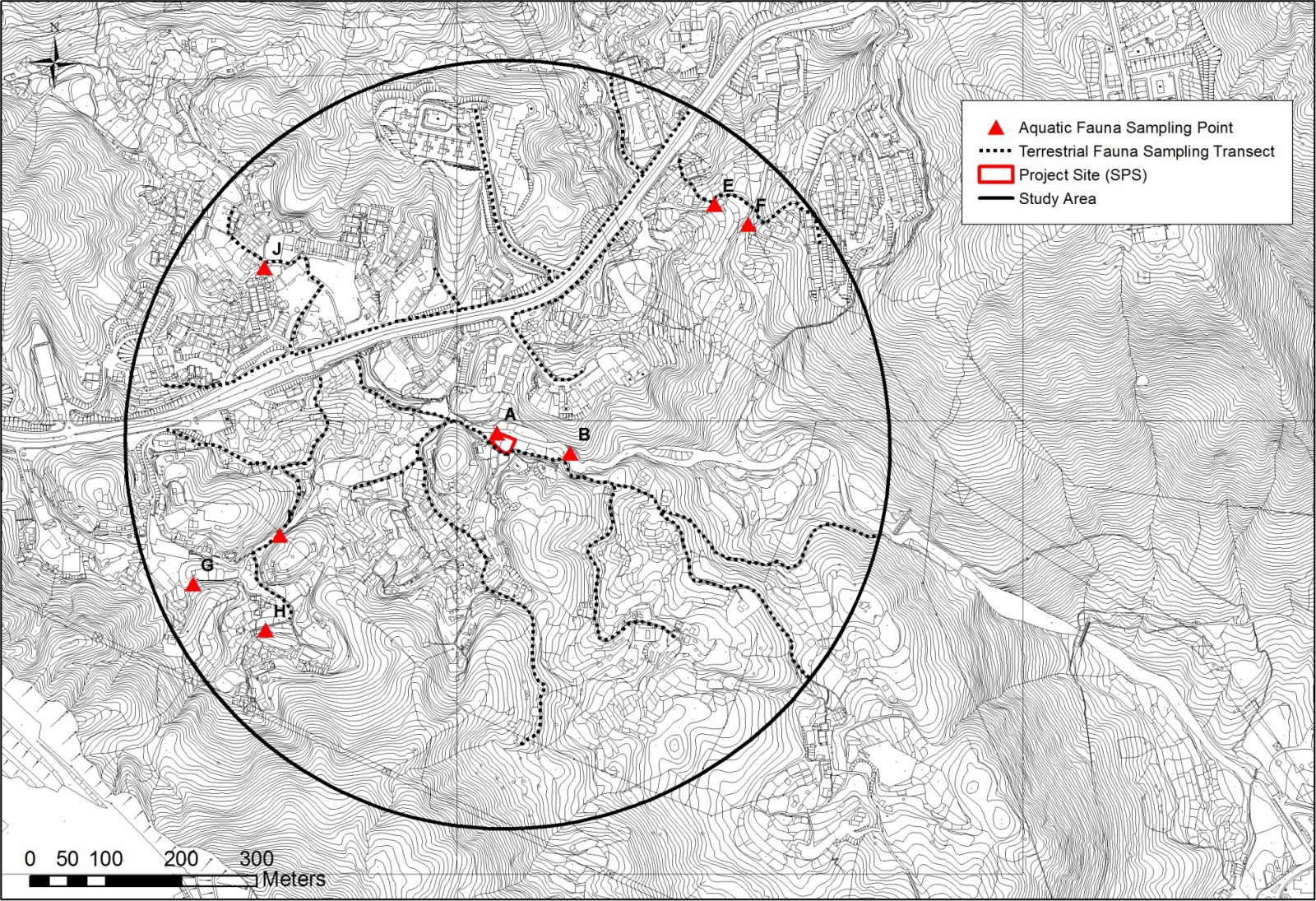


Figure B2 Photos of Habitats


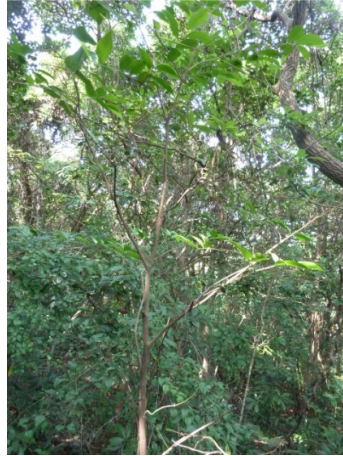
 A photograph showing a field of tall, green grasses and weeds, with a small stream or ditch in the foreground. The background shows a hillside with some buildings and power lines.	 A photograph of a lush green field with various plants and trees, situated in a valley with mountains in the background.	 A photograph of a dense forest with tall trees, a blue truck, and a car parked in a clearing.
Agricultural Land (abandoned)	Agricultural Land (active)	Woodland
 A photograph of a dense thicket of green shrubs and grasses, with trees visible in the background.	 A photograph of a narrow, shallow stream flowing through a dense forest, with a concrete bridge or railing on the left bank.	 A photograph of a concrete-lined watercourse or drainage channel, with a white car and a blue truck parked nearby.
Shrubland/Grassland	Watercourse (natural)	Watercourse (artificial)
 A photograph of a parking lot with several cars parked, surrounded by buildings and trees.	 A photograph of a grassy area with a concrete path and a green metal railing, with trees and buildings in the background.	 A photograph of a paved area with a concrete path, a green metal railing, and several cars parked nearby.
Developed Area	Project Site	Temporary Works Area

Figure B3 Photos of Selected Species of Conservation Importance



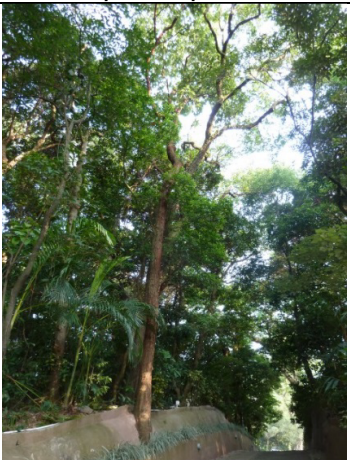
Alsophila spinulosa



Aquilaria sinensis



Artabotrys hongkongensis



Artocarpus hypargyreus



Cibotium barometz



Diospyros vaccinioides

Figure B3 Photos of Selected Species of Conservation Importance (Cont'd)



Little Egret



Hong Kong Newt



Grass Demon



Predaceous Chub

Table B1 Plant species recorded within the Study Area

Scientific Name	Common Name	中文名稱	Growth Form	Native/ Exotic	Study Area					Project Site
					WL	SG	WC	DA	AG	
<i>Acacia confusa</i>	Taiwan Acacia	台灣相思	Tree	Exotic	O			C		
<i>Acalypha wilkesiana</i>	Copper Leaf	紅桑	Shrub	Exotic				S	S	
<i>Acorus gramineus</i>	Grass-leaved Sweet Flag	金錢蒲	Herb	Native			C			
<i>Acronychia pedunculata</i>	Acronychia	山油柑	Tree	Native	C					
<i>Adiantum capillus-veneris</i>	Maidenhair	鐵線蕨	Herb	Native				S		
<i>Adiantum flabellulatum</i>	Fan-leaved Maidenhair	扇葉鐵線蕨	Herb	Native	O	O				
<i>Adina pilulifera</i>	Chinese Buttonbush	水團花	Tree	Native			O			
<i>Ageratum conyzoides</i>	Billygoat-weed	藿香薊	Herb	Exotic	S				S	S
<i>Aglaia odorata</i>	Mock Lime	米仔蘭	Shrub	Exotic				S		
<i>Aidia canthioides</i>	Mountain Wampi	香楠	Tree	Native	O		S			
<i>Alangium chinense</i>	Chinese Alangium	八角楓	Tree	Native	C					
<i>Allamanda cathartica</i>	Allamanda	軟枝黃蟬	Climber	Exotic				S		
<i>Allamanda schottii</i>	Small Allamanda	黃蟬	Shrub	Exotic				O		
<i>Alocasia macrorrhizos</i>	Giant Alocasia	海芋	Herb	native	C		C	O	O	O
<i>Alopecurus aequalis</i>	Short-awn Foxtail	看麥娘	Herb	native			S			
<i>Alpinia oblongifolia</i>	Chinese Galangal	華山薑	Herb	native	C					
<i>Alsophila spinulosa</i>	Spiny Tree-fern	刺桫欏	Fern	native	S					
<i>Alternanthera bettzickiana</i>	Calico-plant	錦繡莧	Herb	Exotic				S		
<i>Alternanthera philoxeroides</i>	Alligator-weed	空心莧	Herb	Exotic			O			
<i>Amaranthus viridis</i>	Green Amaranth	綠莧	Herb	native			C			
<i>Antidesma japonicum</i>	Dense-flowered China Laurel	日本五月茶	Tree	Native	S					
<i>Aporosa dioica</i>	Aporosa	銀柴	Tree	Native	C	C				
<i>Aquilaria sinensis</i>	Incense Tree	土沉香	Tree	Native	O					
<i>Araucaria heterophylla</i>	Norfolk Island Pine	異葉南洋杉	Tree	Exotic				S	S	
<i>Archidendron clypearia</i>	Monkey-pod	猴耳環	Tree	native		S				
<i>Archidendron lucidum</i>	Chinese Apea Ear-ring	亮葉猴耳環	Tree	native	O					
<i>Archontophoenix alexandrae</i>	Alexandra Palm	假檳榔	Tree	Exotic				O	O	
<i>Ardisia lindleyana</i>	Spotted Ardisia	山血丹	Shrub	native	S					
<i>Ardisia quinquegona</i>	Asiatic Ardisia	羅傘樹	Shrub	native	O					
<i>Artabotrys</i>	Hong Kong	香港鷹爪花	Climber	Native	S					

Scientific Name	Common Name	中文名稱	Growth Form	Native/ Exotic	Study Area					Project Site
					WL	SG	WC	DA	AG	
<i>hongkongensis</i>	Eagle's Claw									
<i>Artocarpus heterophyllus</i>	Jackfruit	菠蘿蜜	Tree	Exotic				S		
<i>Artocarpus hypargyreus</i>	Silver-back Artocarpus	白桂木	Tree	Native	O					
<i>Arundinella nepalensis</i>	Minireed	石芒草	Herb	Native		S				
<i>Asparagus cochinchinensis</i>	Wild Asparagus	天門冬	Herb	Native	S					
<i>Aster baccharoides</i>	-	白舌紫菀	Herb	Native		C				
<i>Averrhoa carambola</i>	Carambola	楊桃	Tree	Exotic	S			S		
<i>Bacopa monnieri</i>	Water Hyssop	假馬齒莧	Herb	Native			O			
<i>Bambusa spp.</i>	-	-	Herb	-	C				S	
<i>Bambusa ventricosa</i>	Buddha Bamboo	佛肚竹	Bamboo	Exotic				S		
<i>Bauhinia variegata</i>	Camel's Foot Tree	宮粉羊蹄甲	Tree	Exotic				O		
<i>Begonia cucullata var. hookeri</i>	Perpetual Begonia	四季秋海棠	Herb	Exotic				O		
<i>Bidens alba</i>	-	白花鬼針草	Herb	Exotic	C		C	C	C	S
<i>Blechnum orientale</i>	Oriental Blechnum	烏毛蕨	Herb	Native	C	O				
<i>Boehmeria nivea</i>	Ramie	苧麻	Shrub	Exotic	C		C	C	C	O
<i>Bombax ceiba</i>	Tree Cotton	木棉	Tree	Exotic				S		
<i>Bougainvillea spectabilis</i>	Brazil Bougainvillea	葉子花	Climber	Exotic				O		
<i>Breynia fruticosa</i>	Waxy Leaf	黑面神	Shrub	Native	O	S				
<i>Bridelia tomentosa</i>	Pop-gun Seed	土蜜樹	Shrub	Native			S			
<i>Byttneria grandifolia</i>	Spiny-fruited Vine	刺果藤	Climber	Native			S			
<i>Calliandra haematocephala</i>	Pink Powder Puff	朱纓花	Shrub	Exotic				S		
<i>Callipteris esculenta</i>	Freshy Lady-fern	菜蕨	Herb	Native			O			
<i>Canthium dicoccum</i>	Butulang Canthium	魚骨木	Tree	Native	O					
<i>Cardamine flexuosa</i>	Bitter Cress	彎曲碎米薺	Herb	Native			O			
<i>Carica papaya</i>	Papaya	番木瓜	Tree	Exotic	S			O	C	
<i>Carmona microphylla</i>	Fukien Tea	基及樹, 福建茶	Shrub	Exotic				S		
<i>Castanopsis fabri</i>	Faber's Chestnut	羅浮錐	Tree	Native	S					
<i>Castanopsis fissa</i>	Castanopsis	鰲菊錐	Tree	Native	S					
<i>Casuarina equisetifolia</i>	Horsetail Tree	木麻黃	Tree	Exotic				O		
<i>Cayratia corniculata</i>	Corniculate Cayratia	角花烏蕨莓	Climber	Native	O	S			S	S
<i>Celosia argentea</i>	Wild Coxcomb	青葙	Herb	Native				S		

Scientific Name	Common Name	中文名稱	Growth Form	Native/ Exotic	Study Area					Project Site
					WL	SG	WC	DA	AG	
<i>Celtis sinensis</i>	Chinese Hackberry	朴樹	Tree	Native	C					
<i>Centella asiatica</i>	Moneywort	積雪草	Herb	Native	O	S	S			
<i>Centotheca lappacea</i>	Common Centotheca	假淡竹葉	Herb	Native			O	O	S	S
<i>Chrysopogon aciculatus</i>	Wild Oat Grass	竹節草	Herb	Native		O				
<i>Cibotium barometz</i>	Lamb of Tartary	金毛狗	Herb	Native	O		S			
<i>Cinnamomum burmannii</i>	Batavia Cinnamon	陰香	Tree	Native	C					
<i>Cinnamomum parthenoxylon</i>	Yellow Cinnamomum	黃樟	Tree	Native	C	S				
<i>Citrus maxima</i>	Pummelo	柚	Tree	Exotic	S			O	O	
<i>Citrus reticulata</i>	Mandarin	柑橘	Tree	Exotic	S					
<i>Cleistocalyx nervosum</i>	Lidded Cleistocalyx	水翁	Tree	Native	O		C		S	
<i>Clerodendrum japonicum</i>	Pagoda Flower	楨桐	Shrub	Exotic	S			O		
<i>Codiaeum variegatum</i>	Garden Croton	變葉木	Shrub	Exotic				C		
<i>Colocasia esculenta</i>	Taro	芋	Herb	Native	S		O		O	S
<i>Commelina paludosa</i>	Big Bract Day-flower	大苞鴨跖草	Herb	Native			O			
<i>Commelina sp.</i>	-	-	Herb	-			O		S	S
<i>Conyza canadensis</i>	-	小蓬草, 小白酒草	Herb	Exotic				O		
<i>Cordyline fruticosa</i>	Iron Plant	朱蕉	Shrub	Exotic				S		
<i>Cratoxylum cochinchinense</i>	Yellow Cow Wood	黃牛木	Tree	native	C	O				
<i>Cryptocarya chinensis</i>	Chinese Cryptocarya	厚殼桂	Tree	Native	S					
<i>Cyclea hypoglauca</i>	-	粉葉輪環藤	Climber	Native	S					
<i>Cyclosorus parasiticus</i>	Wood-fern	華南毛蕨	Herb	Native	C		C		S	S
<i>Cymbopogon goeringii</i>	Goering's Lemongrass	橘草	Herb	Native		O				
<i>Cyperus involucratus</i>	Umbrella Plant	風車草	Herb	Exotic			O			
<i>Cyperus spp.</i>	-	-	Herb	-			O			
<i>Cyrtococcum patens</i>	-	弓果黍	Herb	Native					O	
<i>Daemonorops jenkinsiana</i>	Rattan Palm	黃藤	Climber	Native	S					
<i>Dalbergia benthamii</i>	Bentham's Rosewood	兩廣黃檀	Climber	Native	C		O			
<i>Daphniphyllum calycinum</i>	-	牛耳楓	Tree	Native	O	S				
<i>Delonix regia</i>	Flame Tree	鳳凰木	Tree	Exotic			S			
<i>Dendrocalamus pulverulentus</i>	Powdered Dendrocalamus	粉麻竹	Bamboo	Exotic				S		
<i>Desmodium heterocarpon</i>	False Groundnut	假地豆	Shrub	Native		O				

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<i>Desmodium heterophyllum</i>	Heterophyllous Tick Clover	異葉山蚂蝗	Herb	Native	O					
<i>Desmodium triflorum</i>	Three-flowered Beggarweed	三點金	Herb	Native		S				
<i>Desmos chinensis</i>	Desmos	假鷹爪	Shrub	Native	C					
<i>Dianella ensifolia</i>	Dianella	山菅蘭	Herb	Native	O	S				
<i>Dicliptera chinensis</i>	-	狗肝菜	Herb	Native	O		C			
<i>Dicranopteris pedata</i>	Dichotomy Forked Fern	芒萁	Herb	native	O	C				
<i>Dieffenbachia seguine</i>	Dieffenbachia	花葉萬年青	Herb	Exotic				S		
<i>Dillenia indica</i>	Elephant Apple	五椏果, 第倫桃	Tree	Exotic					S	
<i>Dimocarpus longan</i>	Longan	龍眼	Tree	Exotic	C				O	
<i>Diospyros eriantha</i>	Woolly-flowered Persimmon	烏柿	Tree	Native	S					
<i>Diospyros vaccinioides</i>	Small Persimmon	小果柿	Shrub	Native				S		
<i>Diplospora dubia</i>	Common Tricalysia	狗骨柴	Tree	native	O					
<i>Dracaena draco</i>	Dragon Tree	龍血樹	Tree	Exotic				S	S	
<i>Dracaena fragrans</i>	Fragrant Dragon Tree	巴西鐵樹	Shrub	Exotic	O			O		
<i>Dracaena reflexa</i> 'Variegata'	Song of India	分枝鐵樹	Shrub	Exotic					S	
<i>Drymaria cordata</i>	West-India Chickweed	荷蓮豆	Herb	Native			O			
<i>Duhaldea cappa</i>	Elecampane	羊耳菊	Herb	Native		O				
<i>Duranta erecta</i>	Golden Dewdrops	假連翹	Climber	Exotic				S		
<i>Dyopsis lutescens</i>	Bamboo Palm	散尾葵	Shrub	Exotic					S	O
<i>Eclipta prostrata</i>	Eclipta	鱧腸	Herb	Native			S			
<i>Elaeagnus loureirii</i>	-	雞柏紫藤, 羅氏胡頹子	Climber	Native		S				
<i>Elaeocarpus chinensis</i>	Chinese Elaeocarpus	中華杜英	Tree	Native	C	S				
<i>Elephantopus tomentosus</i>	-	白花地膽草	Herb	Native	S	S				
<i>Eleusine indica</i>	Goose Grass	牛筋草	Herb	Native	O				S	O
<i>Embelia laeta</i>	Twig-hanging Embelia	酸藤子	Climber	Native	O	O				
<i>Embelia ribes</i>	White-flowered Embelia	白花酸藤子	Climber	Native	S					
<i>Endospermum chinense</i>	Endospermum	黃桐	Tree	Native	C					
<i>Epipremnum aureum</i>	Ivy-arum	綠蘿	Climber	Exotic	C					
<i>Eranthemum pulchellum</i>	Blue Eranthemum	可愛花	Shrub	Exotic				S		

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<i>Eriobotrya japonica</i>	Loquat	枇杷	Tree	Exotic				O		
<i>Erythrina crista-galli</i>	Cockspur Coral Tree	雞冠刺桐	Tree	Exotic	S				S	O
<i>Eucalyptus citriodora</i>	Lemon-scented Gum	檸檬桉	Tree	Exotic				O		
<i>Eurya chinensis</i>	Chinese Eurya	米碎花	Shrub	Native		S				
<i>Eurya sp.</i>	-	-	Shrub	-	S					
<i>Excoecaria cochinchinensis</i>	Cochin-china Excoecaria	紅背桂	Shrub	Exotic				S		
<i>Ficus benjamina</i>	Weeping Fig	垂葉榕	Tree	Exotic	S			O		
<i>Ficus elastica</i>	India-rubber Tree	印度榕	Tree	Exotic	O		S	O		
<i>Ficus fistulosa</i>	Common Yellow Steg-fig	水同木	Tree	Native	O		O			
<i>Ficus formosana</i>	Taiwan Fig	台灣榕	Shrub	Native	S					
<i>Ficus hirta</i>	Hairy Fig	粗葉榕	Shrub	Native	C	O				
<i>Ficus hispida</i>	Opposite-leaved Fig	對葉榕	Shrub	Native	C		C		O	S
<i>Ficus microcarpa</i>	Chinese Banyan	榕樹	Tree	Native			S	O	S	
<i>Ficus pumila</i>	Creeping Fig	薜荔	Climber	Native	O			O	S	
<i>Ficus pyriformis</i>	Pear-fruit Fig	舶梨榕	Shrub	Native	S		S			
<i>Ficus subpisocarpa</i>	Japanese Superb Fig	筆管榕	Tree	Native			O	S		
<i>Ficus variegata var. chlorocarpa</i>	Common Red-stem Fig	青果榕	Tree	Native	C		S			
<i>Ficus variolosa</i>	Varied-leaf Fig	變葉榕	Tree	Native		S				
<i>Fittonia verschaffeltii var. argyroneura</i>	Snail Plant	白脈網紋草	Herb	Exotic				S		
<i>Garcinia oblongifolia</i>	Lingnan Garcinia	嶺南山竹子	Tree	Native	O					
<i>Garcinia subelliptica</i>	Common Garcinia	菲島福木	Tree	Exotic	S					
<i>Gardenia jasminoides</i>	Cape Jasmine	梔子	Shrub	Native	O	S				
<i>Glochidion eriocarpum</i>	Hairy-fruited Abacus Plant	毛果算盤子	Shrub	Native	O	S				
<i>Glochidion zeylanicum</i>	Hong Kong Abacus Plant	香港算盤子	Shrub	Native					S	
<i>Gnetum luofuense</i>	Luofushan Joint-fir	羅浮買麻藤	Climber	Native	O		S			
<i>Hedychium coronarium</i>	Ginger Lily	薑花	Herb	Exotic				S	O	
<i>Hedyotis acutangula</i>	Angle-stemmed Hedyotis	金草	Herb	Native	S					
<i>Hedyotis hedyotideae</i>	White Ox Creeper	牛白藤	Shrub	Native	O					
<i>Helicia cochinchinensis</i>	Cochin-china Helicia	小果山龍眼	Tree	Native	S					
<i>Hibiscus mutabilis</i>	Changeable Rose-mallow	木芙蓉	Shrub	Exotic				S		
<i>Hibiscus rosa-sinensis</i>	Chinese Hibiscus	朱槿	Shrub	Exotic	S			S		

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<i>Hibiscus sabdariffa</i>	Roselle	玫瑰茄	Shrub	Exotic					S	
<i>Hippeastrum vittatum</i>	Barbados Lily	花朱頂蘭	Herb	Exotic				O		
<i>Holmskioldia sanguinea</i>	Parasol-flower	冬紅花	Shrub	Exotic					S	
<i>Hydrilla verticillata</i>	Water-weed	黑藻	Herb	Exotic			O			
<i>Hylocereus undatus</i>	Night-blooming Cereus	量天尺	Herb	Exotic				S		
<i>Hymenocallis littoralis</i>	American Hymenocallis	水鬼蕉	Herb	Exotic				S		
<i>Hyophorbe lagenicaulis</i>	Bottle Palm	酒瓶椰子	Tree	Exotic				S		
<i>Ilex asprella</i>	Rough-leaved Holly	梅葉冬青	Shrub	Native	C	O				
<i>Ilex pubescens</i>	Downy Holly	毛冬青	Shrub	Native	C					
<i>Ilex rotunda</i>	Chinese Holly	鐵冬青	Tree	Exotic				S	S	
<i>Ipomoea cairica</i>	Gairo Morning Glory	五爪金龍	Climber	Exotic	O		O		C	O
<i>Ipomoea mauritiana</i>	Finger-leaved Morning Glory	七爪龍	Climber	Exotic				S		
<i>Ipomoea triloba</i>	-	三裂葉薯，三裂葉牽牛	Herb	Native				O		
<i>Ischaemum sp.</i>	-	-	Herb	-		O				
<i>Ixora chinensis</i>	Chinese Ixora	龍船花	Shrub	Native				S		
<i>Juniperus chinensis</i>	Chinese Juniper	圓柏, 檜	Tree	Exotic	O			O		
<i>Kyllinga nemoralis</i>	Uni-spike Kyllinga	單穗水蜈蚣	Herb	Native					O	
<i>Kyllinga polyphylla</i>	Aromatic Kyllinga	水蜈蚣	EE	Exotic			C	C	C	C
<i>Lablab purpureus</i>	Hyacinth-bean	扁豆	Herb	Exotic				O		
<i>Lagerstroemia indica</i>	Common Crape Myrtle	紫薇	Shrub	Exotic				S		
<i>Lantana camara</i>	Lantana	馬纓丹	Shrub	Exotic	O	O	O	C	O	S
<i>Lemmaphyllum microphyllum</i>	-	伏石蕨	Herb	Native	S				S	
<i>Leucaena leucocephala</i>	White Popinac	銀合歡	Tree	Exotic	O		S	S		
<i>Ligustrum sinense</i>	Chinese Privet	山指甲	Tree	Native	C		O	C		
<i>Lindernia crustacea</i>	Brittle False Pimpernel	母草	Herb	Native	O		O			
<i>Lindsaea orbiculata</i>	Orbicular Lindsaea	團葉鱗始蕨	Herb	Native			O			
<i>Liquidambar formosana</i>	Sweet Gum	楓香	Tree	Native				S		
<i>Liriope spicata</i>	Lily Turf	山麥冬	Herb	Native	C	S				
<i>Litchi chinensis</i>	Lychee	荔枝	Tree	Exotic	S					
<i>Litsea acutivena</i>	Sharp-veined Litsea	尖脈木薑子	Tree	Native	S	O				
<i>Litsea cubeba</i>	Fragrant Litsea	木薑子	Shrub	Native	S					

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<i>Litsea glutinosa</i>	Pond Spice	潺槁樹	Tree	Native	C		O			
<i>Litsea monopetala</i>	Persimmon-leaved Litsea	假柿木薑子	Tree	Native				S	S	S
<i>Livistona chinensis</i>	Chinese Fan-palm	蒲葵	Tree	Exotic	C	O				
<i>Lophatherum gracile</i>	Common Lophantherum	淡竹葉	Herb	Native	O	O	O			
<i>Lygodium japonicum</i>	Climbing Fern	海金沙	Herb	Native		S				
<i>Lygodium scandens</i>	Scansorial Climbing Fern	小葉海金沙	Herb	Native	O	S				
<i>Macaranga tanarius var. tomentosa</i>	Elephant's Ear	血桐	Tree	Native	C					S
<i>Machilus breviflora</i>	Short-flowered Machilus	短序潤楠	Tree	Native	O					
<i>Machilus chekiangensis</i>	Chekiang Machilus	浙江潤楠	Tree	Native	C	S				
<i>Machilus velutina</i>	Woolly Machilus	絨毛潤楠	Tree	Native	O					
<i>Maesa perlaris</i>	-	鯽魚膽	Shrub	Native	C					
<i>Mallotus paniculatus</i>	Turn-in-the-wind	白楸	Tree	Native	C	O			S	S
<i>Malvaviscus penduliflorus</i>	Turk's Cap	垂花懸鈴花	Shrub	Exotic	O				O	
<i>Melaleuca cajuputi subsp. cumingiana</i>	Paper-bark Tree	白千層	Tree	Exotic				C		
<i>Melastoma malabathricum</i>	Common Melastoma	野牡丹	Shrub	Native	S				S	
<i>Melastoma sanguineum</i>	Blood-red Melastoma	毛萼	Shrub	Native	O	O				
<i>Melicope pteleifolia</i>	Thin Evodia	密茱萸	Shrub	Native	O	S				
<i>Melinis repens</i>	Redtop	紅毛草	Herb	Exotic			S			
<i>Merremia sp.</i>	-	-	Climber	-					S	S
<i>Merremia tuberosa</i>	Wooden Rose	木玫瑰	Climber	Exotic				S		
<i>Michelia figo</i>	Banana Shrub	含笑	Shrub	Exotic				S		
<i>Michelia x alba</i>	White Jade Orchid Tree	白蘭	Tree	Exotic	S			S		
<i>Microstegium ciliatum</i>	Ciliate Microstegium	剛莠竹	Herb	Native	C	C	C	C	C	C
<i>Mikania micrantha</i>	Mile-a-minute Weed	薇甘菊	Herb	Exotic	O		O	O	C	C
<i>Millettia nitida</i>	Glittering-leaved Millettia	亮葉崖豆藤	Climber	Native	S					
<i>Miscanthus floridulus</i>	Many-flowered Silvergrass	五節芒	Herb	Native				O		
<i>Miscanthus sinensis</i>	Chinese Silvergrass	芒	Herb	Native		O			O	S
<i>Murraya paniculata</i>	Orange-jessamine	九里香	Tree	Exotic				S	O	
<i>Musa x paradisiaca</i>	Common Banana	大蕉	Herb	Exotic			S	O	C	
<i>Mussaenda pubescens</i>	Splash-of-white	玉葉金花	Climber	Native		S				

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<i>Neolitsea sp.</i>	-	-	Shrub	-	S					
<i>Ophiopogon jaburan</i>	Jaburan Lily-turf	花葉沿階草	Herb	Exotic	S					
<i>Ormosia semicastrata</i>	Soft-fruited Ormosia	軟莢紅豆	Tree	Native	S					
<i>Oxalis corniculata</i>	Sorrel	酢漿草	Herb	Native	O		O	C		O
<i>Oxalis debilis subsp. corymbosa</i>	Lavender Sorrel	紅花酢漿草	Herb	Exotic			O	O		O
<i>Paederia scandens var. tomentosa</i>	Tomentose Feervine	毛雞矢藤	Climber	Native	O					
<i>Pandanus sp.</i>	-	-	Shrub	-	S					
<i>Panicum maximum</i>	Guinea Grass	大黍	Herb	Exotic		O	O			
<i>Paspalum conjugatum</i>	Hilo Grass	兩耳草	Herb	Native					C	
<i>Passiflora foetida</i>	Passion Flower	龍珠果	Climber	Exotic					S	S
<i>Pavetta hongkongensis</i>	Hong Kong Pavetta	香港大沙葉	Shrub	Native	S					
<i>Pennisetum purpureum</i>	Napier Grass	象草	Herb	Exotic			O		C	
<i>Peperomia pellucida</i>	Clearweed	草胡椒	Herb	Exotic				S		
<i>Persicaria chinensis</i>	Chinese Knotweed	火炭母	Herb	Native	C	O	C	C	C	
<i>Persicaria perfoliata</i>	Spiny Knotweed	杠板歸	Herb	Native				O	C	
<i>Phoenix roebelenii</i>	Dwarf Date Palm	江邊刺葵, 日本葵	Tree	Exotic				S		
<i>Phyllanthus cochinchinensis</i>	Vietnam Leaf-flower	越南葉下珠	Shrub	Native	S					
<i>Phyllanthus emblica</i>	Myrobalan	餘甘子	Tree	Native	O					
<i>Phyllanthus urinaria</i>	Night-closing Leaf	葉下珠	Herb	Native	S					
<i>Phyllodium pulchellum</i>	Beautiful Phyllodium	排錢草	Shrub	Native		S				
<i>Pilea microphylla</i>	Artillery Clearweed	小葉冷水花	Herb	Exotic			O	O		
<i>Pinus elliottii</i>	Slash Pine	濕地松, 愛氏松	Tree	Exotic	S					
<i>Pittosporum tobira</i>	Pittosporum	海桐	Shrub	Exotic				S		
<i>Platyclusus orientalis</i>	Chinese Arborvitae	側柏	Tree	Exotic	S					
<i>Plumeria rubra</i>	Frangipani	雞蛋花	Tree	Exotic				S		
<i>Podocarpus macrophyllus</i>	Buddhist Pine	羅漢松	Tree	Native				O	O	
<i>Pogonatherum crinitum</i>	Golden-hair Grass	金絲草	Herb	Native			O			
<i>Pothos chinensis</i>	Rock Vine	石柑	Herb	Native	S					
<i>Pouzolzia zeylanica</i>	Ceylon Pouzolzia	霧水葛	Herb	Native	S					

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<i>Praxelis clematidea</i>	-	假臭草	Herb	Exotic		O	S	C	C	O
<i>Psychotria asiatica</i>	Wild Coffee	九節	Tree	Native	C	O				
<i>Psychotria serpens</i>	Creeping Psychotria	蔓九節	Climber	Native	O					
<i>Pteridium aquilinum var. latiusculum</i>	Bracken Fern	蕨	Herb	Native	S			S		
<i>Pteris biaurita</i>	Biauriculate Brake	狹眼鳳尾蕨	Herb	Native	O		S			
<i>Pteris ensiformis</i>	Sword Brake	劍葉鳳尾蕨	Herb	Native	S					
<i>Pteris semipinnata</i>	Semi-pinnated Brake	半邊旗	Herb	Native	C					
<i>Pteris vittata</i>	Ladder Brake	蜈蚣草	Herb	Native			O	C		
<i>Pterocypsela indica</i>	Wild Lettuce	翅果菊	Herb	Native			S	O		
<i>Pueraria phaseoloides</i>	Wild Kudzu Vine	三裂葉野葛	Climber	Native		O	S	O		
<i>Pyrrosia adnascens</i>	Tongue-fern	貼生石韋	Herb	Native			S		S	
<i>Reevesia thyrsoidea</i>	Reevesia	梭羅樹	Tree	Exotic	O					
<i>Rhaphiolepis indica</i>	Hong Kong Hawthorn	石斑木	Shrub	Native	O	O				
<i>Rhaphiolepis salicifolia</i>	Willow-leaved Rhaphiolepis	柳葉石斑木	Shrub	Native				O		
<i>Rhapis excelsa</i>	Lady Palm	棕竹	Shrub	Native				O		
<i>Rhododendron pulchrum</i>	Lovely Azalea	錦繡杜鵑	Shrub	Exotic				S		
<i>Rhododendron simsii</i>	Red Azalea	紅杜鵑	Shrub	Native	S					
<i>Rhodomyrtus tomentosa</i>	Rose Myrtle	桃金娘	Shrub	Native		C				
<i>Rhus succedanea</i>	Wax Tree	木蠟樹	Shrub	Native	C	O				
<i>Rhynchosia volubilis</i>	Rat's Eye Bean	鹿藿	Climber	Native		S				
<i>Rorippa indica</i>	-	蔞菜, 塘葛菜	Herb	Native			S			
<i>Rotala indica</i>	Indian Rotala	節節菜	Herb	Native			S			
<i>Rourea microphylla</i>	Little-leaved Rourea	小葉紅葉藤	Climber	Native	S					
<i>Roystonea regia</i>	Royal Palm	王棕	Tree	Exotic				S		
<i>Rubus leucanthus</i>	White-flowered Raspberry	白花懸鈎子	Climber	Native	S					
<i>Rubus reflexus</i>	Rusty-haired Raspberry	鏽毛莓	Climber	Native	O	S		S		
<i>Ruellia coerulea</i>	-	蘭花草	Herb	Exotic			O			
<i>Sageretia thea</i>	Hedge Sageretia	雀梅藤	Shrub	Native	O			S		
<i>Sanchezia parvibracteata</i>	-	小苞黃脈爵床	Shrub	Exotic				S	S	
<i>Sansevieria trifasciata</i>	Snake Plant	虎尾蘭	Herb	Exotic	S					
<i>Sarcandra glabra</i>	Sarcandra	草珊瑚	Shrub	Native	C	O				

Scientific Name	Common Name	中文名稱	Growth Form	Native/ Exotic	Study Area					Project Site
					WL	SG	WC	DA	AG	
<i>Schefflera heptaphylla</i>	Ivy Tree	鵝掌柴	Tree	Native	C	O				
<i>Schima superba</i>	Schima	木荷	Tree	Native	O					
<i>Scleria sp.</i>	-	-	Herb	-	S	S				
<i>Scoparia dulcis</i>	Sweet Broomwort	野甘草	Herb	Exotic				O		S
<i>Scutellaria indica</i>	Skullcap	韓信草	Herb	Native	S					
<i>Sechium edule</i>	Chayote	佛手瓜	Climber	Exotic				S		
<i>Selaginella sp.</i>	-	-	Herb	-	S					
<i>Selaginella uncinata</i>	Blue Selaginella	翠雲草	Herb	Native	S					
<i>Setaria palmifolia</i>	-	棕葉狗尾草	Herb	Native					S	S
<i>Siegesbeckia orientalis</i>	Shrimp Claw Plant	豨薟	Herb	Native	S			S		
<i>Smilax china</i>	Greenbrier	菝葜	Climber	Native		O				
<i>Smilax glabra</i>	Glabrous Greenbrier	土茯苓	Climber	Native		S				
<i>Solanum nigrum</i>	Black Nightshade	龍葵	Herb	Native					S	S
<i>Spilanthes paniculata</i>	Gold Button	金鈕扣	Herb	Native			C		O	O
<i>Sterculia lanceolata</i>	Lance-leaved Sterculia	假蘋婆	Tree	Native	C		C			
<i>Sterculia nobilis</i>	Common Sterculia	蘋婆	Tree	Exotic				S		
<i>Strophanthus divaricatus</i>	Goat Horns	羊角拗	Climber	Native	C					
<i>Symplocos cochinchinensis var. laurina</i>	Laurel Sweet-leaf	黃牛奶樹	Tree	Native	O	S				
<i>Symplocos glauca</i>	Glaucous Sweet-leaf	羊舌樹	Tree	Native	C	O				
<i>Syngonium podophyllum</i>	African Evergreen	合果芋	Herb	Exotic	C		S		S	S
<i>Syzygium hancei</i>	Hance's Syzygium	韓氏蒲桃	Tree	Native	C					
<i>Syzygium jambos</i>	Rose Apple	蒲桃	Tree	Exotic	O			O		
<i>Syzygium levinei</i>	Levine's Syzygium	山蒲桃	Tree	Native	C	S				
<i>Tadehagi triquetrum</i>	Triquetrous Tadehagi	葫蘆茶	Shrub	Native	S	S				
<i>Tetracera asiatica</i>	Sandpaper Vine	錫葉藤	Climber	Native	C	S				
<i>Tetradium glabrifolium</i>	Melia-leaved Evodia	棟葉吳茱萸	Tree	Native	S					
<i>Thunbergia erecta</i>	Bush Thunbergia	硬枝老鴉嘴	Shrub	Exotic					S	
<i>Torenia fournieri</i>	Blue Torenia	藍豬耳	Herb	Exotic				S		
<i>Tradescantia spathacea</i>	Oyster Plant	紫背萬年青	Herb	Exotic				O		
<i>Tradescantia zebrina</i>	Wandering Jew Zebrina	吊竹梅	Herb	Exotic			S			
<i>Tridax procumbens</i>	Tridax	羽芒菊	Herb	Exotic				O		

Scientific Name	Common Name	中文名稱	Growth Form	Native/ Exotic	Study Area					Project Site
					WL	SG	WC	DA	AG	
<i>Tylophora ovata</i>	Ovate Tylophora	娃兒藤	Climber	Native	S			S		
<i>Typhonium blumei</i>	Divaricate Typhonium	犁頭尖	Herb	Native					S	
<i>Ulmus parvifolia</i>	-	榔榆	Tree	Exotic					S	S
<i>Urena lobata</i>	Rose Mallow	肖梵天花	Herb	Native		S				
<i>Uvaria macrophylla</i>	Uvaria	紫玉盤	Climber	Native	C					
<i>Vernonia cinerea</i>	Iron-weed	夜香牛	Herb	Native	O			O	O	
<i>Viburnum odoratissimum</i>	Sweet Viburnum	珊瑚樹	Shrub	Native	O	S	S			
<i>Wedelia trilobata</i>	-	三裂葉蟛蜞菊	Herb	Exotic			S			
<i>Youngia japonica</i>	Hawk's Beard	黃鵪菜	Herb	Native	O					
<i>Zanthoxylum avicennae</i>	Prickly Ash	筍欖花椒, 筍欖	Tree	Native	C	S				
<i>Zanthoxylum nitidum</i>	Shiny-leaved Prickly Ash	兩面針	Climber	Native	O	S				
<i>Zingiber officinale</i>	Ginger	薑	Herb	Exotic					S	

Habitat: WL=Woodland, SG=Shrubland/Grassland, WC=Watercourse, DA=Developed Area, AG=Agricultural Land

Relative Abundance: C = common, O = occasional, S = scarce

Species in boldface = Species of conservation importance

Table B2 Mammal, Reptile and Amphibian recorded in the Study Area

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)				PS	Commonness / Distribution in Hong Kong ¹	Protection Status/ Conservation Status / Level of Concern ^{1 2}
			WL	WC	AG	DA			
Mammals									
Unidentifiable bat	-		+			+	-	All bats are protected under Cap 170	
Domestic Dog	<i>Canis lupus</i>	野狗	+			+	Common; Widely distributed in urban and countryside areas throughout Hong Kong		
Domestic Cat	<i>Felis catus</i>	野貓				+	Uncommon; Widely distributed in urban and countryside areas throughout Hong Kong		
Eurasian Wild Pig	<i>Sus scrofa</i>	野豬	*				Very Common; Very widely distributed in countryside areas throughout Hong Kong		
Reptiles									
Changeable Lizard	<i>Calotes versicolor</i>	變色樹蜥				+	Widely distributed throughout Hong Kong		
Red-necked Keelback	<i>Rhabdophis subminiatus</i>	紅脖游蛇				+	Widely distributed in woodlands throughout Hong Kong		
Chinese Gecko	<i>Gekko chinensis</i>	壁虎	+			+	Widely distributed throughout Hong Kong		
Bowring's Gecko	<i>Hemidactylus bowringii</i>	原尾蜥虎				+	Distributed throughout Hong Kong		
Slender Forest Skink	<i>Scincella modesta</i>	寧波滑蜥		+			Distributed in woodlands in a few scattered sites in the New Territories, on Lantau Island and Hong Kong Island		
Bamboo Snake	<i>Cryptelytrops albolabris</i>	白唇竹葉青	+				Distributed in shrubland, grassland throughout Hong Kong		
Amphibians									
Hong Kong Newt	<i>Paramesotriton hongkongensis</i>	香港瘰螈		++			Widely distributed in Hong Kong	WAPO; Fellowes <i>et al.</i> (2002): PGC	
Asian Common Toad	<i>Bufo melanostictus</i>	黑眶蟾蜍			+		Widely distributed in Hong Kong.		
Paddy Frog	<i>Fejervarya limnocharis</i>	澤蛙		+			Widely distributed throughout Hong Kong		
Gunther's Frog	<i>Rana guentheri</i>	沼蛙		+			Widely distributed throughout Hong Kong.		
Brown Tree Frog	<i>Polypedates megacephalus</i>	斑腿泛樹蛙	+				Widely distributed in mountain streams throughout New Territories, Lantau Island and Hong Kong Island.		

WL = woodland, WC = watercourse, AG = agricultural land, DA = developed area, PS = Project Site

+++ = frequent; ++ = occasional; + = scarce

* Digging signs

1: AFCD (2016), 2: Fellowes *et al.* (2002)

Table B3 Bird species recorded in the Study Area

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)					PS	Commonness & Distribution in Hong Kong ¹	Protection Status/ Conservation Status / Level of Concern ^{1 2 3 4}
			DA	AG	SG	WC	WL			
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	夜鷺				+		Common resident and winter visitor ; Widely distributed in Hong Kong.	Fellowes <i>et al.</i> (2002): (LC)	
Little Egret	<i>Egretta garzetta</i>	小白鷺				+		Common resident; Widely distributed in coastal area throughout Hong Kong.	Fellowes <i>et al.</i> (2002): PRC, (RC)	
Black Kite	<i>Milvus migrans</i>	黑鳶					+	Common resident and winter visitor; Widely distributed in Hong Kong.	Class 2 Protected Animal of China; Listed in Appendix 2 of CITES; Listed in Protection of Endangered Species of Animals and Plants Ordinance(Cap. 586); Fellowes <i>et al.</i> (2002): (RC)	
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	白胸苦惡鳥		+			+	Common resident; Widely distributed in wetland throughout Hong Kong.		
Domestic Pigeon	<i>Columba livia</i>	原鴿	+					Common resident; Widely distributed in urban area throughout Hong Kong.		
Oriental Turtle Dove	<i>Streptopelia orientalis</i>	山斑鳩					+	Common winter visitor and passage migrant; Widely distributed in Hong Kong.		
Spotted Dove	<i>Spilopelia chinensis</i>	珠頸斑鳩	+	+			+	Abundant resident; Widely distributed in Hong Kong.		
Asian Koel	<i>Eudynamys scolopaceus</i>	噪鵲					+	Common resident; Widely distributed in Hong Kong.		
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥					+	Common passage migrant and winter visitor; Widely distributed in wetland habitat throughout Hong Kong.		
Grey-chinned Minivet	<i>Pericrocotus solaris</i>	灰喉山椒鳥					++	Common in winter, scarce in summer; Found in Tai Po Kau, Shing Mun, Ho Chung, Kadoorie Farm and Botanic Garden, Tung Ping Chau.	Fellowes <i>et al.</i> (2002): LC	
Long-tailed Shrike	<i>Lanius schach</i>	棕背伯勞		+				Common resident; Widely distributed in open areas throughout Hong Kong.		
Black Drongo	<i>Dicrurus macrocercus</i>	黑卷尾			+		+	Common summer visitor; Widely distributed in open area throughout Hong Kong.		
Ashy Drongo	<i>Dicrurus leucophaeus</i>	灰卷尾		+				Scarce winter visitor; Found in Shing Mun, Tai Po Kau.		
Red-billed Blue Magpie	<i>Urocissa erythroryncha</i>	紅嘴藍鵲					+	Common resident; Widely distributed in woodland edges throughout Hong Kong		
Eurasian Magpie	<i>Pica pica</i>	喜鵲	+				+	Common resident; Widely distributed in Hong Kong		
Large-billed Crow	<i>Corvus macrorhynchos</i>	大嘴烏鴉		+			+	Common resident; Widely distributed in Hong Kong		
Cinereous Tit	<i>Parus cinereus</i>	蒼背山雀		+			++	Common resident; Widely distributed in Hong Kong		

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)					PS	Commonness & Distribution in Hong Kong ¹	Protection Status/ Conservation Status / Level of Concern ^{1 2 3 4}
			DA	AG	SG	WC	WL			
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	紅耳鶇		+			+		Abundant resident; Widely distributed in Hong Kong.	
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鶇	+	+	+		+++		Abundant resident; Widely distributed in Hong Kong.	
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅臀鶇	+	+	+		+		Uncommon resident; Widely distributed in open areas throughout Hong Kong.	
Chestnut Bulbul	<i>Hemixos castanonotus</i>	栗背短腳鶇					++		Common resident and winter visitor; Widely distributed in woodland throughout Hong Kong.	
Barn Swallow	<i>Hirundo rustica</i>	家燕	+	+					Abundant passage migrant and summer visitor; Widely distributed in Hong Kong.	
Dusky Warbler	<i>Phylloscopus fuscatus</i>	褐柳鶇		+			+	+	Common passage migrant and winter visitor; Widely distributed in shrubland and waterside vegetation throughout Hong Kong.	
Pallas's Leaf Warbler	<i>Phylloscopus proregulus</i>	黃腰柳鶇					+		Common winter visitor; Found in woodland throughout Hong Kong.	
Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	黃眉柳鶇		+	+		+		Common winter visitor; Found in woodland throughout Hong Kong.	
Arctic Warbler	<i>Phylloscopus borealis</i>	極北柳鶇					+		Common passage migrant; Widely distributed in woodland throughout Hong Kong.	
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	黃腹鷓鴣		+					Common resident; Widely distributed in Hong Kong	
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫葉鶇		+			+	+	Common resident; Widely distributed in Hong Kong	
Chinese Hwamei	<i>Garrulax canorus</i>	畫眉					+		Common resident; Widely distributed in hillside shrubland throughout Hong Kong.	Listed in Appendix 2 of CITES; Listed in Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)
Masked Laughingthrush	<i>Garrulax perspicillatus</i>	黑臉噪鶇		+	+		++		Abundant resident; Widely distributed in shrubland throughout Hong Kong.	
Japanese White-eye	<i>Zosterops japonicus</i>	暗綠繡眼鳥		+			+++		Abundant resident; Widely distributed in Hong Kong.	
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	+						Common resident; Widely distributed in Hong Kong	
Black-collared Starling	<i>Gracupica nigricollis</i>	黑領椋鳥	+						Common resident; Widely distributed in Hong Kong	
Grey-backed Thrush	<i>Turdus hortolorum</i>	灰背鶇					+		Common winter visitor; Widely distributed in woodland throughout Hong Kong.	
Oriental Magpie Robin	<i>Copsychus saularis</i>	鵲鶇		+			+		Abundant resident; Widely distributed in Hong Kong.	
Asian Brown	<i>Muscicapa</i>	北灰鶇	+						Common passage migrant and winter visitor;	

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)					PS	Commonness & Distribution in Hong Kong ¹	Protection Status/ Conservation Status / Level of Concern ^{1 2 3 4}
			DA	AG	SG	WC	WL			
Flycatcher	<i>latirostris</i>								Widely distributed in Hong Kong.	
Blue Whistling Thrush	<i>Myophonus caeruleus</i>	紫嘯鶇				+	+		Common resident; Widely distributed in shrubland and woodland throughout Hong Kong.	
Daurian Redstart	<i>Phoenicurus auroreus</i>	北紅尾鶇					+		Common winter visitor; Widely distributed in Hong Kong.	
Fork-tailed Sunbird	<i>Aethopyga christinae</i>	叉尾太陽鳥					+		Common resident; Widely distributed in Hong Kong	
Eurasian Tree Sparrow	<i>Passer montanus</i>	樹麻雀	++	+					Abundant resident; Widely distributed in Hong Kong.	
White-rumped Munia	<i>Lonchura striata</i>	白腰文鳥	+						Common resident; Widely distributed in Hong Kong	
Scaly-breasted Munia	<i>Lonchura punctulata</i>	斑文鳥		++					Common resident; Widely distributed in Hong Kong	
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇鶇					+		Common passage migrant and winter visitor; Widely distributed in hill streams throughout Hong Kong.	
White Wagtail	<i>Motacilla alba</i>	白鶇鶇	+				+	+	Common passage migrant and winter visitor; Widely distributed in Hong Kong.	

WL = woodland, WC = watercourse, AG = agricultural land, DA = developed area, SG = shrubland/grassland, PS = Project Site

1: AFCD (2016), 2: Wang (1998), 3: Zhao (1998), 4: IUCN (2016)

Level of concern: LC = local concern, PRC = potential regional concern, RC = regional concern, GC = global concern; Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence (Fellowes *et al.*, 2002)

Table B4 Dragonfly recorded in the Study Area

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)					Project Site	Commonness & Distribution in Hong Kong ¹
			DA	AG	SG	WC	WL		
Orange-tailed Midget	<i>Agriocnemis femina</i>	杯斑小蟳		+					Abundant; Widely distribute in disused paddy fields, marshes, ditches and ponds
Wandering Midget	<i>Agriocnemis pygmaea</i>	黃尾小蟳		+					Common; Widely distribute in marshes and weedy margins of ponds throughout Hong Kong
Orange-tailed Sprite	<i>Ceriagrion auranticum</i>	琉球橘黃蟳		+					Abundant; Widely distribute in ponds and marshes throughout Hong Kong
Common Bluetail	<i>Ischnura senegalensis</i>	褐斑異痣蟳					+	+	Abundant; Widely distribute in all wetland habitats except fast flowing rivers throughout Hong Kong
Pale-spotted Emperor	<i>Anax guttatus</i>	斑偉蜓					+		Common; Widely distribute in ponds and sluggish streams throughout Hong Kong
Asian	<i>Brachythemis</i>	黃翅蜻					+		Abundant;

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)					Project Site	Commonness & Distribution in Hong Kong ¹
			DA	AG	SG	WC	WL		
Amberwing	<i>contaminata</i>								Widely distribute in weedy ponds and sluggish streams
Blue Percher	<i>Diplacodes trivialis</i>	紋藍小蜻		+					Abundant; Widespread, especially in late summer, when it can be found almost everywhere in Hong Kong
Red-faced Skimmer	<i>Orthetrum chrysis</i>	華麗灰蜻				+	+	+	Abundant; Widely distribute in pools and marshy areas adjacent to flowing streams throughout Hong Kong.
Common Blue Skimmer	<i>Orthetrum glaucum</i>	黑尾灰蜻		+		+			Abundant; Widely distributed in streams, conduits, drainage channels, seepages and road gutters throughout Hong Kong.
Marsh Skimmer	<i>Orthetrum luzonicum</i>	呂宋灰蜻		+					Abundant; Widely distributed in abandoned paddies, marshy swampy and boggy locations
Common Red Skimmer	<i>Orthetrum pruinosum</i>	赤褐灰蜻				+			Abundant; Widely distribute in slow streams, ponds, rain puddles and irrigation conduits
Green Skimmer	<i>Orthetrum sabina</i>	狹腹灰蜻				+			Abundant; Widely distribute in all wetland habitats throughout Hong Kong
Wandering Glider	<i>Pantala flavescens</i>	黃蜻	+	+		+	+		Abundant; Widely distribute in all wetland habitats throughout Hong Kong
Ruby Darter *	<i>Rhodothemis rufa</i>	紅胭蜻				+			Common; Widely distribute in ponds and marshes throughout Hong Kong
Variiegated Flutterer	<i>Rhyothemis variegata</i>	斑麗翅蜻					+		Common; Widely distribute in marshes, ponds and tanks throughout Hong Kong
Crimson Dropwing	<i>Trithemis aurora</i>	曉褐蜻				++			Abundant; Widely distribute in marshes, ponds, streams and ornamental ponds throughout Hong Kong
Indigo Dropwing	<i>Trithemis festiva</i>	慶褐蜻				+	+		Abundant; Widely distribute in sluggish streams with strong current throughout Hong Kong

WL = woodland, WC = watercourse, AG = agricultural land, DA = developed area, SG = shrubland/grassland

+++ = frequent; ++ = occasional; + = scarce

1: AFCD (2016) * considered as local concern (Fellows *et al.* 2002)

Table B5 Butterfly recorded in the Study Area

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)					PS	Commonness & Distribution in Hong Kong ¹
			DA	AG	SG	WC	WL		
Forest Hopper	<i>Astictopterus jama</i>	脛翅弄蝶		+			+		Common; Widely distributed throughout the grassland in Hong Kong
Banana Skipper	<i>Erionota torus</i>	黃斑蕉弄蝶					+		Uncommon; Widely distributed in agricultural field throughout Hong Kong
Common	<i>Parnara</i>	直紋稻弄蝶					+		Common;

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)					PS	Commonness & Distribution in Hong Kong ¹
			DA	AG	SG	WC	WL		
Straight Swift	<i>guttata</i>								Widely distributed in grassland throughout Hong Kong
Little Branded Swift	<i>Pelopidas agna</i>	南亞穀弄蝶					+		Common; Widely distributed in grassland throughout Hong Kong
Grass Demon	<i>Udaspes folus</i>	薑弄蝶		+					Rare; Widely distributed in agricultural field throughout Hong Kong
Common Hedge Blue	<i>Acytolepis puspa</i>	鈕灰蝶				+		+	Common; Widely distributed throughout Hong Kong
Lime Blue	<i>Chilades lajus</i>	紫灰蝶		+					Common; Widely distributed throughout Hong Kong
Pale Grass Blue	<i>Pseudozizeeria maha</i>	酢漿灰蝶	+	+			+	+	Very common; Widely distributed throughout Hong Kong
Dark Grass Blue	<i>Zizeeria karsandra</i>	吉灰蝶		+			+		Uncommon; High Junk Peak, Kat O, Po Toi Island, Shek Mun Kap, Lai Chi Wo, Yung Shue O
Plum Judy	<i>Abisara echerius</i>	蛇目褐蛺蝶		+					Very common; Widely distributed throughout Hong Kong
Punchinello	<i>Zemeros flegyas</i>	波蛺蝶		+				+	Common; Widely distributed throughout Hong Kong
Common Tiger	<i>Danaus genutia</i>	虎斑蝶		+				+	Common; Widely distributed throughout Hong Kong
Common Indian Crow	<i>Euploea core</i>	幻紫斑蝶						+	Common; Widely distributed throughout Hong Kong
Blue-spotted Crow	<i>Euploea midamus</i>	藍點紫斑蝶			+				Very common; Widely distributed throughout Hong Kong
Ceylon Blue Glassy Tiger	<i>Ideopsis similis</i>	擬旖斑蝶						+	Very common; Widely distributed throughout Hong Kong
Glassy Tiger	<i>Parantica aglea</i>	絹斑蝶				+			Common; Widely distributed throughout Hong Kong
Indian Fritillary	<i>Argyreus hyperbius</i>	斐豹蛺蝶						+	Common; Widely distributed throughout Hong Kong.
Large Faun	<i>Faunis eumeus</i>	串珠環蝶						+	Common; Widely distributed in woodland throughout Hong Kong.
Great Egg-fly	<i>Hypolimnas bolina</i>	幻紫斑蛺蝶						+	Common; Widely distributed throughout Hong Kong
Peacock Pansy	<i>Junonia almana</i>	美眼蛺蝶						+	Common; Widely distributed in abandoned grassland and abandoned agricultural field throughout Hong Kong
Dark Brand Bush Brown	<i>Mycalesis mineus</i>	小眉眼蝶		+				+	Very common; Widely distributed in woodland throughout Hong Kong
South China Bush Brown	<i>Mycalesis zonata</i>	平頂眉眼蝶		+					Common; Widely distributed in woodland throughout Hong Kong.

Common Names	Scientific Names	中文名稱	Study Area (excluding Project Site)					PS	Commonness & Distribution in Hong Kong ¹
			DA	AG	SG	WC	WL		
Dark Evening Brown	<i>Melanitis phedima</i>	睇暮眼蝶					+		Uncommon; Widely distributed in woodland throughout Hong Kong.
Common Five-ring	<i>Ypthima baldus</i>	矚眼蝶		+	+	+	+	+	Very common; Widely distributed in grassland throughout Hong Kong
Straight Five-ring	<i>Ypthima lisandra</i>	黎桑矚眼蝶		+			+		Common; Widely distributed throughout Hong Kong
Tailed Jay	<i>Graphium agamemnon</i>	統帥青鳳蝶					+		Common; Widely distributed throughout Hong Kong
Common Bluebottle	<i>Graphium sarpedon</i>	青鳳蝶					+		Very common; Widely distributed throughout Hong Kong
Lime Butterfly	<i>Papilio demoleus</i>	達摩鳳蝶		+					Common; Widely distributed throughout Hong Kong
Red Helen	<i>Papilio helenus</i>	玉斑鳳蝶				+	+		Very common; Widely distributed throughout Hong Kong.
Great Mormon	<i>Papilio memnon</i>	美鳳蝶				+	+		Very common; Widely distributed throughout Hong Kong
Paris Peacock	<i>Papilio paris</i>	巴黎翠鳳蝶	+				+		Very common; Widely distributed throughout Hong Kong.
Common Mormon	<i>Papilio polytes</i>	玉帶鳳蝶					+		Very common; Widely distributed throughout Hong Kong.
Indian Cabbage White	<i>Pieris canidia</i>	東方菜粉蝶		+			+		Very common; Widely distributed throughout Hong Kong.
Mottled Emigrant	<i>Catopsilia pyranthe</i>	梨花遷粉蝶				+			Very common; Widely distributed throughout Hong Kong.
Red-base Jezebel	<i>Delias pasithoe</i>	報喜斑粉蝶		+			+	+	Very common; Widely distributed throughout Hong Kong.
Common Grass Yellow	<i>Eurema hecabe</i>	寬邊黃粉蝶	+	+			+		Very common; Widely distributed throughout Hong Kong
Great Orange Tip	<i>Hebomoia glaucippe</i>	鶴頂粉蝶		+	+		+		Common; Widely distributed throughout Hong Kong
Yellow Orange Tip	<i>Ixias pyrene</i>	橙粉蝶	+						Uncommon; Widely distributed throughout Hong Kong

WL = woodland, WC = watercourse, AG = agricultural land, DA = developed area, SG = shrubland/grassland, PS = Project Site

+++ = frequent; ++ = occasional; + = scarce

1: AFCD (2016)

Table B6a Aquatic fauna recorded in the Study Area during wet season

Scientific Name	Common Name	Relative abundance at different sampling point								Conservation Status
		Downstream		Upstream						
		A	B	E	F	G	H	I	J	
Fish										
<i>Parazacco spilurus</i>	Predaceous Chub					+++	+++	+++	++	China Red Data Book: Vulnerable
<i>Gambusia affinis</i>	Mosquito Fish	+++	++						+++	
<i>Poecilia reticulata</i>	Guppy	+++	++				+	+	+++	
<i>Xiphophorus variatus</i>	Swordtail						++	+		
<i>Monopterus albus</i>	Swampy Eel									
<i>Cyprinus carpio koi</i>	Colored Carp						+	+		
Crustacean										
<i>Caridina cantonensis</i>	Atyid Shrimp									
<i>Macrobrachium sp.</i>						+				
Insect										
<i>Enithares sp.</i>	Waterbug									
<i>Metrocoris sp.</i>	Water Skater			+	+	+				
Odonata larvae	Dragonfly larvae			+	+					
Mollusca										
<i>Physella acuta</i>	Tadpole Snail	+++		+	+					

Table B6b Aquatic fauna recorded in the Study Area during dry season

Scientific Name	Common Name	Relative abundance at different sampling point								Conservation Status
		Downstream		Upstream						
		A	B	E	F	G	H	I	J	
Fish										
<i>Parazacco spilurus</i>	Predaceous Chub					+++	+++	+++	++	China Red Data Book: Vulnerable
<i>Gambusia affinis</i>	Mosquito Fish	+++	++						+++	
<i>Poecilia reticulata</i>	Guppy	+++	++				+	+	+++	
<i>Xiphophorus variatus</i>	Swordtail						++	+		
<i>Cyprinus carpio koi</i>	Colored Carp						+	+		
Crustacean										
<i>Caridina cantonensis</i>	Atyid Shrimp									
Insect										
<i>Enithares sp.</i>	Waterbug									
<i>Metrocoris sp.</i>	Water Skater			+	+	+				
Mollusca										
<i>Physella acuta</i>	Tadpole Snail	+++		+	+					

Table B7 Survey Dates

Items	Wet Season		Dry Season	
	Sep 16	Oct 16	Nov 16	Dec 16
Habitat & Vegetation Survey	21 Sep, 27 Sep	25 Oct	25 Nov	5 Dec
Terrestrial Mammal Survey (including day and night-time)	19 Sep,	11 Oct	25 Nov	15 Dec
Terrestrial Mammal Survey for nocturnal mammal species (e.g. bats) (night-time survey)	19 Sep		25 Nov	
Avifauna Survey (including day and night-time)	19 Sep	11 Oct	25 Nov	15 Dec
Avifauna Survey for nocturnal mammal species (e.g. owl) (night-time survey)	19 Sep	5 Oct	25 Nov	
Herpetofauna Survey	19 Sep	11 Oct	25 Nov	15 Dec
Butterfly & Dragonfly Survey	19 Sep	5 Oct, 11 Oct	25 Nov	15 Dec
Freshwater Aquatic Assemblages Survey	20 Sep, 26 Sep	13 Oct		22 Dec

APPENDIX C

Details of Noise Impact Assessment

APPENDIX C1

Equipment List and Associated Sound Power Level for Construction Activities (Unmitigated)

Construction of Sewage Pumping Station

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
1. Excavation	1a. Pumping station site	Excavator	081	1	112	100%	0	112	115
		Village vehicle ^(see note 1)	-	1	112	70%	0	110	
		Water pump, submersible (electric)	283	2	85	100%	0	88	
		Generator, silenced	102	1	100	100%	0	100	
	1b. Temporary works area	Air compressor	002	1	102	100%	0	102	
		Dump truck	067	1	117	70%	0	115	117
Village vehicle ^(see note 1)	-	1	112	70%	0	110			

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
2. Construction of substructure	2a. Pumping station site	Excavator	081	1	112	100%	0	112	116
		Village vehicle ^(see note 1)	-	1	112	70%	0	110	
		Poker, vibratory	170	1	113	50%	0	110	
		Bar bender and cutter	021	1	90	100%	0	90	
		Water pump, submersible (electric)	283	2	85	100%	0	88	
		Generator, silenced	102	1	100	100%	0	100	
		Air compressor	002	1	102	100%	0	102	
	2b. Temporary works area	Concrete lorry mixer	044	1	109	50%	0	106	109
		Concrete pump, lorry mounted	047	1	109	50%	0	106	

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
3. Construction of superstructure	3a. Pumping station site	Excavator	081	1	112	100%	0	112	116
		Village vehicle ^(see note 1)	-	1	112	70%	0	110	
		Poker, vibratory	170	1	113	50%	0	110	
		Bar bender and cutter	021	1	90	100%	0	90	
		Water pump, submersible (electric)	283	2	85	100%	0	88	
		Generator, silenced	102	1	100	100%	0	100	
		Air compressor	002	1	102	100%	0	102	
	3b. Temporary works area	Concrete lorry mixer	044	1	109	50%	0	106	109
		Concrete pump, lorry mounted	047	1	109	50%	0	106	

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
4. E&M installations	4a. Pumping station site	Excavator	081	1	112	100%	0	112	115
		Village vehicle ^(see note 1)	-	1	112	70%	0	110	
		Generator, silenced	102	1	100	100%	0	100	
		Air compressor	002	1	102	100%	0	102	
	4b. Temporary works area	Lorry	141	1	112	70%	0	110	113
		Village vehicle ^(see note 1)	-	1	112	70%	0	110	

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
5. Finishing and landscaping works	5a. Pumping station site	Excavator	081	1	112	100%	0	112	115
		Village vehicle ^(see note 1)	-	1	112	70%	0	110	
		Generator, silenced	102	1	100	100%	0	100	
		Air compressor	002	1	102	100%	0	102	
	5b. Temporary works area	Lorry	141	1	112	70%	0	110	113
		Village vehicle ^(see note 1)	-	1	112	70%	0	110	

PME = Powered Mechanical Equipment

SWL = Sound Power Level

TM = Technical Memorandum on Noise from Construction Work other than Percussive Piling

BS = BS 5228

Note 1 - sound power level assumed to be equivalent of a lorry

APPENDIX C1

Equipment List and Associated Sound Power Level for Construction Activities (Mitigated 1)

Construction of Sewage Pumping Station

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
1. Excavation	1a. Pumping station site	Excavator	C.4-65	1	99	100%	0	99	106
		Village vehicle ^(see note 1)	*	1	105	70%	0	103	
		Water pump, submersible (electric)	283	2	85	100%	0	88	
		Generator, super silenced	103	1	95	100%	0	95	
	1b. Temporary works area	Dump truck	*	1	105	70%	0	103	
		Village vehicle ^(see note 1)	-	1	105	70%	0	103	

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
2. Construction of substructure	2a. Pumping station site	Excavator	C.4-65	1	99	100%	0	99	107
		Village vehicle ^(see note 1)	*	1	105	70%	0	103	
		Poker, vibratory	*	1	102	50%	0	99	
		Bar bender and cutter	021	1	90	100%	0	90	
		Water pump, submersible (electric)	283	2	85	100%	0	88	
		Generator, super silenced	103	1	95	100%	0	95	
	2b. Temporary works area	Air compressor	001	1	100	100%	0	100	
		Concrete lorry mixer	C.4-18	1	103	50%	0	100	107
Concrete pump, lorry mounted	047	1	109	50%	0	106			

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
3. Construction of superstructure	3a. Pumping station site	Excavator	C.4-65	1	99	100%	0	99	107
		Village vehicle ^(see note 1)	*	1	105	70%	0	103	
		Poker, vibratory	*	1	102	50%	0	99	
		Bar bender and cutter	021	1	90	100%	0	90	
		Water pump, submersible (electric)	283	2	85	100%	0	88	
		Generator, super silenced	103	1	95	100%	0	95	
	3b. Temporary works area	Air compressor	001	1	100	100%	0	100	
		Concrete lorry mixer	C.4-18	1	103	50%	0	100	107
Concrete pump, lorry mounted	047	1	109	50%	0	106			

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
4. E&M installations	4a. Pumping station site	Excavator	C.4-65	1	99	100%	0	99	106
		Village vehicle ^(see note 1)	*	1	105	70%	0	103	
		Generator, super silenced	103	1	95	100%	0	95	
		Air compressor	001	1	100	100%	0	100	
	4b. Temporary works area	Lorry	*	1	105	70%	0	103	106
		Village vehicle ^(see note 1)	*	1	105	70%	0	103	

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
5. Finishing and landscaping works	5a. Pumping station site	Excavator	C.4-65	1	99	100%	0	99	106
		Village vehicle ^(see note 1)	*	1	105	70%	0	103	
		Generator, super silenced	103	1	95	100%	0	95	
		Air compressor	001	1	100	100%	0	100	
	5b. Temporary works area	Lorry	*	1	105	70%	0	103	106
		Village vehicle ^(see note 1)	*	1	105	70%	0	103	

PME = Powered Mechanical Equipment

SWL = Sound Power Level

TM = Technical Memorandum on Noise from Construction Work other than Percussive Piling

BS = BS 5228

Note 1 - sound power level assumed to be equivalent of a lorry

* = Sound power levels of other commonly used PME (source: Guidance Notes for Licence Application in EPD website)

APPENDIX C1

Equipment List and Associated Sound Power Level for Construction Activities (Mitigated 2)

Construction of Sewage Pumping Station

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
1. Excavation	1a. Pumping station site	Excavator	C.4-65	1	99	100%	-5	94	100
		Village vehicle ^(see note 1)	*	1	105	70%	-5	98	
		Water pump, submersible (electric)	283	2	85	100%	-10	78	
		Generator, super silenced	103	1	95	100%	-10	85	
	1b. Temporary works area	Air compressor	001	1	100	100%	-10	90	
		Dump truck	*	1	105	70%	-5	98	101
Village vehicle ^(see note 1)	-	1	105	70%	-5	98			

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
2. Construction of substructure	2a. Pumping station site	Excavator	C.4-65	1	99	100%	-5	94	101
		Village vehicle ^(see note 1)	*	1	105	70%	-5	98	
		Poker, vibratory	*	1	102	50%	-5	94	
		Bar bender and cutter	021	1	90	100%	-10	80	
		Water pump, submersible (electric)	283	2	85	100%	-10	78	
		Generator, super silenced	103	1	95	100%	-10	85	
	2b. Temporary works area	Air compressor	001	1	100	100%	-10	90	
		Concrete lorry mixer	C.4-18	1	103	50%	-5	95	102
		Concrete pump, lorry mounted	047	1	109	50%	-5	101	

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
3. Construction of superstructure	3a. Pumping station site	Excavator	C.4-65	1	99	100%	-5	94	101
		Village vehicle ^(see note 1)	*	1	105	70%	-5	98	
		Poker, vibratory	*	1	102	50%	-5	94	
		Bar bender and cutter	021	1	90	100%	-10	80	
		Water pump, submersible (electric)	283	2	85	100%	-10	78	
		Generator, super silenced	103	1	95	100%	-10	85	
	3b. Temporary works area	Air compressor	001	1	100	100%	-10	90	
		Concrete lorry mixer	C.4-18	1	103	50%	-5	95	102
		Concrete pump, lorry mounted	047	1	109	50%	-5	101	

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
4. E&M installations	4a. Pumping station site	Excavator	C.4-65	1	99	100%	-5	94	100
		Village vehicle ^(see note 1)	*	1	105	70%	-5	98	
		Generator, super silenced	103	1	95	100%	-10	85	
		Air compressor	001	1	100	100%	-10	90	
	4b. Temporary works area	Lorry	*	1	105	70%	-5	98	101
		Village vehicle ^(see note 1)	*	1	105	70%	-5	98	

Construction Works Involved	Location of PME with respect to the construction activity	Type of PME	TM Code / BS Ref.	No. of Units	SWL - dB(A)	On-time %	Barrier Correction - dB(A)	Corrected SWL - dB(A)	Total SWL - dB(A)
5. Finishing and landscaping works	5a. Pumping station site	Excavator	C.4-65	1	99	100%	-5	94	100
		Village vehicle ^(see note 1)	*	1	105	70%	-5	98	
		Generator, super silenced	103	1	95	100%	-10	85	
		Air compressor	001	1	100	100%	-10	90	
	5b. Temporary works area	Lorry	*	1	105	70%	-5	98	101
		Village vehicle ^(see note 1)	*	1	105	70%	-5	98	

PME = Powered Mechanical Equipment

SWL = Sound Power Level

TM = Technical Memorandum on Noise from Construction Work other than Percussive Piling

BS = BS 5228

Note 1 - sound power level assumed to be equivalent of a lorry

* = Sound power levels of other commonly used PME (source: Guidance Notes for Licence Application in EPD website)

Temporary noise barrier : 5 dB(A) reduction for mobile PME; 10 dB(A) reduction for stationary PME

APPENDIX C1

Table of Predicted (unmitigated and mitigated) Construction Noise Levels at Representative NSRs

Construction of Sewage Pumping Station

Noise Sensitive Receivers	Construction Works Involved	Location of Construction Works	Distance of RNSR from Notional Point, m	Unmitigated Sound Power Level, dB(A)	Predicted Noise Level (unmitigated), dB(A)	Total Predicted Noise Level (unmitigated), dB(A)	Mitigated 1 Sound Power Level, dB(A)	Predicted Noise Level (Mitigated 1), dB(A)	Total Predicted Noise Level (Mitigated 1), dB(A)	Mitigated 2 Sound Power Level, dB(A)	Predicted Noise Level (Mitigated 2), dB(A)	Total Predicted Noise Level (Mitigated 2), dB(A)
NSR 1	1: Excavation	1a: Pumping station site	22	115	83	83	106	75	75	100	69	69
		1b: Temporary works area	88	117	73		106	63		101	58	
	2: Construction of Substructure	2a: Pumping station site	22	116	84	84	107	75	76	101	69	70
		2b: Temporary works area	88	109	65		107	63		102	58	
	3: Construction of Superstructure	3a: Pumping station site	22	116	84	84	107	75	76	101	69	70
		3b: Temporary works area	88	109	65		107	63		102	58	
	4: E&M Installations	4a: Pumping station site	22	115	83	83	106	75	75	100	68	69
		4b: Temporary works area	88	113	70		106	63		101	58	
	5: Finishing and Landscaping works	5a: Pumping station site	22	115	83	83	106	75	75	100	68	69
		5b: Temporary works area	88	113	70		106	63		101	58	
NSR 2	1: Excavation	1a: Pumping station site	23	115	82	83	106	74	74	100	68	68
		1b: Temporary works area	140	117	69		106	59		101	54	
	2: Construction of Substructure	2a: Pumping station site	23	116	84	84	107	75	75	101	69	69
		2b: Temporary works area	140	109	61		107	59		102	54	
	3: Construction of Superstructure	3a: Pumping station site	23	116	84	84	107	75	75	101	69	69
		3b: Temporary works area	140	109	61		107	59		102	54	
	4: E&M Installations	4a: Pumping station site	23	115	82	83	106	74	74	100	68	68
		4b: Temporary works area	140	113	66		106	59		101	54	
	5: Finishing and Landscaping works	5a: Pumping station site	23	115	82	83	106	74	74	100	68	68
		5b: Temporary works area	140	113	66		106	59		101	54	
NSR 3	1: Excavation	1a: Pumping station site	65	115	73	75	106	65	66	100	59	61
		1b: Temporary works area	110	117	71		106	61		101	56	
	2: Construction of Substructure	2a: Pumping station site	65	116	75	75	107	66	67	101	60	62
		2b: Temporary works area	110	109	63		107	61		102	56	
	3: Construction of Superstructure	3a: Pumping station site	65	116	75	75	107	66	67	101	60	62
		3b: Temporary works area	110	109	63		107	61		102	56	
	4: E&M Installations	4a: Pumping station site	65	115	73	74	106	65	66	100	59	61
		4b: Temporary works area	110	113	68		106	61		101	56	
	5: Finishing and Landscaping works	5a: Pumping station site	65	115	73	74	106	65	66	100	59	61
		5b: Temporary works area	110	113	68		106	61		101	56	
NSR 4	1: Excavation	1a: Pumping station site	125	115	68	85	106	59	74	100	53	69
		1b: Temporary works area	23	117	84		106	74		101	69	
	2: Construction of Substructure	2a: Pumping station site	125	116	69	77	107	60	75	101	54	70
		2b: Temporary works area	23	109	77		107	75		102	70	
	3: Construction of Superstructure	3a: Pumping station site	125	116	69	77	107	60	75	101	54	70
		3b: Temporary works area	23	109	77		107	75		102	70	
	4: E&M Installations	4a: Pumping station site	125	115	68	81	106	59	74	100	53	69
		4b: Temporary works area	23	113	81		106	74		101	69	
	5: Finishing and Landscaping works	5a: Pumping station site	125	115	68	81	106	59	74	100	53	69
		5b: Temporary works area	23	113	81		106	74		101	69	

NOTES:

Mitigated 1 : Use of Quiet Equipment

Mitigated 2 : Use of Quiet Equipment + Temporary Noise Barrier

3 dB(A) façade correction has been included in the Predicted Noise Level

EIAO-TM daytime construction noise standards: residential premises 75 dB(A)

APPENDIX C2

Operational Noise Assessment of the Proposed Tseng Lan Shue Sewage Pumping Station

NSR	Equipment	No. of Items	Sound Power Level*, dB(A)	Total Sound Power Level, dB(A)	Barrier / Enclosure Correction**, dB(A)	Distance ⁺ , m	Distance Attenuation, dB(A)	Façade Correction, dB(A)	Sound Pressure Level at NSR, dB(A)	Predicted Operational Noise Level, dB(A)	ASR	EIAO-TM Noise Criteria, dB(A) [#]	Exceed EIAO-TM Noise Criteria
NSR 1	Basket screen	1	89	89	20	17	33	3	39	43	A	45	No
	Submersible pump	2	85	88	20	17	33	3	38				
	Exhaust fan with acoustic louver / silencer	2	73	76	10	17	33	3	36				
	Transformer	1	85	85	20	24	36	3	32				
NSR 2	Basket screen	1	89	89	20	19	34	3	38	42	A	45	No
	Submersible pump	2	85	88	20	19	34	3	37				
	Exhaust fan with acoustic louver / silencer	2	73	76	10	19	34	3	35				
	Transformer	1	85	85	20	33	38	3	30				
NSR 3	Basket screen	1	89	89	20	66	44	3	28	32	A	45	No
	Submersible pump	2	85	88	20	66	44	3	27				
	Exhaust fan with acoustic louver / silencer	2	73	76	10	66	44	3	25				
	Transformer	1	85	85	20	60	44	3	24				
NSR 4	Basket screen	1	89	89	20	120	50	3	22	27	A	45	No
	Submersible pump	2	85	88	20	120	50	3	21				
	Exhaust fan with acoustic louver / silencer	2	73	76	10	120	50	3	19				
	Transformer	1	85	85	20	119	50	3	18				

Notes:

* Sound power level of screen, pump and exhaust fan derived from Project Profile for Tai Po Tai Wo Road Sewage Pumping Station (EIAO Register No. DIR-161/2007).

* Sound power level of transformer derived from Project Profile for Western Interceptor Sewer Sewage Pumping Station (EIAO Register No. DIR-175/2008)

** 20 dB(A) reduction from acoustic shielding due to enclosed building design; 10 dB(A) reduction from the shielding provided by the 1m tall concrete parapet wall along the roof and due to no direct line of sight to NSR.

⁺ Distance assumed at the boundary of the pumping station / transformer building to the NSR.



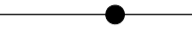
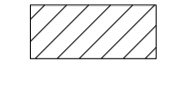




[#] The measured background noise level at Tseng Lan Shue ranges from 49-61 dB(A). The 5 dB(A) below the appropriate night time noise level for the Area Sensitivity Rating (ASR) under the *TM for the Assessment of Noise From Places other than Domestic Premises, Public Places or Construction Sites* was used as the noise criteria, i.e. 45 dB(A).

APPENDIX D
Preliminary Layout of the Sewage Pumping Station

NOTES:

1. ALL LEVELS ARE IN METRES ABOVE P.D.H.K.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
3. GRID LINES ARE HONG KONG GRID 1980.
4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER REFERANT CIVIL & E&M DRAWINGS.
5. DETAILS OF LOCKABLE SLIDING GATE SHOULD BE DESIGNED AND SUBMITTED BY THE CONTRACTOR TO THE ENGINEER'S APPROVAL.
6. THE CONTRACTOR SHALL DESIGN THE STEEL FENCE WALL FOR THE APPROVAL OF THE ENGINEER.

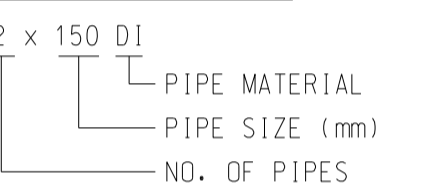
LEGEND:

-  LOCKABLE SLIDING GATE
-  PROPOSED 225mm U-CHANNEL WITH CAST IRON GRATING IN 1:100 GRADIENT
-  STEEL FENCE WALL (REFER TO ARCHITECTURAL DRAWINGS FOR THE TYPES AND DETAILS)
-  PLANTING AREA FOR TREES / STRUBS
-  PROPOSED MANHOLE
-  PROPOSED CATCHPIT
-  PROPOSED FINISH LEVEL
-  EXISTING LEVEL

ABBREVIATION:

- VC : VITRIFIED CLAY
- DI : DUCTILE IRON

FOR MULTI-PIPES



FOR SINGLE PIPES



Revision	Date	Description	Initial
	Designed	Checked	Drawn
Initial	JT	EY	MYS
Date	04/15	04/15	04/15

Approved

Contract no.
CE 65/2006 (DS)

Contract title
**PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION**

Drawing title
**TSENG LAN SHUE SEWERAGE
PUMPING STATION LAYOUT PLAN**

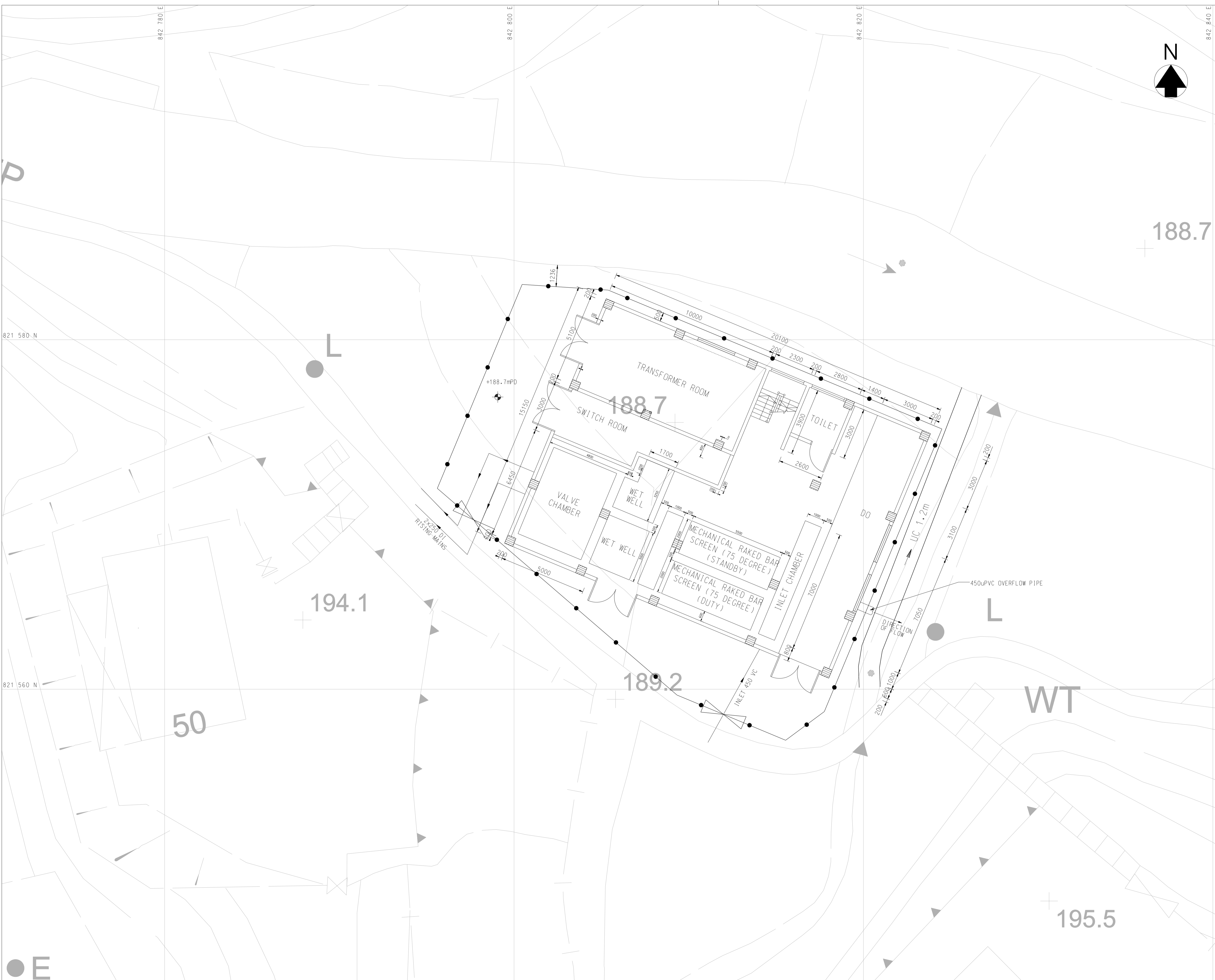
Drawing no.
382770/BVHKL/PS/01/001

Revision
-

Scale
A1 1 : 100
A3 1 : 200

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HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

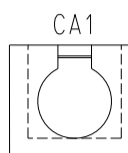
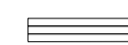
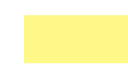


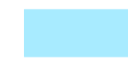
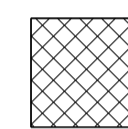
 BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

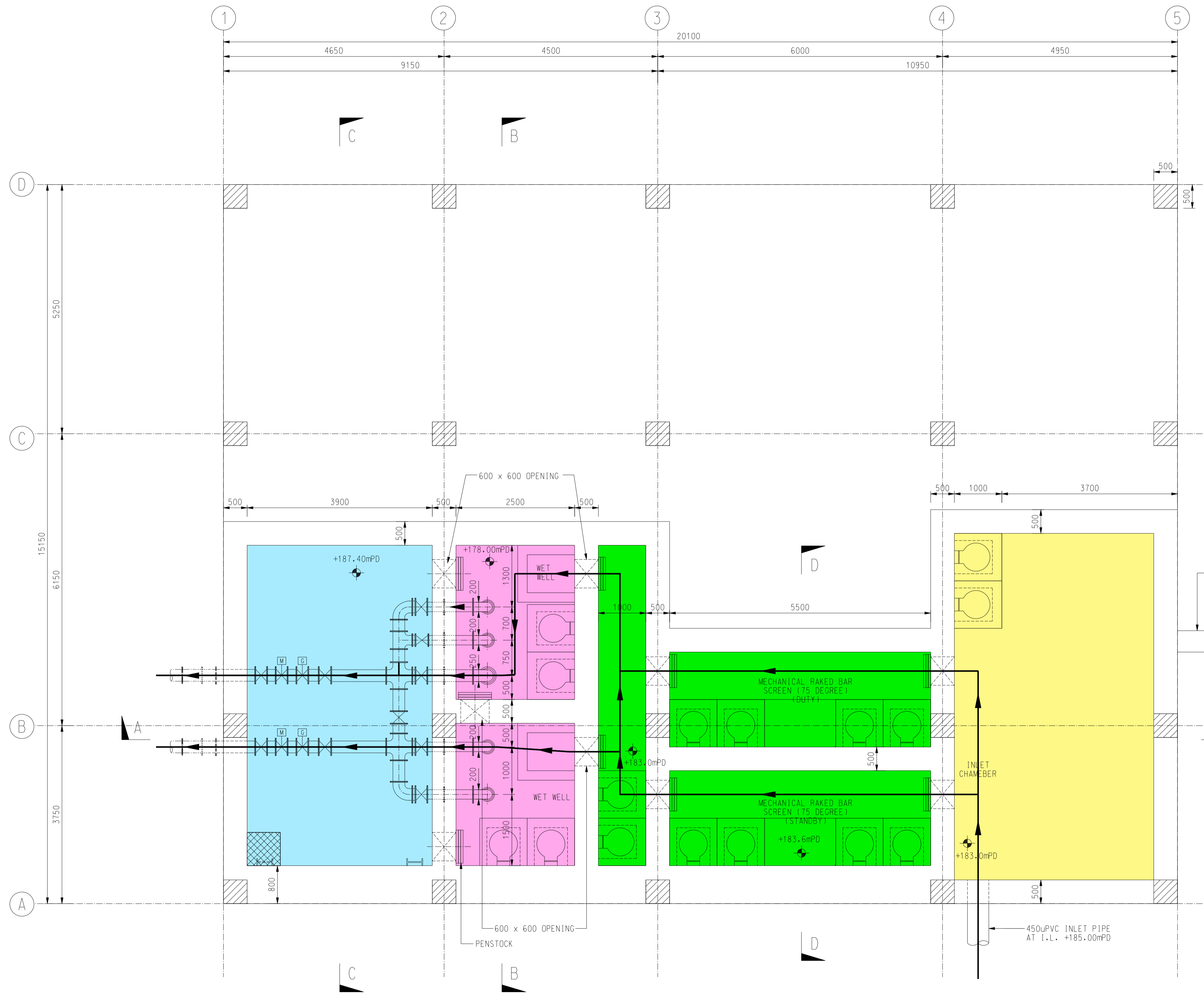


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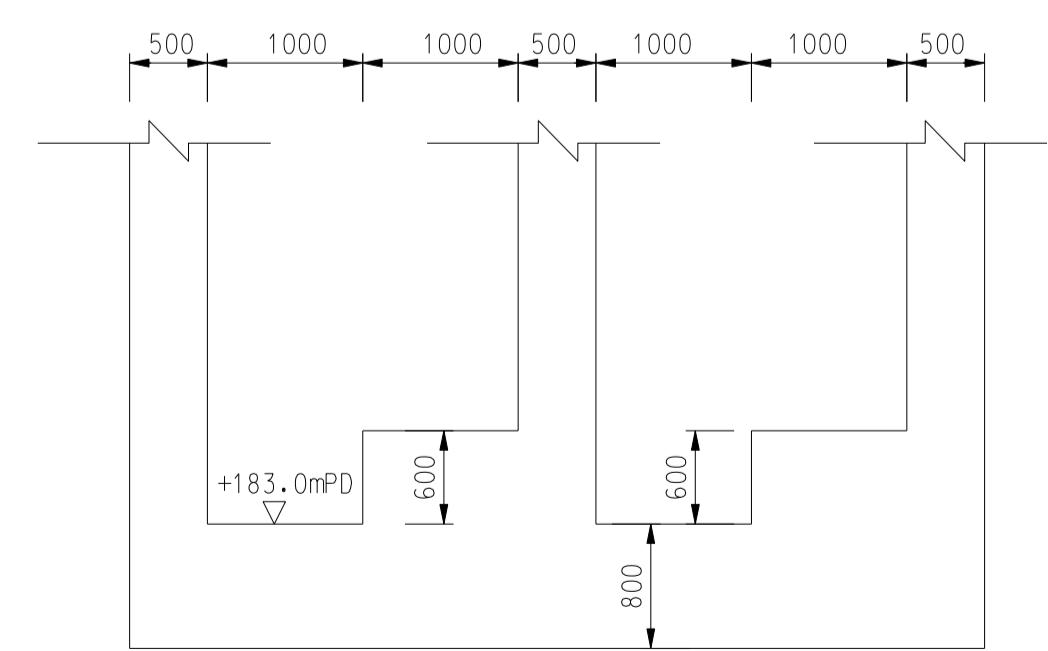
- PLEASE REFER TO DRAWING NO. 382770/BVHKL/PS/01/001 FOR NOTES, LEGENDS AND ABBREVIATIONS.
- CAT LADDER AND SAFETY CAGE SHALL BE GRADE 316 STAINLESS STEEL, SUBMITTED BY CONTRACTOR FOR THE APPROVAL OF THE ENGINEER.
- PENSTOCKS, VALVES, RISING MAIN, PUMPS AND OTHER E & M INSTALLATIONS INSIDE THE PUMPING STATION SHALL BE DESIGNED, SUPPLIED AND INSTALLED BY THE E & M CONTRACTOR UNLESS OTHERWISE STATED.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT CIVIL & E&M DRAWINGS.

LEGEND:

-  CAT LADDER WITH SAFETY CAGE
-  PENSTOCK (BY E&M CONTRACTOR)
-  INLET CHAMBER
-  SCREENING CHAMBERS
-  WET WELLS
-  VALVE CHAMBER
-  STAINLESS STEEL MULTIPART COVER



BASEMENT PLAN



SECTION D-D

Revision	Date	Description	Initial
Initial	Designed	Checked	Drawn
Initial	BK	CSC	SZ
Date	04/15	04/15	04/15

Approved

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
**PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION**

Drawing title
**TSENG LAN SHUE SEWERAGE
PUMPING STATION
BASEMENT PLAN**

Drawing no.
382770/BVHKL/PS/01/002

Scale
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A3 1 : 100

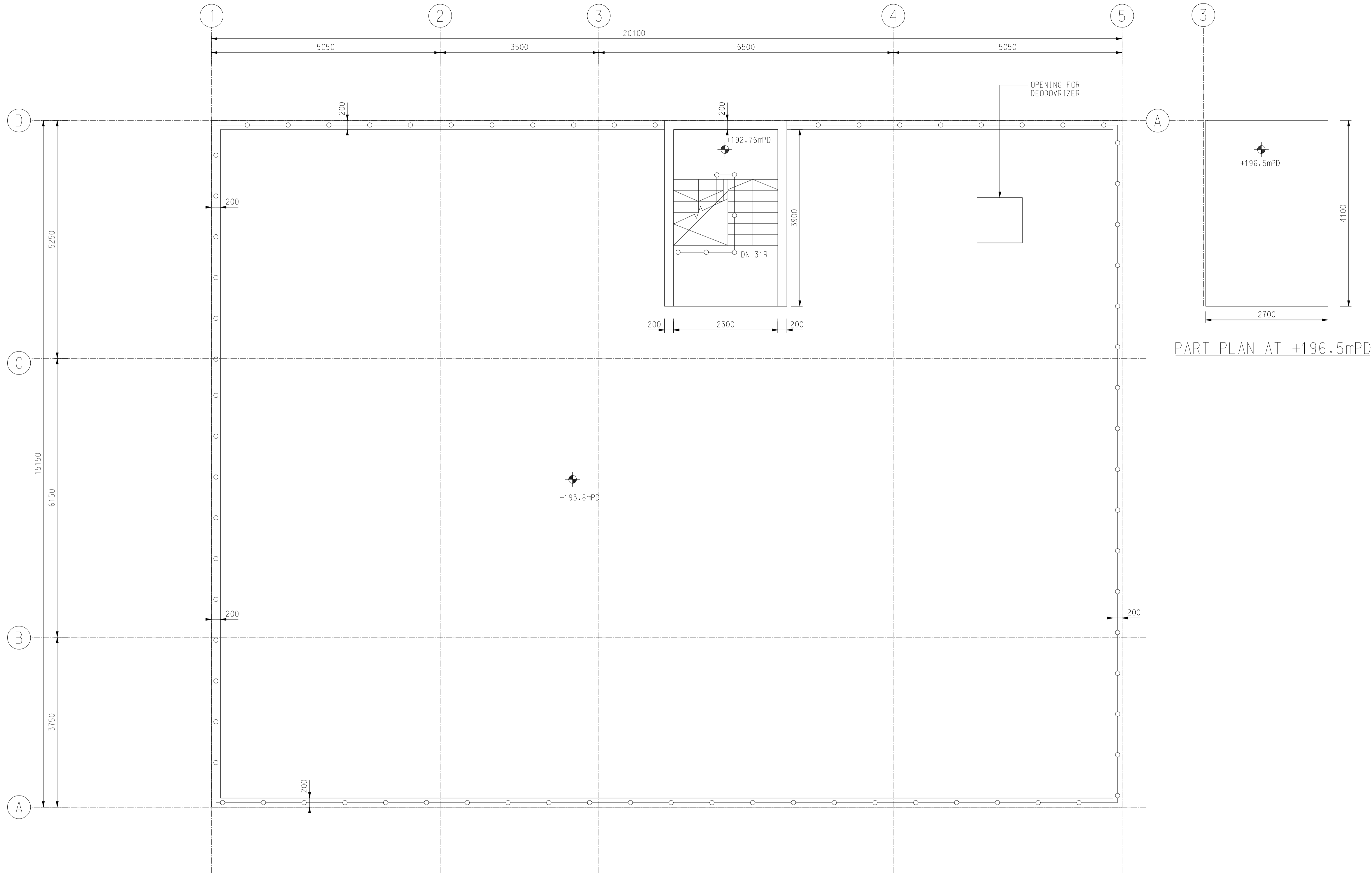


NOTES:

- PLEASE REFER TO DRAWING NO. 382770/BVHKL/PS/01/001 FOR NOTES, LEGENDS AND ABBREVIATIONS.
- CAT LADDER AND SAFETY CAGE SHALL BE GRADE 316 STAINLESS STEEL, SUBMITTED BY CONTRACTOR FOR THE APPROVAL OF THE ENGINEER.
- THE CONTRACTOR SHALL DESIGN THE STAINLESS STEEL RAILING FOR THE APPROVAL OF THE ENGINEER.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT CIVIL & E&M DRAWINGS.

LEGEND:

- STAINLESS STEEL RAILING
- CAT LADDER WITHOUT SAFETY CAGE



ROOF FLOOR PLAN

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	BK	CSC	SZ	CSC	
Date	04/15	04/15	04/15	04/15	

Approved

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
**PORT SHELTER SEWAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION**

Drawing title
**TSENG LAN SHUE SEWAGE
PUMPING STATION
ROOF PLAN**

Drawing no.
382770/BVHKL/PS/01/003

Revision
-





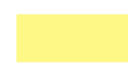


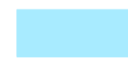



Scale
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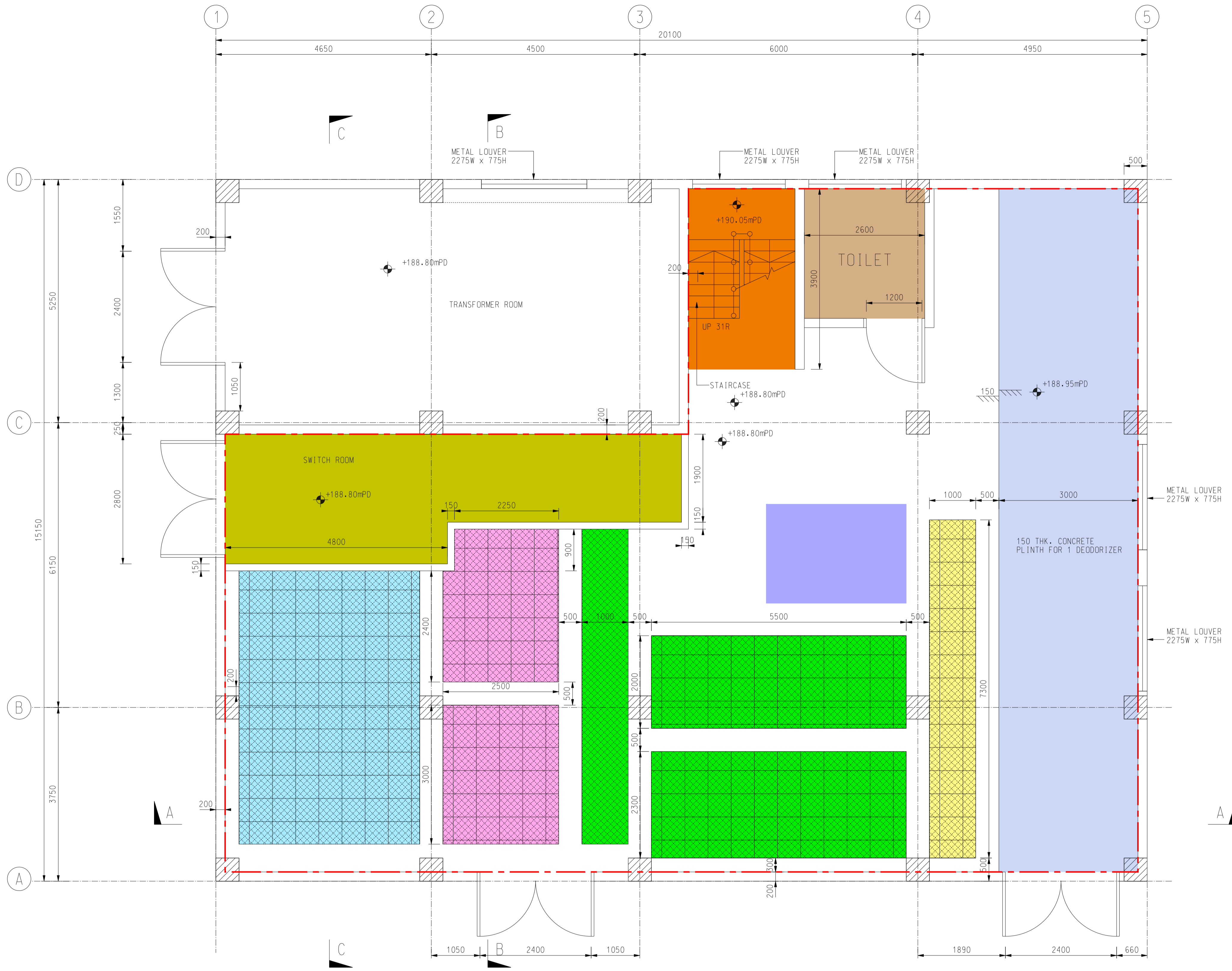


NOTES:

- PLEASE REFER TO DRAWING NO. 382770/BVHKL/PS/01/001 FOR NOTES, LEGENDS AND ABBREVIATIONS.
- THE OPENINGS OF MULTI PART COVERS SHALL ALLOW ACCESS AND REMOVAL OF THE EQUIPMENT. THE SIZES OF INDIVIDUAL MULTIPART COVERS SHALL BE PROPOSED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
- MULTIPART COVERS AND FRAMES SHALL BE GRADE 316 STAINLESS STEEL.
- THE CONTRACTOR SHALL DESIGN THE RECESS AND OTHER DETAILS FOR INSTALLATION OF MULTIPART COVERS AND FRAMES FOR THE APPROVAL OF THE ENGINEER.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT CIVIL & E&M DRAWINGS.

LEGEND:

-  STAINLESS STEEL MULTIPART COVERS
-  BOUNDARY OF GROUND FLOOR
-  SWITCH ROOM
-  DEODORIZING AREA
-  INLET CHAMBER
-  SCREENING CHAMBERS
-  WET WELLS
-  VALVE CHAMBER
-  TOILET
-  STAIRCASE
-  CHEMICAL DOSING AREA



GROUND FLOOR PLAN

Revision	Date	Description	Initial
Initial	Designed	Checked	Drawn
Initial	BK	CSC	SZ
Date	04/15	04/15	04/15

Approved

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
TSENG LAN SHUE SEWAGE
PUMPING STATION
GROUND FLOOR PLAN

Drawing no.	Revision
382770/BVHKL/PS/01/004	-

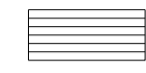
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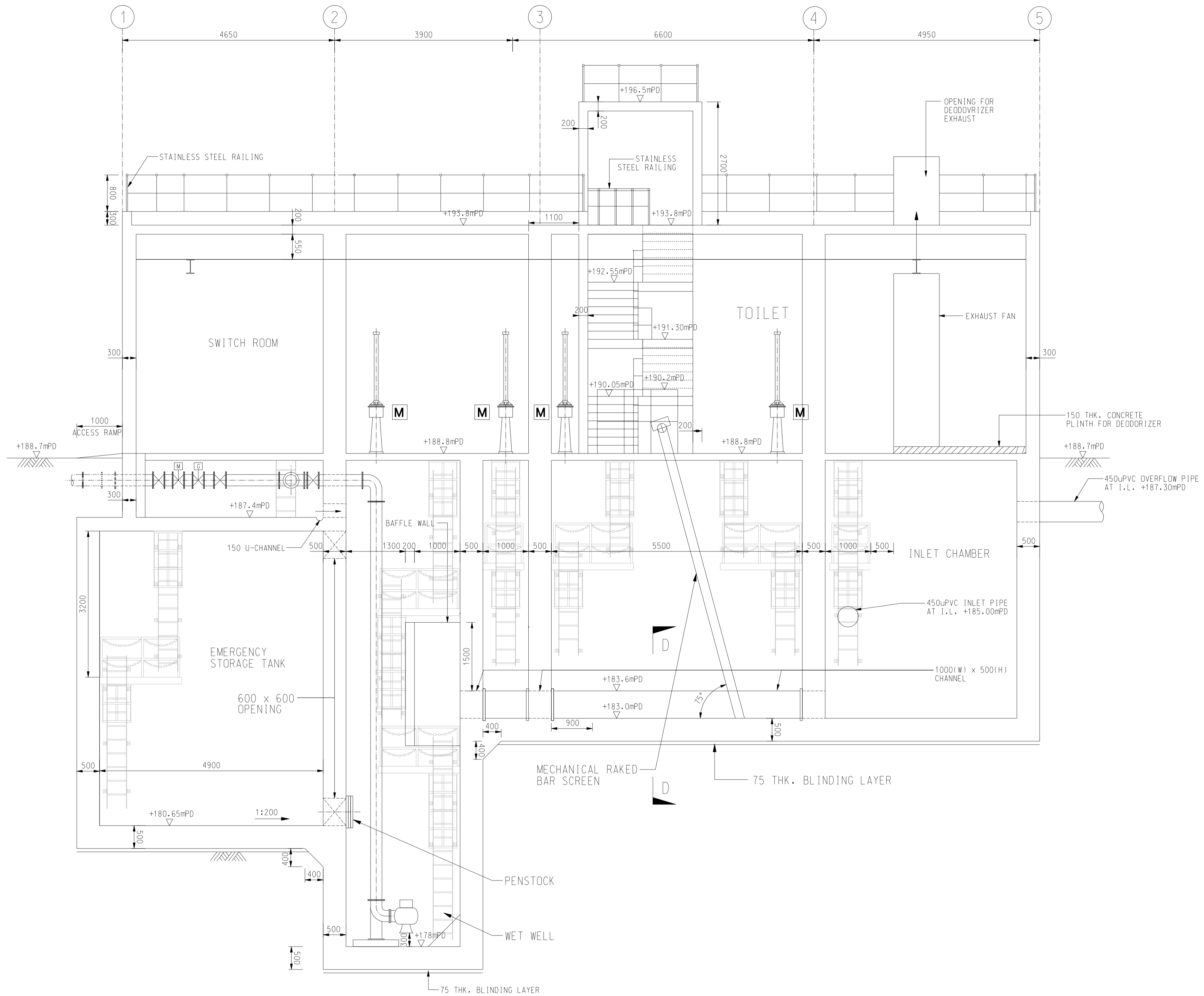


NOTES:

- PLEASE REFER TO DRAWING NO. 382770/BVHKL/PS/01/001 FOR NOTES, LEGENDS AND ABBREVIATIONS.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT CIVIL & E&M DRAWINGS.

LEGEND:

-  GLASS BLOCK PANEL (1500 x 650mm)
-  S. S. LOUVER (2275 x 775mm)
-  150 THK. CONCRETE PLINTH



SECTION A - A
SCALE A1 1:50
A3 1:100

Revision	Date	Description	Initial
	Designed	Checked	Drawn
Initial	BK	CSC	SZ
Date	04/15	04/15	04/15

Approved

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
**PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION**

Drawing title
**TSENG LAN SHUE SEWERAGE
PUMPING STATION SECTION**

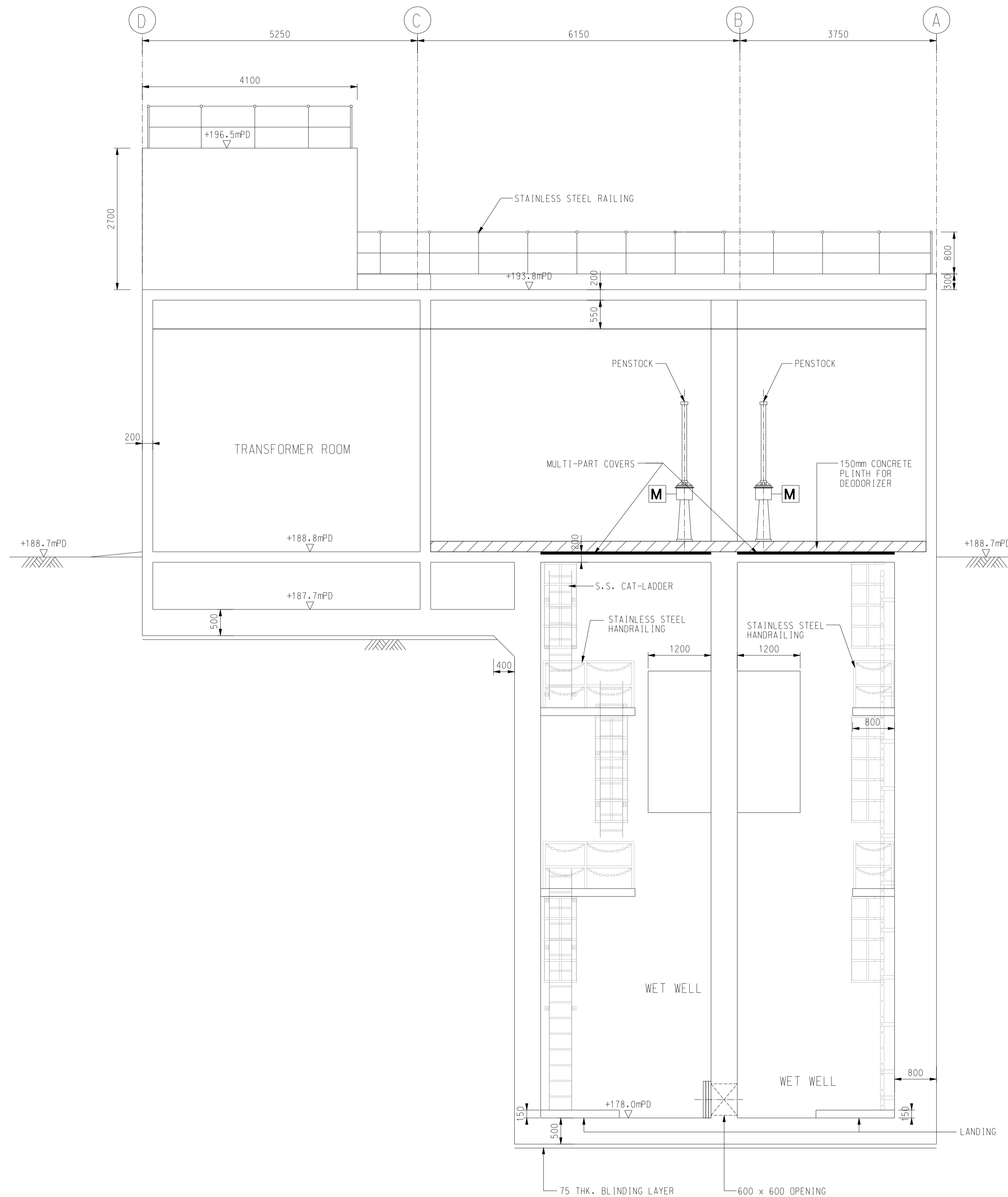
Drawing no.	Revision
382770/BVHKL/PS/01/005	-

Scale
AS SHOWN



NOTES:

- PLEASE REFER TO DRAWING NO. 382770/BVHKL/PS/01/001 FOR NOTES, LEGENDS AND ABBREVIATIONS.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT CIVIL & E&M DRAWINGS.



SECTION B - B

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	BK	CSC	SZ	CSC	
Date	04/15	04/15	04/15	04/15	

Approved

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
TSENG LAN SHUE SEWERAGE
PUMPING STATION SECTION

Drawing no.	Revision
382770/BVHKL/PS/01/006	-

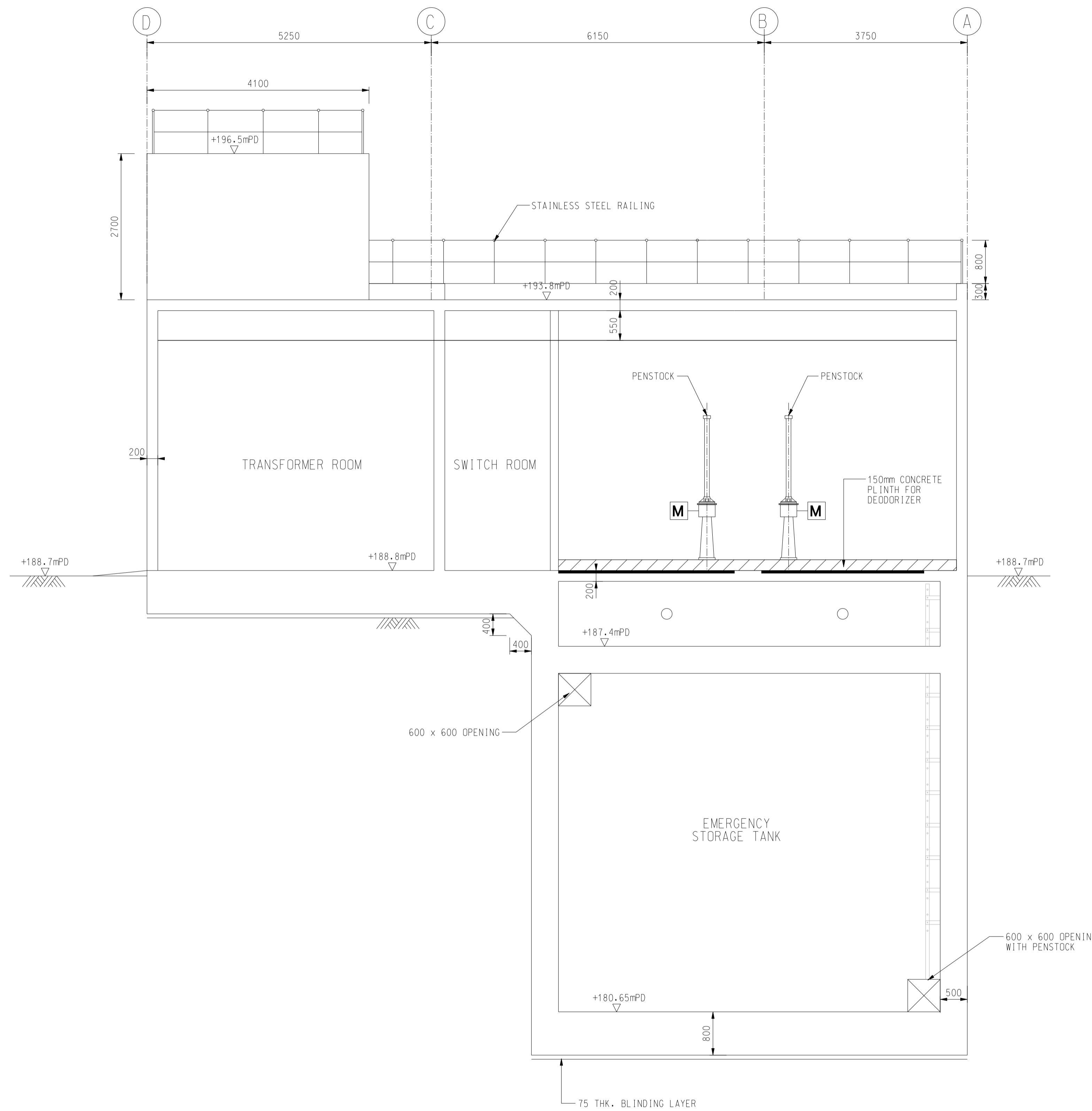
Scale
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A3 1 : 100

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DRAINAGE SERVICES DEPARTMENT

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博威工程顧問有限公司

NOTES:

- PLEASE REFER TO DRAWING NO. 382770/BVHKL/PS/01/001 FOR NOTES, LEGENDS AND ABBREVIATIONS.
- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT CIVIL & E&M DRAWINGS.



SECTION C-C

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	BK	CSC	SZ	CSC	
Date	04/15	04/15	04/15	04/15	

Approved

PRELIMINARY

Contract no.
CE 65/2006 (DS)

Contract title
**PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION**

Drawing title
**TSENG LAN SHUE SEWERAGE
PUMPING STATION SECTION**

Drawing no.	Revision
382770/BVHKL/PS/01/007	-

Scale
A1 1 : 50
A3 1 : 100



APPENDIX E

Tree Survey

APPENDIX E

TREE ASSESSMENT SCHEDULE FOR PROPOSED TSENG LAN SHUE SEWAGE PUMPING STATION

Tree No.	Species	Chinese Name	Exotic/ Native	Soil Level above Root Collar (mPD)	Northing	Easting	DBH (mm)	Overall Height (m)	Crown Spread (m)	Health	Form	Amenity Value	Self-seeded	Value of Tree	Susceptibility*	Survival Rate after Transplantation	Remark	Action	Justification for Tree Felling
T2901	<i>Ficus microcarpus</i>	細葉榕	Native	188.63	821583.360	842792.956	200.0	6.0	5.0	Fair	Poor	Medium	Yes	Common	Low	Poor	Forked	Retain	
T2903	<i>Garcinia subelliptica</i>	菲島福木	Exotic	188.61	821581.267	842790.965	100.0	6.0	3.0	Fair	Fair	Medium	No	Common	Low	Poor		Retain	
T2904	<i>Garcinia subelliptica</i>	菲島福木	Exotic	188.85	821580.011	842790.696	130.0	6.0	3.0	Fair	Fair	Medium	No	Common	Low	Poor		Retain	
T2905	<i>Ficus microcarpus</i>	細葉榕	Native	188.65	821582.052	842794.765	130.0	3.5	2.5	Poor	Poor	Low	Yes	Common	Low	Poor	Leaning	Retain	
T2906	<i>Ficus microcarpus</i>	細葉榕	Native	188.69	821580.720	842797.199	320.0	8.0	5.0	Fair	Fair	Medium	Yes	Common	Low	Poor		Retain	
T2907	<i>Ulmus parvifolia</i>	榔榆	Exotic	188.73	821577.311	842793.064	390.0	6.0	5.0	Fair	Fair	Medium	No	Common	Low	Poor		Retain	
T2915	<i>Ulmus parvifolia</i>	榔榆	Exotic	188.59	821574.059	842803.515	130.0	7.0	4.0	Fair	Fair	Medium	Yes	Common	Low	Poor	Forked	Fell	1, 2, 3
T2918	<i>Erythrina crista-galli</i>	雞冠刺桐	Exotic	188.25	821565.312	842827.326	120.0	2.0	1.0	Fair	Poor	Low	No	Common	Low	Poor	Leaning, Multi-Stem	Retain	
T2919	<i>Erythrina crista-galli</i>	雞冠刺桐	Exotic	188.23	821564.612	842830.319	40.0	2.0	1.0	Fair	Poor	Low	Yes	Common	Low	Poor	Leaning, Multi-Stem	Retain	
T2922	<i>Erythrina crista-galli</i>	雞冠刺桐	Exotic	188.28	821566.998	842830.309	100.0	2.5	1.0	Fair	Poor	Low	Yes	Common	Low	Poor	Multi-Stem, Vines	Retain	
T2923	<i>Erythrina crista-galli</i>	雞冠刺桐	Exotic	188.22	821566.640	842831.371	110.0	2.0	1.5	Poor	Poor	Low	Yes	Common	Low	Poor	Vines, Leaning	Retain	
T2925	<i>Erythrina crista-galli</i>	雞冠刺桐	Exotic	188.46	821570.055	842827.609	100.0	2.5	2.0	Poor	Poor	Low	Yes	Common	Low	Poor	Vines, Leaning	Retain	
T2926	<i>Ficus hispida</i>	對葉榕	Native	188.09	821574.242	842830.364	130.0	2.5	3.0	Poor	Poor	Low	Yes	Common	Low	Poor	Vines, Forked	Retain	
T2927	<i>Citrus maxima</i>	柚	Exotic	188.08	821570.176	842841.188	160.0	4.0	4.0	Fair	Fair	Medium	Yes	Common	Low	Poor		Retain	

* Assuming a little disturbance acting on the tree.

Justification for Tree Felling

1	Tree in direct conflict with proposed Works
2	Poor survival rate after transplantation
3	Lack of access for transplantation machinery
4	Poor form
5	Poor health
6	Low Amenity value

- LEGEND:
- HAND RAILING, FENCE, BARRIERS
 - CHANNEL WITH FLOW DIRECTION
 - GATE
 - OPEN - SIDED STRUCTURE
 - TEMPORARY STRUCTURE
 - ARTIFICIAL SLOPE
 - STEP CHANNEL WITH FLOW DIRECTION
 - TREE LOCATION
 - EXISTING TREE CROWN SPREAD
 - TREE PROPOSED TO BE RETAINED
 - TOPOGRAPHIC SURVEY BOUNDARY
 - TREE PROPOSED TO BE FELLED

- ABBREVIATION:
- BD BOLLARD
 - BN BENCH
 - CA CATCH PIT
 - DP DOWN PIPE
 - EB ELECTRIC BOX
 - EP ELECTRIC POLE
 - FB FLOWER BED
 - FH FIRE HYDRANT
 - FP FOOTPATH
 - G GULLY
 - IL INVERT LEVEL
 - KB KERB BOTTOM
 - L LAMP POST
 - MH MANHOLE
 - MS MANHOLE (STORM WATER)
 - MF MANHOLE (FOUL WATER/SEWER)
 - MT MANHOLE (TELEPHONE)
 - MU MANHOLE (UTILITIES)
 - NB NOTICE BOARD
 - PAV PAVEMENT
 - PV PAVILION
 - RS ROAD SIGN
 - SC STEP CHANNEL
 - SB SIGN BOARD
 - SP SIGN POLE
 - T1 TREE NO.
 - TK TELEPHONE KIOSK
 - TL TRAFFIC LIGHT
 - TP TELEPHONE POLE
 - UC U-CHANNEL
 - UTA UNABLE TO ACCESS
 - V VALVE
 - VF VALVE - FIRE
 - VG VALVE - GAS
 - VW VALVE WATER WORKS
 - W WELL
 - WT WATER TAP
 - W.I.P. WORK IN PROGRESS

Revision	Date	Description	Initial
	Designed	Checked	Drawn
			Checked

Approved

Contract no.
CE 65/2006 (DS)

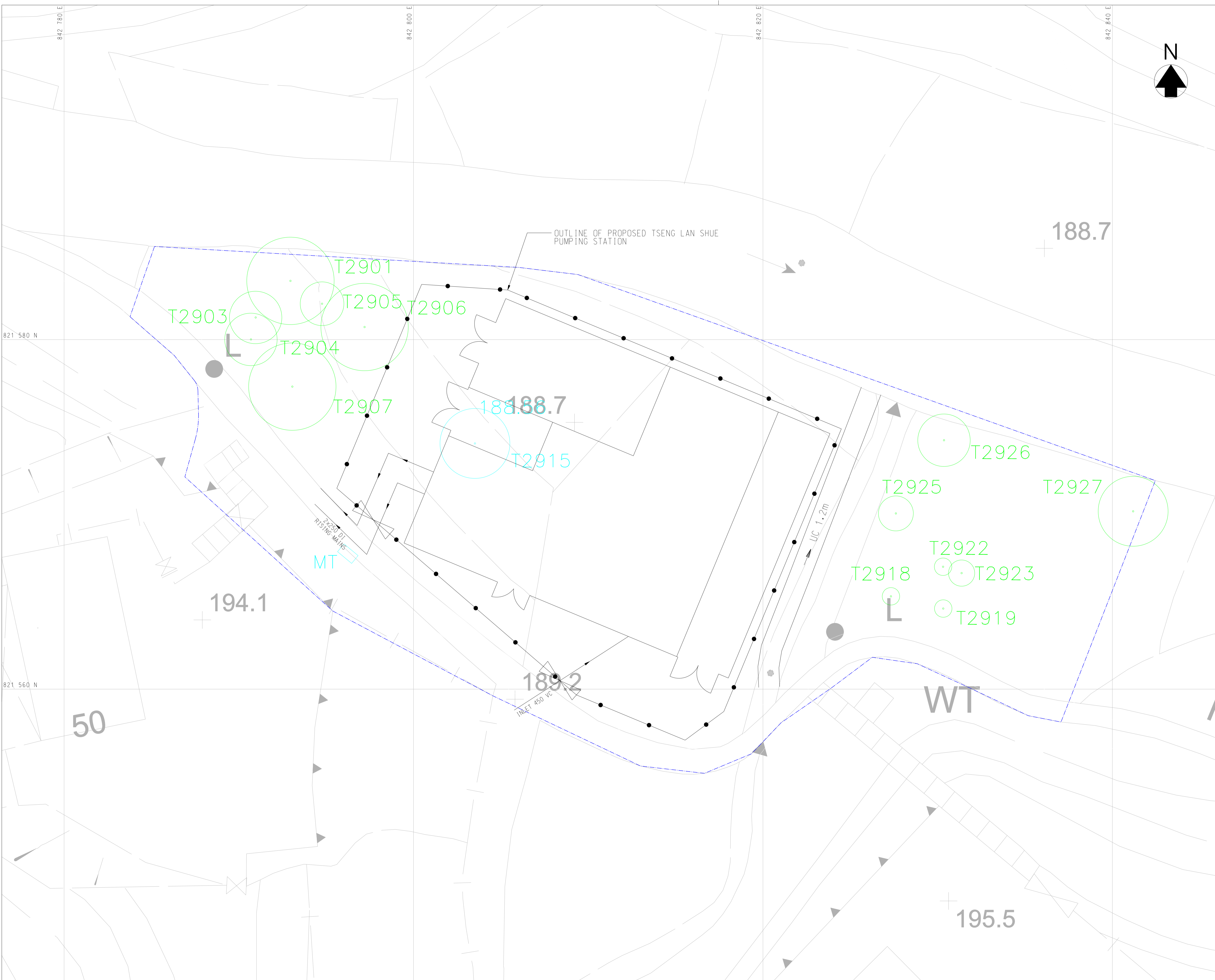
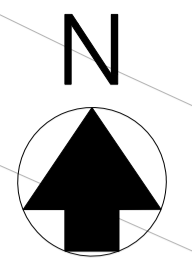
Contract title
PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
TREE SURVEY PLAN
TSEUNG LAN SHUE

Drawing no.
382770/BVHKL/PS/T/002

Revision
-

Scale
A1 1 : 100
A3 1 : 200



Plot Date = 7/22/2014

CAD Filename = Y:\Daily Work\2014\0711c\2770-PS-T-002.dgn

- LEGEND:**
- HAND RAILING, FENCE, BARRIERS
 - CHANNEL WITH FLOW DIRECTION
 - GATE
 - OPEN - SIDED STRUCTURE
 - TEMPORARY STRUCTURE
 - ARTIFICIAL SLOPE
 - STEP CHANNEL WITH FLOW DIRECTION
 - TREE LOCATION
 - EXISTING TREE CROWN SPREAD
 - TREE PROPOSED TO BE RETAINED
 - TOPOGRAPHIC SURVEY BOUNDARY
 - COMPENSATORY TREE

- ABBREVIATION:**
- BD BOLLARD
 - BN BENCH
 - CA CATCH PIT
 - DP DOWN PIPE
 - EB ELECTRIC BOX
 - EP ELECTRIC POLE
 - FB FLOWER BED
 - FH FIRE HYDRANT
 - FP FOOTPATH
 - G GULLY
 - IL INVERT LEVEL
 - KB KERB BOTTOM
 - L LAMP POST
 - MH MANHOLE
 - MS MANHOLE (STORM WATER)
 - MF MANHOLE (FOUL WATER/SEWER)
 - MT MANHOLE (TELEPHONE)
 - MU MANHOLE, UTILITIES
 - NB NOTICE BOARD
 - PAV PAVEMENT
 - PV PAVILION
 - RS ROAD SIGN
 - SC STEP CHANNEL
 - SB SIGN BOARD
 - SP SIGN POLE
 - T1 TREE NO.
 - TK TELEPHONE KIOSK
 - TL TRAFFIC LIGHT
 - TP TELEPHONE POLE
 - UC U-CHANNEL
 - UTA UNABLE TO ACCESS
 - V VALVE
 - VF VALVE - FIRE
 - VG VALVE - GAS
 - VW VALVE WATER WORKS
 - W WELL
 - WT WATER TAP
 - W.I.P. WORK IN PROGRESS

Revision	Date	Description			Initial
		Designed	Checked	Drawn	

Approved

Contract no.
CE 65/2006 (DS)

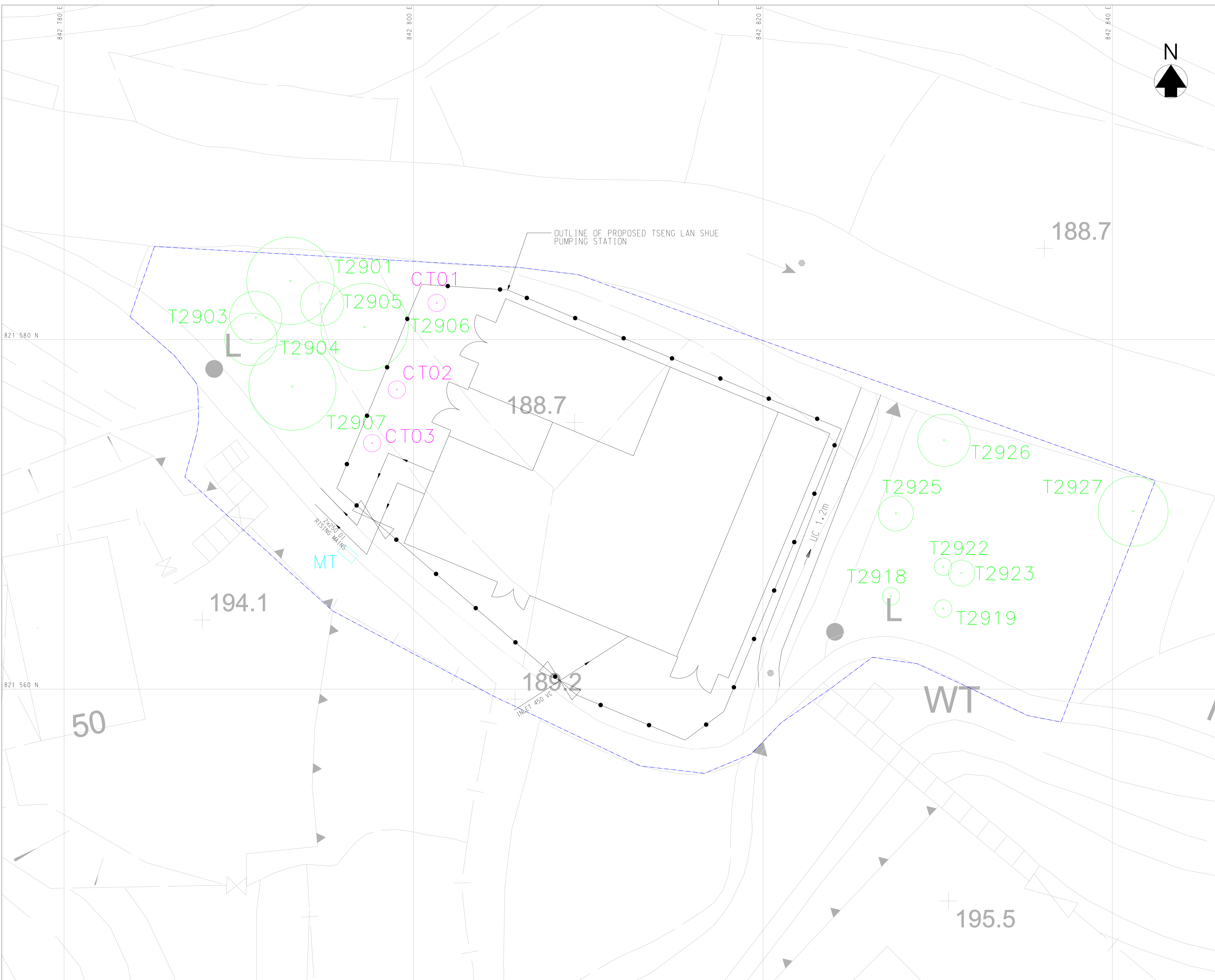
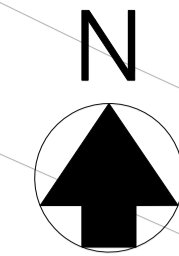
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PORT SHELTER SEWERAGE
STAGE 2 AND STAGE 3
DESIGN AND CONSTRUCTION

Drawing title
COMPENSATORY PLANTING PLAN
(TSENG LAN SHUE)

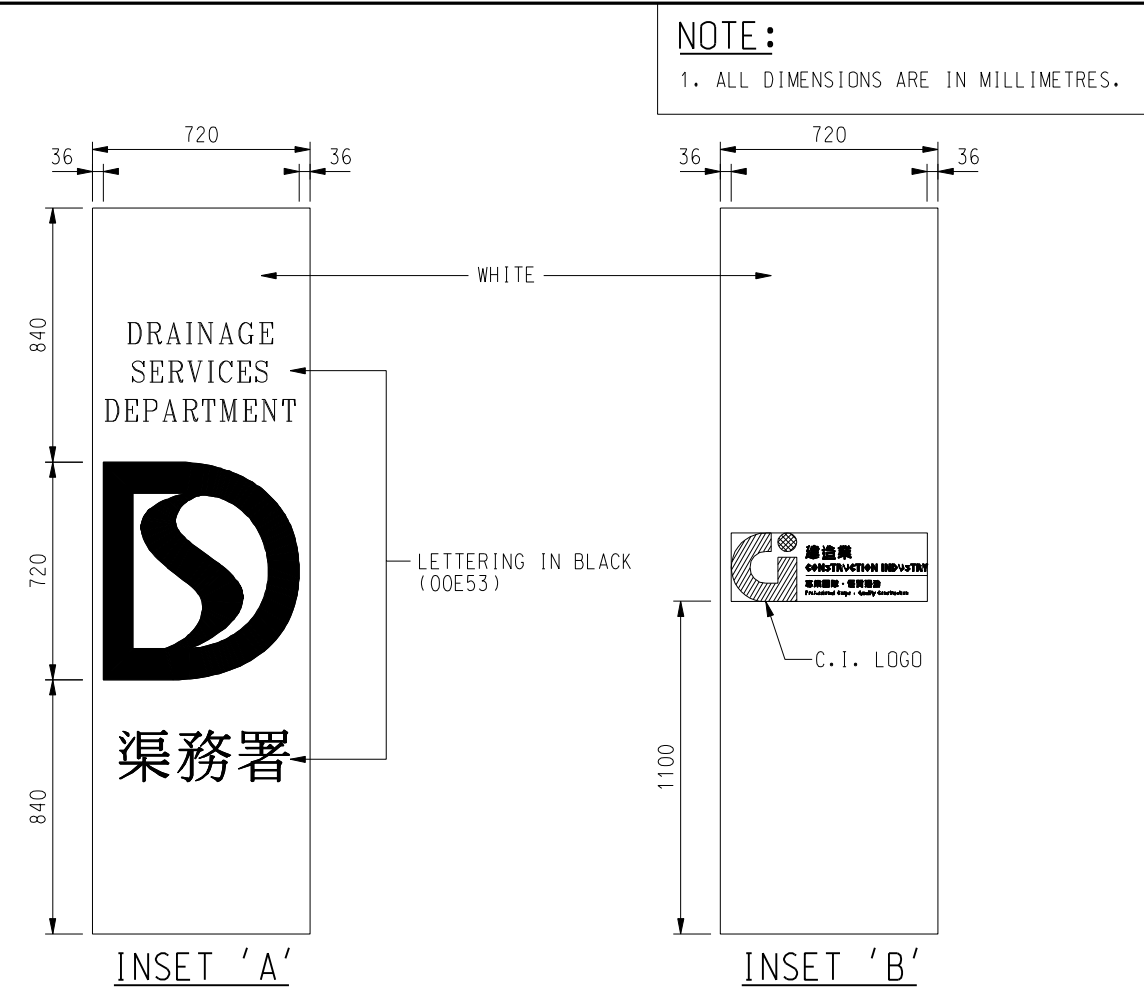
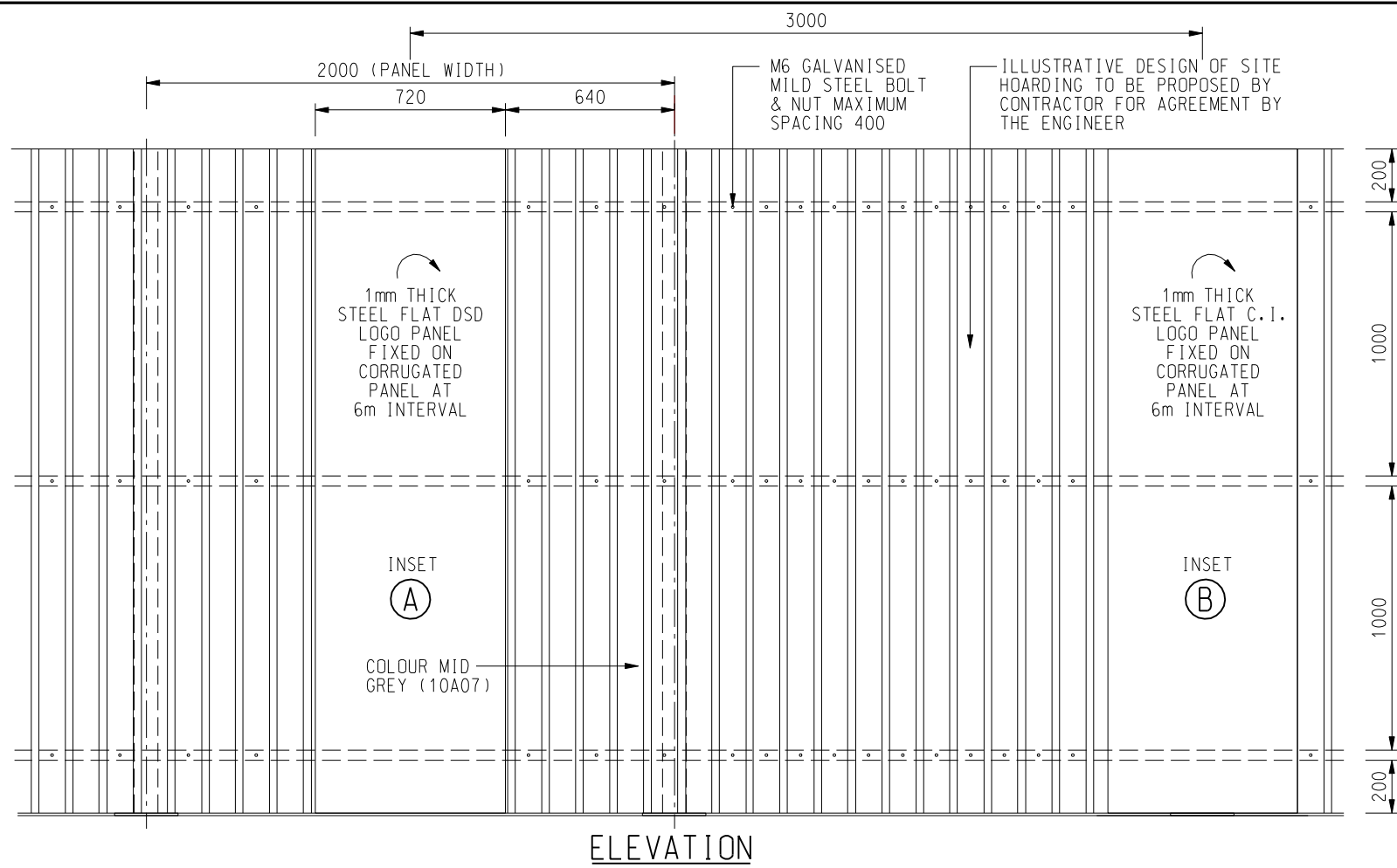
Drawing no.
382770/BVHKL/PS/T/004



Revision
-

Scale
A1 1 : 100
A3 1 : 200



APPENDIX F
Typical Example of Compatible Site Hoarding



Title	PORT SHELTER SEWERAGE STAGE 2 AND STAGE 3 - DESIGN AND CONSTRUCTION		Figure no. FIGURE F1	
	 香港特別行政區政府渠務署 THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION DRAINAGE SERVICES DEPARTMENT		Prepared	Checked
			Date	Scale
 BLACK & VEATCH HONG KONG LIMITED 博威工程顧問有限公司		07/14	A3 1:25	

APPENDIX G

Emergency Storage Calculation

Emergency Storage Calculations

Time	Sewage stored in the emergency storage of SPS (m ³)
18:00	0.0
18:15	0.0
18:30	0.0
18:45	36.3
19:00	70.1
19:15	106.5
19:30	140.1
19:45	185.5
20:00	229.1
20:15	274.5
20:30	323.5
20:45	357.1
21:00	393.0
21:15	305.0
21:30	217.7
21:45	127.0
22:00	36.7
22:15	0.0
22:30	0.0

← Start of emergency event

← delivery of emergency generator

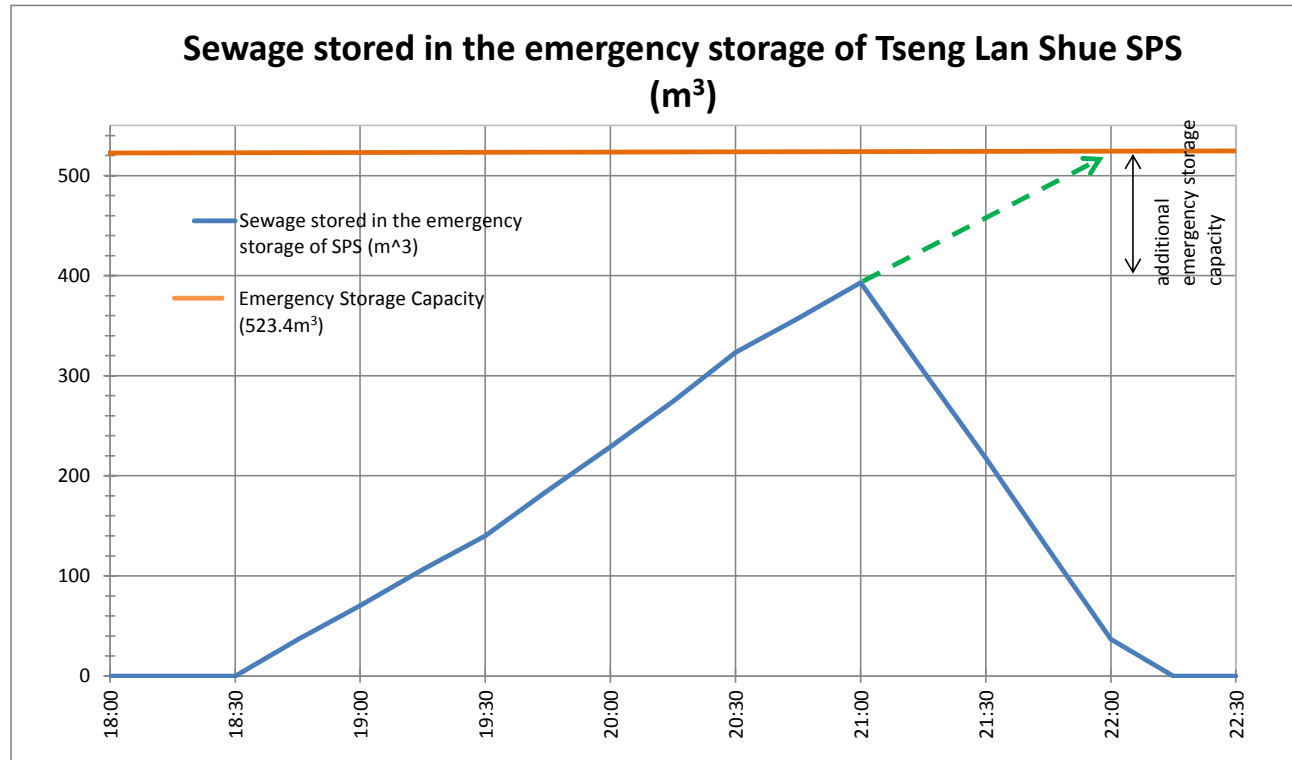
← restoration of SPS

- DSD's emergency team would attend to faults within 30 min. and 2 hours during office hour and non-office hour respectively. The DSD term contractor will deliver an emergency generator to TLS SPS within 2 hours and restoring temporary power at the SPS generally requires < 30 min.

For an emergency event at 6:30pm (the most critical case)

Design Capacity of Tseng Lan Shue = 3337 m³ per day

Sewage flow to TLS SPS during emergency = 1744 m³ per day (with Pak Shek Toi Road SPS and Au Tau SPS stopped)



Therefore, the required volume of the emergency storage = 393.0 m³
 Emergency Storage to be provided = 523.4 m³

Figure G3

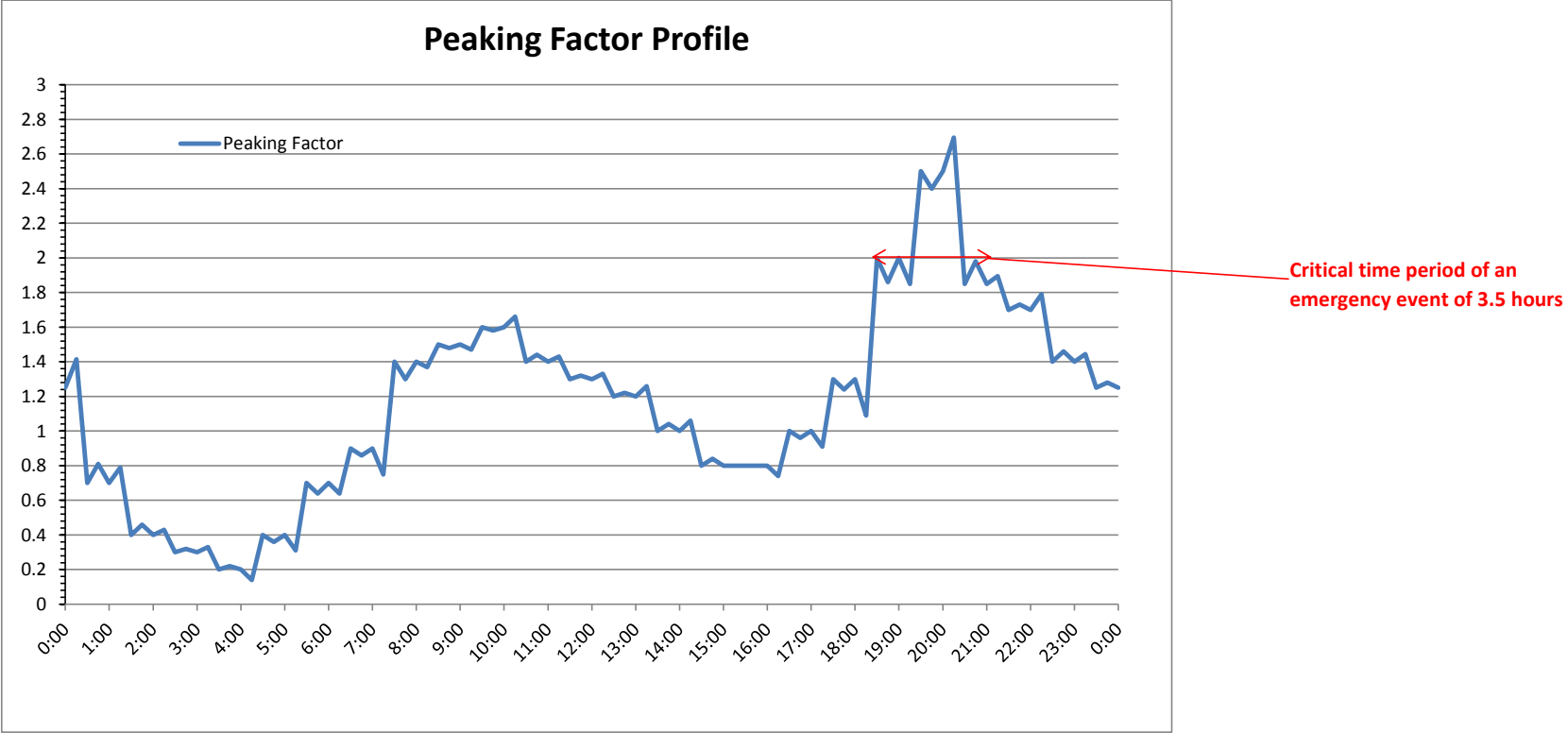


Figure G4

APPENDIX H

Landscape and Visual Impact Assessment Methodology

Landscape Impact Assessment Methodology

1. The assessment of landscape impacts has involved the following procedures:
 - **Identification of the baseline Landscape Resources (LR) and Landscape Character Areas (LCA) found within the study area.** This is achieved by site visit and desktop study of topographical maps, information databases and photographs.
 - **Assessment of the degree of sensitivity of the landscape resources/ landscape character areas.** This is influenced by a number of factors including:
 - quality of landscape resources/characters;
 - importance and rarity of special landscape elements;
 - ability of the landscape resources / character areas to accommodate change;
 - significance of change in local and regional context; and
 - maturity of the landscape.
2. The sensitivity of each landscape resource and character area is classified as follows:

High: Important landscape or landscape resource of particularly distinctive character or high importance, sensitive to relatively small changes.

Medium: Landscape or landscape resource of moderately valued landscape characteristics reasonably tolerant to change.

Low: Landscape or landscape resource of low valued landscape characteristics highly tolerant to change.

 - **Identification of potential sources of landscape impacts.** These are the various elements of the construction works and operation procedures that would generate landscape impacts.
 - **Identification of the magnitude of landscape impacts.** The magnitude of the impact (or magnitude of change) depends on a number of factors including:
 - the physical extent of the impact;
 - compatibility of the project with the surrounding landscape;
 - duration of impacts, i.e. whether it is temporary (short, medium or long term), under construction and operation phases; and;
 - reversibility of change.
3. The magnitude of landscape impacts is classified as follows:

Large: The landscape or landscape resource would suffer major change.

Intermediate: The landscape or landscape resource would suffer moderate change.

Small: The landscape or landscape resource would suffer to slight change.

Negligible: The landscape or landscape resource would suffer no discernible change.

Nil: The landscape or landscape resource would not suffer any change.

 - **Identification of potential landscape mitigation measures.** Mitigation measures may take the form of:
 - adopting alternative design/alignment or revisions to the basic engineering or architectural design to prevent and/or minimize adverse impacts;
 - minimization of works areas, temporary construction;
 - remedial measures such as colour and textural treatment of physical, engineering and building features;
 - compensatory measures such as the implementation of landscape design measures (e.g. tree planting, creation of new open space etc) to compensate for unavoidable adverse impacts and to attempt to generate potentially beneficial long term impacts.
 - **Predicted significance of landscape impacts before and after the implementation of the mitigation measures.** By synthesising the magnitude of the various impacts and the sensitivity of the various landscape resources/ characters it is possible to categorise impacts in a logical, well-reasoned and consistent fashion. *Table G1* shows the rationale for dividing the degree of significance into four thresholds, namely substantial, moderate, slight, and insubstantial, depending on the combination of a large- intermediate- small-negligible magnitude of impact and a high- medium-low degree of sensitivity of landscape resource/character,

Table G1 --- Sensitivity and Magnitude of Change on the Degree of Impact Significance

Magnitude of Impact (Change)	Receptor Sensitivity (of Landscape Resource, Landscape Character Area or Visual Sensitive Receiver (VSR))		
	Low	Medium	High
Large	Moderate	Moderate / Substantial	Substantial
Intermediate	Slight / Moderate	Moderate	Moderate / Substantial
Small	Slight	Slight / Moderate	Moderate
Negligible	Insubstantial	Insubstantial	Insubstantial

Notes:

Substantial: Adverse/beneficial impact where the Project would cause significant deterioration/improvement

Moderate: Adverse/beneficial impact where the Project would cause noticeable deterioration/ improvement

Slight: Adverse/beneficial impact where the Project would cause barely noticeable deterioration/improvement

Insubstantial: The Project would cause no discernible change

- **Prediction of Acceptability of Impacts.** An overall assessment of the acceptability, or otherwise, of the impacts according to the five criteria set out in Annex 10 of the EIAO-TM.

Visual Impact Assessment Methodology

4. The assessment of visual impacts involves the followings:

- **Identification of Zones of Visual Influence (ZVIs) during the construction and operation phase of the project.** This is achieved by site visit and desktop study of topographic maps and photographs, and preparation of cross-section to determine the visibility of the project from various locations.
- **Identification of Visual Sensitive Receivers (VSRs) within the Zone of Visual Influence (ZVIs) at construction and operation phases.** These are the people who would reside within, work within, play within, or travel through, the ZVIs.
- **Assessment of the degree of sensitivity to change of the VSRs.** Factors considered include:
 - the type of VSRs, which is classified according to whether the person is at home, at work, at school, at play, or travelling. Those who view the impact from their homes are considered to be highly sensitive as the attractiveness or otherwise of the outlook from their home will have a substantial effect on their perception of the quality and acceptability of their home environment and their general quality of life. Those who view the impact from their workplace and at school are considered to be only moderately sensitive as the attractiveness or otherwise of the outlook will have a less important, although still material, effect on their perception of their quality of life. The degree to which this applies depends on whether the workplace is industrial, retail or commercial. Those who view the impact whilst taking part in an outdoor leisure activity may display varying sensitivity depending on the type of leisure activity. Those who view the impact whilst travelling on a public thoroughfare will also display varying sensitivity depending on the speed of travel;
 - other factors which are considered (as required by EIAO GN 8/2010) include the value and quality of existing views, the availability and amenity of alternative views, number of VSRs, the minimum viewing distance of VSR, the duration or frequency of view, and the degree of visibility.

5. The sensitivity of VSRs is classified as follows:

High: The VSRs are highly sensitive to any change in their viewing experience.

Medium: The VSRs are moderately sensitive to any change in their viewing experience.

Low: The VSRs are only slightly sensitive to any change in their viewing experience.

- **Identification of relative numbers of VSRs.** This is expressed in term of whether there are few, medium or many VSRs in any one category of VSR.
- **Identification of potential sources of visual impacts.** These are the various elements of the construction works and operation procedures that would generate visual impacts.
- **Assessment of the potential magnitude of visual impacts.** Factors considered include:

- the compatibility with the surrounding landscape;
- the duration of the impacts;
- the scale of the development;
- the reversibility of change;
- the viewing distance; and
- the potential blockage of view.

6. The magnitude of visual impacts is classified as follows:

Large: The VSRs would suffer major change in their viewing experience.

Intermediate: The VSRs would suffer moderate change in their viewing experience.

Small: The VSRs would suffer small change in their viewing experience.

Negligible: The VSRs would suffer no discernible change in their viewing experience.

- **Identification of potential visual mitigation measures.** These may take the form of adopting alternative designs or revisions to the basic engineering and architectural design to prevent and/or minimise adverse impacts, remedial measures such as colour and textural treatment of building features, and tree planting to screen the roads and associated bridge structures. The recommended mitigation measures are provided in *Section 8.9*.
- **Prediction of the significance of visual impacts before and after the implementation of the mitigation measures.** By synthesising the magnitude of the various visual impacts and the sensitivity of the VSRs, and the numbers of VSRs that are affected, it is possible to categorise the degree of significance of the impacts in a logical, well-reasoned and consistent fashion. *Table 8.1* shows the rationale for dividing the degree of significance into four thresholds, namely, insubstantial, slight, moderate and substantial, depending on the combination of a negligible-small-intermediate-large magnitude of impact and a low-medium-high degree of sensitivity of VSRs.
- The significance of visual impacts is categorised as follows:
 - Substantial:** Adverse / beneficial impact where the proposal would cause significant deterioration or improvement in existing visual quality.
 - Moderate:** Adverse / beneficial impact where the proposal would cause noticeable deterioration or improvement in existing visual quality.
 - Slight:** Adverse / beneficial impact where the proposal would cause barely perceptible deterioration or improvement in existing visual quality.
 - Insubstantial:** No discernible change in the existing visual quality.

Residual Impact Assessment Methodology

7. Residual impacts are evaluated by the sensitivity and magnitude of change for both landscape and visual impact assessment after the implementation of proposed mitigation measures. In accordance to Annex 10 of the EIAO-TM, overall assessment of residual landscape and visual impacts for this Project is classified into one of the following five thresholds.

- **Beneficial.** The Project complements the landscape and visual character of its setting and follows the relevant planning objectives. It will improve overall landscape or visual quality.
- **Acceptable.** There are no significant effects on landscape and visual effects caused by this Project.
- **Acceptable with mitigation measures.** There will be some adverse effects that may be eliminated, reduced or offset by specific mitigation measures.
- **Unacceptable.** The adverse effects are considered to be excessive with implemented mitigation measures.
- **Undetermined.** Significant adverse effects are likely but the extent of which they occur or may be mitigated cannot be determined from this study. Further detailed study may be required.