土木工程拓展署
Civil Engineering and Development Department

AGREEMENT NO. NTE/01/2016

Engineering Feasibility Study for the Establishment of an Agricultural Park – Feasibility Study

Report on Preliminary Technical Study (Final)

February 2017

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Document: 673995/61118464
Version: 2

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ABBREVIATIONS

AFCD	Agriculture, Fisheries and Conservation Department
ADWF	Average Dry Weather Flow
ArchSD	Architectural Services Department
Agri-Park	Agricultural Park
CEDD	Civil Engineering and Development Department
DSD	Drainage Services Department
DLO	District Lands Office
DPO	District Planning Office
EPD	Environmental Protection Department
EVA	Emergency Vehicular Access
FEHD	Food and Environmental Hygiene Department
FHB	Food and Health Bureau
FSD	Fire Services Department
GEO	Geotechnical Engineering Office
GFS	Government Flying Service
GI	Ground Investigation
HyD	Highways Department
HKPSG	Hong Kong Planning Standards and Guidelines
KTN/FLN	Kwu Tung North/ Fanling North
LandsD	Lands Department
LCSD	Leisure and Cultural Services Department
MWPMO	Major Works Project Management Office
NDAs	New Development Areas
PGLA	Permanent Government Land Allocation
s16	Section 16 of the Town Planning Ordinance (CAP 131)
TD	Transport Department
TPDM	Transport Planning & Design Manual
WSD	Water Supplies Department
WWR	Waterworks Reserve

1.0 INTRODUCTION

1.1 Study Background

In the 2014 Policy Address, the Government undertook to review its agricultural policy to enhance productivity and promote sustainable agricultural development. As proposed in the consultation document entitled "New Agricultural Policy: Sustainable Agricultural Development in Hong Kong", issued by the FHB and the AFCD in December 2014, the establishment of an Agri-Park is one of the measures to support the policy to take initiative serving as a base for experimenting with new agricultural practices for commercial production and promoting applications of advanced agricultural technology.

The objectives of establishment of an Agri-Park are to:

- facilitate knowledge transfer in agro-technology and agro-business management with a view to enhancing productivity;
- enable researches into, experiment with, and incubation of innovative agricultural practices, from applied agro-technology, production methods to management practices; and
- accommodate eligible farmers displaced by Government development projects, such as KTN/FLN NDAs which are scheduled to be implemented within the same timeframe.

CEDD of the Government of the Hong Kong Special Administrative Region has appointed Halcrow China Limited (HCL) to carry out an engineering feasibility study for the establishment of an Agri-Park. The consultancy services for this Study, Agreement No. NTE/01/2016, commenced on 23 February 2016 for completion in 9 months.

1.2 Report Objectives

The main objectives of this Assignment are to identify the site constraints and key issues of the Agri-Park development and its surrounding that may cause impact or be impacted by the Development and its associated infrastructures, and to confirm the technical feasibility of the identified site for the Agri-Park development.

The objectives of this Study Report are:

- to report the findings as stated in Clauses 6.3.6 to 6.3.36 of the Brief;
- to define the infrastructures and park facilities requirements;
- to report the review findings on the conceptual plan and propose refinements to the preliminary conceptual plan;
- to prepare a preliminary general layout plan of the Agri-Park development; and
- to provide broad assessment and evaluation of impacts in respect of infrastructure and park facility requirements, traffic, drainage, irrigation system, sewerage, water supply, utilities, geotechnical, environmental, heritage and tree preservation of the development.

1.3 Scope of the Report

Following this Introduction, there are ten further sections in this report and they cover the following:

- Section 2.0 provides a general description of the Agri-Park development and the park operational requirements.

- Section 3.0 presents the baseline review findings of the proposed Agri-Park site and discusses the preliminary conceptual plan in respect of the road network. The basic requirements for the park facilities are also discussed.

- Section 4.0 discusses the preliminary traffic review and broad assessment of the traffic impact.

- Section 5.0 discusses the preliminary drainage assessment.

- Section 6.0 discusses the preliminary irrigation assessment.

- Section 7.0 discusses the preliminary sewerage assessment.

- Section 8.0 discusses the preliminary water supply and utilities assessment.

- Section 9.0 discusses the preliminary geotechnical assessment.

- Section 10.0 discusses the preliminary environmental review.

- Section 11.0 summarizes the findings of the relevant preliminary technical assessments and provides recommendations for further works to be carried out in the detailed design stage of the project.

2.0 PROJECT DESCRIPTION

2.1 Development Requirements

2.1.1 An approximately 75 – 80 ha of farmland will be required for crop production in the proposed area. AFCD will be responsible for managing the Agri-Park and provide technical support to farmers operating in the Agri-Park.

2.1.2 The Agri-Park will be demarcated into 3 regions for conventional, organic, floriculture and modern technological farming. **Figure 2.1** illustrates a tentative usage allocation of the Agri-Park.

2.1.3 The infrastructures for the proposed Agri-Park will include the following elements:

i) a public road of 7.3m wide for 2-way traffic with a 2m wide footpath on each side running through the center of the Agri-Park for Phase 1 and Phase 2, and branch roads of 3.5m wide linking various facilities and farms to the public road;

ii) a visitor centre cum management office to house a maximum of 100 visitors, including an exhibition area, a seminar room and a meeting room, and a management office for a maximum of 20 staff, with an associated car park to allow parking of coaches and other vehicles;

iii) park facilities including basic lodging, storage units for Agri-Park tenants and central composting plants; and

iv) provision of associated engineering infrastructures including irrigation, drainage, sewerage, sewage treatment facilities, water supply, electricity and utilities.

2.2 Phasing of Development

2.2.1 As an extensive area of both government and private lands are required for establishment of the Agri-Park, the development is planned to implement in 2 phases. The first phase of the development has aimed to provide about 7.4 ha of farmland, subject to further review, to accommodate displaced farmers who are affected by various government development projects like KTN/FLN NDAs and existing farmers affected by the first phase development in the proposed area. The second phase of the development will cover the remaining portions of the Agri-Park.

2.3 Identification of Potential Site

2.3.1 Existing farmlands or fallow arable lands having water source and access connection will be favorable for the establishment of an Agri-Park.

2.3.2 Given the scale of the Agri-Park development, a potential site in Kwu Tung South was identified to meet its objectives and is considered a relatively suitable location.

2.3.3 The site is accessible from Tsiu Keng Road in the south and the access road leading to Cheung Lek in the east via Fan Kam Road. There are existing van tracks/ village access roads and/ or footways connecting to the farmlands and rural settlement areas. Furthermore, a well-developed irrigation system including water channels and irrigation water pipes, exists to serve the farmlands in the south and west of Tsiu Keng, and area between Tsiu Keng and Cheung Lek.

2.4 Operational Requirements

2.4.1 The Agri-Park will be demarcated into different regions for different farming practices, such as conventional, organic, floriculture and modern technological farming, taking account the topography, operational requirements of different farming operation and the microclimate of different areas within the Agri-Park.

2.4.2 Existing farmers, either being the tenants or land owners, affected by the Agri-Park development would be allowed to continue operation at the same location in the Agri-Park after land acquisition as long as they agree to the terms and conditions of the tenancy of the Agri-Park. The inactive farmlands will be made available for the displaced farmers affected by the KTN/FLN NDAs project and other farmers/ organizations/ entrepreneurial ventures engaged in commercial crop production.

2.4.3 The AFCD will take up the overall management of the proposed site after establishment of an Agri-Park and be responsible for leasing a whole piece of farmland or small plots to the farmers/ applicants.

2.4.4 Farms in the Agri-Park are accessible either via the proposed main/ branch roads or footpaths. The main access road, built to the public road standards, is proposed linking various regions of the Agri-Park from Tsiu Keng Road to the major park facilities. Large farms with high crop production are intended to allocate beside the main access road. Smaller farms located in the far side or near the park boundary can be reached by branch roads/ footpaths linking from the main access road and they will be built to allow motorized village vehicles bringing in farming equipment and bringing out farm produce.

2.4.5 To address the operational needs of farmers, basic lodging and storage facilities in separate building blocks will be provided and allocated to each tenant. Provision of central composting facilities is proposed to recycle food and agricultural waste for production use.

2.4.6 A management office and a visitor centre are needed for management and education/ recreational purposes. It will showcase modern agricultural technology, plant varieties and different production methods and provide information materials on modern and sustainable agriculture, and their contribution to food supply, waste recycling and carbon trapping. Subject to demand, farm visits and guided tours could be organized.

3.0 BASELINE REVIEW

3.1 Information collected for Baseline Review

3.1.1 Search of information from various sources has been carried out since the commencement of this consultancy in February 2016. The information obtained from the relevant Government Departments, maintenance authorities and utility undertakers has been examined and reviewed.

3.1.2 Information provided by CEDD upon commencement of this Consultancy includes the following:

i) Drawing No. CDENORZ0013 – Area of Potential Location of the Agri-Park;

ii) Details of Preliminary Conceptual Plan;

iii) Layout of Preferred Area for the First Phase Development;

iv) Land Status Plans of the Agri-Park;

v) Preliminary Classification of Squatter Structures of the Agri-Park;

vi) Plan of Preliminary Identification of Clustered Structures of the Agri-Park;

vii) Information relating to Irrigation Water Supply of Kwu Tung South;

viii) Plan of Tentative Usage Allocation of the Agri-Park; and

ix) Preliminary Conceptual Plan of the Agri-Park.

3.1.3 A summary of the information search and records received from the relevant government departments and utility undertakers is given in Table 3.1 and Table 3.2 respectively.

Table 3.1: Information collected from Government Departments

Department	Nature of Documents	Remarks
PlanD	Approved Kwu Tung South Outline Zoning Plan No. S/NE-KTS/14 with Explanatory Statements	Files received from CEDD on 2/3/2016.
Land Information Centre, Survey and Mapping Office, LandsD via CEDD	Digital Maps of various scales in DGN and ArcInfoExport (E00) format and LiDAR data	Files received on 11/3/2016.
AFCD	Model Files and Field Survey Photos of Squatters	Received via e-mails in March & April 2016.
HyD/ MW	Layout Plan of Fan Kam Road Improvement	Received via e-mail of 17 March 2016.
DLO	PGLA No. DN532 to LCSD for Sitting-out Area at Cheung Lek – Allocation Plan No. DN9860-D	Revised via CEDD's e-mail of 6 April 2016.
DLO	Simplified Temporary Land Allocation No. GLA-TDN 2945 to LCSD at Cheung	Revised via CEDD's e-mail of 29 April 2016.

Department	Nature of Documents	Remarks
	Lek for 6 months starting from 19 April 2016	
LandsD	Plan showing the VE boundary of Tsiu Keng, Cheung Lek and Chan Uk Po (the boundary is indicative only)	Received via CEDD's e-mail of 14 April 2016.
LandsD	Latest records of Small House Applications for Tsiu Keng and Cheung Lek – approved and under processing	Received via CEDD's e-mail of 3 May 2016.
PlanD/DPO	Approved s16 planning applications for small houses	Received via e-mail of 3 May 2016.

Table 3.2: Information obtained from Utility Undertakers / Authorities

Utility Undertakers / Government Department	Type of Utilities	Status
HyD	As-built records of exclusive road drains at Tsiu Keng Road	HyD's Letter ref (0XWYG) in HyD NT/13-9/1/4-N dated 28 July 2016.
DSD/Mainland North Division	Drainage and Sewerage Plans	DSD's Letter ref (000HPZ) in MN 12/N/16/0 dated 9 Mar 2016.
CLP Power Hong Kong Limited	Records of underground cables and overhead lines	CLP's Letter ref N-2016-0315 dated 16 Mar 2016.
PCCW- HKT Ltd	Records of telephone cables and draw pits	HKT's Letter ref FS/NT/OPS/RW/FLG015/16/ KKC dated 15 Mar 2016.
HK & China Gas Co Ltd	No gas pipe records within the site	HKCG's Letter ref UNE2016/00714/N dated 24 Mar 2016.
WSD/NTE (Fanling and Sheung Shui)	Records of water supply facilities	WSD's Letter ref (8) in WSD/NTE 3050/1/34/2015 Pt. 1 dated 24 Mar 2016.
HyD/Lighting Division	Records of public lighting installation	HyD/Lighting's Letter ref (29) in HyD LTG/15-3/6/6(5) dated 1 Apr 2016.
Hutchison Global Communication Ltd	Records of aerial fibre cable	HGC's Letter ref RW/SHS/16/0275(N) dated 12 April 2016.
Others (HK Broadband, New World, Wharf T&T, HK Cable TV)	Assume no facilities within the site	No reply.

3.1.4 Some aerial photographs of the site were taken on 25 May 2016 through the GFS flight arrangement organized by the AFCD.

3.2 Existing Land Use

3.2.1 The site is located in an area flanked by Ki Lun Shan to the west and Kai Kung Leng to the south, on a piece of fertile flat land. The potential site for establishing the Agri-Park mainly falls within an area zoned "Agriculture" ("AGR") and "Green Belt" ("GB") with a minor portion within an area shown as "Road" on the approved Kwu Tung South Outline Zoning Plan (OZP) No. S/NE-KTS/14, enclosed in **Appendix A1**. A sketch showing the zoning boundary and the proposed Agri-Park site is also enclosed. Sheung Yue River, the upstream named as Tam Shui Hang, runs through the site from south to north.

3.2.2 The area is a traditional vegetable growing area and remains relatively unspoiled. Some agricultural land is under active farming, but a large portion of the area has remained inactive. There are some essential existing agricultural infrastructures including access footpaths, irrigation channels, and a vegetable collection depot remained largely intact and operational.

3.2.3 According to AFCD's initial investigation in 2014/2015, the proposed site has some 67 ha of agricultural land and some 13 ha of land for non-agricultural uses.

3.2.4 There are several recognized villages in the vicinity of the proposed site, namely Cheung Lek, Chan Uk Po and Tsiu Keng (Pang Uk, Lo Wai and San Wai). The proposed site should not encroach onto the "Village Type Development" zone enclosing these recognized villages.

3.2.5 The majority of the Agri-Park lies within the "AGR" zone and a small portion in the southwest falls within the "Green Belt" zone. It is noted that the "GB" zone adjacent to Ki Lun Shan is a permitted burial ground for indigenous villagers and a vegetated area with mature woodland on the southern part of the proposed site lies next to Lam Tsuen Country Park. These areas of the "GB" zone should be preserved and will not be included into the Agri-Park boundary.

3.2.6 There are existing graves/ urns and shrines observed/ identified either on government or private lands in the vicinity of the proposed site. This will be one of the considerations in defining the boundary of the Agri-Park. Based on our desktop study or site inspections, a few graves/ urns/ shrines are identified within the proposed site. A summary record list and a plan illustrating the current conditions of the site shown with the location of existing graves/ urns/ shrines are enclosed in **Appendix A**.

3.2.7 There is a significant number of squatter structures scattering or clustering all over the proposed site. It is anticipated that certain groups of squatters, especially those located in areas with low potential for agricultural rehabilitation, are to be retained in their original locations, if technically and operationally feasible, in order to minimize disturbance to the local residents.

3.2.8 According to the initial investigation merely by observation, conducted by the AFCD in 2014/2015, about some 750 squatter structures were identified in the potential site, including those situated on private lots within the "village environs"("VE") but excluding all New Territories Exempted Small Houses.

3.2.9 There is a 10m waterworks reserve (WWR) for the Dongjiang watermain alongside Fan Kam Road and it lies across the southern portion of the proposed site. A minimum clearance of 5m should be provided for future maintenance.

3.3 Planned Land Use

3.3.1 The "AGR" zone in Kwu Tung South is intended primarily to retain and safeguard good quality agricultural land for farming purposes. It is also intended to retain fallow arable land with good potential for farming rehabilitation and other agricultural purposes. AFCD has considered that the actively cultivated agricultural land within Kwu Tung South is worthy of preservation. The areas south of Cheung Lek and Tsiu Keng are classified as good agricultural land with proper access to support crop farming activities.

3.3.2 The "V" zone is intended to concentrate village type development within it for a more orderly development pattern, efficient use of land and provision of infrastructures and services. Land within this zone is primarily intended for development of Small Houses by indigenous villagers. The boundaries of the "V" zones were drawn up on the OZP taking account of the existing village 'environs', outstanding Small House applications, Small House demand forecast, etc.

3.3.3 The planning intention of "GB" zone is to preserve existing natural features and to provide passive recreational outlets for the local population and visitors. The agricultural use is always permitted.

3.3.4 Based on the approved OZP, a small portion of land in the south of the proposed site falls within the reserved area for Widening of Fan Kam Road project being managed by Highways Department. A plan showing the latest road layout and site limit, subject to change during design development, was obtained from HyD (enclosed as **Appendix A6**). The re-alignment option requiring a small portion of area at the south-eastern section of Kwu Tung South, shown as 'Road' on the OZP for possible widening of the Fan Kam Road has been ruled out during the Feasibility Study stage. As confirmed by HyD, the marked area on the approved OZP (No. S/NE-KTS/14), enclosed in Appendix A, is no longer required. A layout plan showing the road widening of Fan Kam Road is also enclosed in Appendix A. The existing Fan Kam Road will be upgraded to a standard single lane two-way carriageway of 7.3m wide.

3.3.5 A list of the approved Small House Applications and s16 planning applications was obtained from LandsD and PlanD respectively. The relevant lists are enclosed in **Appendix B**, and these approved private lots have been excluded from the Agri-Park. It is noted that the permission of each s16 planning application will be valid until a specified date. After the date, the permission shall cease to have effect unless before the date either the development permit is commenced (e.g. by execution of land grant/building license) or the permission is renewed. The status of these Lots will be taken into account when determining whether individual sites should be included or excluded from the proposed Agri-Park boundary or not.

3.4 Topography

3.4.1 The proposed Agri-Park lies on a relatively unspoiled fertile flat land east of Ki Lun Shan and adjacent to Tam Shui Hang, eventually joined Sheung Yue River (River Beas) in the north, running from upland in the south.

3.4.2 The land close to Tsiu Keng is at level in the range of +27.9 mPD to +24.4 mPD and the part of area near Cheung Lek is at level in the range of +20.1 mPD to +12.4 mPD from west to east. The lowest level of the site is at +10.4 mPD in the north.

3.4.3 There is a number of streams intercepting surface water from the natural terrain in the south/ west and running across the proposed site towards Tam Shui Hang/ Sheung Yue River. The main water source for irrigation comes from the streams and Tam Shui Hang.

3.4.4 An isolated knoll with highest level at +33.2 mPD is located in the southwest of Cheung Lek, just outside the Agri-Park site.

3.4.5 Overall 29 registered geotechnical features of height ranging from 3.0m to 5.0m with an angle of 30° to 65° are identified in the vicinity of the site. Amongst the identified features, there are 12 nos. within the Agri-Park.

3.4.6 Above all, the geographical features in Kwu Tung South having good water source and existing irrigation system are favorable for establishment of an Agri-Park. Steep sloping grounds and knoll will not be selected as it would be difficult to channel irrigation water from flat land to a higher level.

3.5 Land Status

3.5.1 Based on the land status plans collected from LandsD, a large number of private lots and some government lands fall within the proposed site.

3.5.2 It is noted that some private lots under s.16 planning applications but not yet approved are located within the proposed site. These private lots could be considered for inclusion in the Agri-Park boundary as the application site is located on area zoned "Agriculture" and the existing fallow farmlands at there have high potential for agricultural rehabilitation.

3.5.3 The land requirements of the Agri-Park development are discussed in the Report on Land Requirement Study under separate submission.

3.6 Findings of Baseline Review

Development/ Infrastructure Projects under Planning/ Construction

3.6.1 A search for current planning applications in the vicinity of the Agri-Park has indicated that there are two applications as listed below:

i) a s12A application, Application No. Y/NE-KTS/7 for rezoning from "AGR" to "Residential (Group C) 6" at various Lots in D.D. 100 and D.D. 108, located west of Tsiu Keng within the proposed location for Agri-Park; and
ii) a s12A application, Application No. Y/NE-KTS/10 for rezoning from "AGR" to "Residential (Group C) 6" at various Lots in D.D. 100, located to the immediate east of and outside the proposed location for Agri-Park.

The above applications are ongoing and have not been approved by the Town Planning Board.

3.6.2 The private lots with approved Small House Application will not be included in the Agri-Park development.

Traffic and Transport Conditions

3.6.3 The existing road network in the vicinity of the proposed Agri-Park is shown in **Figure 3.1**. The major road access to the site is via Fanling Highway to Fan Kam Road, from where entering the proposed Agri-Park area via Tsiu Keng Road and the village access road leading to Cheung Lek. The road width of Tsiu Keng Road varies from 3.5m to 7.3m near its junction with Fan Kam Road. It is observed that vehicles longer than 10m are not allowed to enter Tsiu Keng Road from Fan Kam Road.

3.6.4 There are Kowloon Motor Bus (KMB) and Green Minibus (GMB) services running along Fan Kam Road, as summarized in Table 3.3.

Table 3.3: Existing Public Transport Services

Route	Origin – Destination
KMB Route No. 77K	Sheung Shui Station – Yuen Long
GMB Route No. 57K	Sheung Shui Station – Tong Kung Leng
GMB Route No. 57K*	Sheung Shui Station – Tsiu Keng

* Time specific service

Accessibility/ Connectivity

3.6.5 Access to the villages and squatters in the vicinity of the Agri-Park site is by means of existing footways and van tracks.

3.6.6 There is an existing access winding through the site to an unnamed road near Ki Lun Tsuen Public Toilet, at the west of Sheung Yue River, via the access road leading to Cheung Lek and the connecting van tracks.

3.6.7 Cheung Lek Road is a single lane carriageway of about 3m wide with no footpath. There are no sharp bends and limited traffic along the 1.2km long access from Fan Kam Road to the site.

3.6.8 Other than the access from Fan kam Road, from the west through San Tin Highway, there is an existing village road connecting Kwu Tong Road to northwest corner of the site. The access road is about 2.5km long, single lane carriageway of about 3m wide without footpath. Generally there are no sharp bend and steep section along this road. The possible routing will be investigated in the detailed design stage.

Geotechnical Conditions

3.6.9 The identified man-made registered slopes within the Agri-Park are of height ranging from 3.0m to 5.0m with an angle of 30° to 50°. There are not many records of boreholes located in the vicinity of the Agri-Park site.

3.6.10 Two natural terrain catchments (Catchment Nos.: 2SE-D/DF17 & 2SE-D/DF18) are identified at the west of the site. A preliminary assessment has been checked in accordance with GEO Report NO. 138, Guidelines for Natural Terrain Hazard Studies (Ho et al., 2016) and is

discussed in Section 9. The purpose of the review is to identify and assess whether the natural hillsides pose potential natural terrain landslide hazard on the development in general.

Environmental Conditions

3.6.11 The proposed site is located in Kwu Tung South of the North District on a flat land, which is edged by Tam Shui Hang/ Sheung Yue River and lies to the west of Hong Kong Golf Club and Fuk Tsuen Shan. Lands of "GB", "V' and "AGR" zoning lie between the Agri-Park and the Hong Kong Golf Club.

3.6.12 As reflected in the land use zoning, residential development will generally be contained in areas that are in close proximity to Fanling Highway. Existing recognized villages are designated for village type development so as to preserve the rural characters of these villages. Those areas adjacent to Ki Lun Shan and Hong Kong Golf Club are considered of high recreational and/ or landscape values.

3.6.13 The proposed site is mainly rural in character with flat agricultural land intermixed with a number of recognized villages nearby the Agri-Park development, they are Cheung Lek, Chan Uk Po, Tsiu Keng Lo Wai, Tsiu Keng Pang Uk and Tsiu Keng San Wai. The nearest village type developments are at around 200m ~ 300m east of Sheung Yue River near Hang Tau and Chan Uk Po, and the nearest low-rise residential developments are at around 500m in the east of Fan Kam Road.

3.6.14 **Figure 3.2** shows the study zone of the development for noise and air quality. The area is rural in nature and is characterised by low-rise/village type houses. Background noise in the vicinity is of typical rural environment. No air pollution sources are identified in the proposed site. According to the "River Water Quality in Hong Kong in 2015" published by EPD, the water quality of River Beas (RB1) is graded as "good" and achieved 90% in terms of Water Quality Objectives compliance. The river water quality is somehow affected by pollution from unsewered villages in the catchment. Key environmental considerations include noise, waste, air quality and water quality during the operation and construction phases.

Landscape Character

3.6.15 The proposed site of Agri-Park located by Tam Shui Hang/ River Beas is of lowland rural landscape. Small patches of dense vegetation are identified at various locations. Existing trees are found to be of common species and none of them are registered Old Valuable Trees. In general, the Agri-Park development will not change the current land use of the area for agriculture. Basic infrastructure and park facilities will be constructed to serve the tenants of the Agri-Park. Mature trees found on site are to be preserved as far as practicable and if unavoidably affected, a compensatory planting proposal will be required. It is envisaged that there should not be any significant changes to the landscape character of the proposed site during the operation and construction phases.

Cultural Heritage

3.6.16 A desk-based search was undertaken on the relevant declared monuments, proposed monuments, graded historic sites and buildings, proposed graded historic sites and buildings, new items in addition to 1,444 historic buildings, sites of archaeological interest and government historic sites in the North District as identified by the Antiquities and Monuments

Office (AMO). None of these historic sites and buildings is located within the Agri-Park site. The heritage impact is discussed in Section 10.

Drainage and Sewerage

3.6.17 According to the record plans collected from DSD, there is no sewage network in the vicinity of the Agri-Park development.

3.6.18 Rainwater is collected by surface channels and culverts, from which directly discharged to Tam Shui Hang/ Sheung Yue River. A road carrier drainage system is identified along Tsiu Keng Road with surface channels alongside. Tam Shui Hang/ Sheung Yue River has been upgraded to a trapezoidal channel of 21 ~ 28m wide. The drainage and sewerage assessments are discussed in Sections 5 and 7 respectively.

3.6.19 Tam Shui Hang /Sheung Yue River (River Beas) are the main watercourse designed under the Land Drainage Ordinance (Cap. 446). In accordance with Section 26 of this Ordinance, no person shall, without the consent in writing of the Drainage Authority, carry out any engineering work or filling or erect any dam, weir, culvert or other like obstruction in any main watercourse impending its flow. Consent of DSD should be sought in advance for any engineering works in Tam Shui Hang for the Agri-Park.

3.7 Review of Conceptual Plan

3.7.1 The preliminary conceptual plan and detailed description of the preliminary conceptual plan of the Agri-Park, provided by AFCD, is enclosed in **Appendix A**. Discussion on the details of the preliminary conceptual plan is enclosed as **Appendix A4**. It has been reviewed with reference to the collected information as listed in Table 3.1 and Table 3.2. Details of the preliminary assessment of various engineering aspects such as traffic and transport, drainage, irrigation, sewerage, water supply and utilities are discussed in Sections 4 to 8. Review of the road network is discussed below and that the visitor centre cum management office and basic lodging and storage units are discussed in Sections 3.8 and 3.9 respectively.

Road Network

3.7.2 The Agri-Park development is accessible from Fan Kam Road via Tsiu Keng Road in the southeast and the access road leading to Cheung Lek in the middle of the Agri-Park. There are local van tracks/ footpaths connecting from Cheung Lek to Ki Lun Tsuen in the northwest and to the permitted burial ground for indigenous villagers within the "Green Belt" zone in the southwest of the site.

3.7.3 There are also existing access roads/ footpaths linking from Tsiu Keng Road to the western side of the site and Chan Uk Po at the east, as shown in **Figure 3.1**.

3.7.4 The proposed main road, is preferable to be located in the central location of the Agri-Park passing through the 3 major regions, namely Region A for existing and displaced farms, Region B for intensive and non-organic production area and Region C for organic farming area, rather than alongside the park boundary as shown on the preliminary conceptual plan enclosed as **Appendix A3**. The proposed main road will be designed to a public road standard for a single

lane 2-way carriageway of 7.3m wide with a 2 m wide footpath on each side to serve the tenants of the park as well as the local villagers /residents.

3.7.5 The branch roads of 3.5m wide linking various facilities and farms to the main road may follow the existing van tracks or footpaths, which could be upgraded to form part of the branch road, such that disturbance to the surrounding could be minimized. Access to the middle of farmland or fringe area of the Agri-Park could be accessed either via the existing footways/ van tracks or new branch roads as appropriate. The proposed network of the main road is shown on **Figure 3.3**. The design and layout of the proposed branch roads linking up to the main road will be reviewed during the detailed design stage of the project.

3.7.6 The branch road/ footways will be built to allow motorized village vehicles for daily farming operation. The overall length and width of motorized vehicles shall not exceed 3.2m and 1.2m respectively following the requirement of the Road Traffic (Village Vehicles) Regulations.

3.7.7 Requirements of the park facilities have been reviewed and are discussed in the following sub-sections. The basic lodging and storage units, composting plants and other park facilities will be easily accessible if they are located beside Tsiu Keng Road or the main access road. Moreover, new utility installation can be planned along the main access road to facilitate future maintenance. **Figure 3.3** is a preliminary layout plan of the Agri-Park showing the proposed location of the park facilities.

3.7.8 As the Agri-Park is located immediate next to various villages and clustered settlements, it is suggested to demarcate the Agri-Park boundary next to these areas. Use of some kind of symbolic indication of the boundary, such as barbed wire fencing of 3m high with galvanized steel angle or hollow post support (photo of some examples below), is recommended.

Photos of Barbed Wire Fencing

3.8 Proposed Requirements for Management Office and Visitor Centre

3.8.1 A building complex is to be designed to house the visitor centre and management office to accommodate a maximum number of 100 visitors and 20 on-site staff respectively.

3.8.2 As there is no standard set out in the Hong Kong Planning Standards and Guidelines (HKPSG) for the type of facility to be provided in the Agri-Park, the schedule of accommodation is

proposed, with reference to the project planning data of community services, and tabulated in Table 3.4.

Table 3.4: Proposed Schedule of Accommodation for Agri-Park Building Complex

	Type	Net Operational Floor Area (m^2)	Outdoor Open Area (m^2)
1.	Visitor Centre		
a)	Entrance Hall & Waiting Area	100	-
b)	Exhibition Hall	600	-
c)	Seminar Room	60	-
d)	Activity Room	120	-
e)	Education / Library Corner	60	-
f)	Outdoor Display Area	-	200
g)	Resting Area	30	-
	Subtotal	970	200
2.	Management Office		
a)	Reception Area	10	
b)	Meeting / Interview Room	15	
c)	Staff Office	150	
d)	Pantry	5	
	Subtotal	180	-
3	Common Facilities		
a)	Storage Room	50	-
b)	Landscape /Sitting-out Area	-	200
c)	Toilet	To be provided in accordance with the Building (Standards of Sanitary Fitments, Plumbing, drainage Works and Latrines) Regulations	
d)	Plant Room /Stairs/Corridor	To be provided in accordance with the Building Regulations	
	Subtotal	50	200
	Total Area	1,200	400

3.8.3 The schematic layout of the visitor centre cum management office is shown in **Figure 3.5**, subject to review in the detailed design stage. The proposed building is to be 2-storey high with a total floor area of 1,720 m^2 including the common area such as toilet, plant room, corridor and stairs. The required operational floor area will be subject to the end user's needs.

3.8.4 The proposed car park is preferable to be located next to the building complex and a drop-off area is to be provided in front of the building. The basic parking space requirements, with reference to the Hong Kong Planning Standards and Guidelines (HKPSG), are summarized in Table 3.5.

Table 3.5: Basic Parking Space Requirements

	Type of Vehicle Parking	Size	Provision Ratio	No. of Parking Bays
1.	Coaches / Light Goods Vehicle	12m (L) X 3.5m (W)		4
2.	Private Car for Visitors	5m (L) x 2.5m (W)	1 every 10	10
3.	Private Car for Staff	5m (L) x 2.5m (W)	1 every 3	7
4.	Accessible Car Parking Space	5m (L) x 3.5m (W)	1 every 50 parking space *	1
			Total	22

* Table 11 of HKPSG Parking for persons with disabilities

3.8.5 In connection with the above requirements, a total car park area of minimum 800 m^2, including space for turning and maneuvering movement, is required. The parking space shall allow access to the building complex in accordance with the Code of Practice for Provision of Means of Escape in case of Fire.

3.8.6 A tentative layout of the proposed car park at Tsiu Keng Road is shown in **Figure 3.4**. This should be located further away from its junction with Fan Kam Road to avoid causing traffic disruption to the main flow on Fan Kam Road.

3.9 Proposed Requirements for Basic Lodging and Storage Facilities

3.9.1 An area of 1 hectare is assumed per farm in the planned Regions B and C where most of the tenants will be engaging in commercial crop production adopting modern agricultural technology. In the planned Region A, the expected farm size is smaller in scale for traditional farming and around 3 to 4 farms per hectare is assumed. On the basic of this assumption, the Agri-Park development of 75~80 ha farmland is expected to accommodate around 200 tenants.

3.9.2 A total of forty 2-storey building blocks of around 700 square feet usable floor area and 3 units per floor are tentatively planned. There will be a total of 240 lodging units of around 230 square feet each provided. The number of storeys will be subject to review during the detailed design stage. Table 3.6 summarizes the design requirements for basic lodging and storage facilities.

3.9.3 In considering the qualification criteria for a lodging unit, a farm area threshold of 0.2 ha (equivalent to about 3 dau chung, which is the average farm size in HK) will be set as the minimum requirement for allocation of a lodging unit. It is considered that a vegetable farm with an area less than 0.2 ha does not require prolonged maintenance periods on a daily basis and "around-the-clock" farming operation does not apply. Instead of a lodging unit, a storage unit will be allocated to the tenants operating a farm area smaller than 0.2 ha. On the other hand, Agri-Park tenants operating a farm at or above 0.2 ha will be assigned with one basic lodging unit and one storage unit to facilitate the farming operation. In general, the basic lodging and storage facilities are intended to provide tenants with short-term resting places and for storage of farm tools in supporting their daily farming operation. As such, the lodging facilities are not for residential purpose.

Table 3.6: Design Requirements for Basic Lodging and Storage Facilities

Location	Tentative Area (ha)	No. of Lodging Units (Each 230 ft^2 or 21.4m^2)	No. of Storage Unit (Each 60 ft^2 or 5.6 m^2)
Region A* for Existing and Displaced Farms	45	180	240
Region B for Intensive Production Farms	12	24	32
Region C for Organic Production Farms	18	36	48
Total	75	240	320

* 24 lodging units and 20 storage units will be provided in Region A for Phase 1 development.

3.9.4 It is anticipated that Agri-Park tenants might store farming machinery and flammable fuel in the provided storage units. In view of the possible hazard associated with the storage of dangerous goods in the same building, it is proposed to construct and provide storage rooms in separate building blocks.

3.9.5 Each lodging unit shall be a self-contained flat containing a simple kitchen sink & cooking top and bathroom. The basic sanitary fitments will be provided in accordance with the current standards. Power and water supply to each unit will be made available.

3.9.6 The basic lodging facilities provided in the Agri-Park will be of village housing design to integrate with the surrounding rural living environment. It is considered that the fire safety requirements for New Territories Exempted Houses (NTEH) shall be adopted. Based on "A Guide to Fire Safety Requirements" June 2006 (Revised edition) issued by Lands Department, the Emergency Vehicular Assess (EVA) requirements are as follows:

(i) there should be a vehicular access to allow emergency vehicles to reach within 30 metres from the NTEH;

(ii) such access, serving as an EVA, should be not less than 4.5m in width, or of a less width acceptable to FSD;

(iii) a standard pedestal type fire hydrant should be made available within 100 m of the proposed NTEH;

(iv) turning space for fire appliances will be allowed at all dead-end EVA.

3.9.7 The foul water from the buildings will be connected to the proposed sewer pipes which connect to the nearest sewage treatment plant inside the Agri-Park. The rainwater collection system will be installed to collect surface water and conveyed rainwater to the surface/ irrigation channels or storage tanks for irrigation as needed.

3.9.8 The storage facilities will be in the form of reinforced concrete or steel shed structures containing compartments of around 60 ft^2 or 5.6 m^2. The number of stores to be provided in each region is shown in Table 3.6. These stores will be located close to the farmland to facilitate their daily farming operation.

4.0 TRAFFIC IMPACT

4.1 Existing Traffic Conditions

4.1.1 At present, the Agri-Park site can be accessed from Fan Kam Road to Tsiu Keng Road via the priority junction of Fan Kam Road and Tsiu Keng Road at the southern end of the site. Tsiu Keng Road is currently restricted to vehicles not longer than 10m in length. It is a single track access road of width ranging from 3.5m to 4m provided with passing places/ lay-bys and del-cul-sac at its road end. The existing road network in the vicinity of the proposed Agri-Park is shown in **Figure 3.1**.

4.1.2 The section of Fan Kam Road in the vicinity of the Agri-Park is a single-two lane road and classified as a Rural Road. At present, as indicated in Station 6216 of the 2015 Annual Traffic Census (ATC), the road carries around 6,000-7,000 vehicles per day in each direction with a peak hour flow of around 440-460 vehicles per direction on weekdays and weekends, reduced to around 200-300 vehicles on Sundays.

4.1.3 Tsiu Keng Road is a local access road which provide accesses to the various local settlements in the area such as Tsiu Keng Lo Wai, Pang Uk and San Wai in the southern section and Chan Uk Po in the eastern section of the Site. The road connects with Hang Tau Road leading to Cheung Lek at the northern section of the Site via the local access roads in the midst of the Site. Based on the traffic count survey undertaken on 25 October 2016 (Tuesday, weekday), Tsiu Keng Road carries around 50 vehicles per direction during the AM and PM peak hours on a weekday.

4.1.4 There is one franchised bus service (Route No. 77K) and one GMB service (Route No. 57K) running on Fan Kam Road, with a scheduled frequency of around 20 min. and 8 to 18min. respectively during day time periods. The current public transport services to the proposed site are summarized in Table 4.1.

Table 4.1: Current Public Transport Services to the Proposed Agri-Park

Route	Origin – Destination	Frequency (during day time)
KMB Route No. 77K	Sheung Shui Station – Yuen Long	20 min.
GMB Route No. 57K	Sheung Shui Station – Tong Kung Leng	8 – 18 min.
GMB Route No. 57K*	Sheung Shui Station – Tsiu Keng	

* Time specific service

4.2 Development Traffic

4.2.1 The estimation of the development traffic to be generated by the Site has taken into account the anticipated number of farm workers and visitors to the Site, as confirmed by AFCD, is summarized below:

(a) Total 520 farm workers

Region A: 170 Tenants (around 0.3 ha farmland per tenant)

Assume 2 workers per tenant, no. of workers = 340 farm workers

Regions B & C: 30 Tenants (around 1.0 ha farmland per tenant)
Assume 6 workers per tenant, no. of workers= 180 farm workers

(b) 20 AFCD staff

(c) Around 500 visitors per day by appointment.

4.2.2 Since there is lack of existing development similar to the proposed Agri-Park, conservative assumptions are adopted in this traffic review. While in general farmland activities start in early morning, to provide conservative estimates, it is assumed that 50% of the workers employed by the tenants and staff would be travelling to/ from the Site during the AM and PM commuter peak hours on a normal weekday, which are 0800-1000 and 1700-1900 respectively. It is also assumed that 30% of the 500 daily visitors would access the Site during commuter peak hours although in general visitors are expected to visit the Agri-Park in the middle of the day, during the non-peak hours. As a result, around 430 person trips are anticipated during the peak hours as summarized in Table 4.2.

Table 4.2: Estimated Peak Hour Development Traffic

	Total No.	Peak hour person trips		Car/Taxi		Public Transport		Coach	
Farmland workers	520	50%	260	20%	52	80%	208	-	
AFCD Staff	20	100%	20	35%	7	65%	13	-	
Visitors	500	30%	150	10%	15	40%	60	50%	75
Total	1,040	-	430	-	74	-	281	-	75

4.2.3 Table 4.2 also describes the assumed modal split taking into account the proposed parking provisions within the Site and the public transport services in the area. Similar to the general public in Hong Kong in which nearly 90% of the commuters adopt public transport modes, it is assumed 80% of the work force in the Site would take public transport and the remaining 20% is assumed to take private car or taxi. For visitors, it is assumed 50% of the visitors would access the Site by arranged transport mode such as school bus or coach and the other 40% and 10% would take public transport and private car or taxi respectively. As a result, 281 people are expected to access the Site by buses or GMB, 74 people by car or taxi and 75 people by coach in the AM/PM peak hour.

4.2.4 Based on the assumed occupancy rate of 25 persons per coach, one person per private car/ taxi for workers and two persons per car/ taxi for visitors, the amount of vehicular traffic to be induced by the Site is summarized in Table 4.3.

Table 4.3: Estimated Peak Hour Vehicular Traffic by Modes

	Car/Taxi		Bus/GMB		Coach		Total	
	No. of Persons	No. of Vehicles	No. of Persons	No. of Vehicles	No. of Persons	No. of Vehicles	No. of Persons	No. of Vehicles
Farmland workers	52	52	208	-	-	-	260	52
AFCD Staff	7	7	13	-	-	-	20	7
Visitors	15	8	60	-	75	3	150	11
Total	74	67	281	-	75	3	430	70

4.2.5 As shown in Table 4.3, around 70 vehicle trips are expected to access the Site via Fan Kam Road during the peak hour and the same amount is assumed for the opposite direction to provide conservative estimates.

4.2.6 Taking into account the current flows on Fan Kam Road, i.e. around 440-460 vehicles per direction during peak hours, the addition of 70 vehicles by the Development would not create adverse traffic impact as the total flows of around 530 vehicles per direction are well within the capacity of Fan Kam Road. A capacity check for the Junction of Fan Kam Road and Tsiu Keng Road and a data sheet of Station 6212 are included in **Appendix G**.

4.2.7 Considering there is limited village traffic along Tsiu Keng Road, the development will have minimal impact to the existing single carriageway with passing bays. The affected road section can be studied for improvement proposal.

4.2.8 Around 281 persons are forecast to take public transport modes including buses and GMB to access the Site during the peak hours. As there is only one bus service (77K) and one GMB service (57K) running along Fan Kam Road, strengthening of the existing bus and GMB services by an additional of 1-2 services per direction for both 77K and 57K during the peak hours would be required to cope with the demand. This will be further reviewed during the detailed design stage.

4.2.9 An alternative routing from the west through San Tin Highway, there is an existing village road connecting Kwu Tong Road to northwest corner of the site. The possible routing will be investigated in the detailed design stage.

4.3 Proposed Access Arrangement

4.3.1 As Tsiu Keng Road will form as a part of the main access road within the Agri-Park development, a section of this road will be upgraded to 7.3m in width to allow for large vehicles such as coach and goods vehicle entering the Agri-Park. The priority junction at Fan Kam Road and Tsiu Keng Road will also be upgraded to provide sufficient spaces for turning vehicles. The existing 10m vehicle length restriction on Tsiu Keng Road can be uplifted upon completion of the upgrading works. A preliminary conceptual layout plan for the proposed

junction improvement is shown in **Figure 4.1**. The design has incorporated the Fan Kam Road widening scheme managed by the Major Works Project Management Office (MWPMO) of Highways Department. The proposed Fan Kam Road widening scheme is enclosed in **Appendix A6** and this project has scheduled to commence in year 2019 for completion in year 2022.

4.3.2 A preliminary layout plan of the proposed widening of Tsiu Keng Road for the section between its junction with Fan Kam Road and the proposed main access road to Agri-Park is shown in **Figure 4.2**. It is recommended to be upgraded to a single lane 2-way carriageway of 7.3m wide with 2m wide footpath on each side. This improvement proposal will be further reviewed in the detailed design stage.

4.3.3 The proposed road network for the Agri-Park is shown in **Figure 4.3**. The main access roads within the Agri-Park, namely Public Road 1 and Public Road 2 for Phase 1 and Phase 2 developments respectively. These roads are to be designed to a single lane 2-way carriageway of 7.3m wide with a 2m wide footpath on each side in accordance with TPDM. Provision of a turnaround facility will be provided at the road end as these two roads will not be connected to any public roads. They are intended to serve the tenants of the Agri-Park as well as visitors coming in groups for farm visits and guided tours, and the local villagers/ residents.

4.3.4 Access to the middle of farmlands will be either via the existing footways/ van tracks or the proposed branch roads. The branch road of 3.5m will be built for use by lorries, farm trucks and motorized village vehicles for daily farming operation.

4.4 Proposed Additional Transport Provisions

4.4.1 As the size of the site is extensive with over 2 km in distance from south to north, it is proposed to provide a shuttle bus service within the Agri-Park development to transport the workers and visitors between the site access near Fan Kam Road and the various regions of the Site via the main access road. However, it will be subject to the demand of services in future and further review in respect of schedule of bus service, the operation cost and its traffic impact.

4.4.2 The transport provision will be further reviewed and studied in the detailed design stage.

4.5 Summary and Recommendations

4.5.1 The general potential traffic impact of the proposed Agri-Park development has been reviewed and detailed assessment will be required in the detailed design stage of the project.

4.5.2 Based on the preliminary assessment, the following transport and traffic provisions are recommended:

- upgrading of the Junction of Fan Kam Road and Tsiu Keng Road to tie in with the proposed Main Road and to remove the existing restriction of 10m long vehicle on Tsiu Keng Road;

- upgrading of a section of Tsiu Keng Road from its junction with Fan Kam Road to the proposed main access road to the Agri-Park;

- proposed a public road of 7.3m wide for 2-way traffic with a 2m wide footpath on each side running through the center of the Agri-Park for Phase 1 and Phase 2;

- provision of branch roads of 3.5m wide to the middle of farmland; and

- strengthening of existing KMB (77K) and GMB (57K) services along Fan Kam Road, subject to demand and consultation with Transport Operation division of TD.

4.5.3 The project will induce around 70 numbers of vehicles and 281 public transport passengers during peak hours.

4.5.4 A comprehensive traffic impact assessment for the development and construction traffic will be undertaken in the detailed design stage.

5.0 DRAINAGE

5.1 Existing Drainage Characteristic

5.1.1 According to the DSD's drainage record plans, the existing Tam Shui Hang has been upgraded to a trapezoidal channel of 21m ~ 28m wide with a built-in Dry Weather Flow channel starting from Tsiu Keng. Watercourses running from the natural terrain at Ki Lun Shan through the flat land are connected to Tam Shui Hang via a 2-cell box culvert of 2000mm x 1500mm at various locations. The surface flow at various spots close to cluster of squatters/ village houses near the riverbank is collected by 300mm U-channels discharging to the river via stepped channels of 450mm/ 600mm/ 1000mm in size.

5.1.2 Surface channel is located alongside Tsiu Keng Road on both sides. The surface flow from Tsiu Keng area is collected by a drainage system at there and discharged to Tam Shui Hang. Near Tsiu Keng Lo Wai, the surface runoff is collected by a twin pipeline of 1200mm/ 1350 mm in diameter and a 1-cell 2350mm x 2550mm box culvert underneath the road. A pipeline of diameters varying from 525mm to 1200mm directing towards Tam Shui Hang is identified along the road section of Tsiu Keng Road near Fan Kam Road.

5.1.3 The DSD's record plans are enclosed as **Appendix E2**. Based on the available information, there is no planned drainage works in the vicinity of the Agri-Park development.

5.1.4 After review of the terrain topography in the vicinity of the site, three catchments have been identified as shown in **Figure 5.1**. Each catchment is then further divided into sub-catchments. The discharge point of each catchment are also indicated in **Figure 5.1**.

5.2 Change in Drainage Characteristic

5.2.1 Based on the preliminary layout plan of the Agri-Park development, there will be minimal increase in hard paved area. The chosen location for the park facilities will be mostly on existing hard paved area of squatters after clearance. The abandoned farmlands and most of the paved areas of squatters after clearance can be rehabilitated for agricultural use. Only small area of farmland will be converted to access roads /footpaths and some park facilities will be sited on farmland.

5.2.2 Upstream of the identified catchment areas is on sloping ground with heavy vegetation cover. Given the proposed infrastructures and park facilities as described in the earlier Sections, there is no significant changes to the drainage characteristic after the Agri-Park development.

5.2.3 A summary of the changes to drainage characteristics for the identified catchments is given in Table 5.1.

Table 5.1: Summary of Changes to Drainage Characteristics

Catchment	Existing Catchment Area (m^2)	Location in Agri-Park	Change to Drainage Characteristics	
			Concerned Area (m^2)	Percentage Change (%)
A	475,918	Region C	5,242	1.1
B	606,661	Region B	4,390	0.7
C	2,813,399	Region A	31,394	1.1
Total	**3,895,978**		**41,026**	**1.1**

5.3 Flood Susceptibility

5.3.1 Based on the updated DSD's flooding blackspot sites as at March 2016 (enclosed in **Appendix C**), the proposed site is not a flooding blackspot.

5.3.2 According to Table 5.1, the total percentage change in drainage characteristic of the project catchment areas is around 1.1%, on a conservative assumption of 20% of the catchment area is hard paved. Given the relatively small percentage change in drainage characteristics, the Agri-Park and its infrastructures are not expected to cause flooding in this area.

5.4 Summary and Recommendations

5.4.1 According to the available information, there is no flooding records or planned drainage works in the vicinity of the Agri-Park development. Within the Agri-Park, some surface channels being maintained by DSD are identified.

5.4.2 As the Agri-Park development has minimal change in drainage characteristic, no adverse impact is anticipated on the river channels/ existing drainage system.

5.4.3 The existing drainage pipes along Tsiu Keng Road have been roughly checked against the anticipated increase in surface flow due to the proposed road widening. A preliminary capacity check is enclosed in **Appendix C**. It has revealed that the capacity of these pipes is adequate to cater for the additional runoff. Upgrading of this drainage system is not required.

5.4.4 Proper drainage channels/ drains are recommended to collect the surface runoff generated from the proposed access roads and park facilities. The existing drainage channels within the site are recommended to be rehabilitated or upgraded to suit the Agri-Park development. The cross road drainage facilities will also be required under the proposed access roads. **Figure 5. 2** shows the preliminary drainage layout plan of the proposed access roads. This will be further reviewed in the detailed design stage.

5.4.5 Detailed investigation of the existing drainage system and its conditions within the site is recommended to be carried out in the detailed design stage of the project. A Drainage Impact Assessment will be undertaken in the detailed design stage.

6.0 IRRIGATION

6.1 Existing Irrigation System

6.1.1 The main irrigation water source of the existing irrigation system in the Agri-Park development is from Tam Shui Hang/ Sheung Yue River with inflatable rubber dams installed at intervals along the river running from south to north, providing nutrient rich waters primarily to the southern part of the Tsiu Keng area.

6.1.2 Locations of the inflatable rubber dam in the vicinity of the Agri-Park and existing irrigation channels being maintained by AFCD are shown in **Figure 6.1.**

6.1.3 The installed rubber dams placed across Tam Shui Hang at various sections. When they are inflated, the water level upstream will be raised up to allow water diverting from the river into the connecting irrigation channels. Currently, there are 6 rubber dams (namely BR8, BR9, BR10, BR11, BR13 and BR14) installed in the vicinity of the Agri-Park development.

6.1.4 The main irrigation channels convey river water at source to the southern part of the site and it is subsequently distributed throughout Tsiu Keng via a network of permanent and temporary open water channels, with built-in drains allowing water flowing into the adjacent fields.

6.1.5 Several weir slide gates, as shown in **Figure 6.1**, are located at watercourses upstream in the vicinity of the area. These weirs are used to adjust the water level and to enable water distribution covering the nearby farmlands.

6.1.6 In additional to the water source from Tam Shui Hang, the existing system is supplemented by groundwater occasionally (from small wells located at various locations throughout the Tsiu Keng area), as well as existing ponds storing direct rainfall during the wet season.

6.1.7 In Tsiu Keng area, the total length of the main open water channels is about 2.82 km with open branch channels supplying irrigation water to some 34 hectares of farmlands, details are summarized in Table 6.1.

Table 6.1: Length of Water Channels and Irrigated Areas in Tsiu Keng

Water Channel	Weir No.	Channel Length* (km)	Irrigated Area* (ha)
1	BR 008	1.11	18.4
2	BR 009	0.54	4.50
3	BR 010	1.17	11.29
	Total	2.82	34.19

*Source: Information provided by AFCD

6.1.8 According to the record plans received from WSD, a raw water supply system for irrigation around Tsiu Keng area, is located at the south of Tsiu Keng. This raw water is supplied by a Dongjiang raw water pipeline (48 inches in diameter), which runs parallel to Fan Kam Road at the southeastern side of the proposed Agri-Park, shown on the record plans of existing watermains enclosed as **Appendix E5**. This raw water supply system contains a pump house (PH032), a raw water tank (WT058) of 15m^3 storage capacity and two irrigation pipes

(galvanized iron pipes of 100mm and 150mm diameters). According to the information given by WSD, the daily flow rate of the pump is about 1.02Mld (0.0108m^3/s).

6.1.9 As advised by WSD, three submersible pump sets of capacity 1.42m^3/min. were installed for pumping water to the water tank. As the pump is set for 11 operating hours from 6:30am to 5:30pm every day, it is estimated that 937.2m^3 (1.42 x 60 min. x 11 hrs. = 937.2) of water supplied to the water tank per day. However, there are two outlets from the tank. One outlet is connecting to a D.N. 25mm pipeline which serves the village at Tsiu Keng and Cheung Lek while the other outlet is leading to the river (Tam Shui Hang) for irrigation only when water level in the tank is higher than the outlet connecting to the D.N. 25mm pipeline. Therefore, it is assumed that 50% of water (468.6m^3) supplied to the river with the estimated rate of Q = 0.0054m^3/s (0.5 x 937.2m^3/24hrs. /3600sec. = 0.0054) under current supply system.

6.2 Historical Rainfall Data

6.2.1 The climate of Hong Kong is of typical sub-tropical weather. The wet season usually occurs during the months from May to September. The mean annual rainfall ranges from about 1400 millimetres at Ping Chau to more than 3000 mm in the vicinity of Tai Mo Shan. About 80% of the rain falls between May and September. June to August are usually the wettest months while December to February are usually the driest months.

6.2.2 The nearby weather/ rainfall stations of the Hong Kong Observatory in the vicinity of Kwu Tung South are listed in Table 6.2. The historical rainfall data of these stations, as appended in **Appendix D**, are used to compute the average monthly total rainfall in Kwu Tung South. The average monthly total rainfall for each month is presented in Table 6.3.

Table 6.2: Details of Weather/ Rainfall Stations in the vicinity of Kwu Tung South

Station Location	Station Type	Date of First Operation	Elevation above mean sea-level (m)
Beas River	Automatic Weather Station	6/12/2012	10.9
Sheung Shui	Automatic Weather Station	9/7/2004	10
Lok Ma Chau	Automatic Rainfall Station	30/6/1985	67

Table 6.3: Average Monthly Rainfall in Kwu Tung South

Month	Average Monthly Rainfall (mm)
January	51
February	29
March	79
April	146
May	307
June	393
July	317
August	259
September	202
October	72
November	38
December	44

6.3 Estimation of Irrigation Water Demand

6.3.1 The amount of irrigation required for crop cultivation depends not only on the amount of water available from rainfall but also the amount of water required by the adopted crop production methods. Generally speaking, the amount of rainfall is important but often not sufficient to support production all year round. The historical rainfall data in the past years as mentioned above will be used to assess the amount of irrigation water needed.

6.3.2 In general, the amount of irrigation water required for crop production in the Agri-Park is the difference between the total irrigation water consumption and the amount of rainfall available (which is the effective rainfall) in Kwu Tung South.

6.3.3 A wide range of vegetable crops are cultivated in Hong Kong. Various types of Chinese cabbages are very popular locally and are grown all year round. Spinach, watercress, and lettuces are commonly produced in the cooler months while beans, water spinach, Chinese spinach, cucumber and different types of Chinese gourd are produced in the summer. A wide range of temperate vegetables including tomato, sweet pepper, cauliflower, carrot and celery are also grown in winter. It is assumed that the crops to be cultivated in the Agri-Park will be similar to the crops commonly grown in other locations in the New Territories.

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6.3.4 The amount of irrigation required by different crops in the production period varies considerably. It depends on the crop type, soil texture, conveyance loss conditions, climate and the growth stage of the crops. As crops grown in different climatic zones will have different water need, a standard or reference crop is chosen for computation of average crop water needs.

6.3.5 Irrigation study has been conducted in Tai Lung Experimental Station from June 2015 to August 2016 by AFCD, which monitored the water usage of vegetable cultivation generated from a sprinkler system. The results are summarized in Table 6.4 below:

Table 6.4: Preliminary Results of the Irrigation Water Study by AFCD

Crop	Growing Seasons	Water Need per month* (mm)
Vegetable	Summer	111#
Vegetable	Winter	37

* Maximum Recorded Water Usage
# Adjusted value taking account of pipe leakage

6.3.6 The results of the irrigation study are based on data collected from vegetables fields using sprinkler irrigation system which in most cases, consumes less water than the more commonly used furrow irrigation in Hong Kong. Based on the information supplied by AFCD and published data from a local study in Mainland China, the sprinkler system usually consumes around 31% to 48% less water than furrow irrigation system. In order to give an overall conservative estimation on the irrigation needs, an additional 50% irrigation water over the AFCD data has been assigned for Region A and C where traditional and organic farming using furrow irrigation are expected to be practiced by farmers.

6.3.7 Based on the current planning of the Agri-Park, Region B will be provided for greenhouse farming which is considered likely to consume 30% less amount of irrigation water. Summary of the irrigation water needs based on AFCD data are detailed in Table 6.5 below:

Table 6.5: Estimated Irrigation Water Requirement (Based on AFCD's Data)

Region	Type of Farmland (Irrigation Type)	Percentage Increased / Decreased (+/ -)	Water Needs per month (mm) - summer (upper) / winter (lower)
A	Traditional (Furrow Irrigation)	+50%	166.5
			55.5
B	Greenhouse Farming (Drip Irrigation)	-30%	77.7
			25.9
C	Organic (Furrow Irrigation)	+50%	166.5
			55.5

6.3.8 The estimated irrigation requirements appear to be similar to or at least within the range of the data provided by the FAO Manual (estimation enclosed in **Appendix D4** for reference) with slightly lower values observed under local conditions.

6.3.9 Part of the rain water is lost through deep percolation and surface run-off. In the absence of soil percolation test or relevant data, the effective rainfall is assumed with reference to "*Irrigation Water Management, Irrigation Water Needs"* issued by the Natural Resources Management and Environment Department of Food and Agriculture Organization of the United Nations (information enclosed in **Appendix D**). The effective rainfall is the part of rainfall which can be effectively absorbed by the crop and the effective rainfall corresponding to the average monthly total rainfall (in millimeter per month) in Hong Kong is given in Table 6.6.

Table 6.6: Effective Rainfall for Estimation of Irrigation Water Demand

Month	Average Monthly Total Rainfall (mm) From Table 6.3	Effective Rainfall (1) (mm/month)
Jan	51	20
Feb	29	8
Mar	79	39
Apr	146	87
May	307	175#
Jun	393	175#
Jul	317	175#
Aug	259	175#
Sept	202	135
Oct	72	32
Nov	38	14
Dec	44	16

Conservative figure used for rainfall > 250mm/month

6.3.10 The irrigation water need of a certain crop is therefore the difference between the crop water need under critical conditions (with a 10% increase to Table 6.5 as contingency) and the effective rainfall (from Table 6.6). Generally, the irrigation water demand for both wet and dry seasons is estimated and presented in Table 6.7. For a conservative estimate, the lowest effective rainfall for the dry/wet months and the water needs for crop type 5 (the highest range of crop water needs) are used. According to "*Irrigation Water Management, Irrigation Water Needs"*, the crop type 5 needs 20% more water than grass in the peak period, is the worst scenario. Therefore, it adopted to estimate the water needs for irrigation.

Table 6.7: Irrigation Water Requirement

Month	Water Needs for Vegetable# (mm/month)	Water Needs for Crop Type 5 (1) for all year round (mm/month) (1)	Effective Rainfall* (mm/month) (2)	Irrigation Water Need (mm/month) = (1) - (2)
Dry Season	183	198	8	190
Wet Season	61	198	135	63

#10% contingency allowed in AFCD's data.
*The lowest effective rainfall is used.
(1) Irrigation Water Management, Irrigation Water Needs issued by the Natural Resources Management and Environment Department of Food and Agriculture Organization (FAO) of the United Nations

6.4 Irrigation Water Assessment

6.4.1 The source of irrigation water largely relies on the adjacent river, Tam Shui Hang/ Sheung Yue River. The flow rate and water quality of the river is monitored by Environmental Protection Department and 3 monitoring stations are identified at the river (alias River Beas). The nearest monitoring station RB1 is located close to Cheung Lek. The historical flow data from year 2003 to year 2014 is summarized and enclosed in ***Appendix D***. Table 6.8 gives a summary of the average flow rates calculated from the historical records for each month. The extreme recorded flow rates have been discarded for computation.

Table 6.8: Average Flow Rate at Sheung Yue River near Cheung Lek (Station RB1)

Month	Average Flow Rate (m^3/s)
January	0.089
February	0.057
March	0.074
April	0.069
May	0.160
June	0.149
July	0.221
August	0.158
September	0.240
October	0.160
November	0.130
December	0.098

6.4.2 Four irrigation regions, as shown in **Figure 6.1**, are demarcated according to the topography and the respective source of irrigation water. Particulars of these regions are summarized in Table 6.9.

6.4.3 The gradient of streams in the vicinity of Agri-Park is in the range of 1 in 480 to 500, which is about the same as the trapezoidal channel of Tam Shui Hang. There are many streams/ watercourses running from the hill toe through the fields towards the river bank and existing irrigation channels diverting the river water to the fields. It is conservative to assume the flow rate of streams/ watercourse in the vicinity of the Agri-Park development is same as Tam Shui Hang/ River Beas.

Table 6.9: Summary of Irrigation Regions

Region	Location	Water Source/ Irrigation Measures	Approx. Area of Farmland (ha)
A1	Near rubber dams BR8, BR9, BR10	Tam Shui Hang, irrigation pipes of 100mm ~ 150mm dia and existing irrigation channels	18
A2	Near rubber dam BR11	Tam Shui Hang, streams, pond, irrigation pipes of 100mm ~ 150mm dia and existing irrigation channels	30.4
B	Area near Cheung Lek (near rubber dam BR14)	Tam Shui Hang, streams, pond, and existing irrigation channels	12
C	North of Cheung Lek	Pond and streams	18

6.4.4 The amount of irrigation water required for the corresponding areas in the development is computed and presented in Table 6.10 and Table 6.11 for dry and wet season respectively. The lowest average flow rate at River Beas Station RB1 in dry season (i.e. 0.057 m^3/s) is used for comparison.

Table 6.10: Irrigation Water Assessment for Dry Season

Region	Approx. Area of Farmland (ha) (1)	Approx. Area of Farmland (m^2) (2)	Amount of Irrigation Water (m^3/mth) (3)=(2) x 0.190m/mth[(1)] or (2) x 0.133m/mth[(2)]	Amount of Irrigation Water (m^3/s) (3)/30 days x 24 hrs x 3600 sec
A1	18	180,000	34,200[(1)]	0.0132
A2	30.4	304,000	57,760[(1)]	0.0223
B	12	120,000	15,960[(2)]	0.0062
C	18	180,000	34,200[(1)]	0.0132
Total	**78.4**	**784,000**	**142,120**	**0.0549**

[(1)] Refer to Table 6.7
[(2)] Assume 70% of the standard irrigation water for greenhouse

Table 6.11: Irrigation Water Assessment for Wet Season

Region	Approx. Area of Farmland (ha) (1)	Approx. Area of Farmland (m^2) (2)	Amount of Irrigation Water (m^3/mth) (3)=(2) x 0.063m/mth[(1)] or (2) x 0.044m/mth[(2)]	Amount of Irrigation Water (m^3/s) (3)/30 days x 24 hrs x 3600 sec
A1	18	180,000	11,340[(1)]	0.0044
A2	30.4	304,000	19,152[(1)]	0.0074
B	12	120,000	5,280[(2)]	0.0020
C	18	180,000	11,340[(1)]	0.0044
Total	**78.4**	**784,000**	**47,112**	**0.0182**

(1) Refer to Table 6.7
(2) Assume 70% of the standard irrigation water for greenhouse

6.4.5 By simply comparison of the needs of irrigation water with the lowest average river flow rate (i.e. 0.057 m^3/s in February), the primarily water source from Tam Shui Hang is theoretically adequate for the crop water needs. In fact, some stream water is diverting to the fields and absorbed by the crop before arriving the river. However, irrigation water supply from other sources should be allowed during drought years or dry periods.

Table 6.12: Available Stream Water from Tam Shui Hang from Historical Data

Month	Available Stream Water (m^3/s)
Dry Season (Dec – Apr)	0.057
Wet Season (May – Nov)	0.130

6.4.6 In practical situation, farmers do not obtain water directly from the water source as any diversion of water using irrigation system may result in water loss. According to AFCD, farmers with similar pattern of using irrigation water would increase the demand of water at a particular time only. Since most of the farmers do not build any backup facilities for storing water, this may result in competition of irrigation water at the same time and may cause dramatically drop at the flow rate. In addition, different crops having different irrigation requirement/ demand/ consumption such as watercress requiring running water would increase water demand. Past experience has shown that an irrigation system mainly relies on natural resources cannot guarantee steady irrigation water supply at all times.

6.4.7 A joint site meeting and inspection with AFCD and CEDD on the existing irrigation system at the proposed Agri-Park site was organized in early September and a site visit to Tai Lung Experimental Station to inspect the adopted irrigation/ sprinkler system was arranged on 26 September 2016. It is noted that a water storage tank of size 7.3m(L) x 7.3m(W) x 2.87m(H) with a capacity of about 137m^3 is supplying irrigation water to Tai Lung Experimental Station and the water source is directly from the Dongjiang raw water via a 2" branch pipe. It supplies adequate irrigation water to a farming area of about 39,613m^2. The relevant information obtained from AFCD is enclosed in **Appendix D7**.

6.5 Existing Water Sources for Irrigation Water

6.5.1 As mentioned in paragraph 6.1.8, Dongjiang raw water pipeline is currently providing raw water to Tsiu Keng and Cheung Lek area by WSD during dry periods with a rate of about 0.0108m^3/s. This raw water supplies to the villages at Tsiu Keng and Cheung Lek and also the current farmland in the vicinity of the Agri-Park. Due to lack of records of the exact amount of raw water supply to the irrigation system at Tsiu Keng, it is therefore assumed that 50% of the current raw supply is/ will be available for irrigation.

6.5.2 The estimated total amount of irrigation water supply available for the proposed Agri-Park is presented in Table 6.13 below.

Table 6.13: Estimated Amount of Existing Irrigation Water Supply

Existing Source	Dry Season		Wet Season	
	m^3/s	m^3/day	m^3/s	m^3/day
Tam Shui Hang	0.057	4,925	0.130	11,232
Dongjiang Raw Water	0.0054	466.6	0.0054	466.6
Total Water Supply	0.0624	5,392	0.1354	11,699
Irrigation Water Needs (from Tables 6.10 & 6.11)	**0.0549**	**4,743**	**0.0182**	**1,573**
Surplus (+ve) / Deficiency (-ve) in Irrigation Water	**+0.0075**	**+649**	**+0.1172**	**+10,126**

6.5.3 Based on the above estimation, the averaged irrigation water available to the proposed Agri-Park is sufficient to satisfy the irrigation needs during both the wet and dry seasons.

6.6 Review of Alternative Irrigation Water Source

6.6.1 The average flow rate in dry season drops from 0.098 m^3/s to 0.057 m^3/s. The estimated total irrigation water available during dry season is only marginally above the irrigation water requirement with 0.0075 m^3/s surplus. If rainfall or irrigation water from the nearby rivers and streams is not adequate to meet the water needs of the crop during extreme dry seasons, harvested water or other water sources will be needed to supplement the shortfall in irrigation water for crop cultivation.

6.6.2 To address this concern, alternative sources for irrigation water have been explored for the provision of contingency irrigation water supply during prolonged dry weather, particularly when the stream flow at Tam Shui Hang is low. Two major water sources have been reviewed for the provision of potential additional irrigation water and these include the Kwu Tung Reservoir and drilled wells within the proposed Agri-Park.

Kwu Tung Irrigation Reservoir

6.6.3 The Kwu Tung Irrigation Reservoir is located about 700m to the north of the proposed Agri-Park. Currently, the reservoir is located in an area not covered by statutory Outline Zoning Plan. According to the record plans received from WSD, the volume of the reservoir is about 0.05 million m^3 and the cover area is about 14,284m^2. At present, the reservoir does not serve for any water supply purpose and excess reservoir water drains through the dam and flows in the downstream of Sheung Yue River. Based on the available topographic information, the average water level of the reservoir is about +26 mPD. Compared with the average elevation of the northern part of Agi-Park area around +11 mPD to +18 mPD, the water in the reservoir should be able to flow to the site by natural gravity. However, there are two knolls located in between the reservoir and the proposed Agri-Park location. A water conveying system including a rising main and an intermediate water tank will be required.

6.6.4 Two schemes have been considered to divert water in the reservoir to the Agri-Park for irrigation, which are i) construction of a water tank at the summit of a mountain to the south of the reservoir to temporarily store water pumped from the reservoir and then transfer the water via irrigation pipelines to the Agri-Park by gravity; ii) construction of underground irrigation pipes by Horizontal Directional Drilling (HDD). The pipes will be connected to irrigation channels at the northern side of the Agri-Park. A schematic layout of these schemes is enclosed in **Appendix D5**. In addition to Region C, the pipelines may be extended to Region B for provision of additional irrigation, if necessary.

Ground Water from Drilled Wells

6.6.5 Alternatively, construction of a number of drilled wells within the Agri-Park along Tam Shui Hang to draw groundwater directly for irrigation has been considered. Based on the current ground investigation record (enclosed as **Appendix D6**), the ground water level close to Tam Shui Hang ranges from 1m BGL to 3.3m BGL. A preliminary analysis has been carried out to model the quantity of water that could be pumped from a drilled well located close to Tam Shui Hang. The results revealed that a drilled well located about 10m away from Tam Shui Hang would be able to provide 0.001 m^3/s groundwater with an average draw down of groundwater table about 4.5m (enclosed as **Appendix D6**). It is estimated that 14 drilled wells yielding flow rate of 0.014 m^3/s are considered adequate for full supply of irrigation water for Region C of the Agri-Park during dry season.

6.6.6 Provision of water storage facilities is also required to ensure a stable irrigation supply all year round in different regions in the Agri-Park. Further study and field survey will be carried out in the detailed design stage.

6.6.7 In addition, assessment of ground settlement due to water draw down from wells is needed so as not to affect the adjoining buildings/ structures. Impact of pumping wells on the surrounding services, buildings, structures and/ or lands, will be carried out in the detailed design stage to ensure that the effect on these facilities/ lands are acceptable. The assessment should include groundwater changes, ground movements and stabilities of adjacent services, buildings, structures and/ or lands, supported by site specific ground investigation and, if necessary, verified appropriate field tests.

Extended Use of Dongjiang Raw Water

6.6.8 WSD was consulted and has reservation in expanding utilization of Dongjiang water for irrigation as it is not in line with the Total Water Management strategy.

6.7 Proposed Enhancement of Irrigation System

6.7.1 The existing and potential irrigation water supply are summarized in Table 6.14. Other potential sources such as harvesting rainwater, water pond, etc. have not been included in the summary table.

Table 6.14: Summary of Existing and Potential Irrigation Water Supply for Dry Season

Source		Irrigation Water Supply (m^3/day)
Existing	Tam Shui Hang	4,925
	Dongjiang raw water	466.6
	Sub-total	5,392
Alternative	Pumping Wells (14 nos)	1,210
	Kwu Tung Irrigation Reservoir*	556

* Reservoir capacity of 50,000m^3 is assumed for 90 days retention.

6.7.2 In additional to the massive infrastructures as described above required for diverting water from Kwu Tung Irrigation Reservoir to the Agri-Park, other issues such as natural terrain hazard, slope improvement, land requirements, future maintenance, maintenance access, etc should also be considered. It is believed that water from Kwu Tung Irrigation Reservoir is discharging to the downstream of River Beas. It would be more cost effective to have water discharged from Kwu Tung Irrigation Reservoir to maintain the normal flow in Tam Shui Hang/ River Beas. On this perspective, the use of Kwu Tung Reservoir should be only accorded as low priority.

6.7.3 Water from pumping wells would be a reliable source of irrigation water and it can be used to maintain the downstream water flow of Tam Shui Hang, subject to further study in the detailed design stage.

6.7.4 The recommended irrigation improvement measures are graphically shown in **Figure 6.2** and summarized in Table 6.15. For Region A1 and Region A2, there are 4 existing rubber dams and associated water channels of about 2.82km in length covering around 55 ha. As Region A2 has comparatively larger area of farmland, use of harvested rainwater/ water storage tanks is recommended to supplement the irrigation system.

Table 6.15: Irrigation Water Management Scheme and Proposed Measures

Region	Weir No. identified within the Region	Approx. Irrigated Area (m^2)	Existing Source of Irrigation Water	Proposed Improvement Measures
A1	BR8, BR9, BR10	180,000	i) Rubber dams(BR8 – BR10) to divert water from Tam Shui Hang into water channels; ii) Raw water supplied to existing water channels near rubber dam BR8.	i) Existing system is considered adequate to cover the whole area; however, upgrading/ refurbishment of existing channels are recommended.
A2	BR11, BR32, BR33, BR34, BR46, BR47, BR48, BR49	304,000	i) Rubber dam BR11 to divert water from Tam Shui Hang into water channels; ii) Raw water to existing water channels near rubber dam BR8. iii) Irrigation pipes on the fringe of Region A2.	i) New extended irrigation pipes connecting to existing/ new water channels; ii) Extension of existing water channels for better coverage. iii) Utilization of harvested water from storage tank.
B	BR38, BR39	120,000	i) Existing weirs to divert water from watercourse into water channels;	i) New extended irrigation pipes and channels connecting to existing/ new water channels; ii) Utilization of harvested water from storage tank/ pond; iii) Provision of water tank for sprinkler system.
C	BR41, BR42	180,000	Natural steams and pond	i) New extended irrigation pipes connecting to existing/new channels; ii) Extended/ new water channels; iii) Utilization of harvested water from storage tank/ pond; iv) Utilization of other water sources as contingency supply.

6.8 Summary and Recommendations

6.8.1 The primary water source from Tam Shui Hang/ River Beas supplemented by limited amount of raw water from Dongjiang pipeline, is theoretically adequate in supplying irrigation water for use in the proposed Agri-Park. However, there are concerns that irrigation water may be scarce in dry seasons and sufficient supply of irrigation water may not be maintained in adverse conditions.

6.8.2 Upgrading the existing irrigation system by means of extended irrigation channels, extended raw water pipes, installation of new weirs, harvest water storage tanks, etc. are recommended. Water supply from other sources should be explored to ensure a stable supply of irrigation during drought years or dry periods.

6.8.3 **Figure 6.2** shows a schematic layout of the proposed improvement measures to the existing irrigation system. The extent of proposed water channels and raw water pipes will be determined during the detailed design stage of the Agri-Park project.

6.8.4 Additional water source for irrigation including diversion of water from Kwu Tung Reservoir and pumping from drilled wells within the proposed Agri-Park are considered possible options to ensure a stable supply of irrigation water all year round. For the reservoir approach, land resumption/ GLA may be required for the provision of new infrastructure outside the Agri-Park. Additional survey and ground investigation will be required in the IDC stage to obtain site specific ground information for the design and construction cost estimate. In view of cost effectiveness, utilization of water from Kwu Tung Reservoir for irrigation should only be accorded as low priority.

6.8.5 The identified ponds in Regions A2, B and C, currently located on private lots, could be another source of irrigation supply, if the above options are found not feasible. Further investigation on pond condition and assessment of water quality are required. If the ponds are found partially or wholly filled, they should be reinstated with concrete lining.

6.8.6 Use of harvested rainwater can be considered as alternative water source in Regions A2 and B. A rainwater harvesting system may include an above ground/ underground storage tank to collect surface runoff from paved area/ water overflow from streams during wet season and conveying pipes/water channels. Further study and field survey will be required.

6.8.7 A detailed investigation on the existing irrigation system and a walk-over survey of farmlands are required to affirm the details of the improvement measures, subject to further review and consultation with AFCD and WSD.

6.8.8 As different types of irrigation methods may be adopted for use in different regions in the Agri-Park (e.g. greenhouses or open field cultivation), further studies will be needed to investigate the feasibility and costs of providing these infrastructure with a view to ensuring these irrigation systems can be effectively installed and put into practice.

6.8.9 Utilizing water from Tam Shui Hang/ Sheung Yue River may have impact on the hydrology downstream of the Agri-Park, especially during dry seasons when the river flow rate is relatively low. Subject to the agreement with WSD, the option of discharging water from Kwu Tung Reservoir to compensate the water usage by the Agri-Park during dry seasons may be explored.

7.0 SEWERAGE, WASTE RECYCLING AND DISPOSAL

7.1 Existing and Planned Sewerage

7.1.1 According to the existing sewerage record plans (enclosed in **Appendix E2**), only limited places in the northern part of Kwu Tung South are served by public sewers and this area falls within the Deep Bay Catchment area.

7.1.2 There is no existing or planned sewerage system in the vicinity of the Agri-Park development.

7.1.3 It is believed that septic tank or cesspool is adopted for disposal of foul water generated from village houses as there is no public sewer in the area.

7.2 Sewage Flow from Development

7.2.1 On-site sewage treatment facilities, complying with the "Standards for effluents discharged into the coastal waters of Deep Bay Water Control Zone", are required to meet the development needs. The treated sewage effluent is to be discharged to Sheung Yue River fronting the Agri-Park and will not be reused, subject to further review. The design shall be in accordance with the "Guidelines for the Design of Small Treatment Plant" published by EPD.

7.2.2 As most areas of the Agri-Park are for cultivation purpose, the design population is small. The sewage flow is estimated on the worst scenario according to the following assumptions:

- 240 basic lodging units as described in Section 2.6;
- 2 workers per lodging unit are assumed to stay overnight for farming operation;
- Visitor Centre to accommodate max 100 visitors;
- 20 staff employed by AFCD.

7.2.3 The unit flow factors for domestic and commercial flows, as given in Table T-1 to Table T-3 of the Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning are summarized in the Table 7.1.

Table 7.1: Unit Flow Factors adopted for Sewage Flow Estimation

Category	Housing Type / Employee Unit	Unit Flow Factor (m^3/day/person or employee)
Domestic Flows	Temporary and non-domestic	0.15
	Mobile residents	0.19
Commercial Flows	Commercial employee	0.08
	Commercial activity J7 (for Agriculture)	-

7.2.4 With the preliminary design parameter as given above, the sewage treatment/ pumping facilities will have an installed capacity of not more than 2000 m^3 per day. A rough estimation of the sewage flow from the development is included in **Appendix C**.

7.3 Proposed Sewerage System

7.3.1 With the absence of the public sewer system in the vicinity of the Agri-Park, adoption of sewage treatment plant is one of the solutions for sewerage disposal in rural area. It is designed to receive and treat the sanitary flows from the visitor centre, management office and the basic lodging facilities provided to the tenants/ farmers. The proposed Agri-Park is to be divided into 3 regions for different agricultural use. Given the layout of the site stretching about 2 km from south to north, the lodging facilities are designed to locate close to the users. To eliminate the needs of extensive length of rising mains along the access road and the associated pumping sump pits, the sewage treatment plant is preferable to be placed at an appropriate location close to the park facilities in each region. The design Dry Weather Flow of sewage treatment plant is expected less than 450 m^3 per day according to the preliminary design parameters as stated above.

7.3.2 Use of a package plant adopting Membrane Bio-Reactor (MBR) is recommended for sewage treatment in the Agri-Park. It is a robust wastewater treatment process with inherent features designed to reduce maintenance and provide reliable and efficient wastewater treatment for small scale applications. The ADWF of each sewage treatment plant is expected to be less than 150m^3 per day and flow estimation based on the preliminary design parameters is included in **Appendix C.** The treated effluent, in compliance with the discharge standards at Deep Bay area, will be discharged to Tam Shui Hang/ Sheung Yue River. The feasibility of effluent reuse will be further assessed in the detailed design stage.

7.3.3 According to the "Guidelines for Design of Small Sewage Treatment Plants" issued by the EPD, the design peak flow is assumed to be 4 times of the ADWF or 3 times with the aid of an equalization tank.

7.3.4 **Figure 7.1** shows a schematic layout of the proposed sewerage system in different region of the Agri-Park development. Generally, foul water generated from the lodging units and composting plants will be collected by gravity sewer mains, which connected to the nearby sewage treatment plant and thereafter, the treated effluent will be discharged to the river via a gravity water main. According to the topography of Region A, an underground wet-well pumping station and twin rising mains will be required, depending on the proposed location of the sewage treatment plant, which is subject to further review in the detailed design stage.

7.4 Proposed Waste Recycling and Disposal System

7.4.1 A certain amount of farm waste is anticipated from agriculture or cultivation operation. To achieve a sustainable development, a multiple bin composting system is proposed for waste recycling. A typical layout of the composting plant in Region C is presented in **Figure 7.2**. The foul water or cleansing water from the plant will be collected by a cut-off channel which connects to the nearby foul water manhole, and eventually conveyed to the sewage treatment plant.

7.4.2 The farm waste after decomposition will be utilized as fertilizer for cultivation or landscaping application.

7.4.3 From the management and maintenance point of view, lesser number of composting plant with larger operational scale will be desirable. With the absence of statistical data of the farm wastes produced by the agricultural industry, a larger composting plant to serve the non-organic farming regions (i.e. Region A and Region B) and a smaller composting plant to serve Region C for organic farming are proposed. The proposed dimensions of the composting plant is summarized in Table 7.2. The chosen location should be located away from the dwellings but easily accessible from the main access road, to avoid possible nuisance caused by the composting operation.

Table 7.2: Proposed Dimensions of Composting Plant

Location of Composting Plant	Number of Covered Bunkers	Size of Each Bunker	Open Area for Operation Use (m^2)	Minimum Area required for Composting Plant (m^2)
In Regions A / Region B	14	10m x 10m	400	1,800
In Region C	7	10m x 10m	200	900

7.4.4 The proposed composting plant will be similar to the existing one (photo below) located in Tai Lung Experimental Station in Sheung Shui.

Photo of Existing Composting Plant at Tai Lung Experimental Station

7.5 Summary and Recommendations

7.5.1 On-site sewage treatment and pumping facilities will be designed taking account of various factors, such as topography, location of the lodging facilities and management office/ visitor centre, planning of the Agri-Park, etc. A schematic layout of the sewage treatment facilities and the associated sewer pipe network is shown in **Figure 7.1**. The system effectiveness of the proposed sewerage facilities will be studied during the detailed design stage.

7.5.2 The size and location of the proposed composting plants to suit different types of farming and operational needs will be further reviewed in the next stage of the project.

7.5.3 A Sewerage Impact Assessment will be undertaken in the detailed design stage. EPD should be consulted for the proposed sewerage treatment/ disposal scheme.

8.0 WATER SUPPLY AND UTILITIES

8.1 Existing Water Supply

8.1.1 Based on the record plans collected from WSD (enclosed as **Appendix E5**), fresh water supply watermains are identified in the vicinity of the Agri-Park development as follows:

- A 80mm diameter polyethylene (PE) pipeline supplying fresh water to the north of the site near Ki Lun Shan and to the middle part near Cheung Lek;
- A 300mm/ 450mm diameter ductile iron (DI) and a 150mm diameter PE pipeline running parallel to Fan Kam Road near Tsiu Keng;
- A PE pipe of 150mm and 80mm diameter, both tee-off from the 300mm diameter DI pipe at the junction of Fan Kam Road/ Tsiu Keng Road.

8.1.2 These pipes supply fresh water to Chan Uk Po, Tsiu Keng Lo Wai, Tsiu Keng San Wai, Tsiu Keng Pang Uk, Cheung Lek and the northern part of the Agri-Park development. Swan neck fire hydrants are located alongside the existing access roads and footpaths in the vicinity of the site.

8.1.3 Kwu Tung South is within the fresh water supply zone of Kwu Tung Fresh Water Service Reservoir. There is no salt water supply in the vicinity of the Agri-Park development.

8.1.4 A Dongjiang water pipeline of 48 inches diameter is located in close distance to the proposed Agri-Park boundary. A minimum clearance of 5m will be provided to avoid affecting its future maintenance.

8.2 Water Demand

8.2.1 Provision of water supply to the park facilities, such as visitor centre, management office, basic lodging and storage facilities and composting plants, is required. Estimation of water consumption will be based on WSD Departmental Instruction (DI) No. 1309. The design demand should include both fresh water and flushing water as there is no salt water supply in the vicinity of the Agri-Park.

8.2.2 The design population for the Agri-Park development will be same as that assumed for the sewerage flow estimation as described in Section 7.2.2.

8.2.3 In accordance with WSD's Departmental Instruction No. 1309 (Design Criteria for Design of New Projects), the design unit demand of water supply is tabulated in Table 8.1. A rough estimate of the fresh water demand, according to the predicted number of farmers/ workers provided by AFCD, is summarized in Table 8.2. For a conservative estimate, the unit demand for residential consumer is adopted for mobile population.

Table 8.1: Design Unit Water Demand

	Unit Demand of Fresh Water	Unit Demand of Flushing Water
Basic lodging facilities, visitor centre & management office Residential Consumer - Village Type Re-development	230 litres/head/day	70 litres/head/day
Visitors and Staff School Consumer	12.5 litres/head/day	12.5 litres/head/day
Composting plant (say 0.2 ha) Industrial Consumer - Type I(A) - rural	380 m^3/ha/day	-

Table 8.2: Estimated Fresh Water Demand for Agri-Park Development

	Population	Mean Daily Demand (m^3/day)
Farmers #	520	156
Visitors *	800	20
Staff	20	0.5
Total	1,340	176.5
Industrial Consumer	-	76
	Total Flow Rate	**252.5**

Total no. of farmers are based on Section 4.2.1, counted of both daytime and night-time workers.
* Assume Operating Hours of Visitor Centre = 8 hrs and the centre accommodate max. 100 visitor per hour

8.2.4 With the preliminary design parameters as given above, the predicted mean fresh water demand will be of small quantity and the Kwu Tung supply zone should have adequate capacity to cater for the predicted demand.

8.3 Existing Utilities

8.3.1 Record plans of existing utilities received from the utility undertakers/ authorities are enclosed in **Appendix E.**

Gas Mains

8.3.2 There is no gas main within the Agri-Park site. A copy of reply letter from HKCG is enclosed as **Appendix E6**.

Power Supply

8.3.3 There are 11kV and low voltage cables laid along Fan Kam Road and Tsiu Keng Road to serve the villages and squatters in Tsiu Keng, Chan Uk Po and Cheung Lek. Various 11kV and low voltage overhead cables mounted on wood/ steel poles and pole mounted transformers are

found in the vicinity of the Agri-Park development. Record plans obtained from CLP are enclosed as **Appendix E1**.

Telecommunications

8.3.4 The PCCW telephone cables and joint boxes are found along Tsiu Keng Raod, the access road leading to Cheung Lek and the van tracks/ footways in the vicinity of the site. The telecommunication services are provided to farther squatter areas near the foot hill via overhead cables mounted on poles erected alongside the existing footpaths. Record plans obtained from PCCW are enclosed as **Appendix E4**.

8.3.5 No response was received from the following telecommunication network services operators:

- HK Broadband Network Limited;
- Hong Kong Cable TV Ltd;
- New World Telecommunications Ltd; and
- Wharf T&T HK Limited.

It is assumed that the above operators have no services provided to the site.

8.3.6 An aerial fibre cable of Hutchison Global Communications (HCG) is identified along Fan Kam Road leading to Chan Uk Po.

Street Lighting

8.3.7 Street lighting cables and street lights are identified alongside Tsiu Keng Road, the access road leading to Cheung Lek and various van tracks/ footways in the vicinity of the Agri-Park site. Record plans obtained from HyD/ Lighting are enclosed as **Appendix E3**.

8.4 Impact on Existing Utilities and Proposed Arrangement of Utilities

8.4.1 Given that the main access roads and branch road are across the fields or next to the existing van tracks/ footpaths, it is envisaged that some existing power cables/ telecommunication cables/ lighting cable poles and water pipes will be unavoidably affected, although the proposed road could be re-aligned and refined to avoid them.

8.4.2 Impact on the existing utilities will be confined to the working area of proposed infrastructural works inside the Agri-Park. Relocation/ diversion/ re-provision of utilities that are physically clashed with the proposed works is recommended as appropriate. These will be identified and assessed in the detailed design stage.

8.4.3 To meet the needs of the proposed park facilities, provision of utility services such as power supply, fresh water supply, sewerage and drainage systems, and communication cables is essential.

8.4.4 Both CLP and PCCW have existing apparatus and cables installed along Tsiu Keng Road, the access road leading to Cheung Lek, and within the Agri-Park site. Extended services network with new installation to the proposed park facilities would be feasible, subject to further coordination with the relevant utility undertakers in the next stage of the project.

8.5 Summary and Recommendations

8.5.1 The proposed infrastructures and park facilities will have no significant impacts on the existing utilities identified in the vicinity of the Agri-Park site.

8.5.2 Provision of utilities, such as power supply, water supply, telecommunication service, etc. is technically feasible to meet the needs of the development.

8.5.3 There are existing watermains covering the Agri-Park site. The proposed watermains to the area where the park facilities are located will be developed and designed in the detailed design stage.

8.5.4 The proposed watermains located within the land allocation of the Agri-Park for fresh and flushing water supply are considered as "inside service" to be managed by AFCD and maintained by ArchSD. The plumbing proposal shall follow the "Handbook on Plumbing Installation for Buildings" and WSD's Customer Services Division should be consulted for the inside service arrangements within the Agri-Park.

8.5.5 It is recommended to develop and agree with the concerned utility undertakers/ authorities the extent of utilities diversion, new installation and works programme when the preliminary layout of the infrastructures and park facilities is affirmed.

8.5.6 Provision of street hydrants and street lights shall be in compliance with the FSD Code of Practice for Minimum Fire Services Installation and Equipment and to the current highway practice respectively. Provision of fire hydrant is to be installed at the roadside within 100 m of the proposed park facilities, which include the basic lodging units and visitor centre/ management office.

9.0 PRELIMINARY GEOTECHNICAL ASSESSMENT

9.1 Desk Study

Registered Geotechnical Feature

9.1.1 A total of 29 registered geotechnical features, as shown on Drawing Nos. 673995/GA/001 to 005, are located within or in the vicinity of the Agri-Park site. A summary of the identified features are enclosed in **Appendix F**.

9.1.2 There are 12 registered geotechnical features of height ranging from 3.0m to 5.0m with an angle of 20° to 65°, identified within the Agri-Park site. The distance from the proposed facilities and the influence zone, in accordance with GEO Technical Guidance Note No. 15, of the individual features within and nearby the proposed Agri-Park are also listed in **Table F1** of **Appendix F**.

9.1.3 As mentioned in Section 2, a main public road linking the 3 major regions of the Agri-Park will be proposed. The area currently occupied by squatter structures will be utilized for the proposed infrastructures and facilities after land resumption and clearance. Site formation will not generally be required within the site.

9.1.4 The findings of the preliminary screening of the identified features reveal that only 1 registered feature that would be affected by the proposed public roads, based on the preliminary general layout plan of the proposed Agri-Park as shown on **Figure 3.3**. According to the preliminary layout plan, the proposed buildings/structures would not affect / be affected by the existing features. Moreover, the existing farmlands are not considered as infrastructure of the Agri-Park development that would affect/ be affected by the existing features.

9.1.5 Feature No. 2SE-D/C168, as shown on Drg. No. 673995/GA/001 enclosed in **Appendix F**, will be affected by the proposed infrastructure of the Agri-Park development. The stability of Feature No. 2SE-D/C168 has recently been improved by prescriptive measures and modification works to this feature should be further studied during the detailed design stage.

9.1.6 As the proposed road alignment and the locations of park facilities are subject to further review in the detailed design stage, the features that will affect or be affected by the proposed infrastructures of the Agri-Park development should be further reviewed as appropriate.

9.1.7 In accordance with GEO Technical Guidance Note No. 15, the classification of consequence-to-life category of the identified features for the existing and future conditions are summarized and enclosed in **Appendix F**. The C-to-L category of registered geotechnical features will be reviewed in the detailed design stage.

Landslide Records

9.1.8 No past landslide events within the site are recorded in the GEO incident database.

9.1.9 In addition, some low-altitude (8,000ft or below) aerial photographs of the Enhanced Natural Terrain Landslide Inventory (ENTLI) prepared by GEO have been obtained and reviewed. It

reveals that there are significant numbers of natural terrain landslide events on the natural hillside above the Agri-Park site, as shown in Drg No. 673995/GA/006.

Ground Investigation

9.1.10 There are only two drillholes (ND037BH1 and BH39) and a number of trial pits identified within the Agri-Park site. The available GI records found in the vicinity of the site are summarized in Table 9.1.

Table 9.1 Summary of GI Records in the vicinity of the Agri-Park Development

GIU Report No.	Project Title	GI Contractor	Year	Drillholes / Trial Pits
28704	CE/47/96 - RPIS Minor Rural Improvement Works	Enpack	1998	ND037BH1
41276	CE5/2002(DS) - Drainage Improvement in the Northern NT	Vibro (HK) Ltd.	2004	BH39
21044	CE51/93 - Rural Drainage Rehabilitation Scheme – River Indus	Geotechnics & Concrete	1995	BTP 3A -6A, 3B -5B, 8A
24129	GE/95/12 - RPIS Minor Rural Improvement Works	Lam Geotechnics	1996	TP-ND144TP1 TP-ND144TP2
05224	Ngau Tam Mei to Tai Po Tunnels	Gammon	1983	BH25, BH28, BH29
58928	CE61/2012(HY) - Improvement to Fan Kam Road	Furgo	2014	BH03
42610	CE/6/2004(GE) for Feature 2SE-D/C199	DrilTech	2005	BH1 – 6 & TP 1-6, CS1- 4
28008	CE51/93 - Rural Drainage Rehabilitation Scheme At the River Beas	Lam Geotechnics	1997	DB-BH4 – 8, DB-TP1
34227	GE/2001/14 - RPIS Minor Rural Improvement Works	Geotechnics and Concrete	2002	TP3, TP4, TP5
38000	ASD 007151 for Feature No. 6NE-B/R1	Furgo (HK) Ltd.	2001	R1-T1
19617	Wo Hop Shek	GEO/ Planning	Unknown	BH/BD/190, BH/BD/191

9.1.11 The site specific ground investigation, if necessary, will be proposed for the detailed site investigation to be carried out in the next stage of the project.

Geology

9.1.12 The proposed Agri-Park is located on a large alluvial plain at the foothill of Kai Kung Leng with a large meandering river, Tam Shui Hang (Upstream of River Beas) cut across the middle of the park. According to the 1:20,000 geological map (Map Sheet 2, San Tin), the majority

of the Agri-Park area is underlain by Pleistocene Alluvium (QPa) and Holocene Alluvium (Qa) comprising silt, sand and gravel. The alluvium sediment is truncated by Pleistocene colluvium (Qpd) comprising sand, gravel and cobble close to the foothill. The sediments are underlain by coarse ash crystal Tuff belonging to Tai Mo Shan Formation (JTM).

9.1.13 The presence of significant fine grained soil content in the alluvial deposits may suggest poor drainage and therefore forming a wet soil layer for cultivation. However, extensive cultivation on the area may have modified the alluvial soil.

Regional Hydrogeology

9.1.14 The proposed Agri-Park is located on the alluvial plain at the foothill of a series of undulating terrain stretching from Kai Kung Leng to the north, with a major river, Tam Shui Hang cut across the middle of the Agri-Park. There are a number of streams originating from the undulating terrain surrounding the Agri-Park which generally flow towards the north. Small base flow was observed flowing through the channels during the dry season.

9.1.15 Based on an initial review of the distribution of superficial, it is anticipated that groundwater is flowing within the quaternary deposits (including Holocene and Pleistocene Alluvium) from higher elevation areas to lower elevation areas. In areas of natural terrain, during the wet season groundwater recharges the superficial deposits or the weathered rock and eventually enter the alluvial plain within the Agri-Park area.

9.1.16 Piezometer records near Tam Shui Hang revealed that the ground water level is at about 0.5m to 1.0m (41276-BH39) below ground level during wet season (in August). During dry season, a system with negligible recharge and reduced flows, and a decline in the groundwater table are likely to occur. The groundwater level can also vary greatly from the wet season to the dry season. However, a water table will be maintained within the alluvial plain at a lower level throughout the year.

9.2 Natural Terrain Hazard

9.2.1 The western and southern sides of the Agri-Park development are surrounded by natural terrain, which may pose natural terrain hazard to the park facilities. A preliminary site specific review on the natural terrain hazards has been carried out for the site.

9.2.2 The preliminary assessment on the natural terrain hillsides was conducted in accordance with the approach outlined in GEO Report No. 138, Guidelines for Natural Terrain Hazard Studies (Ho et al., 2016). The purpose of the review is to identify and assess whether the natural hillsides pose potential natural terrain landslide hazard on the Agri-Park development in general.

Initial Screening

9.2.3 Initial screening was conducted on the natural hillsides surrounding the site based on the guideline given in GEO Report No.138. Two criteria were considered during the screening process, which include considerations on the type of facilities and the proximity of the natural hillsides to the facilities as described below.

a) Facility Group

According to the preliminary conceptual plan of the Proposed Agri-Park, the park is intended for admitting farmers for commercial crop production. To enable viable farming operations in the Agri-Park, the proposed infrastructures including road network, irrigation channels, drainage, power supply, sewage treatment facilities, basic lodging and storage facilities, management office and a visitor centre will be constructed. The grouping were done with reference to Table 2.2 of GEO Report No. 138 which classify facilities into 5 groups according to the likely population affected. Facility group for the proposed park facilities are given in Table 9.2.

Table 9.2: Facility Group

Type of Facilities	Facility Group
Farmland (including green house)	5
Public Road (Low Traffic Density*)	4
Sewage Treatment Plant	2
Lodging and Storage Facilities	1
Visitor Centre	1
Open Car Park	3
Management Office	1
Composting Plant	2

* Based on classification as stated in Highway Slope Manual issued by GEO. For low traffic density, the Average Daily Traffic (ADDT) is in the range of 200 to 2800.

b) Proximity of Natural Terrain

Three natural terrain areas were identified at the western and southern sides of the Agri-Park development (Drg No. 673995/GA/006 enclosed in **Appendix F**). These 3 natural terrain areas are located above the development site and therefore may affect the Agri-Park in case of failure. In order to determine whether further natural terrain hazard review on these catchments is required, site specific screening were carried out on these 3 areas to determine whether the natural hillside areas meet the 'Alert Criteria' as suggested in GEO Report 138.

Ground profile along the steepest flow paths towards the site was generated in the GIS platform. Angular elevation for each catchments was then determined based on the ground profiles data. Elevations are shown on Drg. No. 673995/GA/006 and summarized in Table 9.3.

Table 9.3: Angular Elevation from Natural Terrain to Agri-Park

Natural Terrain Area	Angular Elevation (°)	Within 50m of Ground Sloping 15°	Meet Alert Criteria
NT1	20.9	N	N
NT2	19.2	Y	N
NT3	19.7	Y	N

9.2.4 The results of the site specific screening revealed that Natural Terrain Areas NT1, NT2 and NT3 are unlikely affecting the Agri-Park development due to their relatively far proximities to the park boundary.

Preliminary Natural Terrain Hazard Assessment

9.2.5 Based on results of the initial screening, the Agri-Park site do not fall within the 20° angular elevation zone or is outside the 50m from ground sloping larger than 15° and therefore do not satisfy the 'Alert Criteria' in general.

9.2.6 Moreover, the majority area of the Agri-Park development is intended for farming use. According to the preliminary park layout plan, the area close to the natural terrain at the southern side of the site will as well be planned for farming purpose. According to GEO Report No. 138, farmland should be classified as group 5 facility and therefore do not fall within the 'Alert Criteria' due to its less populated facility group.

9.2.7 However, localized steeper natural terrain above the Agri-Park development may fall within the 'Alert Criteria', i.e. with the park boundary located within the 20° angular elevation zone. Further review on the criteria of the Natural Terrain Hazard will be carried in the detailed design stage when the layout of park facilities is affirmed, to take account of the locations of the group 1 to group 3 facilities categorized in Table 9.2.

9.3 Summary and Recommendations

9.3.1 A preliminary geotechnical assessment was conducted to review whether the Agri-Park development may affect or be affected by the man-made slopes, retaining walls or natural terrain in the vicinity of the area.

9.3.2 Based on the preliminary geotechnical review and findings on the existing man-made slope and retaining features, there are 29 registered features located within or in the vicinity of the Agri-Park development. Of which, 12 registered features are located inside the Agri-Park. The findings of the preliminary screening of the identified features reveal that only 1 registered feature (No. 2SE-D/C168) that would be affected by the proposed works, based on the preliminary general layout plan of the proposed Agri-Park as shown on **Figure 3.3**. The stability of Feature No. 2SE-D/C168 has recently been improved by prescriptive measures and modification works to this feature should be further studied during the detailed design stage

Details of the features and information of distance from the proposed facilities and the influence zone of individual features are presented in **Table F1** of **Appendix F**.

9.3.3 The majority of the identified features are classified as Category 3 consequence-to-life ("C-to-L") and they are of very low consequence in case of failure. However, all features affect or be affected by the development should be assessed/ upgraded to current standards, regardless of their C-to-L categories.

9.3.4 A preliminary natural terrain hazard review was also conducted to initially assess whether the natural hillsides will pose natural terrain hazard to the Agri-Park development. The results revealed that the proposed park facilities do not lie within the 'Alert Zone' stipulated in GEO Report No. 138. Further review will be carried out in the detailed design stage when the layout of the Agri-Park is confirmed.

9.3.5 All existing man-made slopes and retaining walls within or in the vicinity of the site should be assessed and if necessary, upgraded, if the identified geotechnical features would affect or be affected by the Agri-Park development and its infrastructures in accordance with ETWC TCW No. 29/2002. Detailed geotechnical assessment is to be carried out in the detailed design stage of the project. The site specific ground investigation, if necessary, will be proposed for the detailed site investigation to be carried out in the next stage of the project.

9.3.6 Based on the above findings, the Agri-Park development is technically feasible with respect of the geotechnical aspect.

10.0 PRELIMINARY ENVIRONMENTAL ASSESSMENT

10.1 EIA Ordinance

10.1.1 A review of the project is made with reference to the criteria as stipulated in Schedule 2 and Schedule 3 of the Environmental Impact Assessment Ordinance (EIAO) (Cap 499). The scope of the Agri-Park development has been assessed and the project is not considered as a Designated Project requiring Environmental Permits. The relevant categories are discussed below.

Location of Site

10.1.2 The Site is located in Kwu Tung South and falls within area zoned "Agriculture" ("AGR") and "Green Belt" ("GB") with a minor portion within an area shown as "Road" under the approved Kwu Tung South Outline Zoning Plan (OZP) No. S/NE-KTS/14. Sheung Yue River, the upstream named as Tam Shui Hang, runs through the site from south to north.

10.1.3 It does not fall in any sensitive areas such as an existing or gazetted proposed country park, a conservation area, an existing or gazetted proposed marine park or marine reserve, a site of cultural heritage and a site of special scientific interest.

Classification of Roads

10.1.4 The main public access to the Agri-Park will be via Tsiu Keng Road from Fan Kam Road in the south. Local widening of Tsiu Keng Road is required to facilitate the proposed visitor centre and management office to be located next to Tsiu Keng Road. The proposed public road will serve the tenants and visitors of the Agri-Park as well as the nearby village communities in the area while the branch roads linking various facilities and farms to the public road will primarily serve the Agri-Park users. The proposed main road passing through the Agri-Park with a del-cul-sac at its end is considered as a local village road designed for public use.

10.1.5 Tsiu Keng Road is a public road and classified as a local village road, which is currently maintained by HyD.

Sewage Collection, Treatment, Disposal and Reuse

10.1.6 On-site sewage treatment/ pumping facilities will be proposed within the Agri-Park. According to the preliminary design parameters as discussed in Section 7, the sewage treatment/ pumping facilities will have an installed capacity of not more than 2000 m^3 per day. The treated sewage effluent generated from the Agri-Park will be discharged to Sheung Yue River and not be re-used.

Waterways and Drainage Works

10.1.7 The Agri-Park development will not require any drainage channel or river training and diversion works with a channel width of more than 100m or which discharge into sensitive area which is less than 300m from its nearest boundary.

10.2 Identification of Potential Environmental Impacts

10.2.1 Given the nature and purpose of the Agri-Park development, land use of the site will remain unchanged after establishment of the Park. The area is rural in nature and is characterized by low-rise/ village type houses. The branch roads are designed to serve the Agri-Park's tenants and to meet the needs of daily agricultural operation. It will be operated like a local village access and the vehicle speed is expected to be slow and not more than 50km/hr. With at least one central composting plant provided to recycle food and farm wastes produced from crop production and on-site sewage treatment facilities, it is anticipated that impacts on the environment in respect of noise, air and water quality will be minimal.

10.2.2 As the area is of typical rural environment and the proposed branch roads are located close to the existing villages/ squatters, the environmental impacts to the surroundings are mainly due to construction traffic, fugitive dust and wastewater during construction phase.

10.2.3 With implementation of effective site control measures and good site practices, such as restriction of construction working hours within the period between 07:00 and 19:00 hours on weekdays, use of quality powered mechanical equipment with silences or mufflers, implementation of dust suppression measures, proper control of water generated from construction activities, adverse impact on the environment is not anticipated.

10.2.4 Further environmental review/ assessment in respect of noise, air and water quality is recommended to be carried out in the next stage of the project.

10.3 Heritage

10.3.1 Based on a preliminary baseline review and desk study, there are no heritage sites, such as declared monuments, proposed monuments, graded historic sites and buildings, proposed graded historic buildings, sites of archaeological interest and government historic sites identified by the Antiquities and Monuments Offices, located within or in the vicinity of the Agri-Park development.

10.3.2 It is noted that Lung Tam Kwun Yam Temple (Serial No. N89), under the new items in addition to 1,444 historic buildings, is located more than 50m measured from the nearest point of the Agri-Park boundary, as shown on **Figure 10.1**. Given the purpose of establishment of the Agri-Park and the intended usage of the land, it will have no adverse impacts on this built heritage.

10.4 Tree Preservation

10.4.1 The search records reveal that there is no registered or potentially registrable Old and Valuable Trees identified within the Agri-Park development.

10.4.2 Several locations with heavy vegetation cover are identified within the Agri-Park development. These areas are either to be excluded from the Agri-Park or be avoided as far as practicably possible. The Agri-Park development will not affect these areas such that the rural environment can be maintained.

10.5 Summary and Recommendations

10.5.1 Given the nature and scope of the Agri-Park development, the Project is therefore not considered as a Designated Project (DP) in accordance with Schedule 2 of Environmental Impact Assessment Ordinance (EIAO) (Cap 499).

10.5.2 Further environmental review/ assessment in respect of noise, air and water quality will be carried out in the detailed design stage of the Project.

10.5.3 Lung Tam Kwun Yam Temple (Serial No. N89) under the new items in addition to 1,444 historic buildings, is identified and located at a distance more than 50m away from the proposed boundary of the Agri-Park. The development will have no adverse impacts on this built heritage.

10.5.4 There are several patches of heavy vegetation identified in the vicinity of the Agri-Park. The existing trees are to be reserved as far as practicable. Given the purpose of establishment of the Agri-Park and the intended usage of the land, the rural environment can be maintained.

10.5.5 Tree survey for the proposed infrastructures and park facilities is recommended to be carried out in the detailed design stage. Due consideration will be given to preserve/ transplant the trees found in conflict with the proposed works as far as practicable.

11.0 CONCLUSION

11.1 According to the preliminary layout plan of the proposed Agri-Park (**Figure 3.3**), the Development shall include the following infrastructural works and park facilities:

(a) construction of a main access road of 7.3m wide connecting for Phase 1 and Phase 2 developments and branch roads of 3.5m;
(b) improvement to the section of Tsiu Keng Road between its junction with Fan Kam Road and the proposed main access road;
(c) construction of a visitor centre cum management office to house a maximum of 100 visitors including an exhibition area, a seminar room and a meeting room and a management office to house a maximum of 20 staff and an associated car park;
(d) provision of associated engineering infrastructures including drainage, sewerage, sewage treatment facilities, irrigation, water supply, electricity and utilities; and
(e) provision of associated park facilities including basic lodging and storage units and central composting plants.

11.2 The preliminary design requirements for the park facilities are discussed in Sections 3.8 and 3.9. A schematic layout of the proposed improvement to the existing irrigation system and the proposed sewerage system is presented in **Figure 6.2** and **Figure 7.1** respectively.

11.3 **Figure 3.4** shows a tentative layout of the proposed car park at Tsiu Keng Road. The car park ingress will be located at a distance of around 200m from its junction with Fan Kam Road. **Figure 4.1** shows the preliminary layout of the proposed upgrading works to the Fan Kam Road/ Tsiu Keng Road junction and **Figure 4.2** shows the layout plan of the proposed widening of Tsiu Keng Road.

Traffic Impact

11.4 Based on the preliminary traffic impact review, upgrade of the junction of Fan Kam Road with Tsiu Keng Road to tie in with the proposed main access road and to remove the existing restriction of 10m long vehicle on Tsiu Keng Road are required.

11.5 Strengthening of existing KMB and GMB services to the vicinity of the Agri-Park are recommended, subject to the demand of services to be reviewed in the detailed design stage.

11.6 A comprehensive traffic impact assessment for the development and construction traffic will be undertaken in the detailed design stage.

Drainage

11.7 According to the available information, there is no flooding records or planned drainage works in the vicinity of the Agri-Park development.

11.8 As the Agri-Park development has minimal change in drainage characteristic, no adverse impact is anticipated on the river channels/ existing drainage system.

11.9 The existing drainage pipes along Tsiu Keng Road have been roughly checked against the anticipated increase in surface flow due to the proposed road widening. The check has revealed that the capacity of these pipes are adequate to carter for the additional runoff. Upgrading of this drainage system is not required.

11.10 Proper drainage channels/ drains are recommended to collect the surface runoff generated from the proposed access roads and park facilities. The existing drainage channels within the site are recommended to be rehabilitated or upgraded to suit the Agri-Park development. The cross road drainage facilities will also be required under the proposed access roads. **Figure 5.2** shows the preliminary drainage layout plan of the proposed access roads. This will be further reviewed in the detailed design stage.

11.11 Detailed investigation of the existing drainage system and its conditions within the site is recommended to be carried out in the detailed design stage of the project. A Drainage Impact Assessment will be undertaken in the detailed design stage.

Irrigation

11.12 The primary water source from Tam Shui Hang/ River Beas supplemented by limited amount of raw water from Dongjiang pipeline, is theoretically adequate in supplying irrigation water for use in the proposed Agri-Park. However, there are concerns that irrigation water may be scarce in dry seasons and sufficient supply of irrigation water may not be maintained in adverse conditions.

11.13 Upgrading the existing irrigation system by means of extended irrigation channels, extended raw water pipes, installation of new weirs, harvest water storage tanks, etc. are recommended. Water supply from other sources should be explored to ensure a stable supply of irrigation during drought years or dry periods.

11.14 **Figure 6.2** shows a schematic layout of the proposed improvement measures to the existing irrigation system. The extent of proposed water channels and raw water pipes will be determined during the detailed design stage of the Agri-Park project.

11.15 Additional water source for irrigation including diversion of water from Kwu Tung Reservoir and pumping from drilled wells within the proposed Agri-Park are considered possible options to ensure a stable supply of irrigation water all year round. For the reservoir approach, land resumption/ GLA may be required for the provision of new infrastructure outside the Agri-Park. Additional survey and ground investigation will be required in the IDC stage to obtain site specific ground information for the design and construction cost estimate. In view of cost effectiveness, utilization of water from Kwu Tung Reservoir for irrigation should only be accorded as low priority.

11.16 The identified ponds in Regions A2, B and C, located on private lots, could be another source of irrigation supply, if the above options are found not feasible. Further investigation on pond condition and assessment of water quality are required. If the ponds are found partially or wholly filled, they should be reinstated with concrete lining.

11.17 Use of harvested rainwater can be considered as alternative water source in Regions A2 and B. A rainwater harvesting system may include an above ground/ underground storage tank to collect surface runoff from paved area/water overflow from streams during wet season and conveying pipes/water channels. Further study and field survey will be required.

11.18 A detailed investigation on the existing irrigation system and a walk-over survey of farmlands are required to affirm the details of the improvement measures, subject to further review and consultation with AFCD and WSD.

11.19 As different types of irrigation methods may be adopted for use in different regions in the Agri-Park (e.g. greenhouses or open field cultivation), further studies will be needed to investigate the feasibility and costs of providing these infrastructure with a view to ensuring these irrigation systems can be effectively installed and put into practice.

11.20 Utilizing water from Tam Shui Hang/ Sheung Yue River may have impact on the hydrology downstream of the Agri-Park, especially during dry seasons when the river flow rate is relatively low. Subject to the agreement with WSD, the option of discharging water from Kwu Tung Reservoir to compensate the water usage by the Agri-Park during dry seasons may be explored.

Sewerage, Waste Recycling and Disposal

11.21 Only limited areas in the northern part of Kwu Tung South are served by the public sewers which falls within the Deep Bay Catchment area. There is no public sewers in the vicinity of the Agri-Park development.

11.22 On-site sewage treatment and pumping facilities will be designed taking account of various factors, such as topography, location of the lodging facilities and visitor centre, planning of the Agri-Park, etc. A schematic layout of the sewage treatment facilities and the associated sewer pipe network is shown in **Figure 7.1**. The system effectiveness of the proposed sewerage facilities will be studied during the detailed design stage.

11.23 The size and location of the proposed composting plants to suit different type of farming and operational needs will be reviewed in the next stage of the project. A typical layout of the composting plant for Region C is presented in **Figure 7.2**.

11.24 A Sewerage Impact Assessment will be undertaken in the detailed design stage. EPD should be consulted for the proposed sewerage treatment/ disposal scheme.

Water Supply and Utilities

11.25 Kwu Tung South is located within the fresh water supply zone of Kwu Tung Fresh Water Service Reservoir. There are existing watermains covering the Agri-Park site. The proposed watermains to the area where the park facilities are located will be developed and designed in the detailed design stage.

11.26 The proposed infrastructures and park facilities will have no significant impacts on the existing utilities identified in the vicinity of the Agri-Park site.

11.27 Provision of utilities, such as power supply, water supply, telecommunication service, etc. is technically feasible to meet the needs of the development.

11.28 The proposed watermains located within the land allocation of the Agri-Park for fresh and flushing water supply are considered as “inside service” to be maintained by the maintenance agent of AFCD. The plumbing proposal shall follow the “Handbook on Plumbing Installation

for Buildings" and WSD's Customer Services Division should be consulted for the inside service arrangements within the Agri-Park.

11.29 The proposed watermains located within the land allocation of the Agri-Park for fresh and flushing water supply are considered as "inside service" to be managed by AFCD and maintained by ArchSD. The plumbing proposal shall follow the "Handbook on Plumbing Installation for Buildings" and WSD's Customer Services Division should be consulted for the inside service arrangements within the Agri-Park.

11.30 It is recommended to develop and agree with the concerned utility undertakers/ authorities the extent of utilities diversion, new installation and works programme when the preliminary layout of the infrastructures and park facilities is affirmed.

11.31 Provision of street hydrants and street lights shall be in compliance with the FSD Code of Practice for Minimum Fire Services Installation and Equipment and to the current highway practice respectively. Provision of fire hydrant is to be installed at the roadside within 100 m of the proposed park facilities, which include the basic lodging units and visitor centre/ management office.

Preliminary Geotechnical Assessment

11.32 Based on the preliminary geotechnical review and findings on the existing man-made slope and retaining features, there are 29 registered features located within or in the vicinity of the Agri-Park development. Of which, 12 registered features are located inside the Agri-Park.

11.33 The majority of the identified features are classified as Category 3 consequence-to-life ("C-to-L") and they are of very low consequence in case of failure. However, all features affect or be affected by the development should be assessed/ upgraded to current standards, regardless of their C-to-L categories.

11.34 A preliminary natural terrain hazard review was also conducted to initially assess whether the natural hillsides will pose natural terrain hazard to the Agri-Park development. The results revealed that the proposed park facilities do not lie within the 'Alert Zone' stipulated in GEO Report No. 138. Further review will be carried out in the detailed design stage when the layout of the Agri-Park is confirmed.

11.35 All existing man-made slopes and retaining walls within or in the vicinity of the site should be assessed and if necessary, upgraded, if the identified geotechnical features would affect or be affected by the Agri-Park development and its infrastructures in accordance with ETWC TCW No. 29/2002. Detailed geotechnical assessment is to be carried out in the detailed design stage of the project. The site specific ground investigation, if necessary, will be proposed for the detailed site investigation to be carried out in the next stage of the project.

11.36 Based on the above findings, the Agri-Park development is technically feasible with respect of the geotechnical aspect.

Preliminary Environmental Assessment

11.37 The main access roads of the Agri-Park development do not fall in any one of the road categories, like an expressway, truck road, primary distributor road or district distributor road.

The treated sewage effluent from the proposed sewage treatment plant will not be reused. On this basis, the Project is therefore not considered as a Designated Project (DP) in accordance with Schedule 2 of Environmental Impact Assessment Ordinance (EIAO) (Cap 499).

11.38 Construction impact assessment in respect of noise, air and water quality will be carried out in the detailed design stage of the Project.

11.39 There is no declared monument or graded historical building identified within the proposed site. Hence, a Heritage Impact Assessment is not required for this project.

11.40 According to the desktop study and walk-over inspection, the existing trees in the site are found to be common species and none of them are Old and Valuable Trees (OVTs) according to the Register of OVT's maintained by the LCSD.

11.41 Tree survey for the proposed infrastructures and park facilities is recommended to be carried out in the detailed design stage. Due consideration will be given to preserve/ transplant the trees found in conflict with the proposed works as far as practicable.

FIGURES

Legend

- Proposed Agricultural Park 93 Ha
- Existing Agricultural Farmland 78.4 Ha
  - Active Agricultural Land
  - Abandoned Agricultural Land
  - Clustered Structure
  - Existing Structures
- Ⓐ Existing and Displaced Farms (Agricultural Land 48 Ha)
- Ⓑ Intensive, Non-organic Production Area (Agricultural Land 12 Ha)
- Ⓒ Organic Production Area (Agricultural Land 18 Ha)

Remark: Boundary subjected to the changes

828000
828500
839000
838500
838000
837500
837000
C
B
A
長瀝
Cheung Lek
陳屋埔
Chan Uk Po
蕉徑
Tsiu Keng
N
0 125 250 375 500 Meters

Client: CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Consulting Engineers: ch2m:	Project: Agreement No. NTE/01/2016 Engineering Feasibility Study For the Establishment of An Agricultural Park - Feasibility Study	FIGURE 2.1
		Title: Tentative Usage Allocation of The Agri-Park	Checked: ML; Scale: 1:6000@ A3; Rev.: 1; Designed: DY; Drawn: DY; Date: 7/10/2016

828000 N
829000 N
830000 N
831000 N
841000 N
840000 N
839000 N
838000 N
837000 N

鳳崗
Fung Kong

塱原
Long Valley

古洞
Kwu Tung

粉嶺公路 Fanling Highway

麒麟山
Ki Lun Shan

古洞水塘
Kwu Tung Reservoir

雙魚河
River Beas

牛地
Ngau Tei

雙魚河鄉村會所
Beas River Country Club

坑頭大布
Hang Tau Tai Po

高爾夫球場
Fanling Golf Course

麒麟山坳
Ki Lun Shan Au

福全山
Fuk Tsuen Shan

蝦公地
Ha Kung Tei

坑頭
Hang Tau

Tam Shui Hang

唐公嶺
Tong Kung Leng

長瀝
Cheung Lek

粉錦公路 Fan Kam Road

大隴實驗農場
Tai Lung Experimental Farm

蓮塘尾
Lin Tong Mei

大隴
Tai Lung

陳屋埔
Chan Uk Po

蕉徑路
Tsiu Keng Road

蕉徑
Tsiu Keng

營盤
Ying Pun

Legend :

Proposed Boundary of Agricultural Park

Proposed Phase I Boundary of Agricultural Park

0 80 160 240 320 400
METRES
1 : 15000(A3)

CLIENT: CEDD	CONSULTANT: ch2m.	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: EXISTING ROAD NETWORK	DRAWING NO.: FIGURE 3.1
				CHECKED BY: ML / SCALE: 1:15000 @ A3 / REV.: B
				DESIGNED BY: SK / DRAWN BY: VT / DATE: 1/NOV/2016

Victor
11/2/2016
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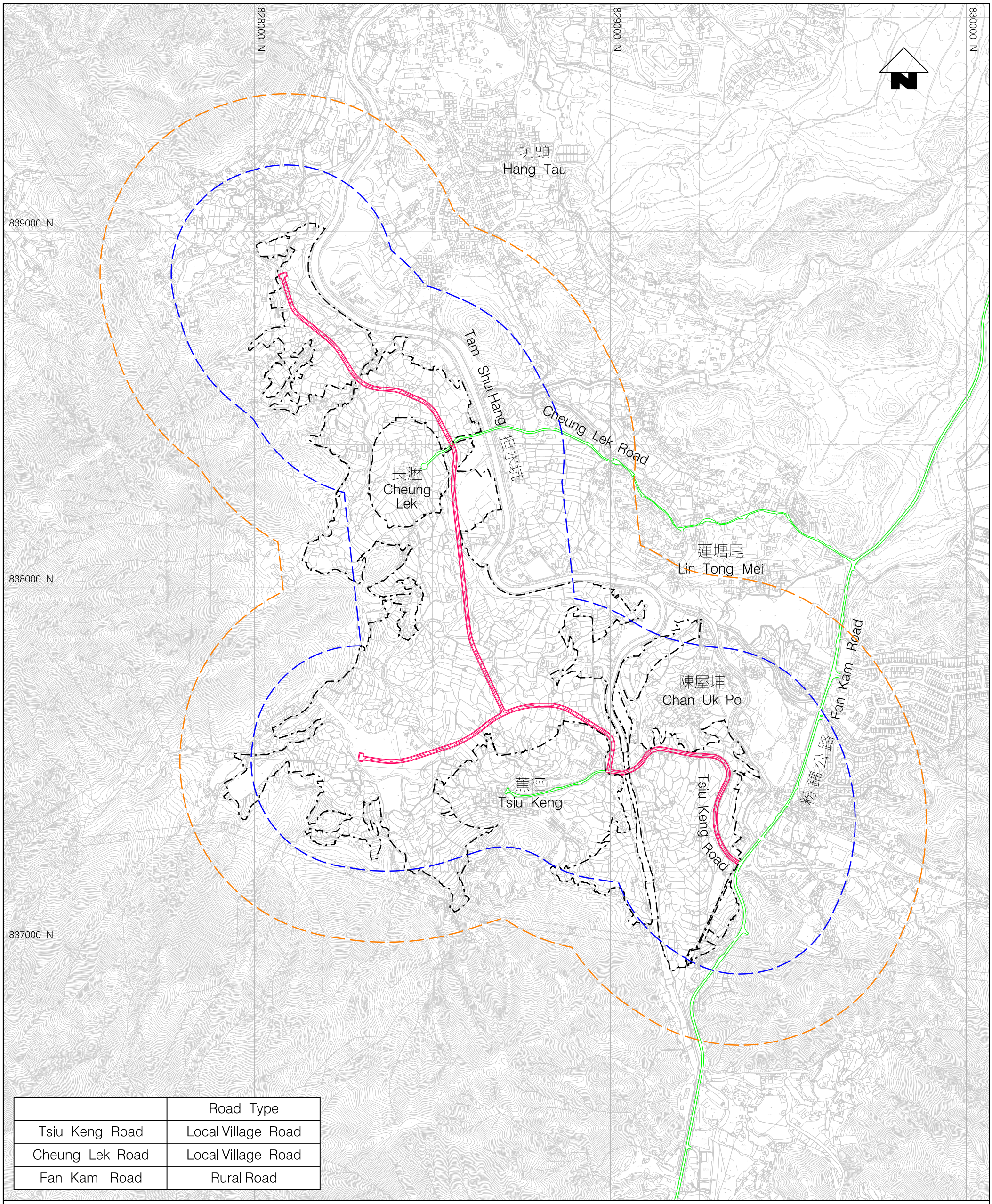


	Road Type
Tsiu Keng Road	Local Village Road
Cheung Lek Road	Local Village Road
Fan Kam Road	Rural Road

Legend :

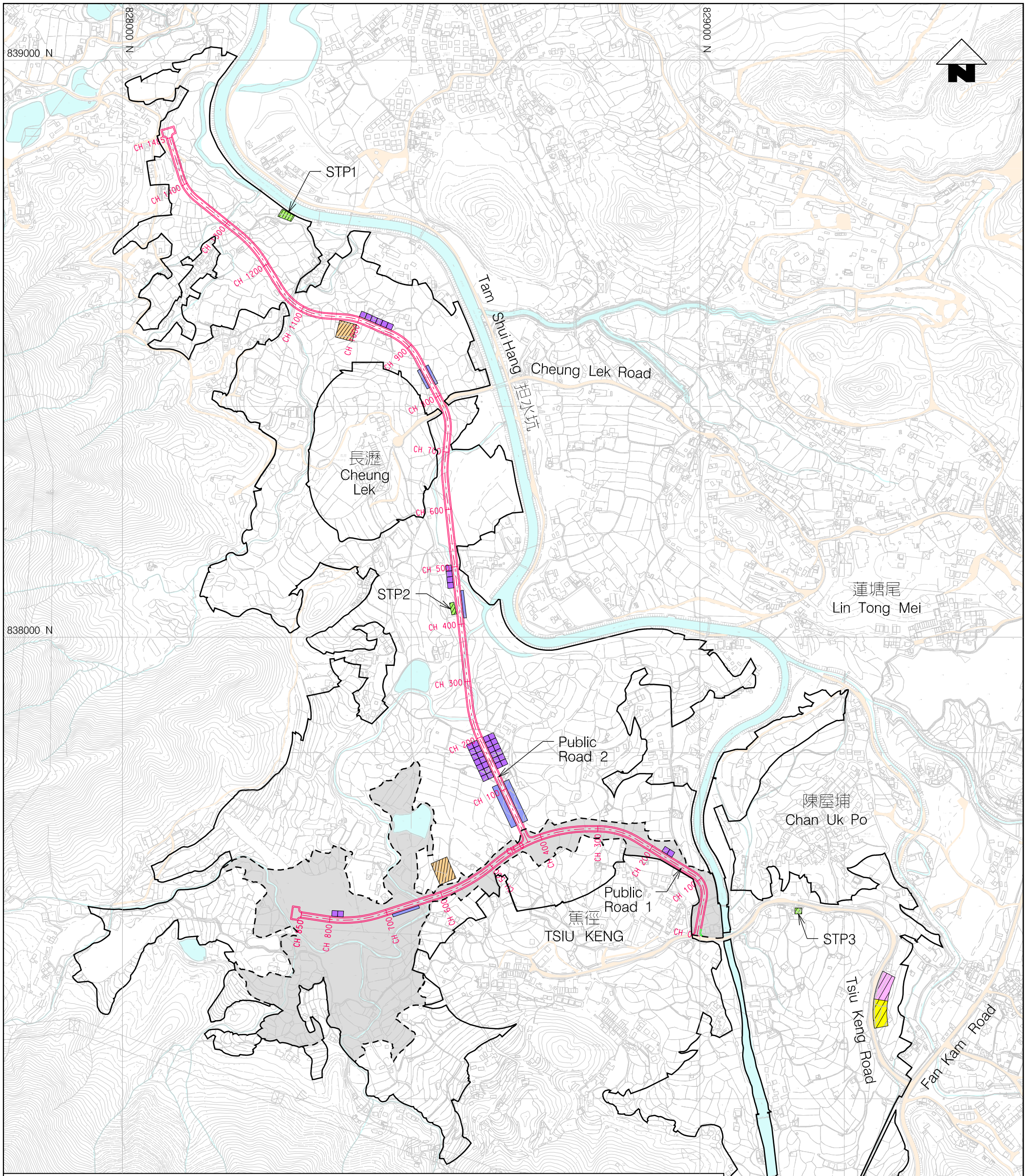
- Proposed Boundary of Agricultural Park
- 300m Study Area (Noise)
- 500m Study Area (Air)
- Proposed Main Access Road / Widening of Tsiu Keng Road
- Existing Road

0 50 100 150 200 250
METRES
1 : 10000(A3)

CLIENT: CEDD	CONSULTANT: ch2m	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: STUDY AREA FOR NOISE AND AIR QUALITY

DRAWING NO.: FIGURE 3.2		
CHECKED BY: ML	SCALE: 1:10000 @ A3	REV.: B
DESIGNED BY: SK	DRAWN BY: VT	DATE: 1/NOV/2016

Victor 11/3/2016
E:*proj*673995*04_Drawings*673995_F_CH2M_FIG3-2_B.dgn



Legend :

- Proposed Boundary of Agricultural Park
- Proposed Boundary of Agricultural Park (Phase I)
- Proposed Public Road (7.3m wide)
- Proposed Composting Plants (2 Nos.)
- Proposed Visitor Centre and Management Office (2,100m^2)
- Proposed Car Park (800m^2 min.)
- Proposed Sewage Treatment Plants (STP)
- Proposed Basic Lodging
- Proposed Storage Facilities

Remarks: The proposed location and size of the car park are tentative only subject to detailed design and approval by C for T.

CLIENT: CEDD	CONSULTANT: ch2m	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: PRELIMINARY GENERAL LAYOUT PLAN OF THE PROPOSED AGRI- PARK	DRAWING NO.: FIGURE 3.3	
				CHECKED BY: ML	SCALE: N.T.S. / REV.: A
				DESIGNED BY: SK	DRAWN BY: VT / DATE: 1/NOV/2016

Victor 11/3/2016
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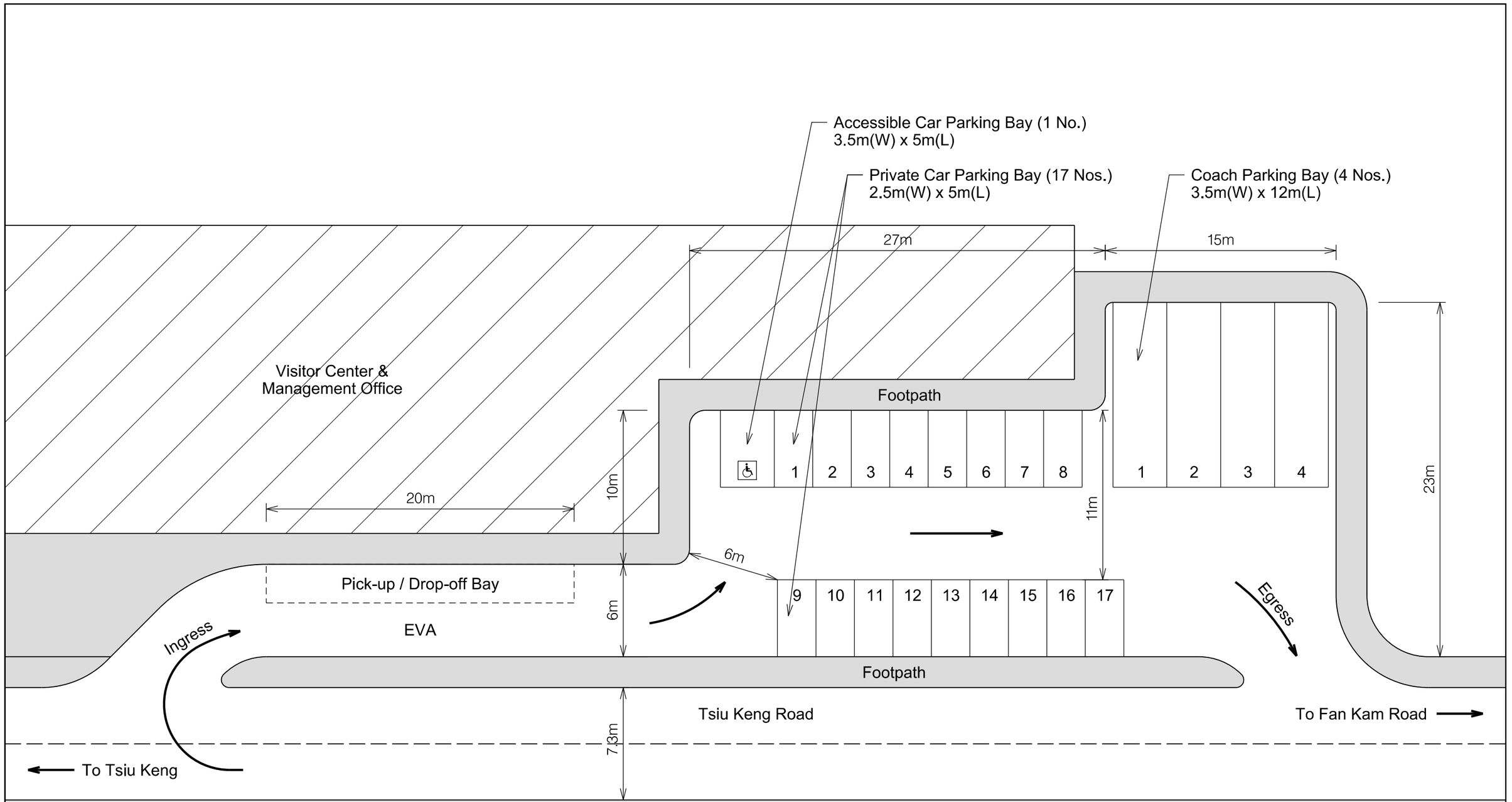

CLIENT: CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	CONSULTANT: ch2m. SM	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: TENTATIVE LAYOUT PLAN OF CAR PARK AT TSIU KENG ROAD	DRAWING NO.: FIGURE 3.4	
				CHECKED BY: ML	SCALE: N.T.S.
				DESIGNED BY: SK	DRAWN BY: VT
				REV.: C	DATE: 25/JAN/2017

Victor 2/16/2017
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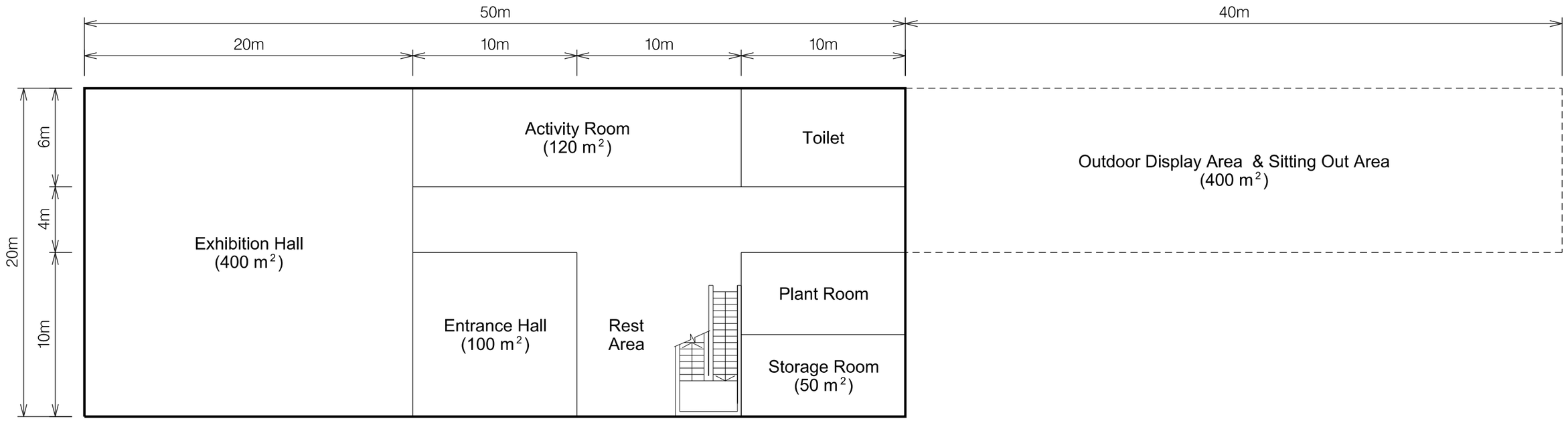
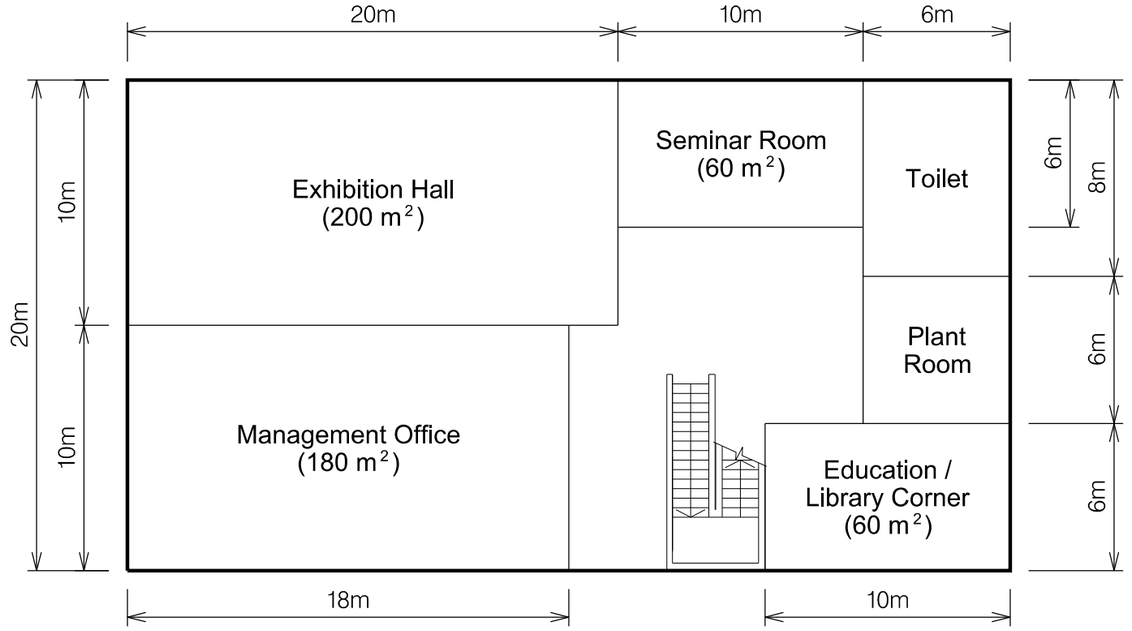


Ground Floor Plan



First Floor Plan

CLIENT: CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	CONSULTANT: ch2m. SM	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: SCHEMATIC LAYOUT PLAN OF VISITOR VENTER CUM MANAGEMENT OFFICE	DRAWING NO.: FIGURE 3.5	
				CHECKED BY: ML	SCALE: N.T.S. / REV.: A
				DESIGNED BY: SK	DRAWN BY: VT / DATE: 1/NOV/2016

Victor 11/4/2016
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Tsui Keng Road

Fan Kam Road

7.3m

2m

2m

1.5m

LOOK RIGHT 望右

LOOK LEFT 望左

STOP

LOOK LEFT 望左

LOOK RIGHT 望右

+26.0

0 2.5 5 7.5 10

12m Bus Swept Path Demonstration
1:500

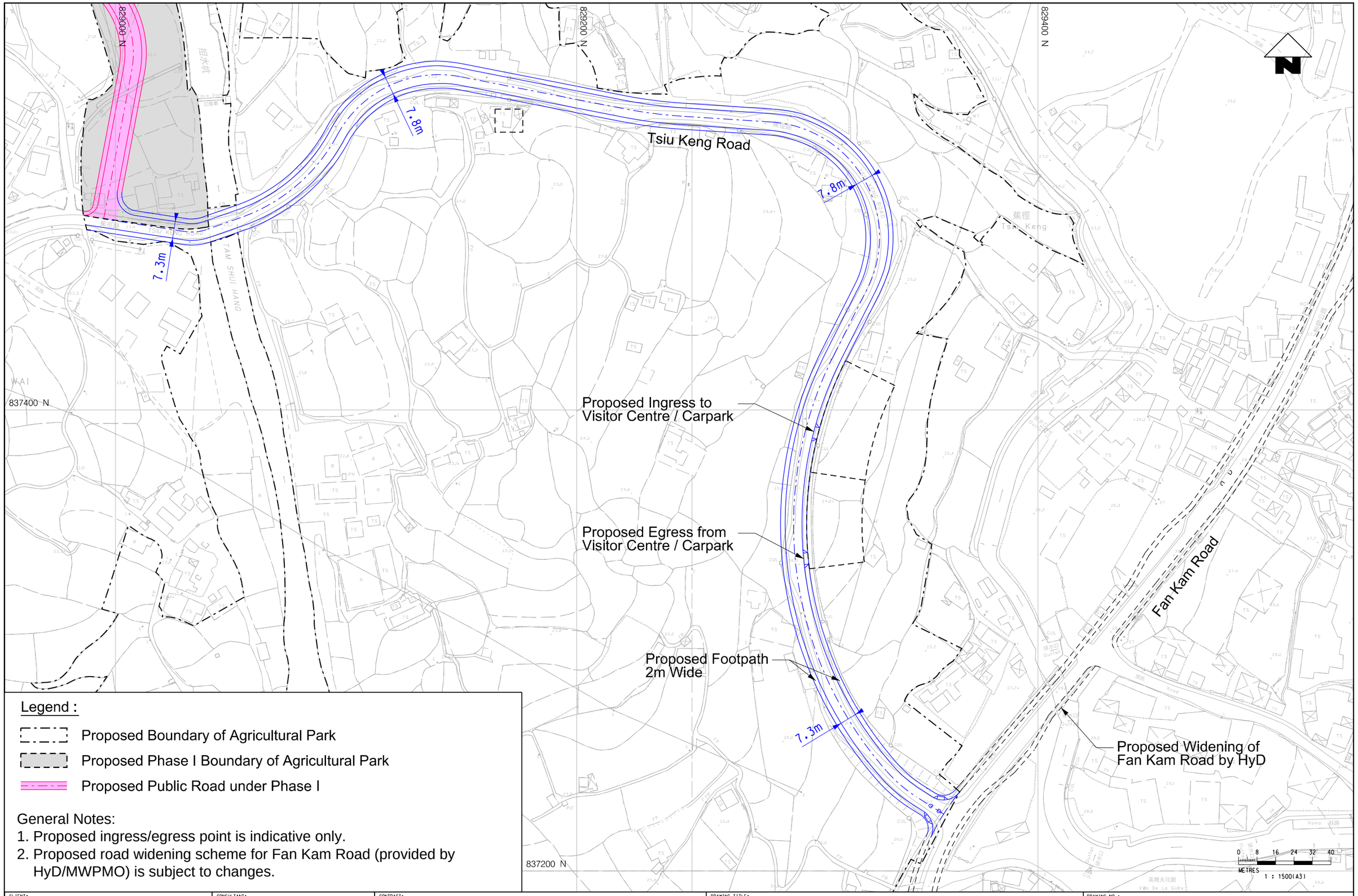
Fan Kam Road

+26.0

CLIENT: CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	CONSULTANT: ch2m.	CONTRACT: AGREEMENT No. NTE /01/2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: PRELIMINARY LAYOUT PLAN FOR UPGRADING OF FAN KAM ROAD AND TSIU KENG ROAD

DRAWING NO.: FIGURE 4.1

CHECKED BY:	SCALE:	REV.:
ML	N.T.S.	B
DESIGNED BY:	DRAWN BY:	DATE:
KC	TC	1/NOV/2016



Legend :

- Proposed Boundary of Agricultural Park
- Proposed Phase I Boundary of Agricultural Park
- Proposed Public Road under Phase I

General Notes:

1. Proposed ingress/egress point is indicative only.
2. Proposed road widening scheme for Fan Kam Road (provided by HyD/MWPMO) is subject to changes.

CLIENT: CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	CONSULTANT: ch2m.	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: LAYOUT PLAN OF PROPOSED WIDENING OF TSIU KENG ROAD	DRAWING NO.: FIGURE 4.2
				CHECKED BY: ML / SCALE: 1: 1500 @ A3 / REV.: A
				DESIGNED BY: SK / DRAWN BY: VT / DATE: 1/NOV/2016

Victor 11/3/2016
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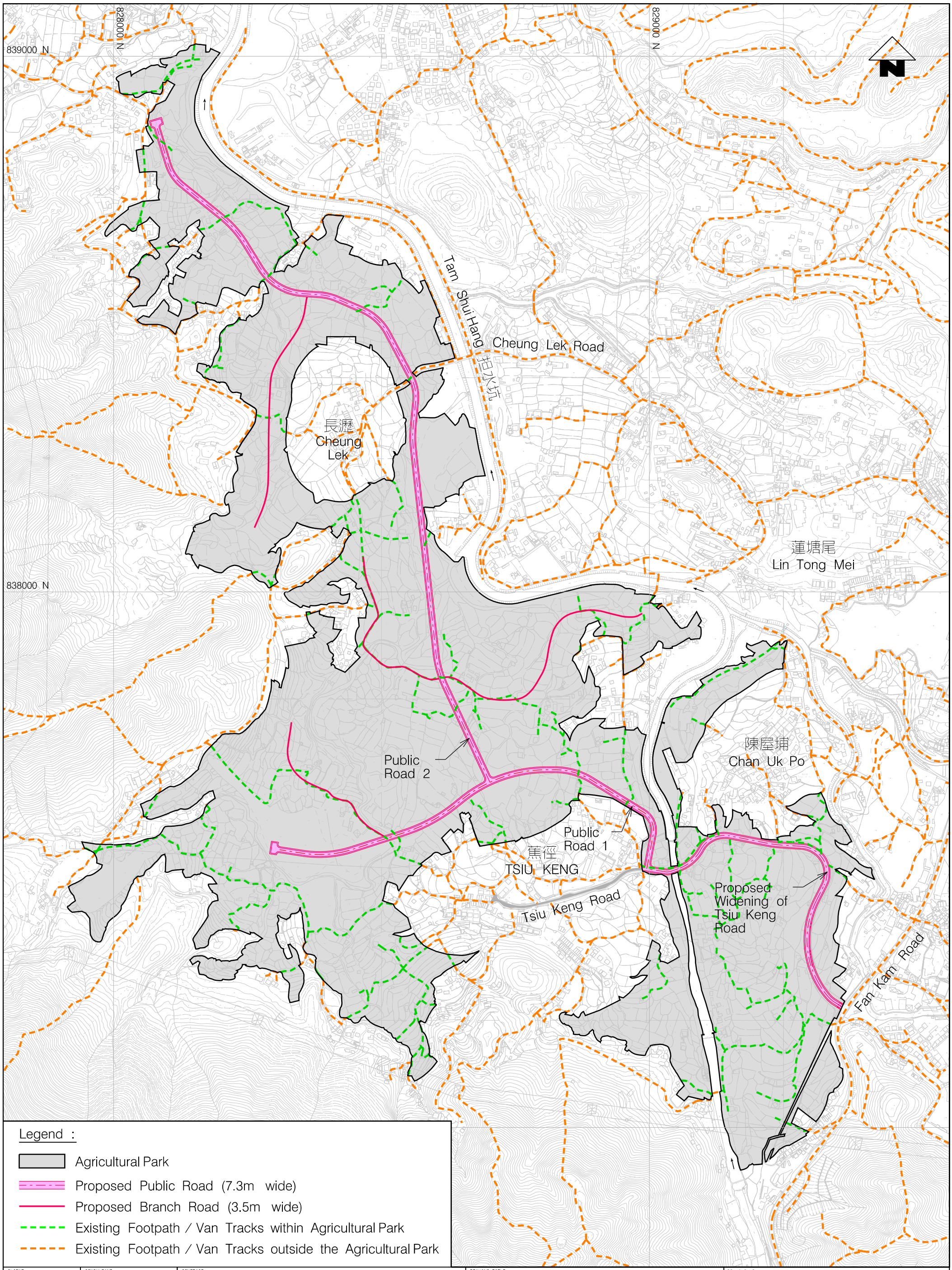

CLIENT: CEDD	CONSULTANT: ch2m	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: PROPOSED ROAD NETWORK FOR AGRICULTURAL PARK	DRAWING NO.: FIGURE 4.3	
				CHECKED BY: ML	SCALE: N.T.S.
				DESIGNED BY: SK	DRAWN BY: VT
				REV.: B	DATE: 25/JAN/2017

Victor 2/20/2017
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828000 N

829000 N

839000 N

838000 N

837000 N

B5 - Existing 2 Cells
2000 x 1500

B4 - Existing 2 Cells
2000 x 1500

B3 - Existing 2 Cells
2000 x 1500

B2 - Existing 2 Cells
2000 x 1500

B1 - Existing 1 Cell
2350 x 2550

A1

A2

A3

A4

B1

B2

C1

C2

C3

C4

C5

C6

C7

Legend :

Agri-Park Boundary

Catchment Area

Existing Box Culvert (Stormwater)

Stream Course

0 50 100 150 200 250
METRES
1 : 10000(A3)

CLIENT: CEDD	CONSULTANT: ch2m	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: PLAN SHOWING THE EXISTING CATCHMENTS	DRAWING NO.: FIGURE 5.1	
				CHECKED BY: ML	SCALE: 1:10000 @ A3
				DESIGNED BY: SK	DRAWN BY: VT
				REV.: B	DATE: 1/NOV/2016

Victor 11/2/2016
E:*proj*673995*04_Drawings*673995_F_CH2M_FIG5-1_B.dgn

Legend :

- Agricultural Park
- Proposed Main Access Road (7.3m wide)
- Proposed Manhole and Pipe
- Proposed Gullies
- Proposed U–Channel

Legend :

The Shown Locations are Indicative Only.

828500 N

829000 N

838500 N

838000 N

837500 N

Discharge to river

Discharge to river

Discharge to river

Discharge to river

Discharge to river

Discharge to river

Tam Shui Hang 担水坑

Cheung Lek Road

長瀝 Cheung Lek

Phase II Proposed U–Channel

Phase II Access Road

Phase I Access Road

Phase I Proposed U–Channel

蕉徑 Tsiu Keng

CLIENT: CEDD	CONSULTANT: ch2m	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: PRELIMINARY DRAINAGE LAYOUT PLAN FOR PROPOSED MAIN ACCESS ROADS	DRAWING NO.: FIGURE 5.2	
				CHECKED BY: ML	SCALE: N.T.S.
				DESIGNED BY: SK	DRAWN BY: VT
				REV.: A	DATE: 1/NOV/2016

Victor 11/7/2016

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828000 N
829000 N
838000 N
837000 N
N
Tam Shui Hang
坦水坑
長歷
Cheung Lek
蓮塘尾
Lin Tong Mei
陳屋埔
Chan Uk Po
雀徑
Tsiu Keng
BR42
BR41
BR14
BR13
BR38
BR39
BR33
BR47
BR48
BR34
BR49
BR46
BR32
BR55
BR11
BR10
BR9
BR8
Existing Concrete Irrigation Channel
Existing Ø100 Irrigation Pipeline
Existing Dongjiang Raw Water Pipeline
Existing Tsiu Keng Shaft Raw Water Irrigation Pump House (PH032)
Existing Ø150 Irrigation Pipeline
Existing Tsiu Keng Shaft Raw Water Tank (WT058) CAP .15 cum
A1
A2
B
C
P

Legend :

- Proposed Boundary of Agricultural Park
- Existing Irrigation Pipeline
- Existing Concrete Irrigation Channel
- Existing Fibre Dam
- Existing Weir
- Stream Course
- Ponds
- Region line
- Region A1
- Region A2
- Region B
- Region C

0 40 80 120 160 200
METRES
1 : 7500(A3)

CLIENT: CEDD

CONSULTANT: ch2m

CONTRACT:
AGREEMENT No. NTE / 01 / 2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY

DRAWING TITLE:
EXISTING IRRIGATION SYSTEM

DRAWING NO.: FIGURE 6.1

CHECKED BY:	SCALE:	REV.:
ML	1:7500 @ A3	B
DESIGNED BY:	DRAWN BY:	DATE:
SK	VT	1/NOV/2016

Victor
11/3/2016
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828000 N
829000 N
838000 N
N
Tam Shui Hang
坦水坑
長歷
Cheung Lek
蓮塘尾
Lin Tong Mei
陳屋埔
Chan Uk Po
蕉徑
Tsiu Keng
BR42
BR41
BR14
BR13
BR38
BR39
BR33
BR47
BR48
BR34
BR49
BR46
BR32
BR55
BR11
BR10
BR9
BR8
Existing Concrete Irrigation Channel
Existing Ø100 Irrigation Pipeline
Existing Dongjiang Raw Water Pipeline
Existing Ø150 Irrigation Pipeline
Existing Tsiu Keng Shaft Raw Water Irrigation Pump House (PH032)
Existing Tsiu Keng Shaft Raw Water Tank (WT058) CAP .15 cum
A1
A2
B
C
P
W

Legend :

- Proposed Boundary of Agricultural Park
- Existing Irrigation Pipeline
- Proposed Irrigation Pipeline
- Existing Concrete Irrigation Channel
- Proposed Concrete Irrigation Channel
- Proposed Water Tank
- Existing Fibre Dam
- Existing Weir
- Stream Course
- Ponds
- Region line
- Region A1
- Region A2
- Region B
- Region C

Remarks: Locations of Proposed Irrigation System are Indicative Only.

0 40 80 120 160 200
METRES
1 : 7500(A3)

CLIENT: CEDD
CONSULTANT: ch2m
CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY
DRAWING TITLE: PROPOSED IMPROVEMENT MEASURES TO IRRIGATION SYSTEM
DRAWING NO.: FIGURE 6.2
CHECKED BY: ML
SCALE: 1:7500 @ A3
REV.: B
DESIGNED BY: SK
DRAWN BY: VT
DATE: 1/NOV/2016

Victor
11/4/2016
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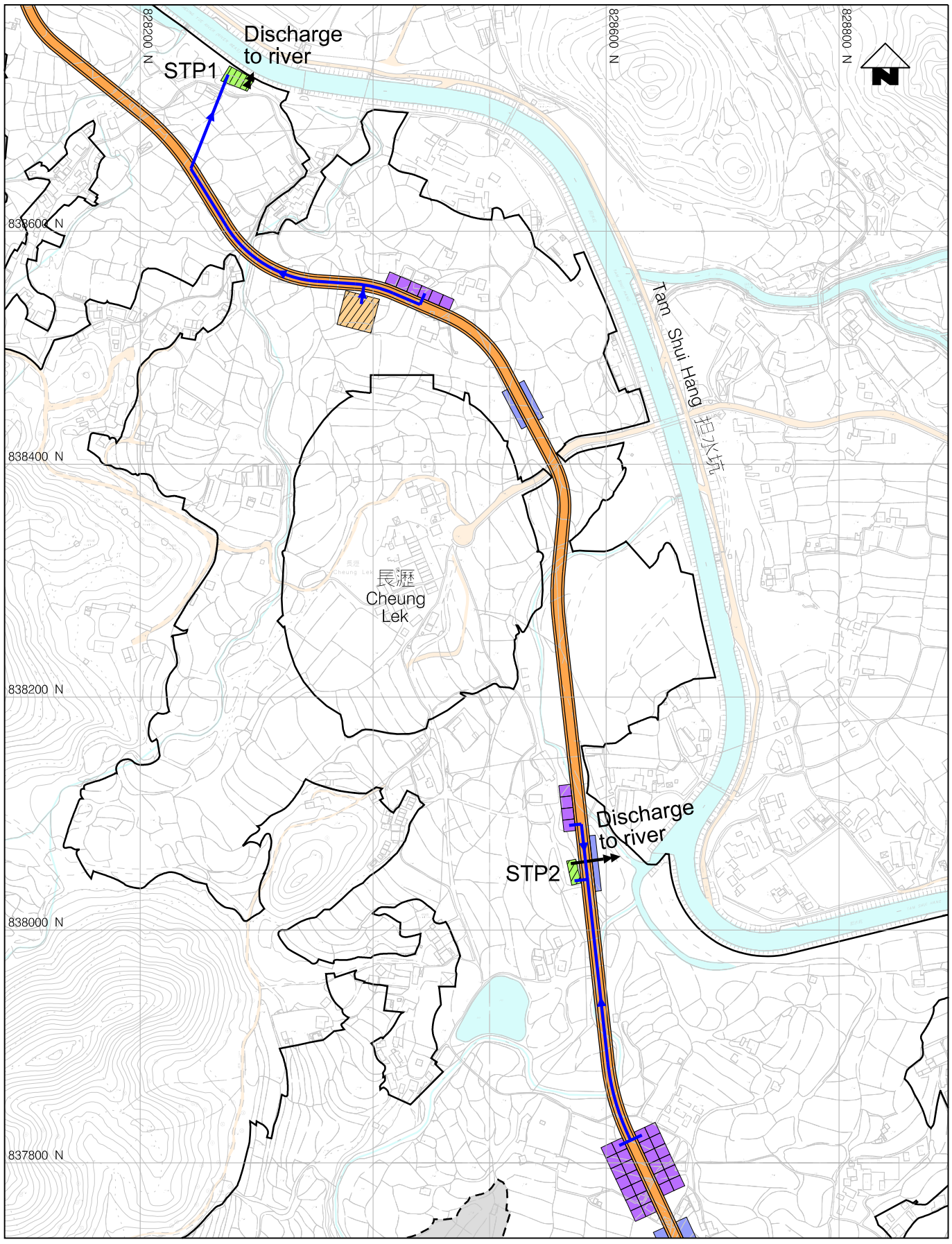
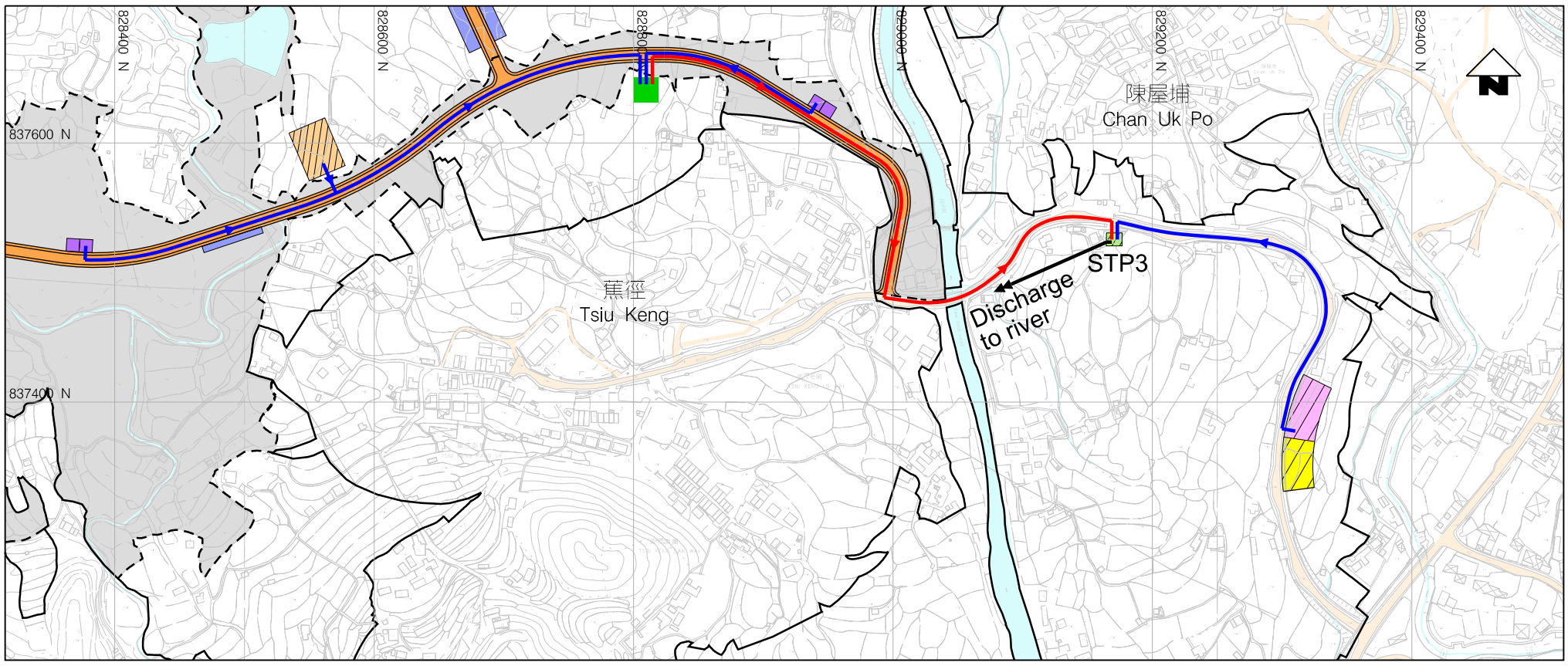
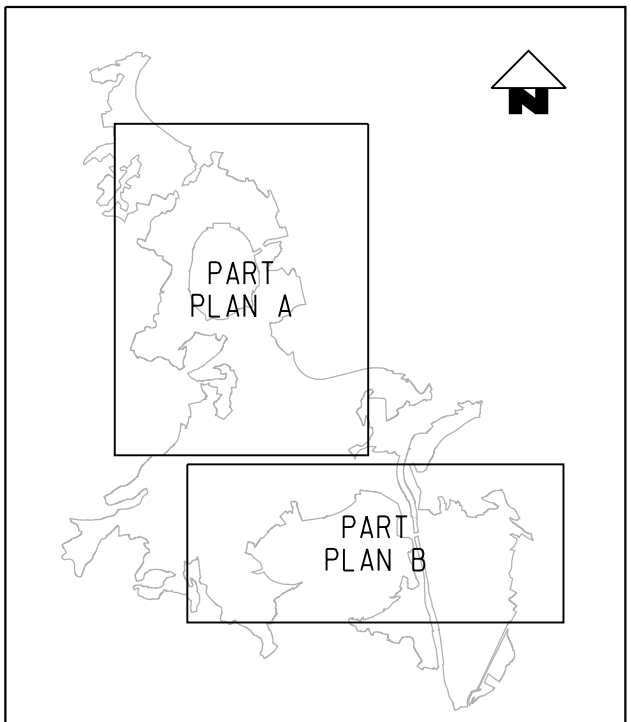


Part Plan A



Part Plan B



KEY LOCATION PLAN

Legend :

- Proposed Boundary of Agricultural Park
- Proposed Boundary of Agricultural Park (Phase I)
- Proposed Sewer Gravity Mains
- Proposed Sewer Twins Rising Mains
- Proposed Sewerage Pumping Station
- Proposed Main Road (7.3m wide)
- Proposed Composting Plants (2 Nos.)
- Proposed Visitor Centre and Management Office (2,100m^2 max.)
- Proposed Car Park (800m^2 min.)
- Proposed Sewage Treatment Plants (STP)
- Proposed Basic Lodging
- Proposed Storage Facilities

Remarks: Locations of Proposed Sewerage System are Indicative Only.

CLIENT: CEDD	CONSULTANT: ch2m	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: SCHEMATIC LAYOUT OF PROPOSED SEWERAGE SYSTEM	DRAWING NO.: FIGURE 7.1	
				CHECKED BY: ML	SCALE: N.T.S.
				DESIGNED BY: SK	DRAWN BY: VT
				REV.: B	DATE: 1/NOV/2016

Victor 11/4/2016
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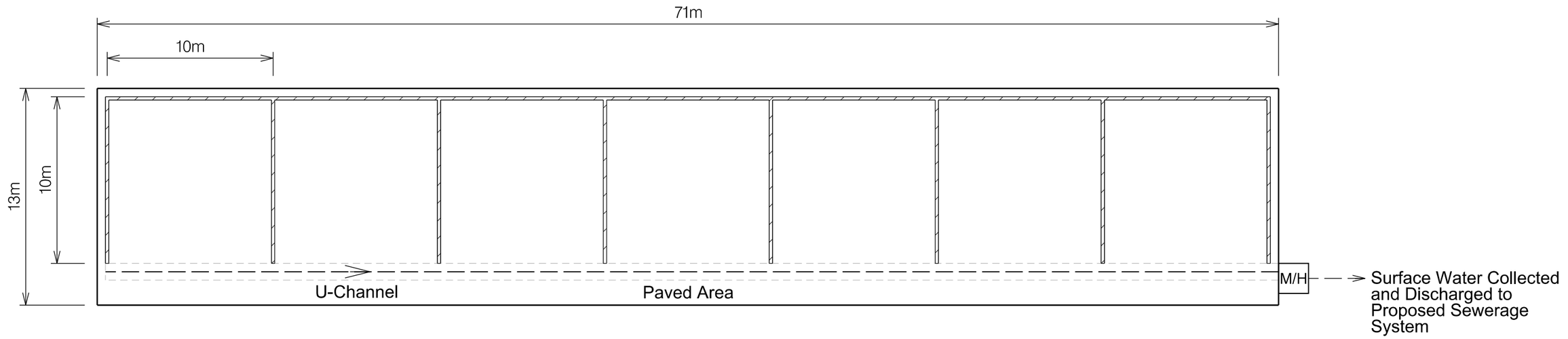
Example of Composting Plant



CLIENT: CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	CONSULTANT: ch2m: SM	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: TYPICAL LAYOUT OF COMPOSTING PLANT IN REGION C	DRAWING NO.: FIGURE 7.2	
				CHECKED BY: ML	SCALE: 1:250 @ A3
				DESIGNED BY: SK	DRAWN BY: VT
				REV.: A	DATE: 1/NOV/2016

Victor 11/3/2016
E:*proj*673995*04_Drawings*673995_F_CH2M_FIG7-2_B.dgn

828000 N

826000 N

839000 N

838000 N

837000 N

坑頭
Hang Tau

Tam Shui Hang 担水坑

長歷
Cheung Lek

蓮塘尾
Lin Tong Mei

陳屋埔
Chan Uk Po

蕉徑
Tsiu Keng

Lung Tam Kwun Yam Temple (From List of New Items in Addition to 1,444 Historic Buildings)

Note :

No HIA Implication

Legend :

Proposed Boundary of Agricultural Park

50–Meter Zone

Proposed Main Road (7.3m wide)

0 50 100 150 200 250
METRES
1 : 5000(A1)

CLIENT: CEDD	CONSULTANT: ch2m	CONTRACT: AGREEMENT No. NTE / 01 / 2016 ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK – FEASIBILITY STUDY	DRAWING TITLE: PLAN SHOWING HERITAGE IMPLICATION ZONE	DRAWING NO.: FIGURE 10.1	
				CHECKED BY: ML	SCALE: 1:5000 @ A1
				DESIGNED BY: SK	DRAWN BY: VT
				REV.: B	DATE: 1/NOV/2016

Victor 11/3/2016
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Appendix A

Information for Baseline Review

A1 Approved Kwu Tung South Outline Zoning Plan no.S/NE-KTS/14

A2 List of Graves/ Urns/ Shrines Identified in the Proposed Site

A3 Preliminary conceptual plan of the Agri-Park

A4 Details of the preliminary conceptual plan of the Agri-Park provided by AFCD

A5 Plan illustrating the Current Conditions of the Agri-Park Site

A6 HyD's Layout Plan of Road Widening Proposal for Fan Kam Road

古洞北
KWU TUNG NORTH
洲頭
Chau Tau
白石凹
Pak Shek Au
石仔嶺
Shek Tsai Leng
古洞
Kwu Tung
燕崗
Yin Kong
松柏朗
Tsung Pak Long
大頭嶺
Tai Tau Leng
彩園邨
Choi Yuen Estate
石湖墟
SHEK WU HUI
掃管埔
So Kwun Po
太平邨
Tai Ping Estate
吳屋村
Ng Uk Tsuen
雞嶺
Kai Leng
FANLING HIGHWAY
CASTLE PEAK ROAD - KWU TUNG
CASTLE PEAK ROAD - CHAU TAU
SAN TIN HIGHWAY
SAN SHAM ROAD
KWU TUNG ROAD
KAM HANG ROAD
KAM TSIN ROAD
KAM CHUI ROAD
KAM TSIN SOUTH ROAD
HANG TAU ROAD
SHEUNG YUE RIVER (RIVER BEAS)
MASS TRANSIT RAILWAY (EAST RAIL LINE)
PAK WO ROAD
FAN KAM ROAD
金錢
Kam Tsin
牛地
Ngau Tei
坑頭大布
Hang Tau Tai Po
坑頭
Hang Tau
麒麟山
KI LUN SHAN
(HADDEN HILL)
麒麟村
Ki Lun Tsuen
鹿尾村
Luk Mei Tsuen
麒麟山坳
KI LUN SHAN AU
(SADDLE PASS)
彭龍地
Pang Loon Tei
小磡村
Siu Hum Tsuen
新田軍營
San Tin Barracks
擬議河道（有待詳細設計）
PROPOSED RIVER CHANNEL
(SUBJECT TO DETAILED DESIGN)
高爾夫球場
Golf Course
抽水站
Pumping Station
碑頭嶺角
Pei Tau Ling Kok
福全山
FUK TSUEN SHAN
(FIR HILL)
蝦公地
Ha Kung Tei
丙崗
Ping Kong
莊前嶺
CHONG TSIN LENG
蒲嶺
PO LENG
(MID HILL)
唐公嶺
Tong Kung Leng
長瀝
Cheung Lek
水務專用範圍
WATER WORKS RESERVE
蓮塘尾
Lin Tong Mei
陳屋埔
Chan Uk Po
蓮塘尾菜園
Lin Tong Mei Tsoi Yuen
大龍
Tai Lung
蕉徑老圍
Tsiu Keng Lo Wai
蕉徑彭屋
Tsiu Keng Pang Uk
蕉徑新圍
Tsiu Keng San Wai
營盤
Ying Pun
程其坑
TSING KEI HANG
(VOLUNTEER SLOPE)
箕勒仔
KEI LAK TSAI
(CORPS RIDGE)
林村郊野公園
LAM TSUEN COUNTRY PARK
北大刀屻
PAK TAI TO YAN
840500N
836500N
826000E
832000E
CDA
R(C)1
R(C)2
R(C)3
R(C)4
R(C)5
V
G/IC
O
REC
AGR
GB
該區先前屬於由規劃署署長根據1990年城市規劃（修訂）條例草案第26條（其後已通過成為1991年城市規劃（修訂）條例的一部分）規定制訂，並在一九九零年十月五日公開展示的八鄉中期發展審批地區圖第IDPA/YL-PH/1號的範圍。
THIS AREA WAS PREVIOUSLY COVERED BY THE INTERIM DEVELOPMENT PERMISSION AREA PLAN FOR PAT HEUNG No. IDPA/YL-PH/1 PREPARED BY THE DIRECTOR OF PLANNING PURSUANT TO SECTION 26 OF THE TOWN PLANNING (AMENDMENT) BILL 1990 (SUBSEQUENTLY ENACTED AS PART OF THE TOWN PLANNING (AMENDMENT) ORDINANCE 1991) EXHIBITED ON 5.10.1990.

圖例 NOTATION

ZONES		地帶
COMPREHENSIVE DEVELOPMENT AREA	CDA	綜合發展區
RESIDENTIAL (GROUP C)	R(C)	住宅（丙類）
VILLAGE TYPE DEVELOPMENT	V	鄉村式發展
GOVERNMENT, INSTITUTION OR COMMUNITY	G/IC	政府、機構或社區
OPEN SPACE	O	休憩用地
RECREATION	REC	康樂
AGRICULTURE	AGR	農業
GREEN BELT	GB	綠化地帶

COMMUNICATIONS 交通

MAJOR ROAD AND JUNCTION 主要道路及路口

MISCELLANEOUS 其他

BOUNDARY OF PLANNING SCHEME 規劃範圍界線

WATER WORKS RESERVE — WWR — 水務專用範圍

土地用途及面積一覽表 SCHEDULE OF USES AND AREAS

USES	大約面積及百分率 APPROXIMATE AREA & % 公頃 HECTARES	% 百分率	用途
COMPREHENSIVE DEVELOPMENT AREA	15.80	3.01	綜合發展區
RESIDENTIAL (GROUP C)	36.49	6.95	住宅（丙類）
VILLAGE TYPE DEVELOPMENT	43.90	8.37	鄉村式發展
GOVERNMENT, INSTITUTION OR COMMUNITY	8.58	1.64	政府、機構或社區
OPEN SPACE	3.19	0.61	休憩用地
RECREATION	45.85	8.74	康樂
AGRICULTURE	228.93	43.63	農業
GREEN BELT	134.26	25.59	綠化地帶
MAJOR ROAD ETC.	7.72	1.46	主要道路等
TOTAL PLANNING SCHEME AREA	524.72	100.00	規劃範圍總面積

夾附的《註釋》屬這份圖則的一部分
THE ATTACHED NOTES ALSO FORM PART OF THIS PLAN

Appendix A1

行政長官會同行政會議於２０１４年１月７日　根據城市規劃條例第９（１）（ａ）條核准的圖則
APPROVED BY THE CHIEF EXECUTIVE IN COUNCIL UNDER SECTION 9(1)(a) OF THE TOWN PLANNING ORDINANCE ON 7 JANUARY 2014

Ms Kinnie WONG　黃潔怡女士
CLERK TO THE EXECUTIVE COUNCIL　行政會議秘書

香港城市規劃委員會依據城市規劃條例擬備的古洞南分區計劃大綱圖
TOWN PLANNING ORDINANCE, HONG KONG TOWN PLANNING BOARD
KWU TUNG SOUTH - OUTLINE ZONING PLAN

SCALE 1:7500 比例尺

米 METRES 200　0　200　400　600　800　1000 METRES 米

規劃署遵照城市規劃委員會指示擬備
PREPARED BY THE PLANNING DEPARTMENT UNDER THE DIRECTION OF THE TOWN PLANNING BOARD

圖則編號 PLAN No. S/NE-KTS/14

Appendix A1

28000 N

29000 N

30000 N

840000 N

839000 N

838000 N

837000 N

Legend:

- Zoning Boundary
- Agri-Park Site

CDA	Comprehensive Development Area
R(C)	Residential (Group C)
V	Village Type Development
G/IC	Government, Institution or Community
O	Open Space
REC	Recreation
AGR	Agriculture
GB	Green Belt

0 60 120 180 240 300

METRES

1 : 12000(A3)

Appendix A2: List of Graves / Urns / Shrines identified in the Proposed Site

Table 1: Graves / Urns / Shrines Located within the Proposed Agri-Park Site

No.	Graves/Urns/Shrine	Type of Land	Location (Lot no.*)	No. of Phase
1	Grave	Government Land	356	Phase 2
2	Grave	Private Land	81 RP	Phase 2

*All private lots are located in the Demarcation District 100

Table 2: Graves / Urns / Shrines Located outside the Proposed Agri-Park Site

No.	Graves/Urns/Shrine	Type of Land	Location (Lot no.*)
1	Grave	Government Land	18
2	Grave	Government Land	18
3	Grave	Government Land	42RP
4	Grave	Government Land	43
5	Grave	Government Land	43
6	Grave	Government Land	79
7	Grave	Government Land	79
8	Grave	Government Land	263
9	Urn	Government Land	263
10	Urn	Private Land	81SA
11	Urn	Private Land	81SA
12	Urn	Private Land	81SA
13	Grave	Private Land	530
14	Urn	Private Land	1779
15	Urn	Private Land	508
16	Shrine	Private Land	100
17	Shrine	Private Land	154RP
18	Shrine	Private Land	324

*All private lots are located in the Demarcation District 100

Preliminary Conceptual Plan of the Agricultural Park

Appendix A3

N

Legend

- Proposed Main Road (24,000m²)
- Proposed Branch Road (11,000m²)
- Proposed Water Pipe
- Existing Water Pipe
- Basic Lodging and Storage Facilities
- Proposed Composting Plant (2,000m²)
- Proposed Visitor Centre and Management Office (2,800m²)
- Proposed Car Park (1,700m²)
- Proposed Sewage Treatment Plant (1,600m²)
- Proposed Agricultural Park Boundary
- Ⓐ Existing and Displaced Farms (Agricultural Land 51 Ha)
- Ⓑ Intensive, Non-organic Production Area (Agricultural Land 12 Ha)
- Ⓒ Organic Production Area (Agricultural Land 18 Ha)

Golf View\Garden
Regent Garden
Ric
Rose Garden
Grand Garden
Hang Tau
RIVER BEAS
C
Tong Kung Leng
Cheung Lek
B
Lin Tong Mei
TAM SHUI HANG
Chan Uk Po
A
TSIU KENG
Tsiu Keng\Lo Wai
Tsiu Keng\Pang Uk
Tsiu Keng\San Wai
TAM SHUI HANG

Date: 4/1/2016

Details of Preliminary Conceptual Plan of the Agricultural Park

Identified Location and Size

1. In identifying the potential site for the proposed Agri-Park, AFCD is looking at farmland which is zoned "AGR" on existing statutory plans and are either under active farming or fallow, and which would provide relatively ready locations for starting agricultural activities. The area should remain relatively unspoiled, with soil and water quality being favourable for agricultural purpose. To achieve economy of scale and to ensure that the Agri-Park is viable in achieving its intended purposes, the Agri-Park should be of sufficient size. Preliminarily, an area in the range of 75 - 80 ha would suffice for the purpose, which is roughly equivalent to one-tenth of the size of agricultural land currently under active farming.

2. A potential area for consideration is in Kwu Tung South. The following paragraphs seek to provide an overview on how the Agri-Park may be set up and run if it is to be established in Kwu Tung South. The figures quoted are merely ballpark figures providing an indicative scale of the project.

3. Located in an area flanked by Ki Lun Shan (麒麟山) to the West and Kai Kung Leng (雞公嶺) to the south, the area is mainly a piece of fertile flat land currently zoned as "AGR" on the Kwu Tung South OZP. Sheung Yue River runs through the land from south to north. The area is a traditional vegetable growing area and remains relatively unspoiled. Of the estimated 75 - 80 ha arable agricultural land in the area, some 25 ha is under active farming if portions of private lots falls outside the "village environs" are included. Essential agricultural infrastructure including access footpaths, irrigation channels, and a vegetable collection depot remain largely intact and operational.

4. With existing rural settlements and area zoned as "V" on the OZP excluded, and portion of private lots falls outside the "village environs" included, the Development Area will include some 67 ha of agricultural land and some 13 ha of land for non-agricultural uses under private ownership. Therefore, a total of 80 ha would be resumed if the Agri-Park is to be established in the area.

Tentative Usage Allocation

5. It is expected that, following the completion of land resumption by the LandsD, the Development Area will be assigned to AFCD for management and leasing to farmers for production. It will be demarcated into different zones for different farming practices such as conventional, organic, floriculture, and modern technological farming, taking into account the topography, operational requirements of individual types of farming operation, and the microclimate of different areas within the Agri-Park. A tentative usage allocation of the proposed Agri-Park will be provided to the Consultants upon signing of the Agreement.

Existing Farmers

6. Existing farmers primarily farm in the southern part of Kwu Tung South (a total of 51 ha with 30 ha being fallow if private lots on "village environs" are included). Those farmers who are farming on the lots before the land resumption for the Agri-Park will be accorded priority for admission, and are generally expected to continue operation at the same location.

Displaced Farmers

7. Crop farmers in KTN / FLN NDAs affected may apply for relocation to the Agri-Park. They will be accorded priority relative to other interested farmers so long as suitable land is available. They will be primarily allocated to suitable fallow land not currently farmed within southern part of Kwu Tung South. A maximum of 28 ha in this area will be required to accommodate these farmers. Each affected farm, irrespective of the number of people involved, may submit one application only. Subject to negotiation with the Agri-Park management, they may be offered land of similar size to their existing farms under the terms laid down by the Agri-Park management.

Other Farmers

8. The northern part of the Agri-Park will be subdivided into appropriate lots for leasing out to any person interested in taking up farming in the Agri-Park (measured about 30 ha of agricultural land if private lots on "village environs" are included), allowing better economy of scale in production and yet remains within the capability of most professional farmers. Entrepreneurial ventures requiring more land may apply for multiple lots, subject to availability.

9. This area will be reserved for organic production (about 18 ha agricultural land if included private lots on "village environs"), and for intensive, non-organic production and floriculture (about 12 ha agricultural land if included private lots on "village environs"). Farmers in these areas are expected to produce high value crops. Organic farms will likely produce vegetables commonly consumed, supplemented by other high value crops such as different types of melon and edible fungi. Non-organic production may include adopting hydroponics to accelerate production, and/or vertical multi-tier farming to maximise land usage.

Proposed Infrastructure and Park Facilities

10. Farms in the Agri-Park will be provided with suitable access roads or footpaths as appropriate. Connections for power supply, potable water, irrigation, and surface drainage will be installed. To maximise the productivity and sustainability of the Agri-Park as a whole, the Government will seek to upgrade its road, irrigation, drainage and waste disposal systems. To address the operational needs of tenants, basic lodging and storage units will be built and allocated to the tenants. A preliminary conceptual plan for the proposed infrastructure and park facilities of the Agri-Park will be provided to the

Consultants upon signing of the Agreement.

Road Network

11. Currently, the area may be accessed from Tsiu Keng Road in the south, and Cheung Lek Road in the north. These narrow village roads wind through rural settlements and are not considered entirely suitable for farming use. It is proposed to build a new main road linking the centre of the Agri-Park and construct branch roads to run along lot boundaries to link up the main road with large farms and major facilities in the Agri-Park (including the composting plant(s), management office and visitor centre, etc). Smaller farms will be serviced by footpaths running from this road network. These footpaths will be built to allow motorised village vehicles bringing in farming inputs and bringing out farm produce.

Irrigation

12. Sheung Yue River runs through the area from south to north and provides good irrigation water primarily to the southern part of the Agri-Park. We propose to build an additional irrigation system to supply the northern part of the Park for irrigation use. Side channels will run along lot boundaries to supply individual farm in the Park.

Drainage

13. The Agri-Park slopes gently from Ki Lun Shan to the west to Sheung Yue River to the east, and surface water drains naturally into the river. River training works has recently been completed along the river to improve its drainage capacity to 50-year return period. In any case, the river will be regularly de-silted, particularly before the rainy season, to ensure smooth and rapid discharge of surface runoff.

Sewerage, Waste Recycling and Disposal

14. The basic lodging and storage facilities (paragraph 17 below) within the Agri-Park will be equipped with suitable sewage treatment facilities. To further improve sustainability of the Agri-Park, it was proposed to build a sewage treatment plant within the Agri-Park. Central composting facilities will also be built to recycle food and agricultural waste for production use.

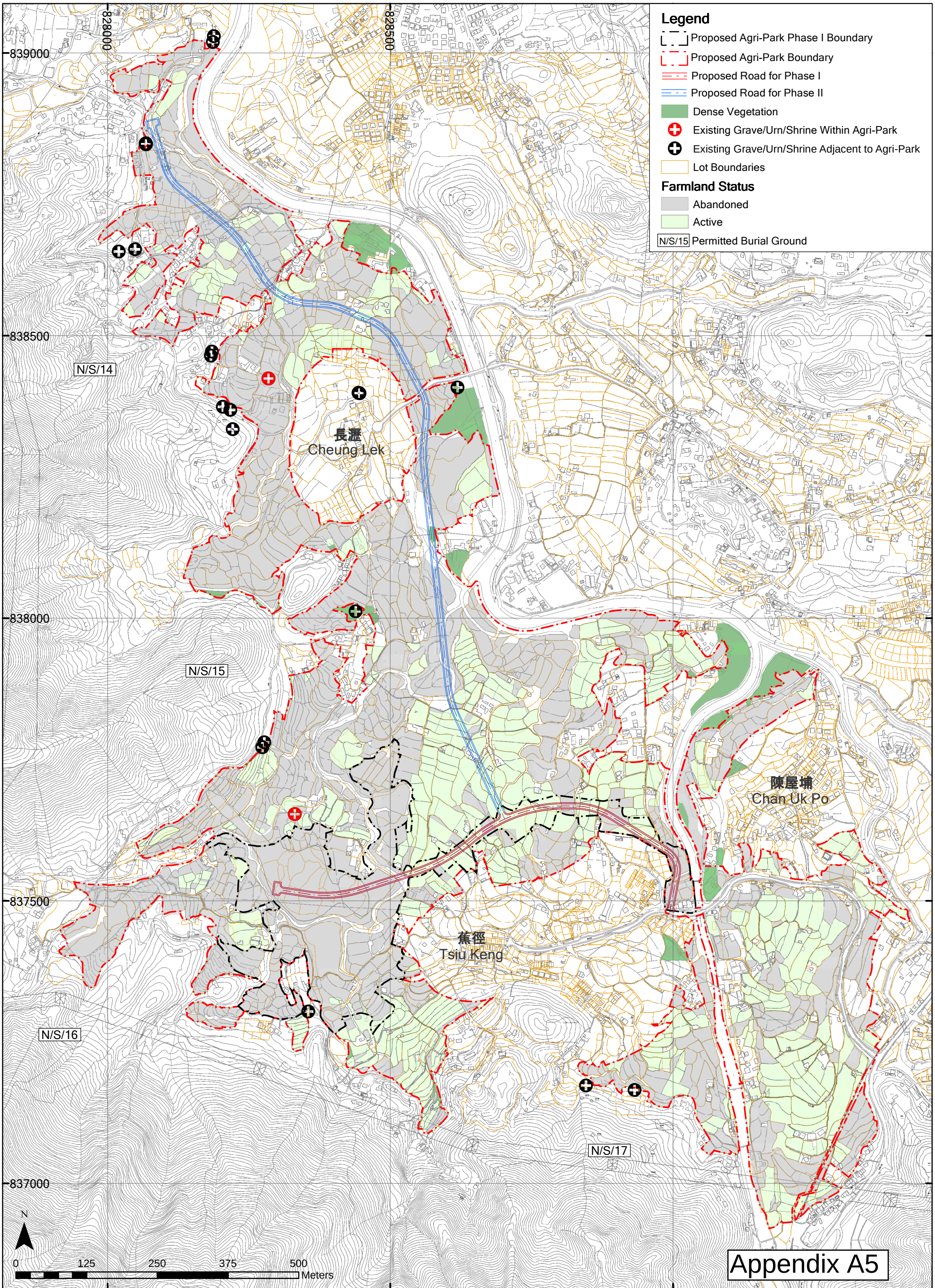
Management Office and Visitor Centre

15. A management office and visitor centre will be built within the Agri-Park. The visitor centre will serve educational and recreational purposes by providing information on modern and sustainable agriculture, and their contribution to food supply, waste recycling and carbon trapping to the public visiting the centre. It will also showcase modern agricultural technology, plant varieties and different production methods. Subject to demand, organised farm visits and guided tours may be offered.

16. Farmers operating in the Agri-Park may also open up their farms for the public to see farming in practice, engage in harvesting or fruit picking, or even participate in actual farming. However, the Agri-Park should primarily be fully dedicated to full time production to realise its potential, and subletting in smaller plots for farming by other people for leisure is not permitted. Subject to prevailing legislative control on catering and food processing, farmers may also choose to venture further downstream to produce packaging and preservation for the consumer market, and/or other innovative undertakings that will bring about an increase in sale of farm produce and revenue.

Basic Lodging and Storage Facilities

17. Basic lodging and storage units located at strategic locations will be built for tenants to rest and store farming equipment. The design of the units would be based on the daily operational needs of tenants and is meant to provide only basic facilities for overnight lodging and storage of farming equipment so that farmers could take care of their crops round the clock. Each tenant will be entitled to one such unit (tenants leasing larger areas of agricultural land may be entitled to more than one such unit) and the rental for such units will be subsumed in the farm tenancy arrangement. When the tenancy agreement ends, the tenants have to vacate the units. The Agri-Park management would take up maintenance responsibility for the facilities.



Client: CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Consulting Engineers: ch2m	Project: Agreement No. NTE/01/2016 Engineering Feasibility Study For the Establishment of An Agricultural Park - Feasibility Study	FIGURE 4.2
		Title: Plan Illustrating the Current Conditions of the Agri-Park Site	Checked: ML; Scale: 1:6000@ A3; Rev.: 2; Designed: DY; Drawn: DY; Date: 07/10/2016

Leung, Mable/CNH

Appendix A6

From: e1sd.mw@hyd.gov.hk
Sent: Thursday, March 17, 2016 6:12 PM
To: Leung, Mable/CNH
Cc: den.nt@hyd.gov.hk; sesd.mw@hyd.gov.hk
Subject: Fw: Agreement No. NTE/01/2016 - Engineering FS for the Establishment of an Agricultural Park - Request for Information
Attachments: KWU TUNG SOUTH OZP.pdf; FKR Road Alignment with Site Boundary.pdf

Dear Mable,

Please be informed that the re-alignment option at the concerned area was ruled out during the Feasibility Study Stage. The current proposed alignment generally follows the original alignment of Fan Kam Road. A plan showing the latest road layout and site limit is attached for your information. Please note that the layout and site limit are subject to change during design development. The project is now in the Investigation Stage and is scheduled to commence construction in late 2018 for completion in end 2021/early 2022 (subject to review).

Regards,
Ivan LI

----- Forwarded by Siu Chung LI/HYD/HKSARG on 17/03/2016 17:32 -----

From: Tiu Kai WONG/HYD/HKSARG
To: Siu Chung LI/HYD/HKSARG@HYD
Date: 09/03/2016 10:37
Subject: Fw: Agreement No. NTE/01/2016 - Engineering FS for the Establishment of an Agricultural Park - Request for Information

---

Dear Ivan,

Please help to provide reply to CEDD's consultant CH2M. Thank you.

Regards,
T. K. WONG
District Engineer/North
NT Region, Highways Department
Tel: 2762 3995 Fax: 2714 5228

----- Forwarded by Tiu Kai WONG/HYD/HKSARG on 09/03/2016 10:34 -----

From: <Mable.Leung@ch2m.com>
To: <den.nt@hyd.gov.hk>
Cc: <katekwong@cedd.gov.hk>, <elaine_yl_tang@afcd.gov.hk>, <stephen_yh_lai@afcd.gov.hk>, <Danny.Yung@ch2m.com>, <Shirley.Kwok@ch2m.com>
Date: 04/03/2016 16:49
Subject: Agreement No. NTE/01/2016 - Engineering FS for the Establishment of an Agricultural Park - Request for Information

---

Dear Mr Wong,

We have been appointed by CEDD to undertake the captioned assignment.

It is noted that road improvement of Fan Kam Road in Kwu Tung South has been under planning.
Re-alignment of a short section of Fan Kam Road near Tsiu Keng Pang Uk has been planned,
as marked on the attached Kwu Tung South Outline Zoning Plan.
This re-aligned road section falls within the proposed boundary of the Agri-Park.

We would like to obtain the road layout plan for Improvement to Fan Kam Road,
site limit boundary, the project status /implementation programme, etc. for our land requirement study.

Grateful if you could provide the requested information at your earliest to facilitate our study.

Regards,

Mable Leung
Principal Engineer

CH2M
Level 27 Tower 1
Millennium City 1
388 Kwun Tong Road
Kwun Tong
Hong Kong
Tel: 852 2802 9228
Direct: 852 2159 6197
Fax: 852 2827 8352
www.ch2m.com | LinkedIn | Twitter | Facebook

Appendix A6


DD108
65
B,4
OSL
(1.69m²)
P2299
GLL
(52.13m²)
YL/20
(206.35m²)
FAN KAM ROAD
TSIU KENG ROAD
Tsiu Keng
Chan Uk Po
Lin Tong Mei
DD100
1612
B,RP
OSL
(20.28m²)
STT496
STJ
(98.78m²)
DD100
1582
B,1
OSL
(7.96m²)
DD100
1861
NNG
(124.33m²)
DD100
1584
B,4
OSL
(153.97m²)
DD100
1584
B,RP
OSL
(89.76m²)
DD100
1584
B,2,A
OSL
(124.09m²)
1584
B,2,RP
OSL
(8.53m²)
DD100
1583
B,1,A
OSL
(31.03m²)
Ying Pun
Tennis Court
POPLAR DRIVE
MAPLE DRIVE
CHERRY DRIVE
CYPRESS DRIVE
The Green
DD91
3351
B
OSL
(2.18m²)
DD91
3350
B,1
OSL
(241.29m²)
DD94
942
RP
NNG
(292.15m²)
DD94
942
RP
NNG
(292.15m²)
Hong Kong Golf Club

Appendix B

List of Approved Small House Application and s16 Planning Application

Appendix B: List of Approved Small House and s.16 Planning Applications

Table 1: List of Approved s.16 Planning Applications

No.	Application No.	Applied Use	Land Lot No.*	Within the proposed Agri-Park site? (Yes/No)
1	A/DPA/NE-KTS/43	Small House	1251 RP	No
2	A/DPA/NE-KTS/71	Small House	1251 RP	No
3	A/DPA/NE-KTS/73	Small House	1251D	No
4	A/NE-KTS/3	Small House Development	1412A	No
5	A/NE-KTS/4	Small House Development	1412RP	No
6	A/NE-KTS/14	Small House	1251B	No
7	A/NE-KTS/14 (Extension of Time Limit)	Small House	1251B	No
8	A/NE-KTS/14 (Extension of Time Limit)	Small House	1251B	No
9	A/NE-KTS/14 (Extension of Time Limit)	Small House	1251B	No
10	A/NE-KTS/14 (Extension of Time Limit)	Small House	1251B	No
11	A/NE-KTS/15	Small House	1252	No
12	A/NE-KTS/15 (Extension of Time Limit)	Small House	1252	No
13	A/NE-KTS/15 (Extension of Time Limit)	Small House	1252	No
14	A/NE-KTS/15 (Extension of Time Limit)	Small House	1252	No
15	A/NE-KTS/15 (Extension of Time Limit)	Small House	1252	No
16	A/NE-KTS/99	5 New Territories Exempted Houses (NTEH)	682	No
17	A/NE-KTS/99 (Extension of Time Limit)	5 New Territories Exempted Houses (NTEH)	682	No
18	A/NE-KTS/132	Proposed New Territories Exempted House (NTEH)(Small House)	422	No
19	A/NE-KTS/133	Proposed New Territories Exempted House (NTEH) (Small House)	641C	No
20	A/NE-KTS/133 (Extension of Time Limit)	Proposed New Territories Exempted House (NTEH) (Small House)	641C	No
21	A/NE-KTS/150	New Territories Exempted House (NTEH)(Small House)	1411	No
22	A/NE-KTS/155	Proposed New Territories Exempted House (NTEH) (Small House)	1234RP	No
23	A/NE-KTS/156	Proposed New Territories Exempted House (NTEH) (Small House)	1234A	No
24	A/NE-KTS/162	Proposed New Territories Exempted House (NTEH) (Small House)	643C	No
25	A/NE-KTS/172	Proposed New Territories Exempted House (NTEH) (Small House)	641FRP & 641H1	No
26	A/NE-KTS/173	Proposed New Territories Exempted House (NTEH) (Small House)	641G1 & 641H4	No
27	A/NE-KTS/174	Proposed New Territories Exempted House (NTEH) (Small House)	642B	No

Table 1: List of Approved s.16 Planning Applications

No.	Application No.	Applied Use	Land Lot No.*	Within the proposed Agri-Park site? (Yes/No)
28	A/NE-KTS/175	Proposed New Territories Exempted House (NTEH) (Small House)	641GRP & 641H3	No
29	A/NE-KTS/176	Proposed New Territories Exempted House (NTEH) (Small House)	641F1, 641G2 & 641H2	No
30	A/NE-KTS/182	New Territories Exempted House (NTEH) (Small House)	642D	No
31	A/NE-KTS/183	New Territories Exempted House (NTEH) (Small House)	642C	No
32	A/NE-KTS/248	House (New Territories Exempted House - Small House)	1422B	No
33	A/NE-KTS/249	House (New Territories Exempted House - Small House)	1422A	No
34	A/NE-KTS/253	Proposed House (New Territories Exempted House - Small House)	1413RP	No
35	A/NE-KTS/262	Proposed House (New Territories Exempted House - Small House)	1391S.A ss. 1	No
36	A/NE-KTS/263	Proposed House (New Territories Exempted House - Small House)	1391 S.A RP	No
37	A/NE-KTS/275	Proposed House (New Territories Exempted House - Small House)	642 S.C	No
38	A/NE-KTS/275-1 (Extension of Time Limit)	Proposed House (New Territories Exempted House - Small House)	642 S.C	No
39	A/NE-KTS/276	Proposed House (New Territories Exempted House - Small House)	642 S.D	No
40	A/NE-KTS/276-1 (Extension of Time Limit)	Proposed House (New Territories Exempted House - Small House)	642 S.D	No
41	A/NE-KTS/277	Proposed House (New Territories Exempted House - Small House)	642 S.B	No
42	A/NE-KTS/277-1 (Extension of Time Limit)	Proposed House (New Territories Exempted House - Small House)	642 S.B	No
43	A/NE-KTS/283	Proposed House (New Territories Exempted House - Small House)	642 S.E	No
44	A/NE-KTS/292	Proposed House (New Territories Exempted House - Small House)	546 S.D	No
45	A/NE-KTS/292-1 (Extension of Time Limit)	Proposed House (New Territories Exempted House - Small House)	546 S.D	No
46	A/NE-KTS/293	Proposed House (New Territories Exempted House - Small House)	641 S.G ss.1 and 641 S.H ss.4	No
47	A/NE-KTS/294	Proposed House (New Territories Exempted House - Small House)	641 S.F R.P. and 641 S.H ss.1	No
48	A/NE-KTS/295	Proposed House (New Territories Exempted House - Small House)	641 S.G R.P. and 641 S.H ss. 3	No
49	A/NE-KTS/345	Proposed House (New Territories Exempted House - Small House)	1421 S.C	No
50	A/NE-KTS/346	Proposed House (New Territories Exempted House - Small House)	1421 S.B	No
51	A/NE-KTS/349	Proposed House (New Territories Exempted House - Small House)	546 S.C	No
52	A/NE-KTS/355	Proposed House (New Territories Exempted House - Small House)	1228 S.A	No
53	A/NE-KTS/356	Proposed House (New Territories Exempted House - Small House)	1228 S.B	No
54	A/NE-KTS/366	Proposed House (New Territories Exempted House - Small House)	582	No
55	A/NE-KTS/375	Proposed House (New Territories Exempted House - Small House)	1235 S.A	No
56	A/NE-KTS/379	Proposed House (New Territories Exempted House - Small House)	643 S.E	No
57	A/NE-KTS/389	Proposed House (New Territories Exempted House - Small House)	642 S.E	No

*All private lots are located in the Demarcation District 100

Appendix B: List of Approved Small House and s.16 Planning Applications

Table 2: List of Approved Small House Applications

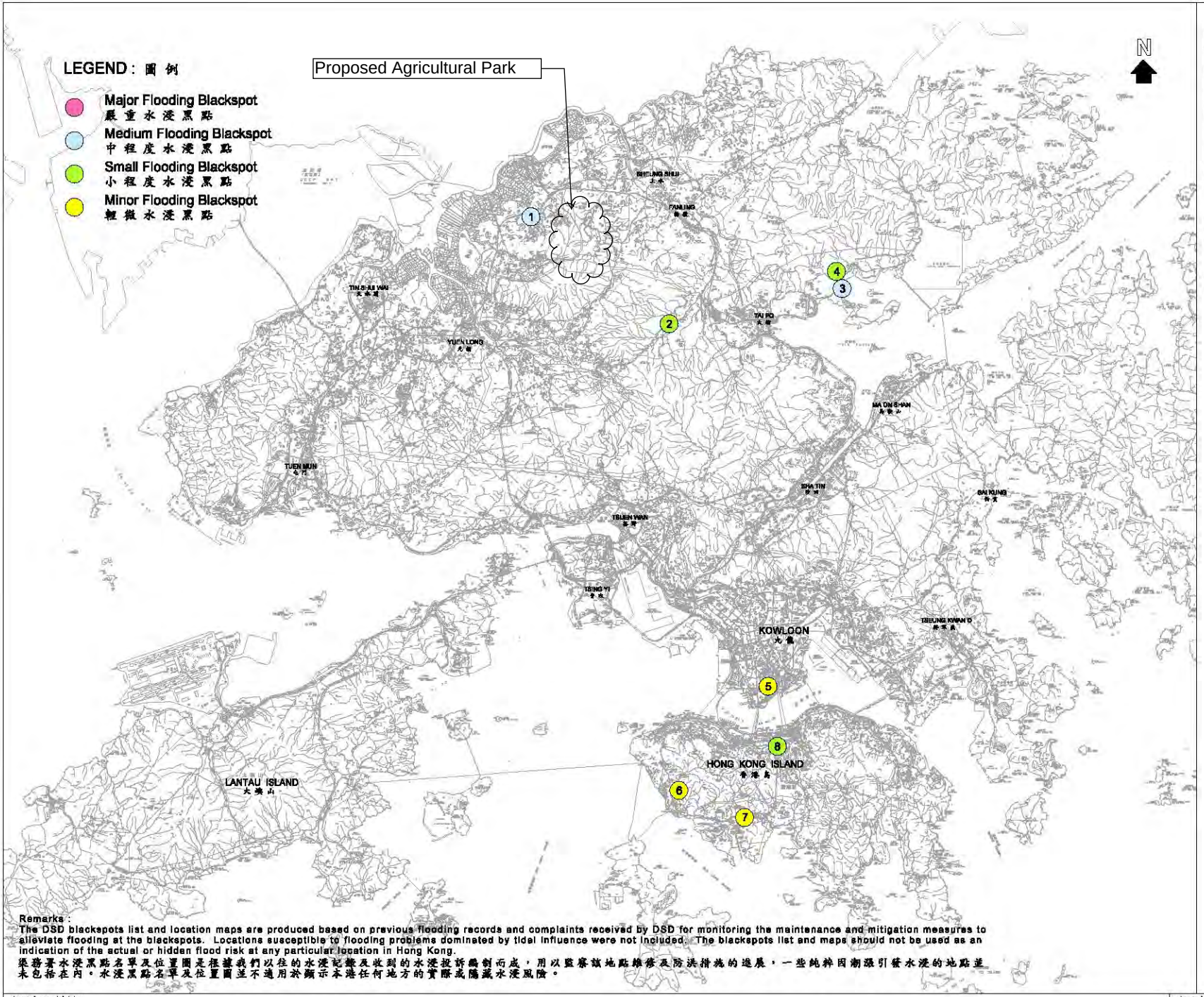
No.	Land Lot No.*	Status	Within the proposed Agri-Park site? (Yes/No)
1	422	Approved (B/L No. 143/2002)	No
2	546C	Approved (B/L No. 49/2014)	No
3	546D	Approved (B/L No. 50/2014)	No
4	641F1; 641G2; 641H2	Approved (B/L No. 52/2004)	No
5	641FRP; 641H1	Approved (B/L No. 51/2004)	No
6	641G1; 641H4	Approved (B/L No. 54/2004)	No
7	641GRP; 641H3	Approved (B/L No. 53/2004)	No
8	642C	Approved (B/L No. 66/2012)	No
9	642B	Approved (B/L No. 31/2012)	No
10	682A	Approved (B/L No. 84/2003)	No
11	682B	Approved (B/L No. 85/2003)	No
12	682C	Approved (B/L No. 86/2003)	No
13	682D	Approved (B/L No. 70/2001)	No
14	682E	Approved (B/L No. 179/2000)	No
15	1234A	Approved (B/L No. 162/2003)	No
16	1234RP	Approved (B/L No. 163/2003)	No
17	1251B	Approved (B/L No. 14/2003)	No
18	1251D	Approved (B/L No. 98/93)	No
19	1251RP	Approved (B/L No. 61/94)	No
20	1252	Approved (B/L No. 15/2003)	No
21	1391ARP	Approved (B/L No. 13/2011)	No
22	1391A1	Approved (B/L No. 12/2011)	No
23	1412ARP	Approved (B/L No. 26/95)	No
24	1412RP	Approved (B/L No. 25/95)	No
25	1413RP	Approved (B/L No. 40/2010)	No
26	1422A	Approved (B/L No. 38/2009)	No
27	1422B	Approved (B/L No. 39/2009)	No

*All private lots are located in the Demarcation District 100

Appendix C

Calculations on Drainage and Sewerage

Appendix C1



NO 編號	LOCATION 地點
1	Shek Wu Wai, San Tin 新田石湖圍
2	Lam Tsuen Valley Basin 林村谷盆地
3	Ting Kok Road - Shuen Wan Chim Uk to Wong Yue Tan 汀角路 - 鮜灣詹屋至黃魚潭段
4	Tung Tsz Road 銅梓路
5	Chatham Road South between Granville Road and Austin Avenue 介乎加連威老道和柯士甸路之間的一段漆咸道南
6	Pok Fu Lam Village 薄扶林村
7	Wong Chuk Hang Road J/O Nam Long Shan Road 黃竹坑道與南朗山道交界
8	Morrison Hill Road J/O Lap Tak Lane 摩理臣山道與立德里交界

Remarks :
The DSD blackspots list and location maps are produced based on previous flooding records and complaints received by DSD for monitoring the maintenance and mitigation measures to alleviate flooding at the blackspots. Locations susceptible to flooding problems dominated by tidal influence were not included. The blackspots list and maps should not be used as an indication of the actual or hidden flood risk at any particular location in Hong Kong.
渠務署水浸黑點名單及位置圖是根據我們以往的水浸記錄及收到的水浸投訴編制而成，用以監察該地點維修及防洪措施的進展，一些純粹因潮汐引發水浸的地點並未包括在內。水浸黑點名單及位置圖並不適用於顯示本港任何地方的實際或隱藏水浸風險。

drawing title

Location of DSD Flooding Blackspots as at March 2016
渠務署水浸黑點位置圖 (2016 年 3 月版本)

drawing no.	scale	date
DLD 1699	N. T. S.	Mar 2016

office	
LAND DRAINAGE DIVISION	DRAINAGE SERVICES DEPARTMENT HONG KONG

Appendix C2 - Summary of Characteristics of Catchments

Sub-catchment Area	Existing Unpaved Area (1)	Existing Paved Area (2)	Existing Catchment Area	Additional Area (Sites Development)	Additional Area (New Internal Access Road)	Proposed Catchment Area
	m^2	m^2	m^2	m^2	m^2	m^2
A1	100,926	25,231	126,157	0	0	126,157
A2	110,078	27,519	137,597	0	0	137,597
A3	118,749	29,687	148,436	0	0	148,436
A4	50,982	12,746	63,728	891	4,351	68,969
Sum of Catchment A	380,734	95,184	475,918	891	4,351	481,159
B1	352,282	88,071	440,353	0	0	440,353
B2	133,046	33,262	166,308	1,000	3,390	170,698
Sum of Catchment B	485,329	121,332	606,661	1,000	3,390	611,051
C1	399,736	99,934	499,670	0	0	499,670
C2	324,538	81,134	405,672	0	0	405,672
C3	307,942	76,986	384,928	0	0	384,928
C4	341,301	85,325	426,626	0	0	426,626
C5	600,494	150,124	750,618	6,689	18,645	775,952
C6	132,253	33,063	165,316	0	0	165,316
C7	168,455	42,114	210,569	6,060	0	216,629
Sum of Catchment C	2,274,719	568,680	2,843,399	12,749	18,645	2,874,793

Remarks:
(1) Assume Existing Unpaved Area = 80% of Existing catahments
(2) Assume Existing Paved Area = 20% of Existing catahments

Appendix C3
Preliminary Capacity Check on Existing Drainage for Widening of Tsiu Keng Road
Design Return Period = 50 years

g:	9.81	m/s^2	
ks	0.00015	m	(Concrete pipe taken from Table 14 of DSD Stormwater Drainage Manual, ks = 0.15mm)
v:	1.14E-06	m^2/s	(Viscosity value for fluid temperature = 15 degree celsius)

Manhole Number	Catchment Area[(1)] (m^2)	Estimated Peak Flow (m^3 / s)	Cumulative Peak Flow (m^3 / s)	Downstream Pipe			Full-bore Capacity	Hydraulic Check	Invert Levels (mPD)		Cover Level (mPD)	Cover Depth
				Length	Dia	Gradient			Inlet	Outlet		
				m	mm	1 in	m^3/ s					
SMH 1045166	413	0.031	**0.031**	18.1	525	72	**0.670**	ok		24.67	26.25	1.58
SMH 1045165	276	0.021	**0.052**	18.4	600	123	**0.729**	ok	24.42	24.37	26.04	1.67
SMH 1045164	267	0.020	**0.072**	18.4	600	102	**0.799**	ok	24.22	24.20	25.83	1.63
SMH 1045163	268	0.020	**0.092**	18.5	675	80	**1.224**	ok	24.02	23.93	25.64	1.71
SMH 1045162	268	0.020	**0.112**	18.5	825	264	**1.137**	ok	23.70	23.56	25.44	1.88
SMH 1045161	261	0.020	**0.132**	18.5	825	132	**1.609**	ok	23.49	23.42	25.24	1.82
SMH 1045160	261	0.020	**0.151**	18.5	825	925	**0.606**	ok	23.28	23.27	25.04	1.77
SMH 1045159	183	0.014	**0.165**	13	900	54	**3.154**	ok	23.25	23.21	25.03	1.82
SMH 1045158	183	0.014	**0.179**	13	900	3250	**0.404**	ok	22.97	22.96	25.13	2.17
SMH 1045157	183	0.014	**0.192**	13	900	162	**1.819**	ok	22.96	22.96	25.30	2.34
SMH 1045156	141	0.011	**0.203**	9.99	900	167	**1.797**	ok	22.88	22.88	25.48	2.60
SMH 1045155	984	0.074	**0.277**	18.5	900	264	**1.426**	ok	22.82	22.79	25.55	2.76
SMH 1045154	159	0.012	**0.289**	11.3	900	75	**2.673**	ok	22.72	22.72	25.43	2.71
SMH 1045153	162	0.012	**0.301**	14.3	900	1430	**0.611**	ok	22.57	22.51	25.35	2.84
SMH 1045152	206	0.015	**0.316**	18.2	900	202	**1.630**	ok	22.50	22.47	25.17	2.70
SMH 1045151	207	0.016	**0.332**	18.3	900	203	**1.626**	ok	22.38	22.36	24.94	2.58
SMH 1045150	267	0.020	**0.352**	23.6	900	81	**2.572**	ok	22.27	22.24	24.74	2.50
SMH 1045149	228	0.017	**0.369**	20.2	900	168	**1.787**	ok	21.95	21.91	24.51	2.60
SMH 1045148	190	0.014	**0.383**	16.8	900	99	**2.334**	ok	21.79	21.75	24.29	2.54
SMH 1045147	147	0.011	**0.394**	13	900	108	**2.229**	ok	21.58	21.50	24.08	2.58
SMH 1045146	1318	0.099	**0.493**	13	900	54	**3.154**	ok	21.38	21.37	23.94	2.57
SMH 1045145	295	0.022	**0.515**	13	900	76	**2.654**	ok	21.13	21.01	23.69	2.68
SMH 1045144	171	0.013	**0.528**	12.5	1050	114	**3.249**	ok	20.84	20.78	23.44	2.66
SMH 1045143	141	0.011	**0.539**	12.5	1050	625	**1.382**	ok	20.67	20.61	23.05	2.44
SMH 1045142	24	0.002	**0.541**	2.1	1050	3	**20.726**	ok	20.59	20.48	22.66	2.18
SMH 1046263	97	0.007	**0.548**	8.6	1050	215	**2.361**	ok	19.73	19.73	22.55	2.82
SMH 1045141	355	0.027	**0.575**	17.3	1200	432	**2.353**	ok	19.69	19.69	22.50	2.81
SMH 1045140	217	0.016	**0.591**	10.6	1200	353	**2.604**	ok	19.65	19.59	22.75	3.16
SMH 1045139	674	0.051	**0.641**	6.9	1200	33	**8.554**	ok	19.56	19.50	23.12	3.62
SMH 1045138		0	**0.641**	4.3	1200				19.29	19.29	23.70	4.41
			Discharged to Tam Shui Hang									

Remarks:

(1) Catchment areas = 7.3m carriageway + 4m footpath + adjacent catchments

Appendix C4: Estimated of Design Capacity for Sewage Treatment Facilities

Design Parameters:

- 520 farmers
- 800 visitors (assume operation hours of visitor centre = 8 hrs and the centre accommodate max. 100 visitor per hour)
- 20 staff employed by AFCD

Table 1. Unit Demand for Sewage Flow Estimation

Category	**Housing Type / Employee Unit**	**Unit Flow Factor (m^3/day/person or employee)**	**Populations**	**Unit Demand (m^3/day)**
Domestic Flows	Temporary and non-domestic	0.15	520	78
	Mobile residents	0.19	800	152
Commercial Flows	Commercial employee	0.08	20	1.6
	Commercial activity J7 (for Agriculture)	-	0	0
			Average Dry Weather Flow (ADWF)=	231.6

The design ADWF = 231.6 m^3/day (< 450 m^3/day)

Design flow rate = peak factor x ADWF = 3 x 231.6 = 694.8 m^3/day (say 695 m^3/day)

Sewage pump capacity= 3 x 231.6 = 695 m^3/day

Design Equalization Tank
Retention hours = 2 hrs
Design flow rate = 695 m^3/day
Peak flow = 695 / 24 hrs = 29 m^3/hr
Min. retention volume = Peak flow x Retention hours = 29 x 2 = 58 m^3

Design Package Plant
Package plant capacity = 695 m^3/day

Reference: Small Sewage Treatment Plant Design Guide published by EPD

Appendix D

Data for Irrigation Assessments

D1 Past Rainfall Records from Climatological Information Services of Hong Kong Observatory

D2 Locations of River Water Monitoring Stations in Deep Bay Water Control Zone with Computation of Average Flow rate for Sheung Yue River at Station RB1

D3 Table for Rough Estimate of the Effective Rainfall

D4 Estimation of Irrigation Water Demand based on Food and Agriculture Organization (FAO) of the United Nations

D5 Sketches for Irrigation Water Supply from Kwu Tung Irrigation Water Reservoir

D6 Existing Ground Water Level Record & Preliminary Hydrogeological Assessement for Pumping Wells

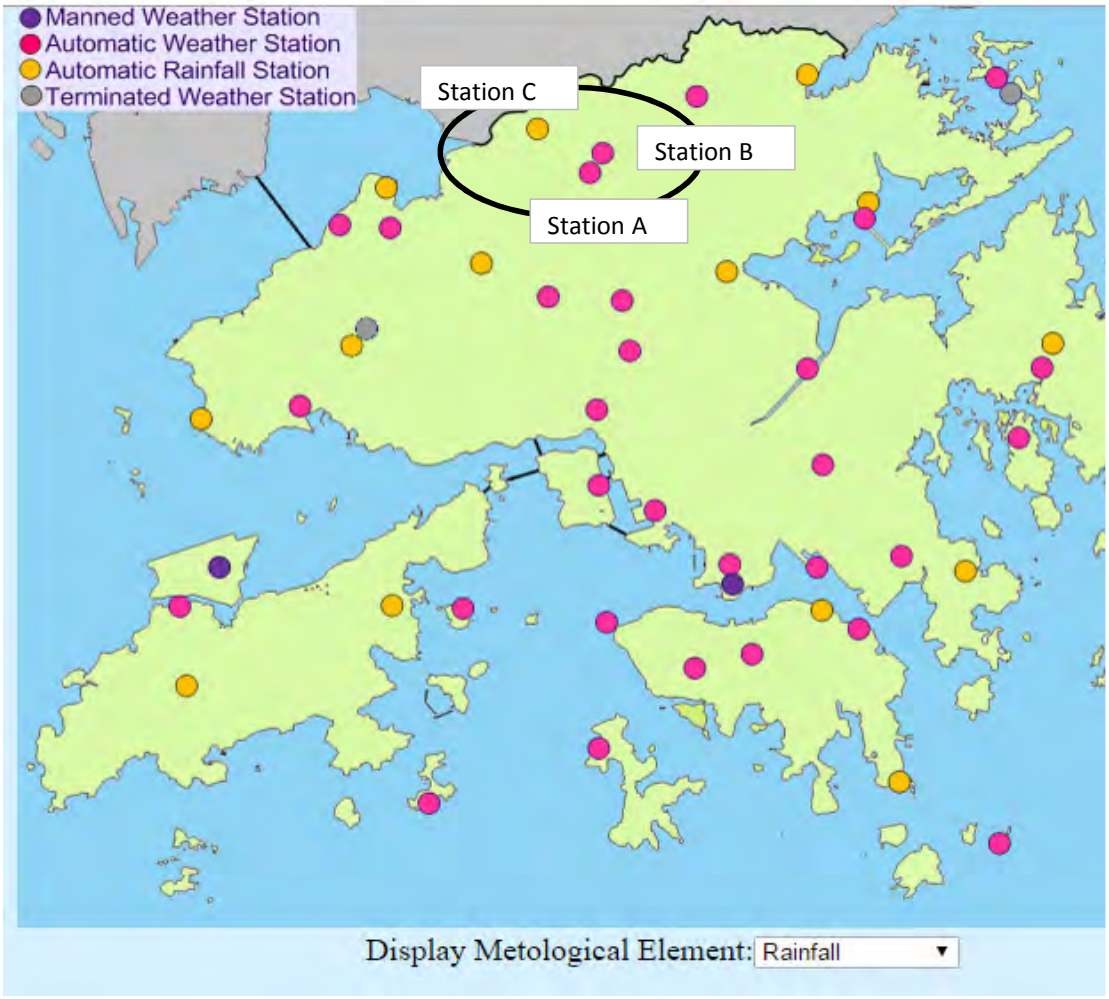
D7 Information on irrgation (provided by AFCD) as discussed in the meeting held on 1st September 2016

Appendix D1

Past Rainfall Records from Climatological Information Services of Hong Kong Observatory

Individual Weather Station in the vicinity of Proposed Site

Station A: Automatic Weather Station at River Beas
Station B: Automatic Weather Station at Sheung Shui
Station C: Automatic Rainfall Station at Lok Ma Chau



Back

Monthly Total Rainfall (mm) at Beas River

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	***	***	***	***	***	***	***	***	***	***	***	14.0#
2013	11.0	1.0	117.0	17.5#	375.0#	381.5	360.5	565.0	203.0	7.5	41.5	135.5
2014	0.0	34.5	242.0	135.0	568.0	225.5	261.5	128.0	239.5	9.0	13.0	41.5
2015	58.0	11.0	9.5	50.5	291.0	188.0	358.0	64.5#	110.0#	327.0	13.0	81.5
2016	266.5	35.0	136.0	217.0	409.0							

*** unavailable

data incomplete

Rainfall measured in increment of 0.5 mm. Amount of < 0.5 mm cannot be detected

Back

Monthly Total Rainfall (mm) at Sheung Shui

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004	***	***	***	***	***	***	***	313.0	182.5	7.5	0.0	0.0
2005	3.0	16.5	48.0	52.5	304.5	586.0	328.5	568.5	259.0	8.0	17.0	3.0
2006	20.0	62.0	61.5	112.5	311.5	414.0	432.5	373.0	444.5	0.0	82.0	26.5#
2007	18.5	32.0	13.5	145.5	280.0	477.5	73.5	409.5	85.5	49.5	12.5	14.5
2008	48.5	25.0	36.5	227.0	160.0	1321.5	456.5	345.0	152.0	104.5	2.5	6.5
2009	0.0	0.0	141.0	125.0	325.5	262.0	290.0	287.5	300.5	5.5	34.0	35.0
2010	27.5	74.5	17.5	121.0	141.0#	265.0	345.5	139.5	325.5	9.0	32.0	15.0
2011	9.0	26.0	18.0	50.5	287.0	398.0	299.5	188.0	153.5	161.0	98.5	0.0
2012	47.0	27.0	27.0	291.5	206.5	366.5	482.5	68.0	50.5	48.0	97.0	44.5
2013	9.5	0.5	113.0	282.5	422.5	377.5	393.5	538.5	206.0	7.0	46.0	135.5
2014	0.0	34.0	235.5	135.5	559.5	218.0	233.5	136.5	234.5	9.5	10.5	40.5
2015	59.0	11.0	9.5	48.0	265.0	160.5	326.5	234.0	188.0	283.5	16.0	78.5
2016	258.5	34.5	131.0	206.5	381.0							

*** unavailable

data incomplete

Rainfall measured in increment of 0.5 mm. Amount of < 0.5 mm cannot be detected

Back

Monthly Total Rainfall (mm) at Lok Ma Chau

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	***	***	***	***	***	***	***	***	278.0#	39.0	7.5	9.5
1986	0.0#	1.5#	48.5	99.5#	88.0#	299.5	344.5	267.0	113.0	32.0	106.5#	35.5
1987	2.5	5.5	158.5#	229.0	283.0	140.5	321.0	110.0#	1.0#	4.5#	1.0#	0.5
1988	5.0	10.5#	12.0#	50.0	22.5	84.0	274.5	325.5	43.5	38.0	33.5	87.0
1989	30.5	5.0	17.0	230.5	172.5#	43.0	70.0	177.5#	0.0#	0.0#	5.0	28.5
1990	18.5#	12.5#	***	9.5#	38.5#	282.0	154.5	24.5	0.0#	***	3.0#	0.0
1991	0.0#	***	0.5#	1.0#	41.0	199.5#	286.0	230.0	1.0#	***	4.5#	13.0
1992	0.5#	1.5#	79.0	188.0#	236.0	396.5	219.5	34.5#	219.5	0.0#	3.5	40.0#
1993	23.0	0.0	27.5	112.5	281.5	384.5	102.0	152.5	544.0	79.5	162.0	4.5
1994	0.5	39.0	27.5	61.0	114.0	272.0	734.5	88.0#	211.0	0.5	0.0	138.0
1995	19.5	21.0	17.5	76.0	85.5	227.0	364.5	482.0	56.0	447.0	3.5#	7.0
1996	0.0	17.5#	69.0	112.0	197.5	204.0	190.0	145.5	379.0	0.0	1.0	0.0
1997	8.5#	6.5#	35.5	89.5	210.0	115.5	276.5#	647.0	139.0#	26.0	0.5#	22.0#
1998	29.5	100.0	28.5	106.5	256.0#	251.0#	0.0#	246.0	122.0	66.5	0.0#	21.5#
1999	8.5	0.0	23.0	35.5#	114.5	114.0#	95.5	622.5	285.5	23.0	10.0	25.0
2000	100.5	24.0	24.5#	590.5	101.0	167.0	308.0	180.5#	76.0	99.5	68.0	64.0
2001	45.5	18.0	39.5	130.0	164.5	750.0	471.0	234.0	231.0	22.0	0.5	34.5
2002	13.0	7.0	42.5#	4.0	133.5	117.0	5.0#	382.5#	422.5	85.5	16.5	55.0#
2003	14.0	5.0	43.0	17.5	286.0	366.5	139.0	274.5	303.0	40.0	10.0	2.0
2004	42.0	58.5	78.0	116.5	154.5	103.5	231.5	317.0	136.5	1.0	0.5	0.0#
2005	2.5	17.0	46.0	33.5	321.5	533.5	320.5	523.0	277.5	0.5	14.0	2.5
2006	22.0	67.5	49.5	100.5	235.0	410.0	369.5	339.0#	387.5	2.0	92.0	20.5
2007	26.0	20.5	16.0	142.5	298.0	371.0	82.0	402.5	68.5	43.5	11.0	13.5
2008	51.5	23.5	31.5	190.0	134.5	1184.0	312.5	291.5	196.0	92.0	0.5	5.5
2009	0.0	0.0	162.5	119.5	293.0	212.5	221.0	324.0	286.5#	1.0#	34.0	26.5
2010	24.5	83.5	20.0	122.0	160.5	263.5	349.0	119.0	317.0	11.5	22.5	15.5
2011	8.5	22.5	17.0	52.0	200.0	518.0	273.5#	105.5	198.0#	137.5	84.0#	0.0
2012	46.5	36.0	21.0	248.5	191.0	307.5	479.0	97.5	33.5	40.5	73.0	43.0
2013	8.0	0.5	65.0	279.5	335.5	371.0	359.0	468.5	147.5	2.5	37.0	127.0
2014	0.0	29.5	227.5	118.0#	577.0	163.0	246.5	187.5	200.0	0.0	8.0	42.5
2015	52.5	14.5	9.0	49.0	233.0	179.5	270.5	173.0	136.5	312.5	14.5	74.0
2016	249.0	34.5	121.5	201.0	315.5							

*** unavailable

data incomplete

Rainfall measured in increment of 0.5 mm. Amount of < 0.5 mm cannot be detected

Computation of Average Monthly Total Rainfall (mm)

	2016			2015			2014			2013		
	A	B	C	A	B	C	A	B	C	A	B	C
Jan	266.5	258.5	249	58	59	52.5	0	0	0	11	9.5	8
Feb	35	34.5	34.5	11	11	14.5	34.5	34	29.5	1	0.5	0.5
Mar	136	131	121.5	9.5	9.5	9	242	235.5	227.5	117	113	65
Apr	217	206.5	201	50.5	48	49	135	135.5	118	17.5	282.5	279.5
May	409	381	315.5	291	265	233	568	559.5	577	375	422.5	335.5
Jun				188	160.5	179.5	225.5	218	163	381.5	377.5	371
Jul				358	326.5	270.5	261.5	233.5	246.5	360.5	393.5	359
Aug				64.5	234	173	128	136.5	187.5	565	538.5	468.5
Sep				110	188	136.5	239.5	234.5	200	203	206	147.5
Oct				327	283.5	312.5	9	9.5	0	7.5	7	2.5
Nov				13	16	14.5	13	10.5	8	41.5	46	37
Dec				81.5	78.5	74	41.5	40.5	42.5	135.5	135.5	127

	2012			2011			2010			2009		
	A	B	C	A	B	C	A	B	C	A	B	C
Jan		47	46.5		9	8.5		24.5	24.5		0	0
Feb		27	36		26	22.5		83.5	83.5		0	0
Mar		27	21		18	17		20	20		141	162.5
Apr		291.5	248.5		50.5	52		122	122		125	119.5
May		206.5	191		287	200		160.5	160.5		325.5	293
Jun		366.5	307.5		398	518		263.5	263.5		262	212.5
Jul		482.5	479		299.5	273.5		349	349		290	221
Aug		68	97.5		188	105.5		119	119		287.5	324
Sep		50.5	33.5		153.5	198		317	317		300.5	286.5
Oct		48	40.5		161	137.5		11.5	11.5		5.5	1
Nov		97	73		98.5	84		22.5	22.5		34	34
Dec		44.5	43		0	0		15.5	15.5		34	26.5

	2008			2007			2006			Average Monthly Total
	A	B	C	A	B	C	A	B	C	Rainfall (mm)
Jan		48.5	51.5		18.5	26		20	22	51
Feb		25	23.5		32	20.5		62	67.5	29
Mar		36.5	31.5		13.5	16		61.5	49.5	79
Apr		227	190		145.5	142.5		112.5	100.5	146
May		160	134.5		280	298		311.5	235	307
Jun		1321.5	1184		477.5	371		414	410	393
Jul		456.5	312.5		73.5	82		432.5	369.5	317
Aug		345	291.5		409.5	402.5		373	339	259
Sep		152	196		85.5	68.5		444.5	387.5	202
Oct		104.5	92		49.5	43.5		0	2	72
Nov		2.5	0.5		12.5	11		82	92	38
Dec		6.5	5.5		14.5	13.5		26.5	20.5	44

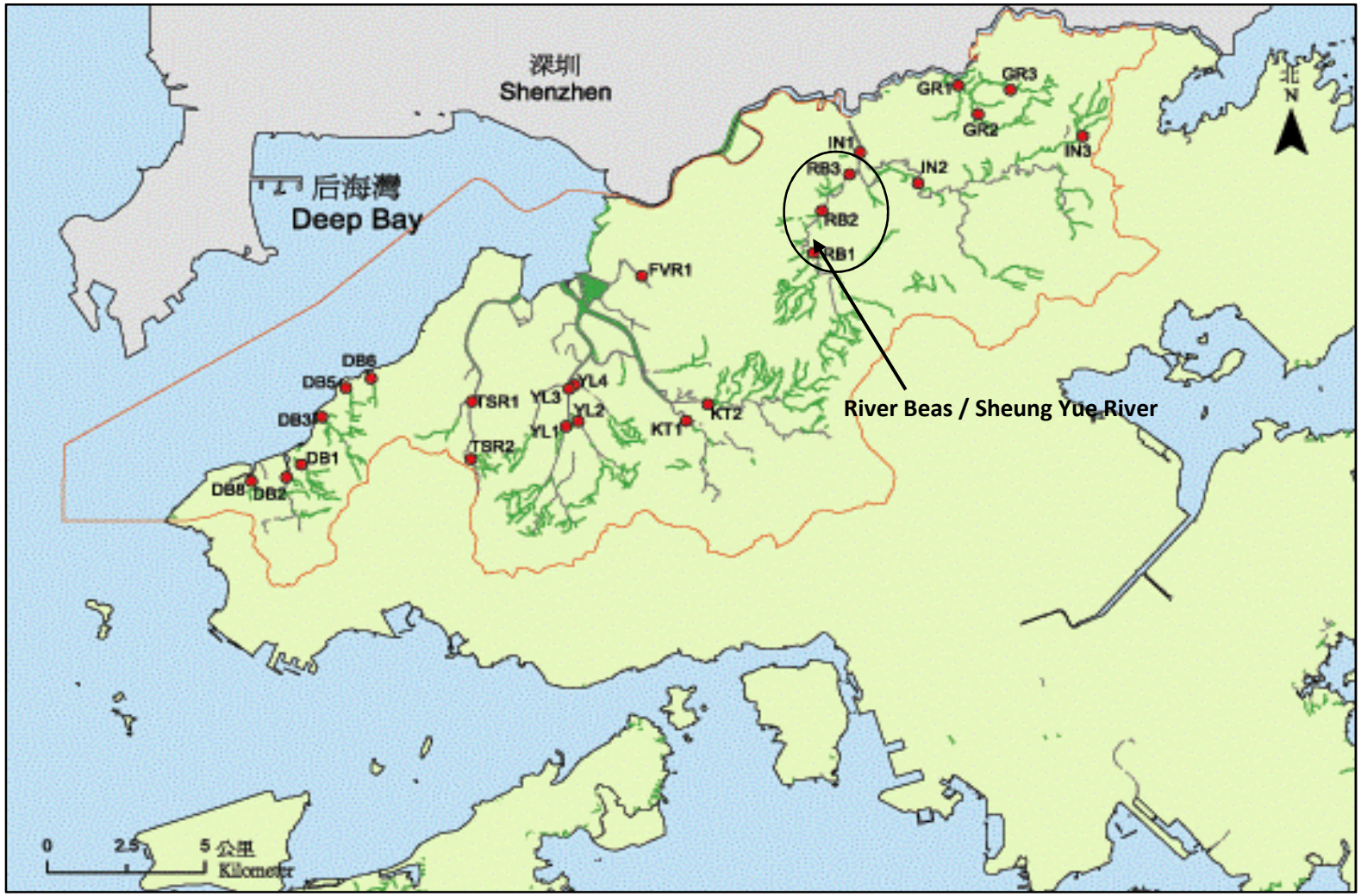
Column A Automatic Weather Station at River Beas
Column B Automatic Weather Station at Sheung Shui
Column C Automatic Rainfall Station at Lok Ma Chau

Remark:

1) As the rainfall record in 2016 is not completed and some data are extremely higher than previous data. Therefore, it is not to be considered in this computation.
2) Average Monthly Total Rainfall (Jan to May) = sum of all columns / 26
3) Average Monthly Total Rainfall (Jun to Dec) = sum of all columns / 23

Appendix D2

Locations of River Water Monitoring Stations in Deep Bay Water Control Zone



Map extracted from EPD's River Water Quality Data : http://epic.epd.gov.hk/EPICRIVER/river/

Appendix D2

Computation of Average Flow Rate for Sheung Yue River at Station RB1 (m^3/s)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average Flow Rate (m^3/s)
Jan	0.144	0.087	0.058	0.108	0.114	0.092	0.084	0.069	0.04	0.13	0.065	0.073	0.089
Feb	0.072	0.075	0.033	0.042	0.088	0.024	0.021	0.024	0.129	0.07	0.044	0.058	0.057
Mar	0.054	0.099	0.041	0.138	0.21	0.036	null	null	0.064	0.014	0.033	0.055	0.074
Apr	0.026	0.105	0.047	0.029	0.129	0.06	0.078	0.039	0.022	0.041	0.102	0.144	0.069
May	0.114	0.092	0.252	0.425	0.252	0.047	0.023	0.1	0.053	0.29	0.144	0.12	0.159
Jun	0.355	0.077	0.094	0.21	0.125	0.175	0.09	0.158	0.024	0.238	0.204	0.036	0.149
Jul	null	0.128	0.248	0.15	0.267	0.18	0.075	1.44	0.16	0.54	0.179	0.287	0.221
Aug	0.31	0.176	0.308	0.126	0.24	0.185	0.01	0.012	0.22	0.159	0.029	0.123	0.158
Sep	0.7	0.195	0.44	0.18	0.174	0.092	10.95	0.064	0.13	0.084	0.275	0.305	0.240
Oct	0.198	0.038	0.281	0.23	0.135	0.176	0.06	0.156	0.098	0.1	0.248	0.196	0.160
Nov	0.164	0.086	0.156	0.068	0.144	0.12	0.12	0.058	0.22	0.09	0.12	0.217	0.130
Dec	0.101	0.068	0.105	0.126	0.135	0.096	0.15	0.049	0.102	0.11	0.024	0.106	0.098

Data Source: River Water Quality Data from EPD

Extreme data discarded from the calculation

Appendix D3

Table for Rough Estimate of the Effective Rainfall * -

Rainfall or Precipitation (P) verse Effective Rainfall or Effective Precipitation (Pe) in mm/month

Rainfall (P) (mm/month)	Effective Rainfall (Pe) (mm/month)	Rainfall (P) (mm/month)	Effective Rainfall (Pe) (mm/month)
0	0	130	79
10	0	140	87
20	2	150	95
30	8	160	103
40	14	170	111
50	20	180	119
60	26	190	127
70	32	200	135
80	39	210	143
90	47	220	151
100	55	230	159
110	63	240	167
120	71	250	175

*Data Source: ***_Irrigation Water Management: Irrigation Water Needs_ – Volume 3 Part 1*** by *C Brouwer,* International Institute for Land Reclamation and Improvement and *M. Heibloem*, FAO Land and Water Development Division

Appendix D4

Estimation of Irrigation Water Demand in accordance with Food and Agriculture Organization (FAO) Manual of the United Nations for reference

1) Table 1 [(1)] indicates the average daily water needs of a reference crop, of which grass is chosen. For Hong Kong, the standard grass crop grown in sub-humid climate with a mean temperature above 15°C[(2)] in dry season needs approximately 5.5mm per day; while in wet season, the standard grass crop grown in humid climate with a mean temperature over 25°C[(2)] needs about 5.5mm of water per day.

Table 1: Average Daily Water Needs of Standard Grass during Irrigation Season **(1)**

Climatic Zone	**Mean Daily Temperature**		
	Low	**Medium**	**High**
	Less than 15°C	**15°C ~ 25°C**	**More than 25°C**
Desert/ arid	4-6 mm	7-8 mm	9-10 mm
Semi-arid	4-5 mm	6-7 mm	8-9 mm
Sub-humid	3-4 mm	5-6 mm[#]	7-8 mm
Humid	1-2 mm	3-4 mm	5-6 mm[#]

Adopted according to the weather conditions of Hong Kong

2) Table 2 [(1)] indicates the water needs of different crops when compared with the standard crop. The crops in column 1 need 30 percent less water than grass in their peak period. The crops in column 2 need 10 percent less water than grass. The crops in column 3 need the same amount of water as grass. The crops in columns 4 and 5 need respectively 10 and 20 percent more water than grass in their peak period.

Table 2: Crop Water Needs in Peak Period when compared to Standard Grass **(1)**

Crop Type 1	**Crop Type 2**	**Crop Type 3**	**Crop Type 4**	**Crop Type 5**
-30%	**-10%**	**Same as Standard Grass**	**+10%**	**+20%**
Citrus	Cucumber	Carrots	Beans	Paddy Rice
Olives	Radishes	Onion	Tomato	Sugarcane
Grapes	Squash	Lettuce Pepper	Eggplant	Banana
		Spinach	Peas	Nuts & fruit trees with cover crop
		Crucifers, such as cabbage, cauliflower, etc.		
		Clean cultivated nuts & fruit trees		

3) In connection with Table 1 and Table 2 above, the water needs of common crops grown in Hong Kong is listed in Table 6.6.

Table 3: Estimation of Water Needs of Common Crops grown in Hong Kong

Crop	**Growing Months**	**Water Requirement (mm)**	**Water Needs per day (mm)**	**Water Needs per month* (mm)**
Chinese Cabbage	All year round	Standard	5.5mm	165
Lettuce/Spinach	Winter	Standard	5.5mm	165
Tomato	Winter	+10%	6.05mm	182
Beans	Summer	+10%	6.05mm	182

* Adoption of 30 days per month

4) As crop farming activities in the Agri-Park are likely to be highly diversified (e.g. from flooded irrigation to drip irrigation in greenhouses), it is considered that more conservative estimation should be adopted to cater for potential high irrigation demands. As such, the data recommended by the FAO Manual with the upper bound crop water needs (i.e. +20%)) is taken as the estimation basis of irrigation requirement for the Agri-Park as given in Table 3.

Table 3: Estimated Water Needs of the Proposed Agri-Park

Crop Type	**Growing Months**	**Water Requirement**	**Water Needs per month* (mm)**
Type 5	All year round	+20%	5.5mm x 1.20 x30 =198

* Adoption of 30 days per month

(1) Irrigation Water Management, Irrigation Water Needs issued by the Natural Resources Management and Environment Department of Food and Agriculture Organization (FAO) of the United Nations

(2) Based on The Year's Weather issued by the Hong Kong Observatory http://www.weather.gov.hk/wxinfo/pastwx/ywx2015.htm

Appendix D5: Sketches for Irrigation Water Supply Systems

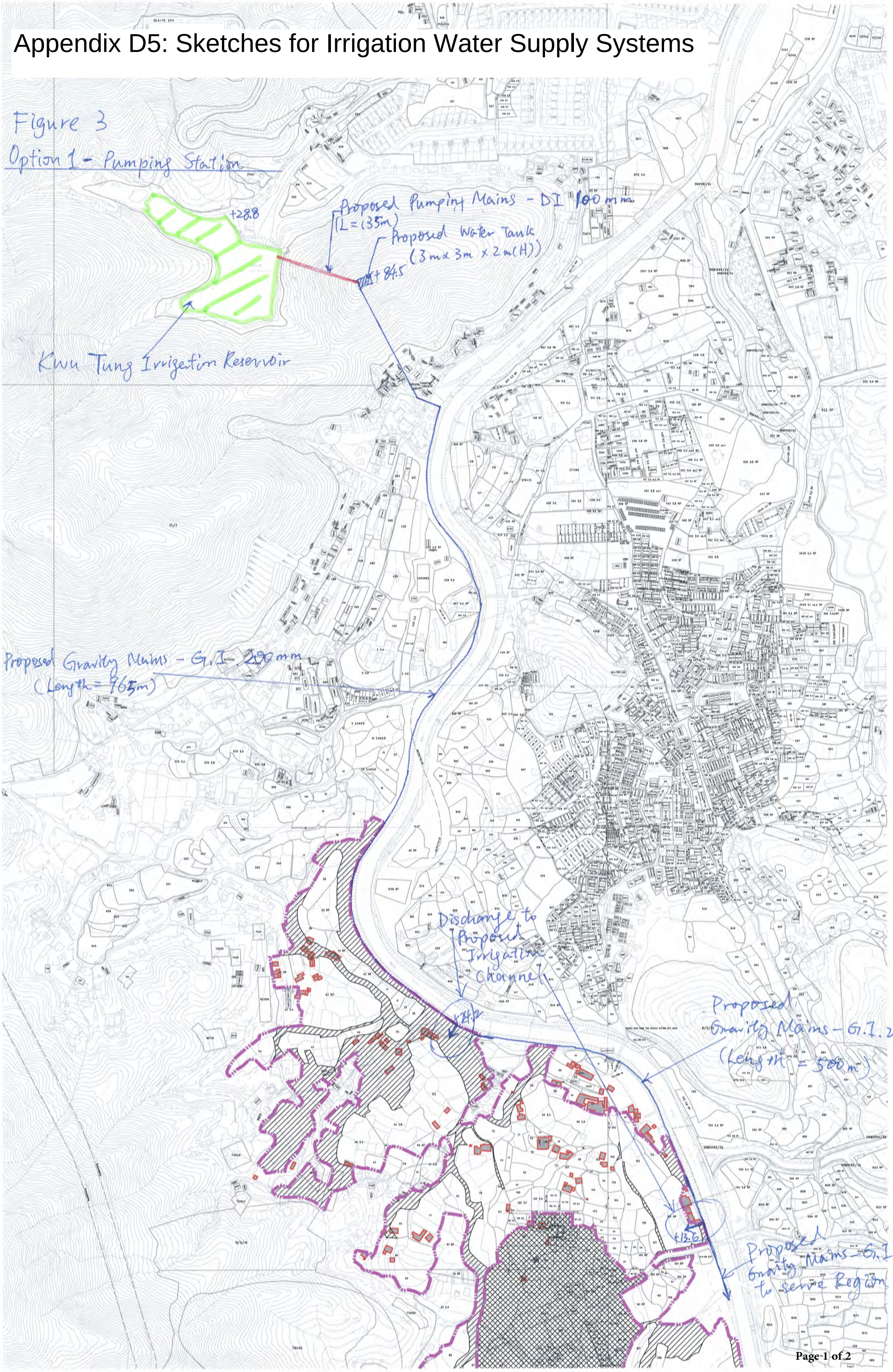
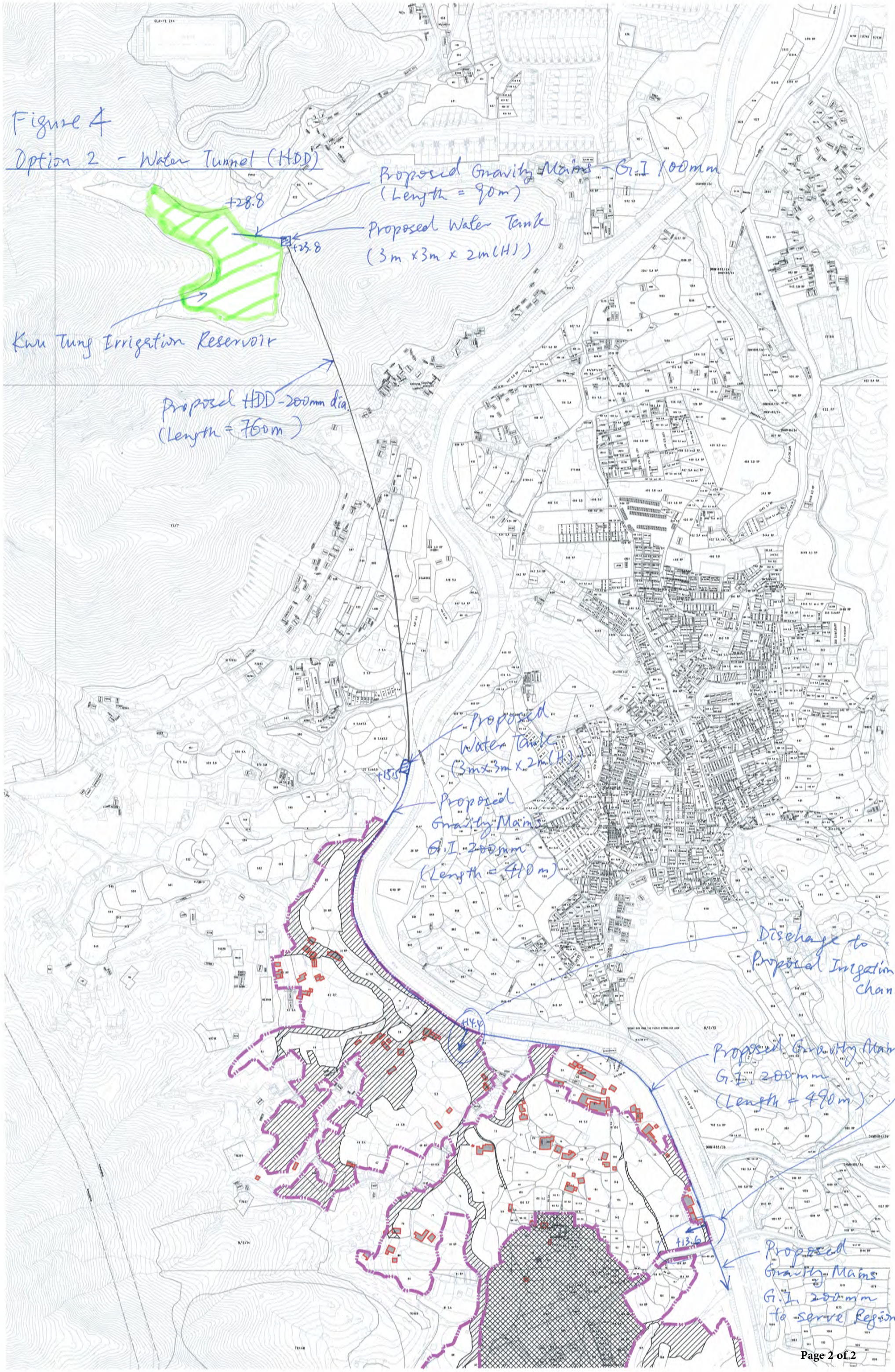


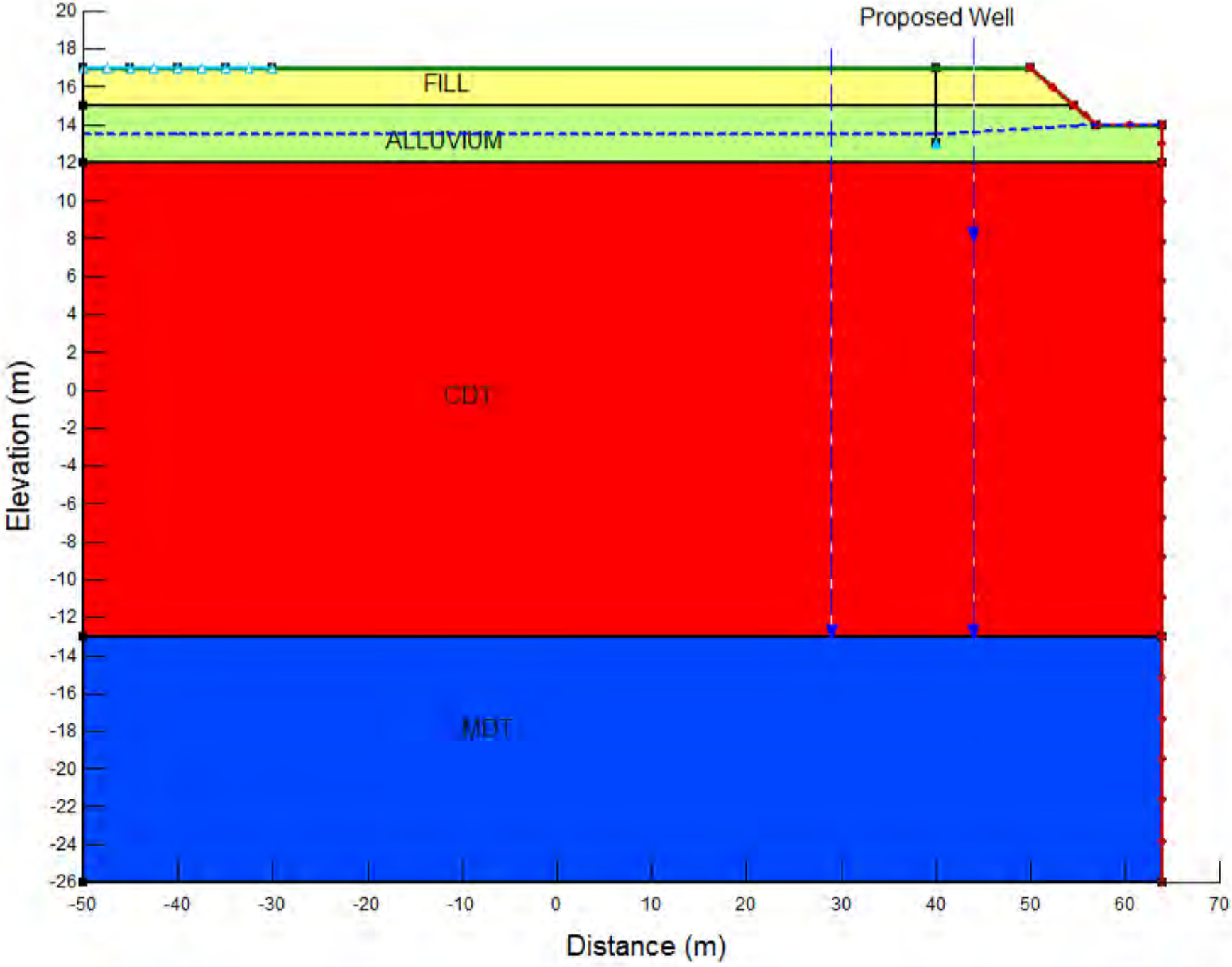
Figure 4

Option 2 - Water Tunnel (HDD)



Appendix D6: Existing Ground Water Level Record & Preliminary Hydrogeological Assessment for Pumping Wells

GIU Report No.	Date of Water Level Monitoring	Drillhole No.	Easting	Northing	Drillhole/Trial Pit Depth (m)	Ground Level (mPD)	Measured Highest Ground Water Level	Remarks
21044	9/25/1995	BTP3B	828519.59	838701.7	1.9	11.69	1.9	water seepage
21044	9/25/1995	BTP4A	828670.52	838445.8	1.9	12.53	1.9	water seepage
21044	9/25/1995	BTP4B	828651.58	838438.31	1.4	11.7	1.3	water seepage
21044	9/28/1995	BTP5A	828676.62	838111.52	1.1	17.65	1.1	water seepage
21044	9/28/1995	BTP5B	828682.39	838099.31	1	17.95	1	water seepage
21044	9/28/1995	BTP6A	829012.03	838026.83	1.8	21.39	1.8	water seepage
21044	9/28/1995	BTP7A	829257.68	837951.8	1.5	23.67	1.5	water seepage
21044	9/28/1995	BTP8A	829032.35	837527.47	1	20.64	1	water seepage
24129	9/12/1996	TP-ND144TP1	828462.46	837622.07	2.5	21.92	2.1	water seepage
24129	9/12/1996	TP-ND144TP2	828451.34	837585.9	2.66	22.11	1.5	water seepage
28008	7/23/1997	DB-BH1	829371.98	837738.81	22.3	22.18	0.83	Piezometer tip at 2.5mbgl
28008	8/9/1997	DB-BH3	829206.42	837936.6	25.7	18	1.14	Piezometer tip at 5mbgl
28008	8/1/1997	DB-BH4	829002.46	838029.12	30.1	17.09	1.59	Standpipe tip at 6.5mbgl
28008	8/9/1997	DB-BH5	828842.41	838031.39	30.97	16.4	1.02	Piezometer tip at 5mbgl
28008	8/6/1997	DB-BH6	828695.45	838108.48	28.95	15.08	1.29	Standpipe tip at 4.5mbgl
28008	7/31/1997	DB-BH7	828676.44	838449.05	30	13.33	1.82	Standpipe tip at 4mbgl
28008	8/4/1997	DB-BH8	828515.16	838721.86	18.4	11.03	0.17	Standpipe tip at 2mbgl
28008	8/11/1997	DB-TP1	829387.05	837663.31	2.5	23.4	1.28	water seepage
28008	8/9/1997	DB-TP2	829012.22	837673.91	2	19.95	1.6	water seepage
34227	1/29/2002	TP4	828611.7	838428.76	2.65	13.14	2.35	water seepage
41276	7/2/2004	BH39	828981.5	837505.12	16.71	22.09	0.53	Standpipe tip at 6mbgl
41276	7/24/2004	TP12	829312.11	837873.74	2.5	20.61	0.77	Standpipe tip at 2mbgl
42610	11/11/2005	BH2	828003.29	838485.79	7.5	36.38	3.3	Piezometer tip at 7mbgl

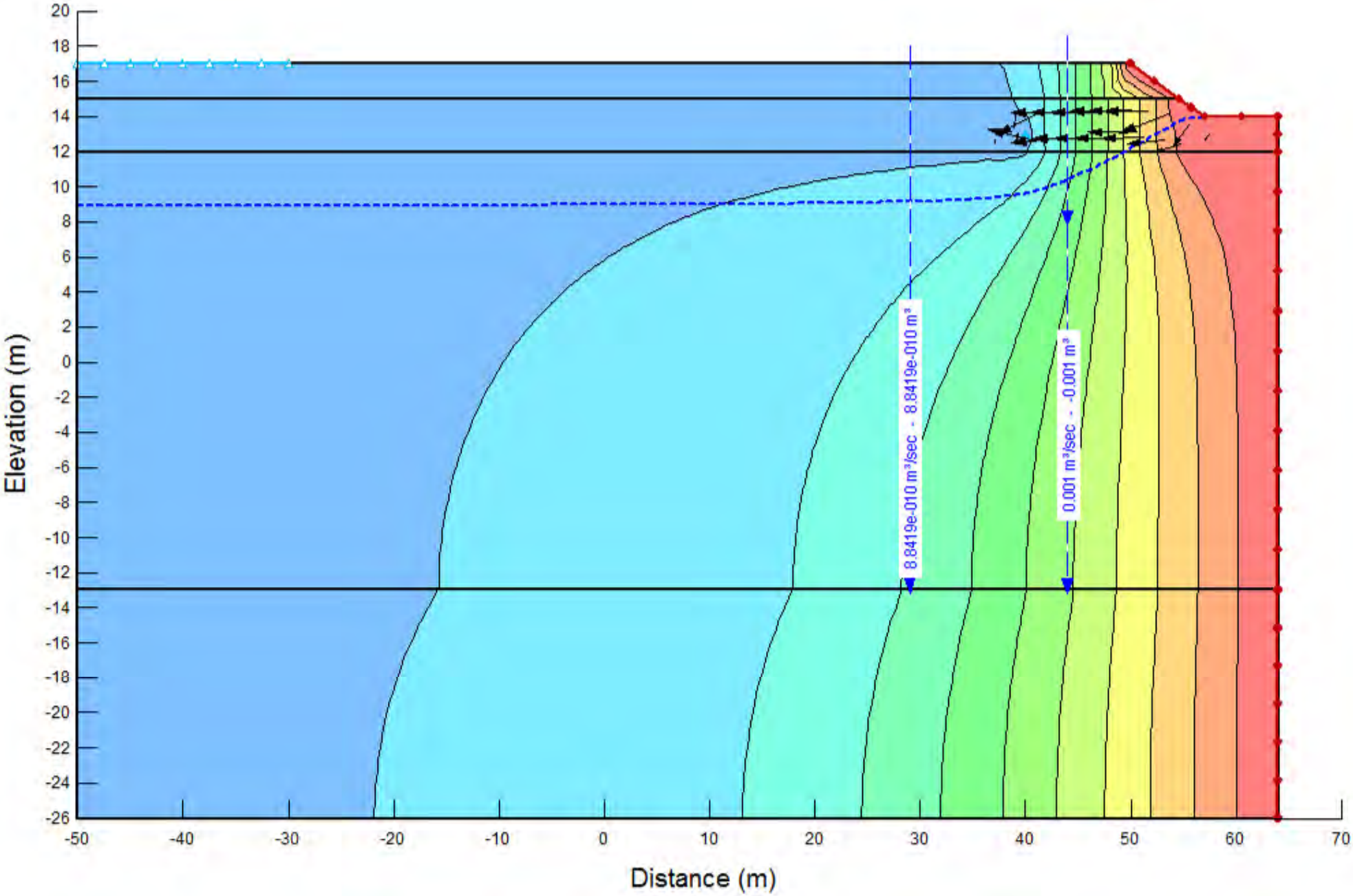


Name: FILL
Sat Kx: 5e-006 m/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °

Name: ALLUVIUM
Sat Kx: 0.001 m/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °

Name: CDT
Sat Kx: 1e-006 m/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °

Name: MDT
Sat Kx: 1e-009 m/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °


Elevation (m)
Distance (m)
8.8419e-010 m³/sec - 8.8419e-010 m³
0.001 m³/sec - -0.001 m³

Appendix D7: Data Records for Irrigation

From: stephen_yh_lai@afcd.gov.hk
Sent: Sunday, September 11, 2016 2:01 PM
To: Yung, Danny/CNH; Kwok, Pui Sheung Shirley/CNH
Subject: Fw: Agri-Park: Report on Preliminary Technical Study (Meeting and Site Insepction on Irrigations) - Brief Notes of Action [EXTERNAL]
Attachments: Furrow vs Sprinkler Irrigation.jpg; F41 irrigation water usage data 2016.09.07.xlsx; NTE012016 - Meeting with AFCD_Brief notes of action (2Sept2016).docx

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: NTE/01/2016 Agri-Park

Danny, I have missed out one major point in my email below.

The data below are generated from a sprinkler irrigation system while furrow irrigation is the most commonly practiced irrigation method in Kwu Tung South. Based on the available technical information, such as the Chinese reference I sent you last week (re-attached below), sprinkler irrigation uses a significantly less amount of water (31 to 48%) compared with furrow irrigation, depending on the type of crops to be grown.
(See attached file: Furrow vs Sprinkler Irrigation.jpg)

Therefore, for estimation purpose, I think we need to include a 50% increase on the data generated from the study below for the amount of water needed for furrow irrigation in Zone A and C.

For greenhouse production, I think it is reasonable to adopt a 30% less water demand compared with sprinkler irrigation for Zone B. .

Happy to discuss Monday morning.

Stephen

----- Forwarded by Stephen YH LAI/AFCD/HKSARG on 11/09/2016 13:41 -----
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| From: |
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|Stephen YH LAI/AFCD/HKSARG |
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|---------->
| To: |
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>----------|
|Danny.Yung@ch2m.com, Shirley.Kwok@ch2m.com |
>----------|
|---------->
| Cc: |
|---------->
>----------|
|Paul YT YUEN/AFCD/HKSARG@AFCD, Yat Fai TANG/AFCD/HKSARG@AFCD, KONG FAI CHAN/AFCD/HKSARG@AFCD, Elaine YL TANG/AFCD/HKSARG@AFCD, KATE SIU TING |
|KWONG/CEDD/HKSARG@CEDD, CS YEUNG/CEDD/HKSARG@CEDD |
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| Date: |
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|09/09/2016 15:07 |
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|---------->
| Subject: |
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>----------|
|Fw: Agri-Park: Report on Preliminary Technical Study (Meeting and Site Insepction on Irrigations) - Brief Notes of Action
|
>----------|

Dear Danny and Shirley,

Please find below an excel file summarizing the results of an irrigation study conducted in Tai Lung Experimental Station from June 2015 to August 2016. The agricultural field under study has a total area of 2 d.c. (= 0.135 ha.) and it was used for vegetable (dry field) cultivation all year round.
(See attached file: F41 irrigation water usage data 2016.09.07.xlsx)

For greenhouse crop production, the amount of water usage should be smaller than open field cultivation. For estimation purpose, I recommend that a 30% less irrigation water usage be adopted for Zone B i.e. the greenhouse production area.

Regards,

Stephen

----- Forwarded by Stephen YH LAI/AFCD/HKSARG on 06/09/2016 11:45 -----
|---------->
| From: |
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|KATE SIU TING KWONG/CEDD/HKSARG@CEDD |
>----------|
|---------->
| To: |
|---------->
>----------|
|Stephen YH LAI/AFCD/HKSARG@AFCD, Danny.Yung@ch2m.com, Paul YT YUEN/AFCD/HKSARG@AFCD, Yat Fai TANG/AFCD/HKSARG@AFCD, KONG FAI |
|CHAN/AFCD/HKSARG@AFCD, YL MA/AFCD/HKSARG@AFCD, annie_yn_fung@afcd.gov.hk, Shirley.Kwok@ch2m.com
|
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| Cc: |
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>----------|
|CS YEUNG/CEDD/HKSARG, Mable.Leung@ch2m.com, Elaine YL TANG/AFCD/HKSARG@AFCD
|
>----------|
|---------->

Date:
02/09/2016 16:53

Subject:
Re: Agri-Park: Report on Preliminary Technical Study (Meeting and Site Insepction on Irrigations) - Brief Notes of Action

Dear all,

Thanks a lot for joining the meeting yesterday. I enclosed some major points discussed during the meeting for your follow-up please.

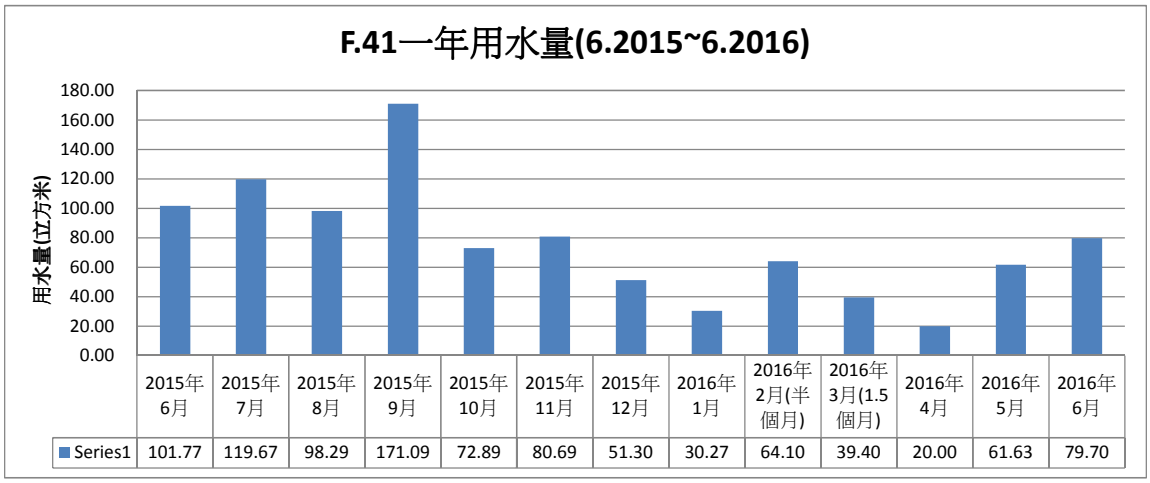
Would Halcrow please review the proposed irrigation system and let us have the revised proposal by next week. Thank you.

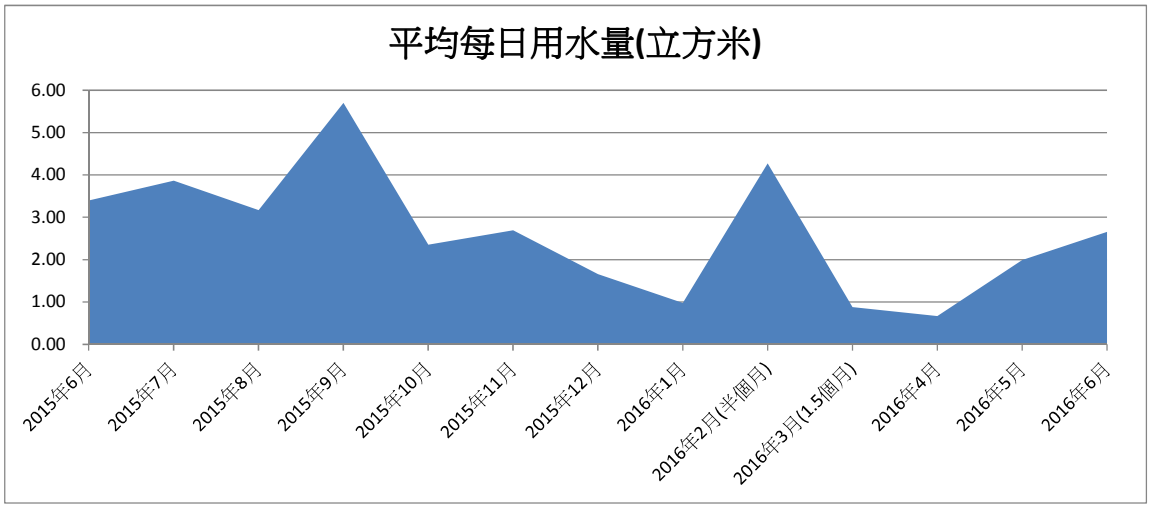
(See attached file: NTE012016 - Meeting with AFCD_Brief notes of action (2Sept2016).docx)

Regards,
Kate KWONG
E22
NTE DevO, CEDD
Tel.: 2116 3431

Irrigation Water Usage Data - Tai Lung Experimental Station (provided by AFCD via email dated 11 Sept 2016)

月份	用水量m^3	平均每日用水量m^3
2015年6月	101.77	3.39
2015年7月	119.67	3.86
2015年8月	98.29	3.17
2015年9月	171.09	5.70
2015年10月	72.89	2.35
2015年11月	80.69	2.69
2015年12月	51.30	1.65
2016年1月	30.27	0.98
2016年2月(半個月)	64.10	4.27
2016年3月(1.5個月)	39.40	0.88
2016年4月	20.00	0.67
2016年5月	61.63	1.99
2016年6月	79.70	2.66
2016年7月	235.15	3.79
2016年8月		
2016年9月6日(截止)	1.42	0.28
2016年10月		
2016年11月		
2016年12月		





From: stephen_yh_lai@afcd.gov.hk
Sent: Monday, September 12, 2016 5:53 PM
To: Yung, Danny/CNH; Kwok, Pui Sheung Shirley/CNH
Subject: Fw: Irrigation [EXTERNAL]

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: NTE/01/2016 Agri-Park

see emails below.

We may need to provide elevated irrigation tanks to provide the necessary water pressure to cater for the need of Zone B.

For Zone A and B, if some farmers opt to set up sprinkler systems, some form of high pressure irrigation water supply may be needed.

I think we may just put this as a potential study area in the upcoming IDC study and there is no need to put too much emphasis at this stage.

Happy to discuss.

Stephen

----- Forwarded by Stephen YH LAI/AFCD/HKSARG on 12/09/2016 17:47 -----

From: Wendy WC KO/AFCD/HKSARG
To: Stephen YH LAI/AFCD/HKSARG@AFCD
Cc: Raymond WK CHEUNG/AFCD/HKSARG@AFCD, YM CHEN/AFCD/HKSARG@AFCD, KONG FAI CHAN/AFCD/HKSARG@AFCD
Date: 12/09/2016 17:26
Subject: Fw: Irrigation

Dear Stephen,

As we are essentially users in TLES, not much technical advice can be offered. Nevertheless, you may wish to note the following comments made by Yi-min and Raymond.

Wendy Ko
SAO(CD)

----- Forwarded by Wendy WC KO/AFCD/HKSARG on 12/09/2016 17:21 -----

From: Raymond WK CHEUNG/AFCD/HKSARG
To: Wendy WC KO/AFCD/HKSARG@AFCD
Cc: YM CHEN/AFCD/HKSARG@AFCD
Date: 12/09/2016 17:14
Subject: Re: Fw: Irrigation

Dear Wendy,

As there are many irrigation method, it is difficult to suggest a particular setup to fit all, since even

sprinkler may not be suitable for all farmers and all crops (e.g. strawberry should use drip). But one particular point should be mentioned is that, gravity fed water pressure should be provided in pipes instead of asking farmers to buy irrigation pumps to take water from channels . May be an elevated water tank (just like the domestic one on top of the building) should be installed in every zones so as to provide appropriate water pressure.

A separated issue I would like to bring out is that, the irrigation system should be compatible to farm mechanization in the future. If there are many underground piping all around the land, it is very difficult to use machines to do the plowing and tilling in the future.

For your consideration, please.

Regards,

Raymond Cheung
Agricultural Officer (Plant Protection)
Tai Lung Experimental Station
Tel: 2679 4253 Fax: 2679 5443

----- Forwarded by Wendy WC KO/AFCD/HKSARG on 12/09/2016 17:21 -----

From:	YM CHEN/AFCD/HKSARG
To:	Wendy WC KO/AFCD/HKSARG@AFCD
Cc:	Raymond WK CHEUNG/AFCD/HKSARG@AFCD
Date:	12/09/2016 16:50
Subject:	Re: Irrigation

Dear Wendy

The pressure should come from pump station. The irrigation engineer should be the expert. We are only users.

Chen Yimin

From:	Wendy WC KO/AFCD/HKSARG
To:	YM CHEN/AFCD/HKSARG@AFCD
Cc:	Raymond WK CHEUNG/AFCD/HKSARG@AFCD
Date:	12/09/2016 16:46
Subject:	Re: Irrigation

Dear Yi-min,

Where the pressure comes from to force the water out the drip and keep water moving in the pipes? Stephen is most concern about the pressure to keep water moving.

Wendy Ko
SAO(CD)

From: YM CHEN/AFCD/HKSARG
To: Wendy WC KO/AFCD/HKSARG@AFCD
Cc: Raymond WK CHEUNG/AFCD/HKSARG@AFCD
Date: 12/09/2016 16:36
Subject: Re: Fw: Irrigation

Dear Wendy,

For greenhouses, pipe system (like tap water system) is usually adopted to channel irrigation water into a greenhouse. With water output from the pipe, drip irrigation system may be installed if needed. Irrigation water should be free of chlorine.

Chen Yimin

From: Wendy WC KO/AFCD/HKSARG
To: Raymond WK CHEUNG/AFCD/HKSARG@AFCD, YM CHEN/AFCD/HKSARG@AFCD
Date: 12/09/2016 16:21
Subject: Fw: Irrigation

Dear all,

Re. the enquiry below, base on the experience of TLES and practice in the farming community, Raymond please advise on open field and Yi-min please advise on greenhouse situation.

Wendy Ko
SAO(CD)

----- Forwarded by Wendy WC KO/AFCD/HKSARG on 12/09/2016 16:10 -----
From: Stephen YH LAI/AFCD/HKSARG
To: Wendy WC KO/AFCD/HKSARG@AFCD
Cc: KONG FAI CHAN/AFCD/HKSARG@AFCD
Date: 12/09/2016 16:01
Subject: Irrigation

Wendy, could you please advise what type of infrastructure would be required to provide a sprinkler irrigation system for open-field cultivation? Similarly, what is needed to channel irrigation water into greenhouses? or is normal irrigation water suitable for use in greenhouses? or may be tap (potable) water is the more desirable option for greenhouses, due to whatever technical reasons?

The background is that in certain areas of the Agri-Park (e.g. Zone B), we need to plan for infrastructure to support different mode of farming operations. In Zone A and C, most farmers would probably adopt furrow irrigation but some farmers may opt to install sprinklers in their fields. It is anticipated that farmers will be responsible for the investment on the actual sprinklers and pipelines but certain basic infrastructure, such as the provision of a high power water source for connection to the pipelines may be needed. Therefore, I would like to seek your advice on the subject matters.

From: stephen_yh_lai@afcd.gov.hk
Sent: Monday, September 19, 2016 1:25 PM
To: Yung, Danny/CNH; Kwok, Pui Sheung Shirley/CNH
Subject: Fw: 大龍灌溉田面積 [EXTERNAL]
Attachments: 大龍灌溉田面積 (19.9.2016).docx

Dear Danny and Shirely,

The area of farmland to be irrigated by the water storage tank is around 39,613m^2. See attached map below.

BTW, I have checked my diary again, it might be better if we go to Tai Lung Farm on Friday morning instead. Please confirm if this is OK.

Stephen

----- Forwarded by YN FUNG/AFCD/HKSARG on 19/09/2016 09:17 -----

From: Luk Ching YIP/AFCD/HKSARG
To: YN FUNG/AFCD/HKSARG@AFCD
Cc: Katherine KY LO/AFCD/HKSARG@AFCD
Date: 19/09/2016 09:15
Subject: 大龍灌溉田面積 2016.09.19

Dear Annie,

Regards,
Ching Yip
Field Officer II
Plant Protection Section
Tai Lung Experimental Station
Tel:2679 4354 , Fax: 2679 5443

From: stephen_yh_lai@afcd.gov.hk
Sent: Monday, September 19, 2016 1:25 PM
To: Yung, Danny/CNH; Kwok, Pui Sheung Shirley/CNH
Subject: Fw: 大龍灌溉田面積 [EXTERNAL]
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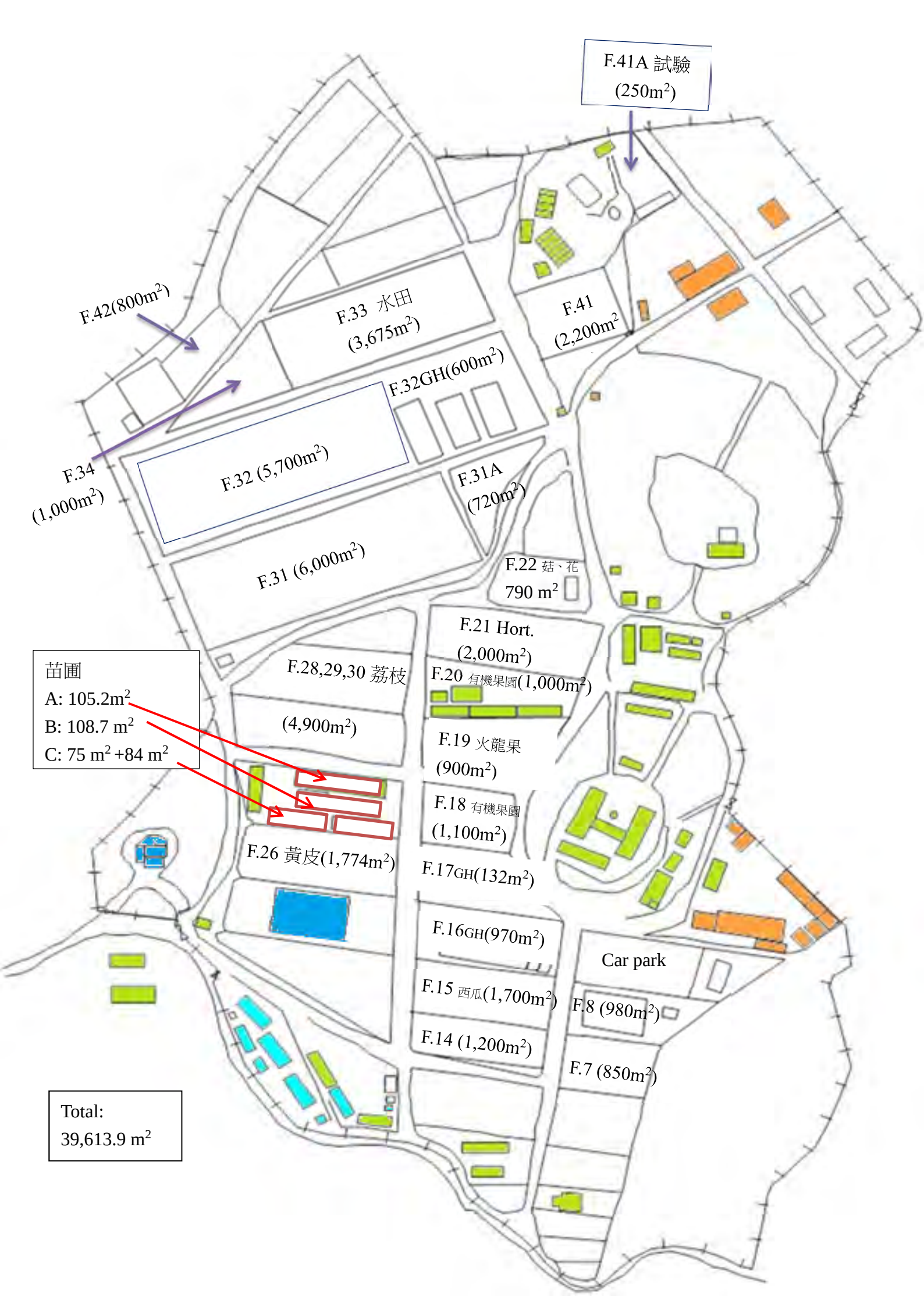
Cc: Katherine KY LO/AFCD/HKSARG@AFCD
Date: 19/09/2016 09:15
Subject: 大龍灌溉田面積 2016.09.19

Dear Annie,

Regards,
Ching Yip
Field Officer II
Plant Protection Section
Tai Lung Experimental Station
Tel:2679 4354 , Fax: 2679 5443


F.41A 試驗
(250m²)
F.42(800m²)
F.33 水田
(3,675m²)
F.41
(2,200m²
F.32GH(600m²)
F.34
(1,000m²)
F.32 (5,700m²)
F.31A
(720m²)
F.31 (6,000m²)
F.22 菇、花
790 m²
F.21 Hort.
(2,000m²)
F.20 有機果園(1,000m²)
苗圃
A: 105.2m²
B: 108.7 m²
C: 75 m² +84 m²
F.28,29,30 荔枝
(4,900m²)
F.19 火龍果
(900m²)
F.18 有機果園
(1,100m²)
F.26 黃皮(1,774m²)
F.17GH(132m²)
F.16GH(970m²)
Car park
F.15 西瓜(1,700m²)
F.8 (980m²)
F.14 (1,200m²)
F.7 (850m²)
Total:
39,613.9 m²

Appendix E

Record Plans of Existing Utilities

E1 CLP’s Record Plans

E2 DSD’s Record Plans

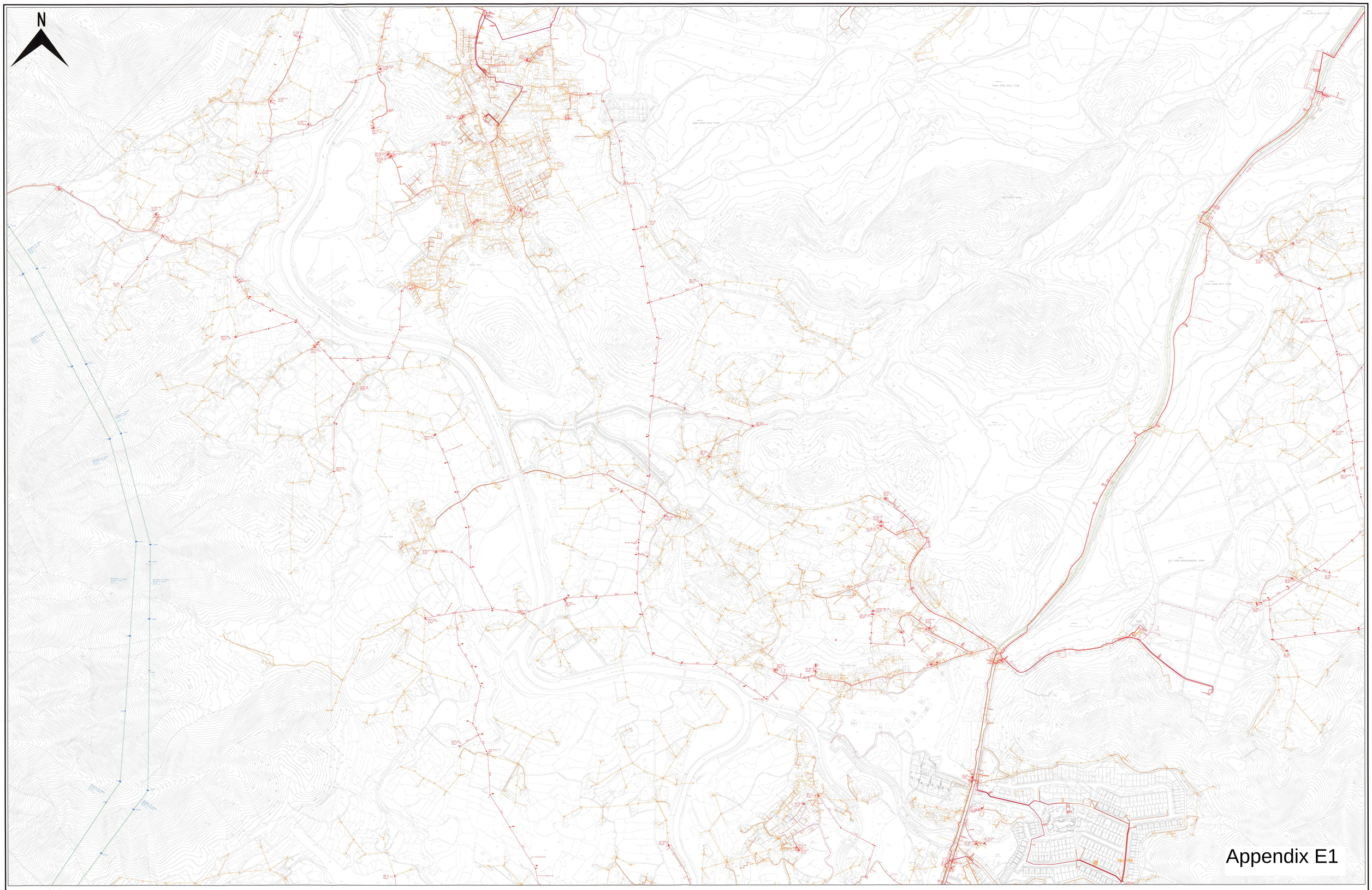
E3 HyD’s Lighting Plans

E4 PCCW’s Record Plans

E5 WSD’s Record Plans

E6 HKCG’s Letter

E7 HyD’s Record Plans for Exculsive Road Drains



Legend

- 400kV CABLE/SUBMARINE CABLE/OHL
- THROUGH DUCT 400kV CABLE
- AS BUILT 400kV CABLE
- 400kV OVERHEAD LINE TOWER
- 132kV CABLE/SUBMARINE CABLE/OHL
- THROUGH DUCT 132kV CABLE
- AS BUILT 132kV CABLE
- 132kV OVERHEAD LINE TOWER
- 132kV TERMINAL OHL POLE
- 132kV DOUBLE OHL POLE
- 132kV SINGLE OHL POLE
- ABANDONED TRANSMISSION CABLE
- 33kV CABLE
- THROUGH DUCT 33kV CABLE
- AS BUILT 33kV CABLE
- 33kV SUBMARINE CABLE
- 33kV OVERHEAD LINE
- 33kV STEEL POLE
- 33kV WOOD POLE
- 11kV CABLE
- THROUGH DUCT 11kV CABLE
- AS BUILT / ABANDONED 11kV CABLE
- SUBMARINE 11kV CABLE
- 11kV OVERHEAD LINE
- 11kV STEEL POLE
- 11kV WOOD POLE
- POLE MOUNT TRANSFORMER
- L.V. CABLE
- THROUGH DUCT L.V. CABLE
- AS BUILT / ABANDONED L.V. CABLE
- L.V. OVERHEAD LINE (1 PHASE)
- L.V. OVERHEAD LINE (3 PHASE)
- L.V. OVERHEAD LINE (ABC)
- L.V. OVERHEAD LINE (PVC)
- L.V. OVERHEAD LINE (Wall Mounted)
- L.V. STEEL POLE
- L.V. WOOD POLE
- L.V. PILLAR
- PILOT CABLE
- THROUGH DUCT PILOT CABLE
- AS BUILT / ABANDONED PILOT CABLE
- FIBRE OPTIC
- THROUGH DUCT FIBRE OPTIC
- AS BUILT FIBRE OPTIC
- TEMPERATURE SENSING CABLE (DTS)
- AERIAL EARTH WIRE (AEW)
- OVERHEAD LINE FIBRE OPTIC
- OVERHEAD LINE FIBRE OPTIC
- SHALLOW COVER INSTALLATION
- CLP 400/132/66kV SUBSTATION
- CLP 33kV SUBSTATION
- CLP 11kV SUBSTATION
- 400kV CABLE JOINT BAY
- 132kV CABLE JOINT BAY
- DUCT LINE

CLP 中電

ALL LOCATIONS, MEASUREMENTS, DIMENSIONS AND DISTANCES ARE FOR CLP POWER INTERNAL USE ONLY. THEY SHOULD NOT BE SCALED AND ASSUMED ACCURATE. CLP POWER ACCEPTS NO RESPONSIBILITY IN THE EVENT OF ANY INACCURACY. EXTREME CARE MUST BE EXERCISED WHEN WORKING IN CLOSE PROXIMITY TO OUR EQUIPMENT. PLEASE CONTACT OUR REGIONAL OFFICE AS SOON AS YOU ARE READY TO COMMENCE WORK.

CLP Facility Records Map

02SE19C	03SW11A
03SW16C	02SE14A

Scale: (1:2500)

Printed On: 09-03-2016

Reference no. : N-2016-0315-001

Appendix E1

Legend

400kV CABLE/SUBMARINE CABLE/OHL	ABANDONED TRANSMISSION CABLE	SUBMARINE 11kV CABLE	L.V. OVERHEAD LINE (PVC)	TEMPERATURE SENSING CABLE (DTS)
THROUGH DUCT 400kV CABLE	33kV CABLE	11kV OVERHEAD LINE	L.V. OVERHEAD LINE (Wall Mounted)	AERIAL EARTH WIRE (AEW)
AS BUILT 400kV CABLE	THROUGH DUCT 33kV CABLE	11kV STEEL POLE	L.V. STEEL POLE	OVERHEAD LINE FIBRE OPTIC
400kV OVERHEAD LINE TOWER	AS BUILT 33kV CABLE	11kV WOOD POLE	L.V. WOOD POLE	OVERHEAD LINE FIBRE OPTIC
132kV CABLE/SUBMARINE CABLE/OHL	33kV SUBMARINE CABLE	POLE MOUNT TRANSFORMER	L.V. PILLAR	SHALLOW COVER INSTALLATION
THROUGH DUCT 132kV CABLE	33kV OVERHEAD LINE	L.V. CABLE	PILOT CABLE	CLP 400/132/66kV SUBSTATION
AS BUILT 132kV CABLE	33kV STEEL POLE	THROUGH DUCT L.V. CABLE	THROUGH DUCT PILOT CABLE	CLP 33kV SUBSTATION
132kV OVERHEAD LINE TOWER	33kV WOOD POLE	AS BUILT / ABANDONED L.V. CABLE	AS BUILT / ABANDONED PILOT CABLE	CLP 11kV SUBSTATION
132kV TERMINAL OHL POLE	11kV CABLE	L.V. OVERHEAD LINE (1 PHASE)	FIBRE OPTIC	400kV CABLE JOINT BAY
132kV DOUBLE OHL POLE	THROUGH DUCT 11kV CABLE	L.V. OVERHEAD LINE (3 PHASE)	THROUGH DUCT FIBRE OPTIC	132kV CABLE JOINT BAY
132kV SINGLE OHL POLE	AS BUILT / ABANDONED 11kV CABLE	L.V. OVERHEAD LINE (ABC)	AS BUILT FIBRE OPTIC	DUCT LINE

CLP 中電

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CLP Facility Records Map

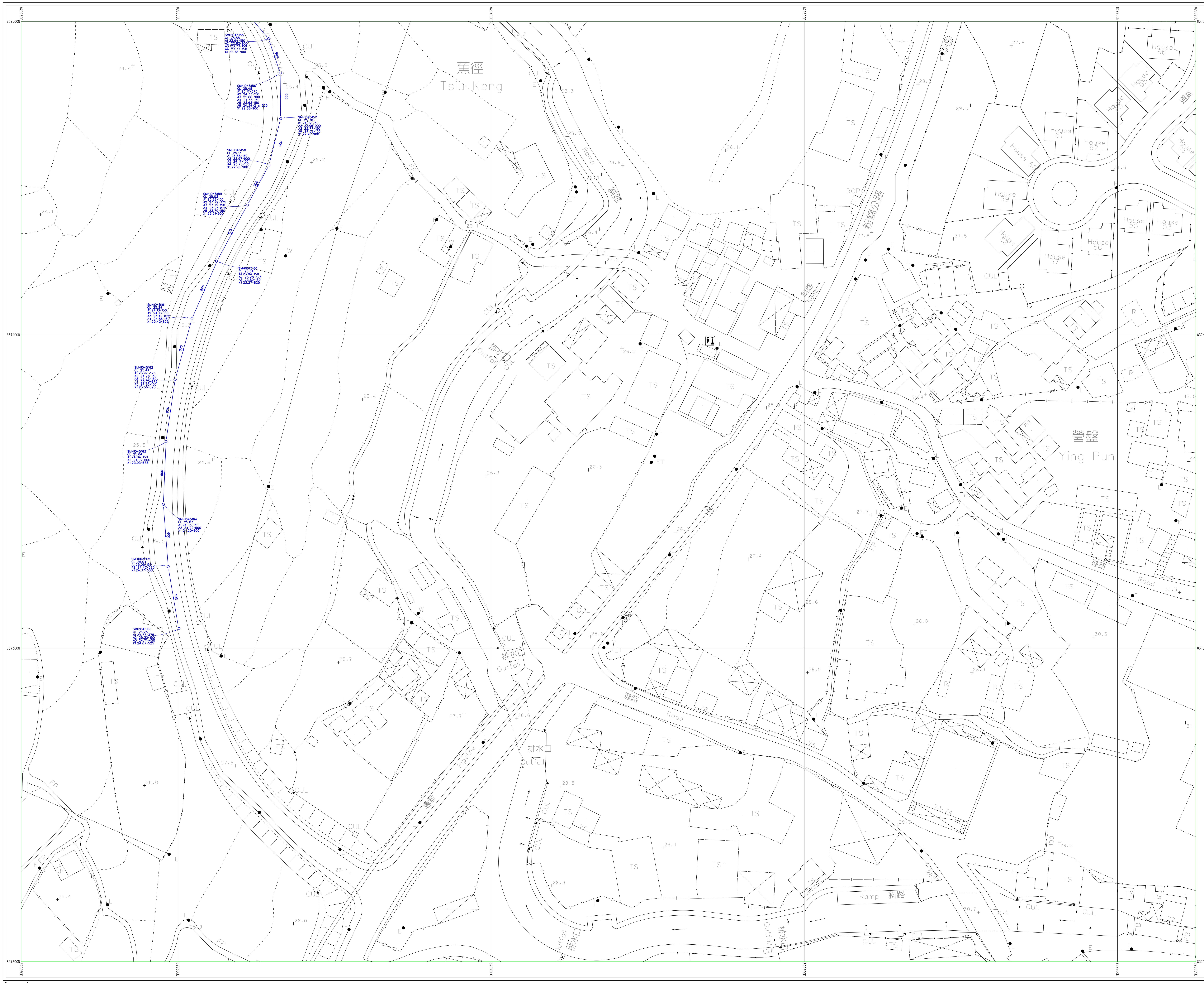
02SE24C 03SW16A
03SW21C 02SE19A

Scale: (1:2500)

Printed On: 09-03-2016

Reference no. : N-2016-0315-002

Appendix E2



Legend :

Storm Water Manhole		Existing Pipe (Storm/Sewer/Combined)		Tunnel Protection Zone		Slope Sign Board	
Storm Water Terminal Manhole		Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)		Gully Sump / Gully		Slope Number	
Storm Water Special Manhole		Proposed Pipe (Storm/Sewer)		Tapping Point (Storm/Sewer)		Slope Boundary	
Sewer Manhole		Works In Progress Pipe (Storm/Sewer)		Overflow (Sewer/Combined)		Existing Submarine Outfall with Diffuser	
Sewer Terminal Manhole		Not Yet Commissioned Pipe (Storm/Sewer)		Interface Valve Chamber		Proposed Submarine Outfall with Diffuser	
Sewer Special Manhole		Abandoned Pipe		Oil / Petrol Interceptor		Works In Progress Submarine Outfall with Diffuser	
Combined Manhole		Abandoned Pipe (Filled with Materials)		Valve		Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width)	
Catchpit		Existing U Channel / Stepped Channel (Storm)		Water Gauge		Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width)	
Desilting Opening		Proposed U Channel / Stepped Channel (Storm)		Spot Level (Storm/Sewer)			
Inspection Opening		Works In Progress U Channel / Stepped Channel (Storm)		Existing Y-Junction (Storm/Sewer/Combined)			
Dry Weather Flow Interceptor		Rising Main					
Sand Trap		Vaccum Sewer					
Inlet		Drainage Reserve					
Outlet							
Tunnel / Box Culvert (Storm/Sewer)							

(Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Notes :

1. All levels are given in metres principle datum.
2. All dimensions shown are in millimetres unless otherwise stated.
3. The information shown on the record drawings are subject to verification on site and no guarantee can be given that this is a complete record.
4. Abbreviations for Channels of width smaller or equal to 1200mm:
   900C = 900mm width Surface Channel
   900SC = 900mm width Stepped Channel
   900UC = 900mm width U Channel
   900DWFC = 900mm width Dry Weather Flow Channel
5. The Incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.
   eg. SMH7000123 — Manhole number; CL 4.68 — Cover Level or Ground Level; A1 1.14-225 — 225mm dia. Incoming Pipe Invert Level; A2 1.29-375 — 375mm dia. Incoming Pipe Invert Level; X1 1.14-525 — 525mm dia. Outgoing Pipe Invert Level
6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

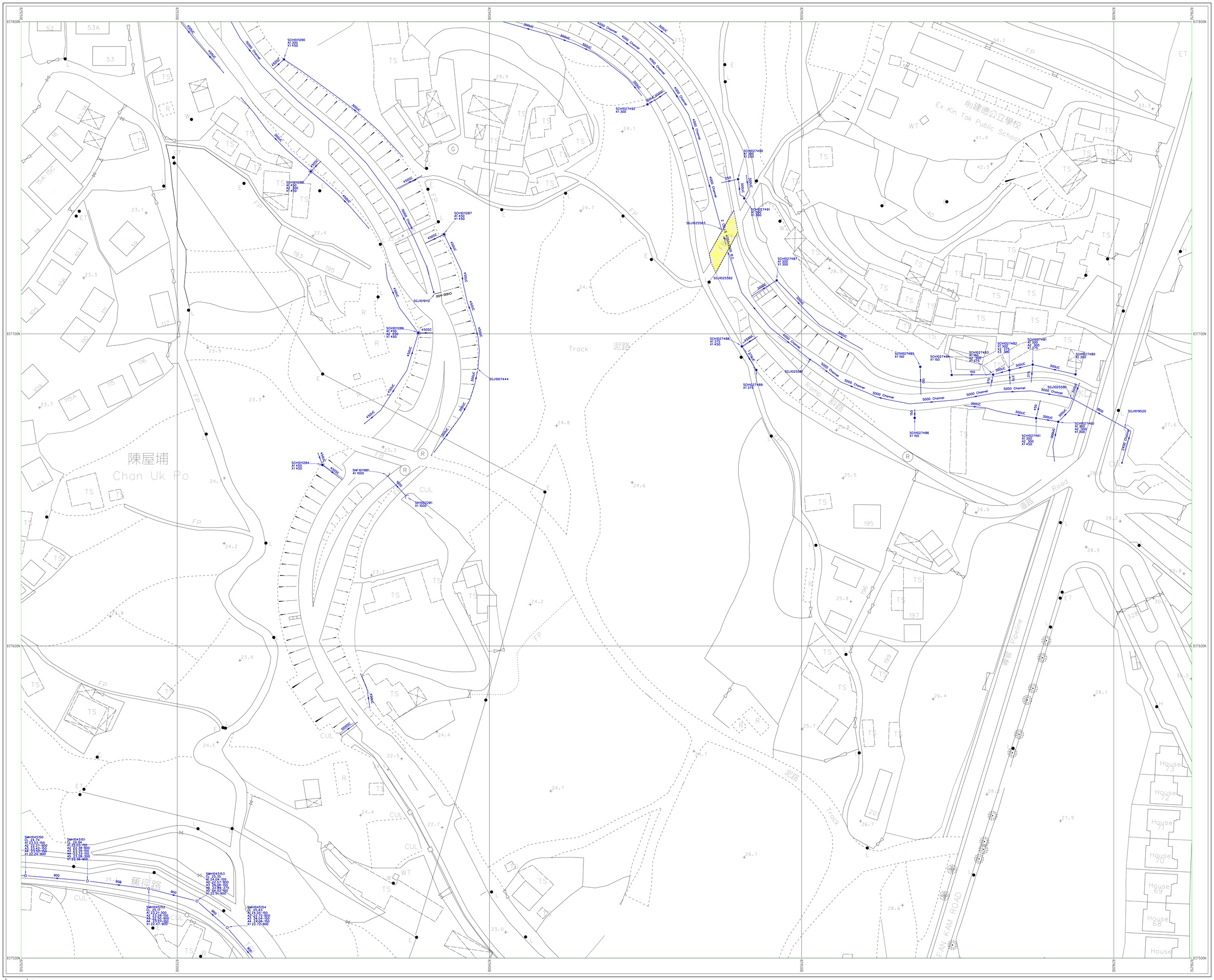
Drainage Record Sheet Number

2-SE-20D-3

Last Updating : 16-11-2015

Map data renewed on February 2015

Appendix E2



Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vaccum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
- Slope Sign Board
- Slope Number
- Slope Boundary
- Existing Submarine Outfall with Diffuser
- Proposed Submarine Outfall with Diffuser
- Works In Progress Submarine Outfall with Diffuser
- Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)
- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)

2-SE-20D-3

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

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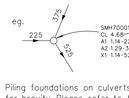

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Drainage Record Sheet Number

2-SE-20D-1

Last Updating : 16-11-2015

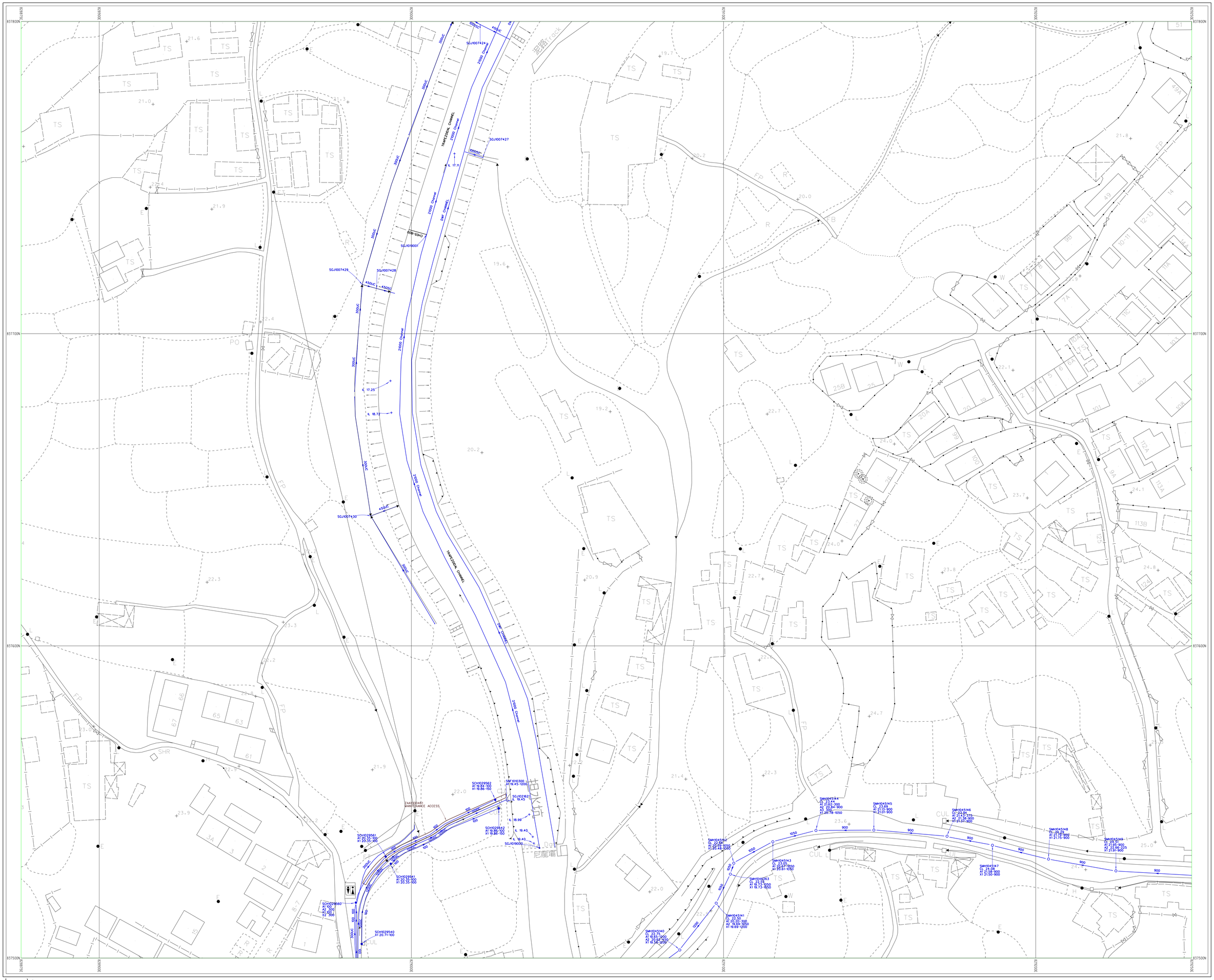
Map data renewed on February 2015

Appendix E2

2-SE-20A-4

2-SE-20C-1

2-SE-20D-1



Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- **Existing Pipe (Storm/Sewer/Combined)**
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vaccum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
- Slope Sign Board
- Slope Number
- Slope Boundary
- Existing Submarine Outfall with Diffuser
- Proposed Submarine Outfall with Diffuser
- Works In Progress Submarine Outfall with Diffuser
- Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width) (Please note that all proposed works within the HATS Sewage TunnelProtection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered StructuralEngineers and Registered GeotechnicalEngineers No. APP-82 issued by the Buildings Department)
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2-SE-20C-4

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Notes :

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   - 900UC - 900mm width U Channel
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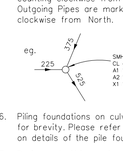
   eg.

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7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Drainage Record Sheet Number

2-SE-20C-2

Last Updating : 16-11-2015

Map data renewed on May 2015

Appendix E2

2-SE-20C-3

2-SE-20D-3

Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vacuum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
- Slope Sign Board
- Slope Number
- Slope Boundary
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- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)

2-SE-25A-2

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Notes :

1. All levels are given in metres principle datum.
2. All dimensions shown are in millimetres unless otherwise stated.
3. The information shown on the record drawings are subject to verification on site and no guarantee can be given that this is a complete record.
4. Abbreviations for Channels of width smaller or equal to 1200mm:
   900C - 900mm width Surface Channel
   900SC - 900mm width Stepped Channel
   900UC - 900mm width U Channel
   900DWFC - 900mm width Dry Weather Flow Channel
5. The Incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.

6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Drainage Record Sheet Number

2-SE-20C-4

Last Updating : 16-11-2015

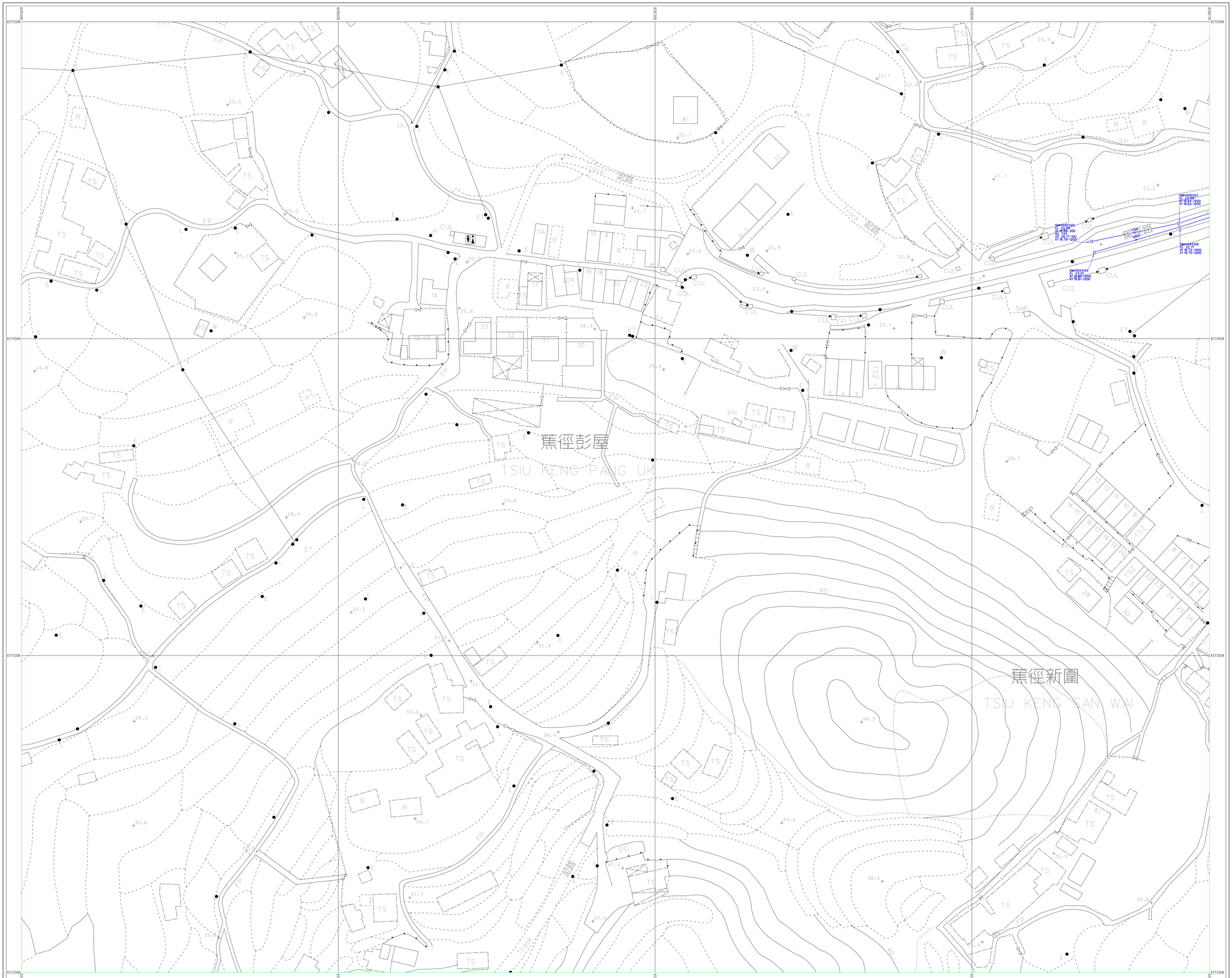
Map data renewed on May 2015

Appendix E2

2-SE-20C-1

2-SE-19D-4

2-SE-20C-4



Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vaccum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
- Slope Sign Board
- Slope Number
- Slope Boundary
- Existing Submarine Outfall with Diffuser
- Proposed Submarine Outfall with Diffuser
- Works In Progress Submarine Outfall with Diffuser
- Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.29/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)
- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.29/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)

2-SE-25A-1

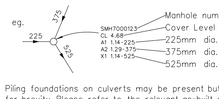
SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Notes :

1. All levels are given in metres principle datum.
2. All dimensions shown are in millimetres unless otherwise stated.
3. The information shown on the record drawings are subject to verification on site and no guarantee can be given that this is a complete record.
4. Abbreviations for Channels of width smaller or equal to 1200mm:
   900C - 900mm width Surface Channel
   900SC - 900mm width Stepped Channel
   900UC - 900mm width U Channel
   900DWFC - 900mm width Dry Weather Flow Channel
5. The Incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.



6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Drainage Record Sheet Number

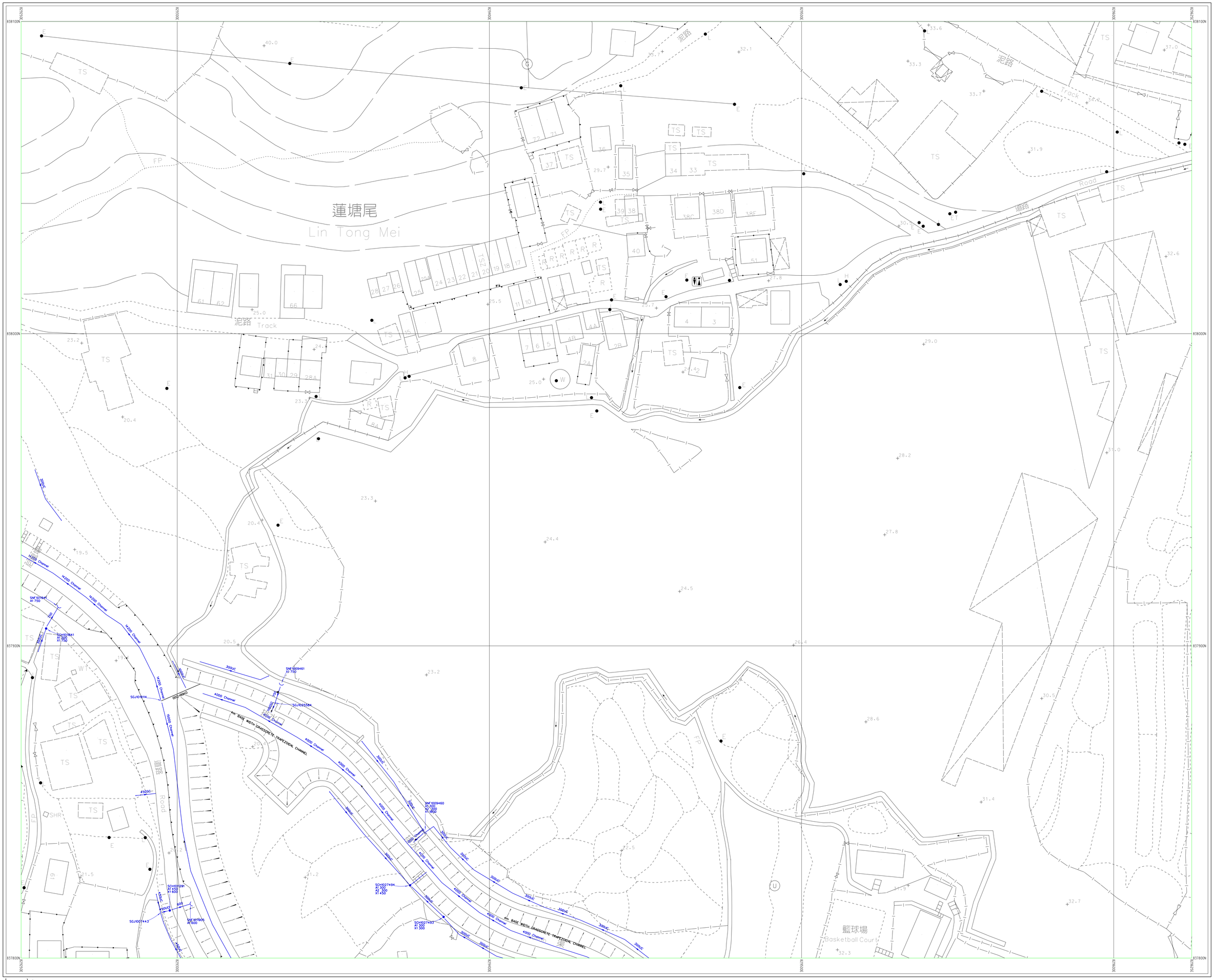
2-SE-20C-3

Last Updating : 16-11-2015

Map data renewed on May 2015

Appendix E2

2-SE-20B-1



Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vaccum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
- Slope Sign Board
- Slope Number
- Slope Boundary
- Existing Submarine Outfall with Diffuser
- Proposed Submarine Outfall with Diffuser
- Works In Progress Submarine Outfall with Diffuser
- Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)
- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)

2-SE-20D-1

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Notes :

1. All levels are given in metres principle datum.
2. All dimensions shown are in millimetres unless otherwise stated.
3. The information shown on the record drawings are subject to verification on site and no guarantee can be given that this is a complete record.
4. Abbreviations for Channels of width smaller or equal to 1200mm:
   900C - 900mm width Surface Channel
   900SC - 900mm width Stepped Channel
   900UC - 900mm width U Channel
   900DWFC - 900mm width Dry Weather Flow Channel
5. The Incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.

6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Drainage Record Sheet Number

2-SE-20B-3

Last Updating : 16-11-2015

Map data renewed on February 2015

Appendix E2

2-SE-20A-3

2-SE-20B-3

Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vaccum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
- Slope Sign Board
- Slope Number
- Slope Boundary
- Existing Submarine Outfall with Diffuser
- Proposed Submarine Outfall with Diffuser
- Works In Progress Submarine Outfall with Diffuser
- Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)
- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)

2-SE-20C-2

SCALE 1 : 500

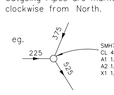
Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Notes :

1. All levels are given in metres principle datum.
2. All dimensions shown are in millimetres unless otherwise stated.
3. The information shown on the record drawings are subject to verification on site and no guarantee can be given that this is a complete record.
4. Abbreviations for Channels of width smaller or equal to 1200mm:
   - 900C - 900mm width Surface Channel
   - 900SC - 900mm width Stepped Channel
   - 900UC - 900mm width U Channel
   - 900DWFC - 900mm width Dry Weather Flow Channel
5. The Incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.

   eg.

6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Drainage Record Sheet Number

2-SE-20A-4

Last Updating : 16-11-2015

Map data renewed on May 2014

Appendix E2

2-SE-19B-4

2-SE-20A-4

2-SE-20C-1

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vaccum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
- Slope Sign Board
- Slope Number
- Slope Boundary
- Existing Submarine Outfall with Diffuser
- Proposed Submarine Outfall with Diffuser
- Works In Progress Submarine Outfall with Diffuser
- Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width) (Please note that all proposed works within the HATS Sewage TunnelProtection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)
- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage TunnelProtection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-62 issued by the Buildings Department)

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   900UC - 900mm width U Channel
   900DWFC - 900mm width Dry Weather Flow Channel
5. The Incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.

   eg. 225, 275, 225, 225
   SMH7000123 — Manhole number
   Cl. 4.68 — Cover Level or Ground Level
   A1 1.14-225 — 225mm dia. Incoming Pipe Invert Level
   A2 1.29-375 — 375mm dia. Incoming Pipe Invert Level
   X1 1.14-525 — 525mm dia. Outgoing Pipe Invert Level
6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Drainage Record Sheet Number

2-SE-20A-3

Last Updating : 16-11-2015

Map data renewed on May 2014

Appendix E2

2-SE-15C-3

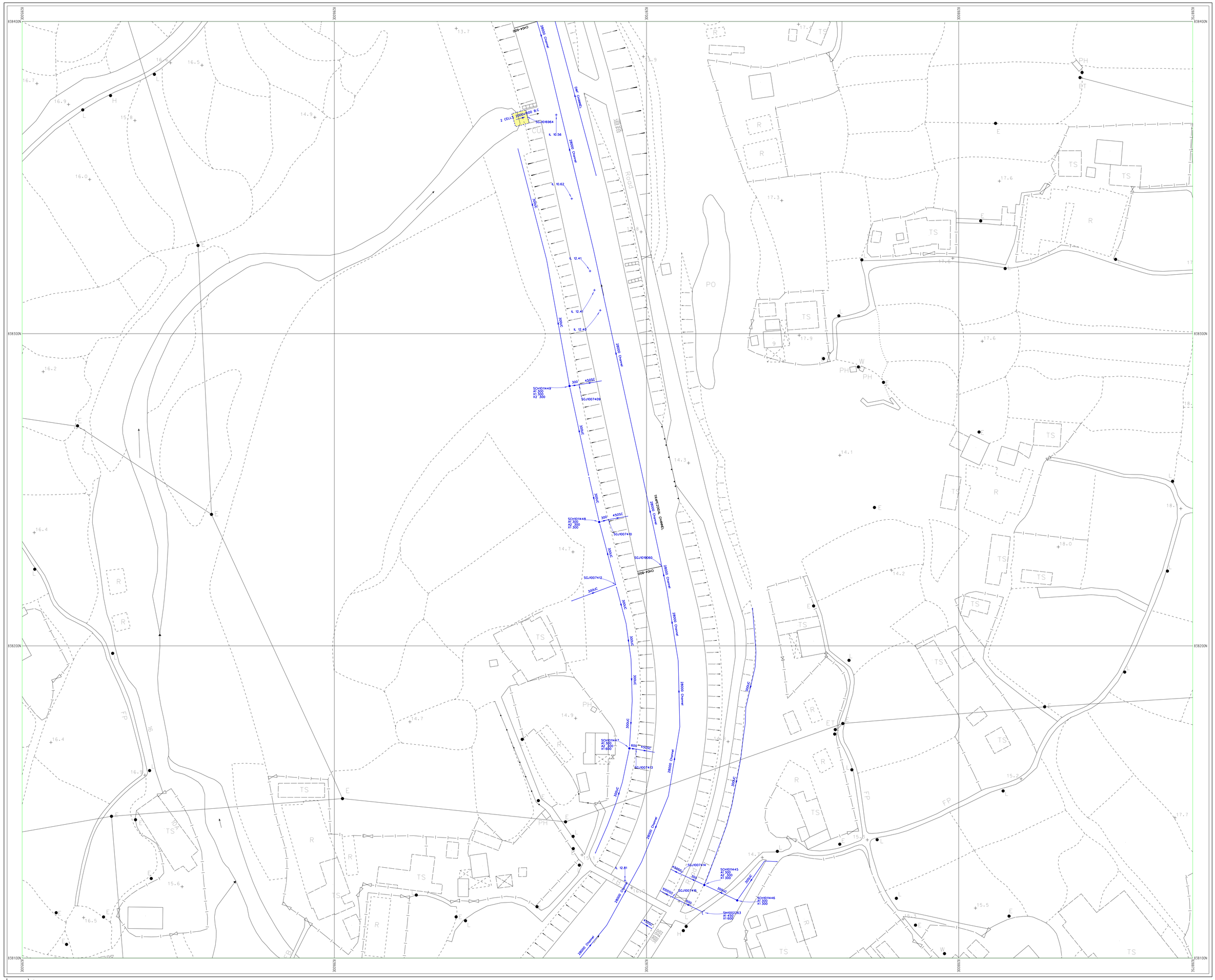
2-SE-19B-2

2-SE-20A-2

2-SE-20A-3

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres



Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
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- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
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- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vaccum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
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- Overflow (Sewer/Combined)
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- Valve
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- Slope Number
- Slope Boundary
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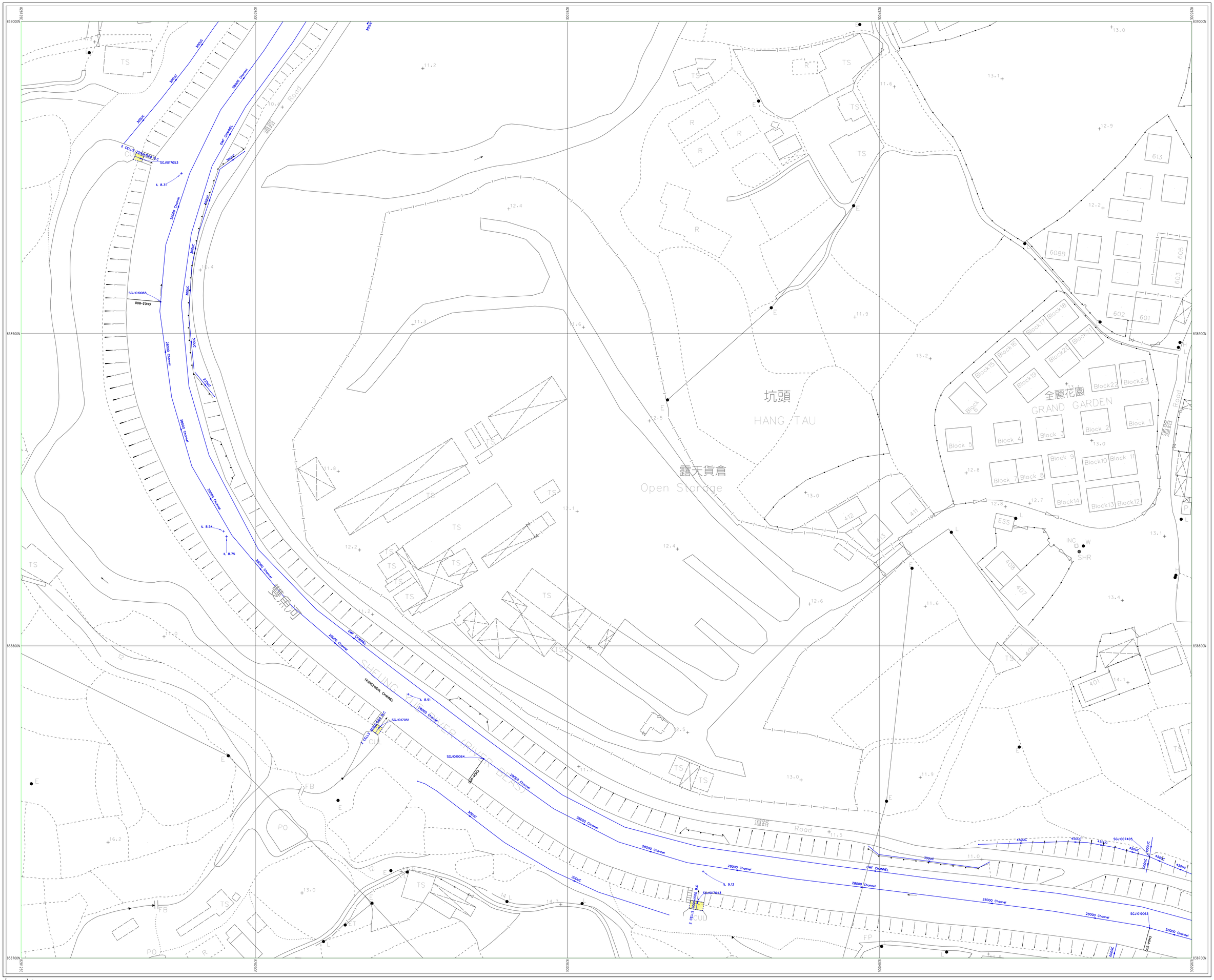
Drainage Record Sheet Number

2-SE-20A-1

Last Updating : 16-11-2015

Map data renewed on May 2014

Appendix E2



Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
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- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vaccum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
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- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
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- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)

2-SE-14D-4

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Notes :

1. All levels are given in metres principle datum.
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   900UC - 900mm width U Channel
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6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Drainage Record Sheet Number

2-SE-14D-2

Last Updating : 16-11-2015

Map data renewed on August 2014

Appendix E2

2-SE-14D-3

2-SE-15C-3

Legend :

- Storm Water Manhole
- Storm Water Terminal Manhole
- Storm Water Special Manhole
- Sewer Manhole
- Sewer Terminal Manhole
- Sewer Special Manhole
- Combined Manhole
- Catchpit
- Desilting Opening
- Inspection Opening
- Dry Weather Flow Interceptor
- Sand Trap
- Inlet
- Outlet
- Tunnel / Box Culvert (Storm/Sewer)
- Existing Pipe (Storm/Sewer/Combined)
- Existing Pipe (Storm/Sewer/Combined) (Planning / Identifying to be Abandoned)
- Proposed Pipe (Storm/Sewer)
- Works In Progress Pipe (Storm/Sewer)
- Not Yet Commissioned Pipe (Storm/Sewer)
- Abandoned Pipe
- Abandoned Pipe (Filled with Materials)
- Existing U Channel / Stepped Channel (Storm)
- Proposed U Channel / Stepped Channel (Storm)
- Works In Progress U Channel / Stepped Channel (Storm)
- Rising Main
- Vacuum Sewer
- Drainage Reserve
- Tunnel Protection Zone
- Gully Sump / Gully
- Tapping Point (Storm/Sewer)
- Overflow (Sewer/Combined)
- Interface Valve Chamber
- Oil / Petrol Interceptor
- Valve
- Water Gauge
- Spot Level (Storm/Sewer)
- Existing Y-Junction (Storm/Sewer/Combined)
- Slope Sign Board
- Slope Number
- Slope Boundary
- Existing Submarine Outfall with Diffuser
- Proposed Submarine Outfall with Diffuser
- Works In Progress Submarine Outfall with Diffuser
- Harbour Area Treatment Scheme Sewage Tunnel Protection Area (100m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)
- Harbour Area Treatment Scheme Sewage Tunnel Outer Protection Area (200m width) (Please note that all proposed works within the HATS Sewage Tunnel Protection Area have to be complied with the requirements in the Environment, Transport and Works Bureau Technical Circular (Works) No.28/2003 or the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers No. APP-82 issued by the Buildings Department)

2-SE-19B-2

SCALE 1 : 500

Metres 10 0 20 40 60 80 100 Metres

Mainland North Division
Drainage Services Department

Notes :

1. All levels are given in metres principle datum.
2. All dimensions shown are in millimetres unless otherwise stated.
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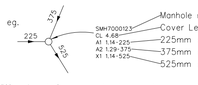
   900C - 900mm width Surface Channel
   900SC - 900mm width Stepped Channel
   900UC - 900mm width U Channel
   900DWFC - 900mm width Dry Weather Flow Channel
5. The Incoming Pipes are marked A1, A2, A3, ... counting clockwise from the first Outgoing Pipe X1. Outgoing Pipes are marked X1, X2, X3 ... counting clockwise from North.



6. Piling foundations on culverts may be present but not shown for brevity. Please refer to the relevant as-built drawings on details of the pile foundation.
7. Drainage facilities maintained by other parties, if shown, are indicative only. It is no guarantee that these information are exact.

Drainage Record Sheet Number

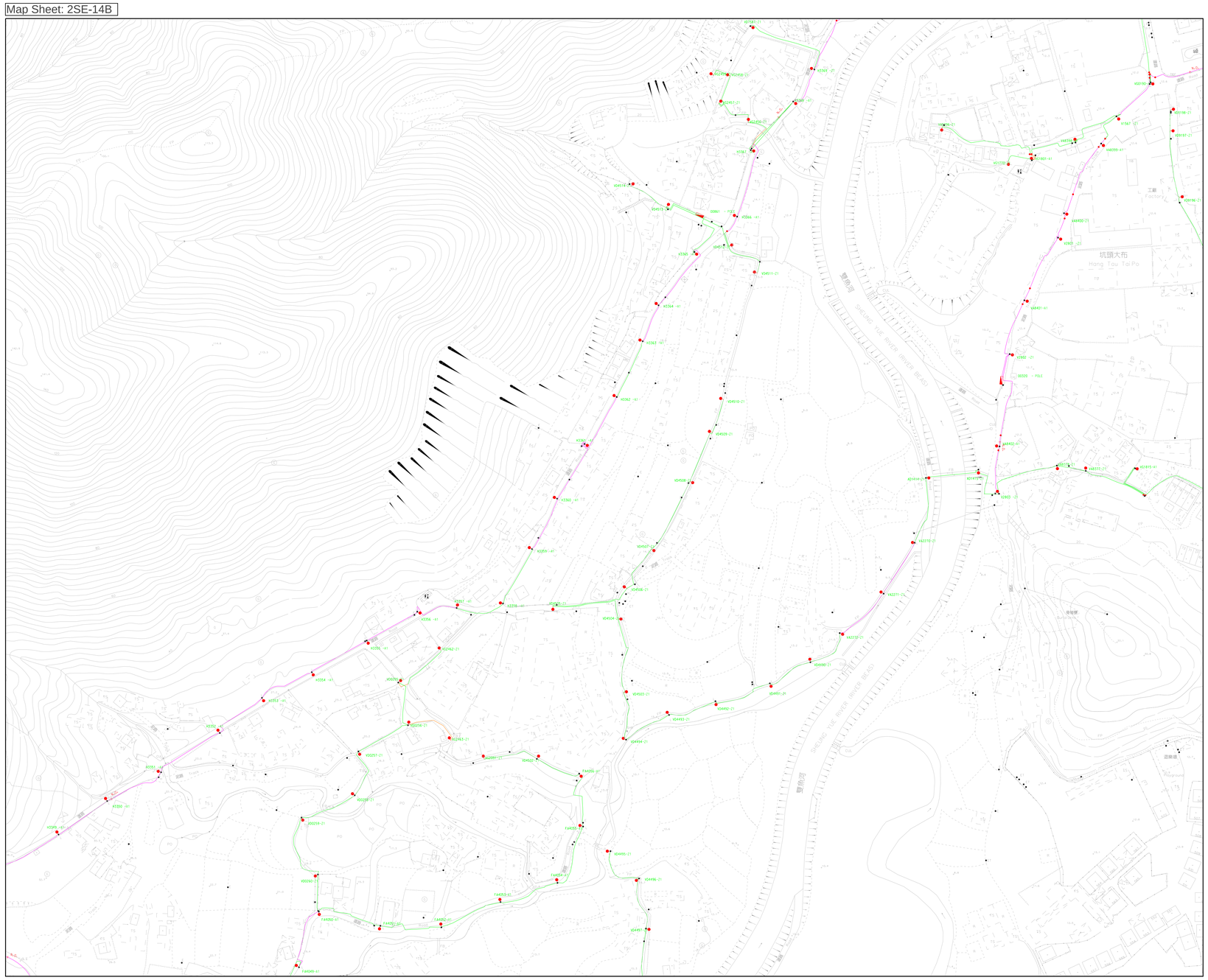
2-SE-14D-4

Last Updating : 16-11-2015

Map data renewed on August 2014

Appendix E3

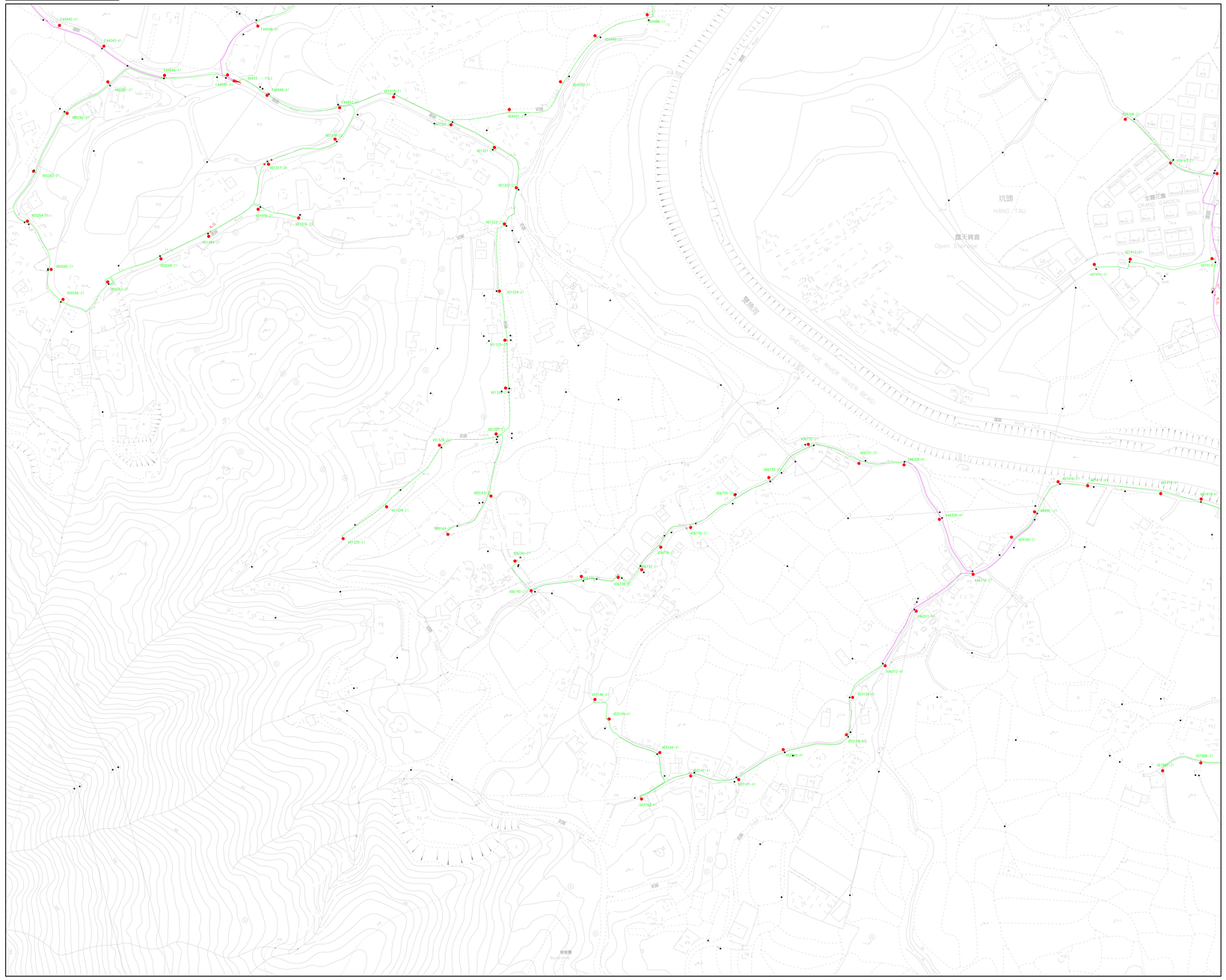
Map Sheet: 2SE-14B



Oct 2015

Appendix E3

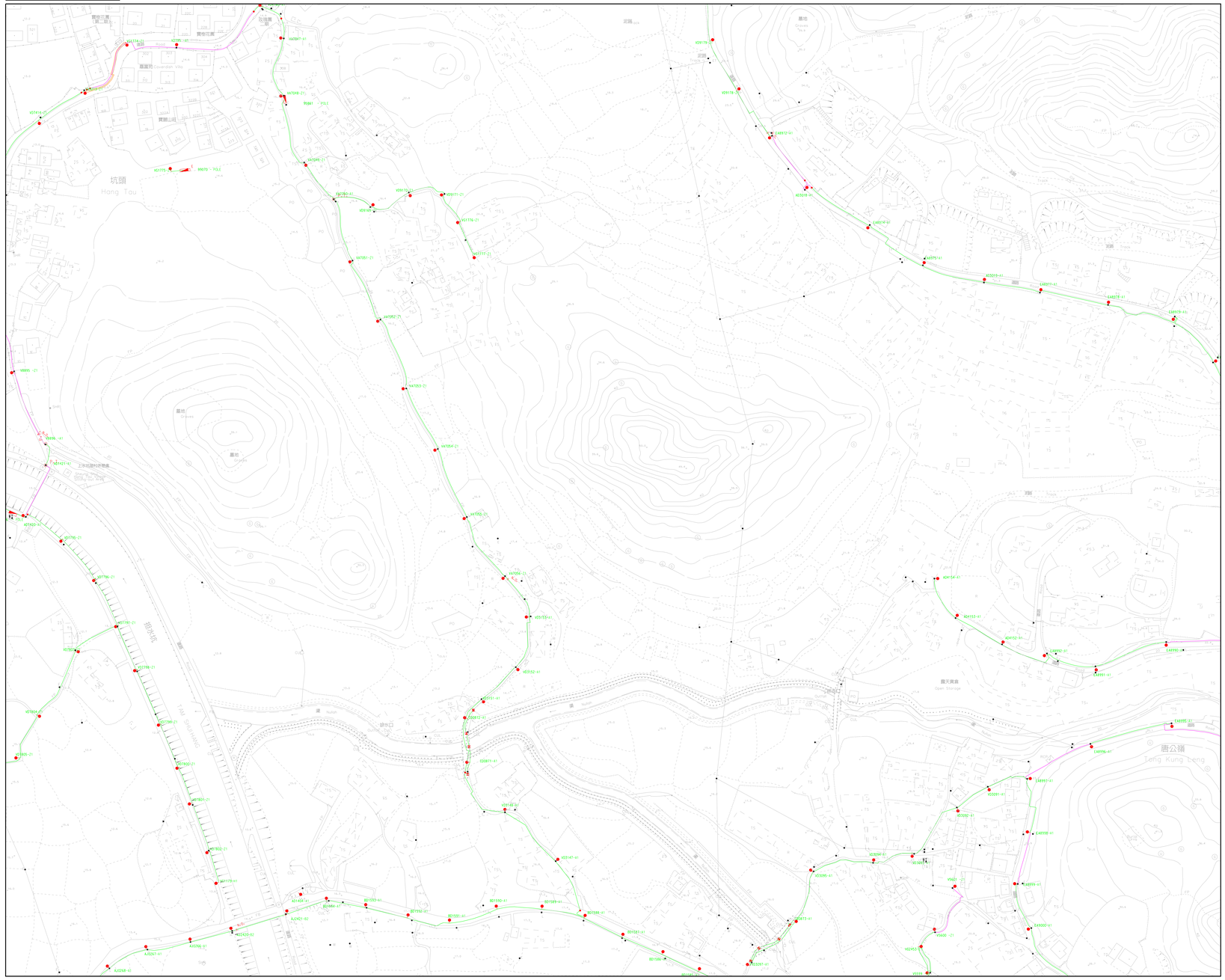
Map Sheet: 2SE-14D



Oct 2015

Appendix E3

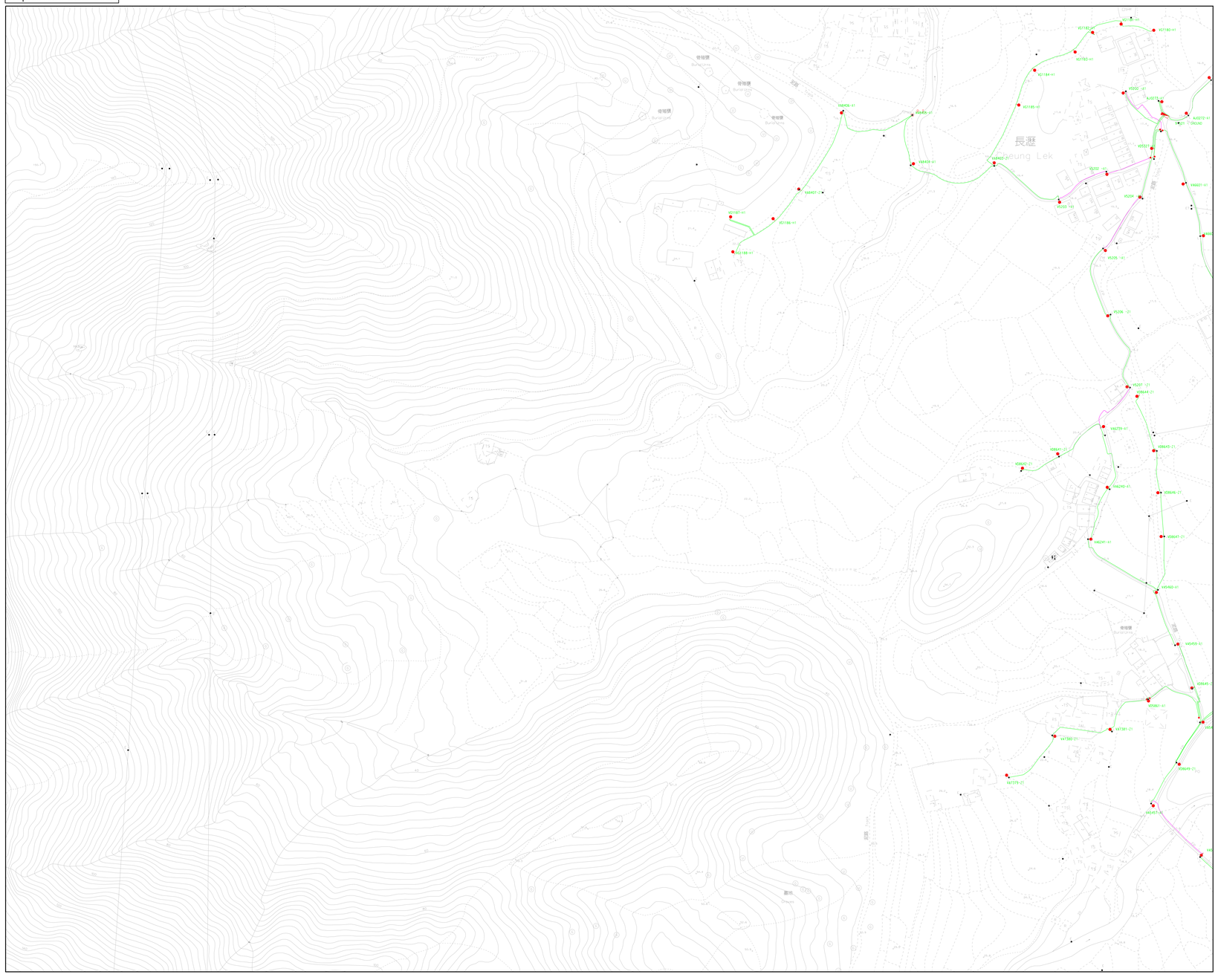
Map Sheet: 2SE-15C



Oct 2015

Appendix E3

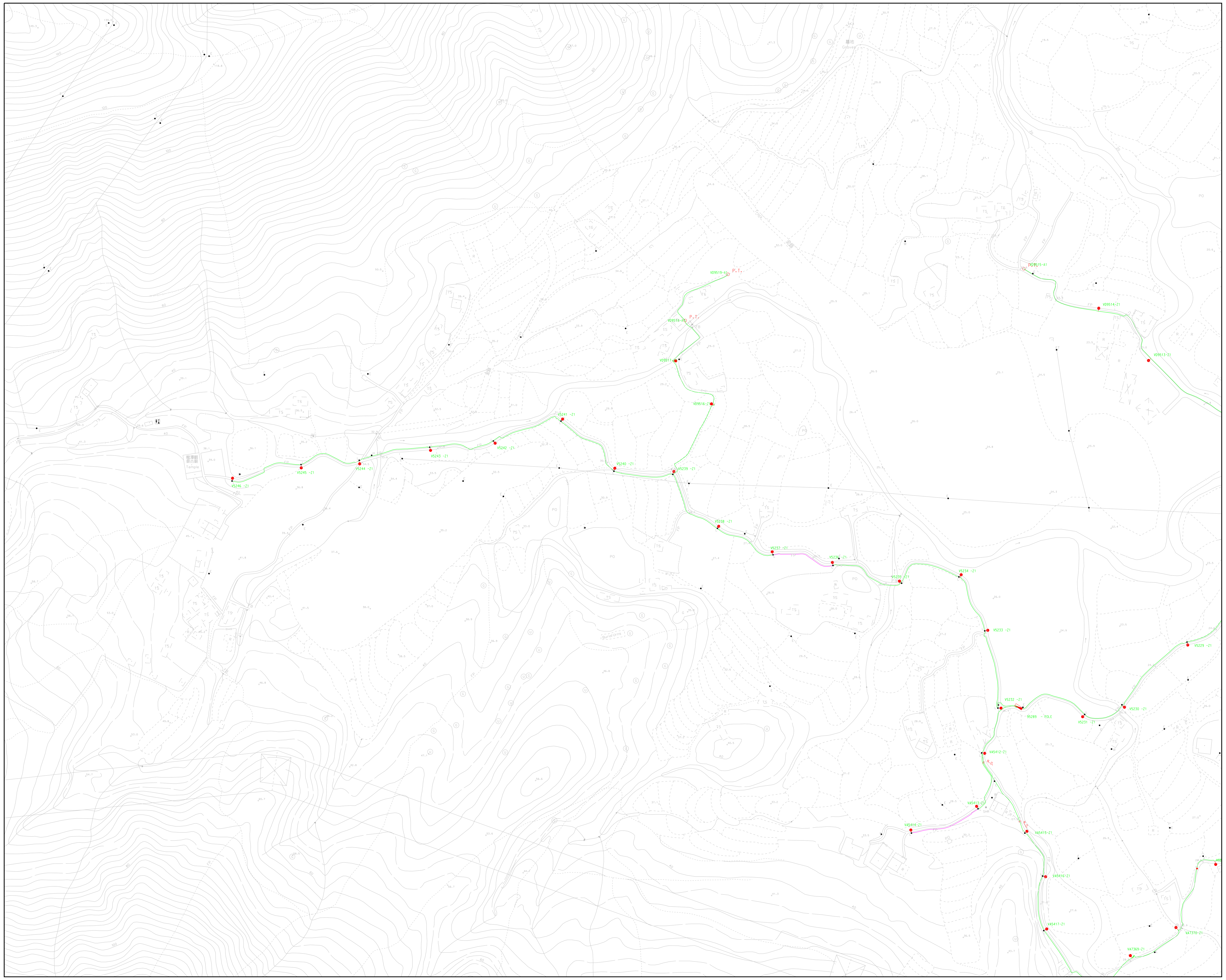
Map Sheet: 2SE-19B



Oct 2015

Appendix E3

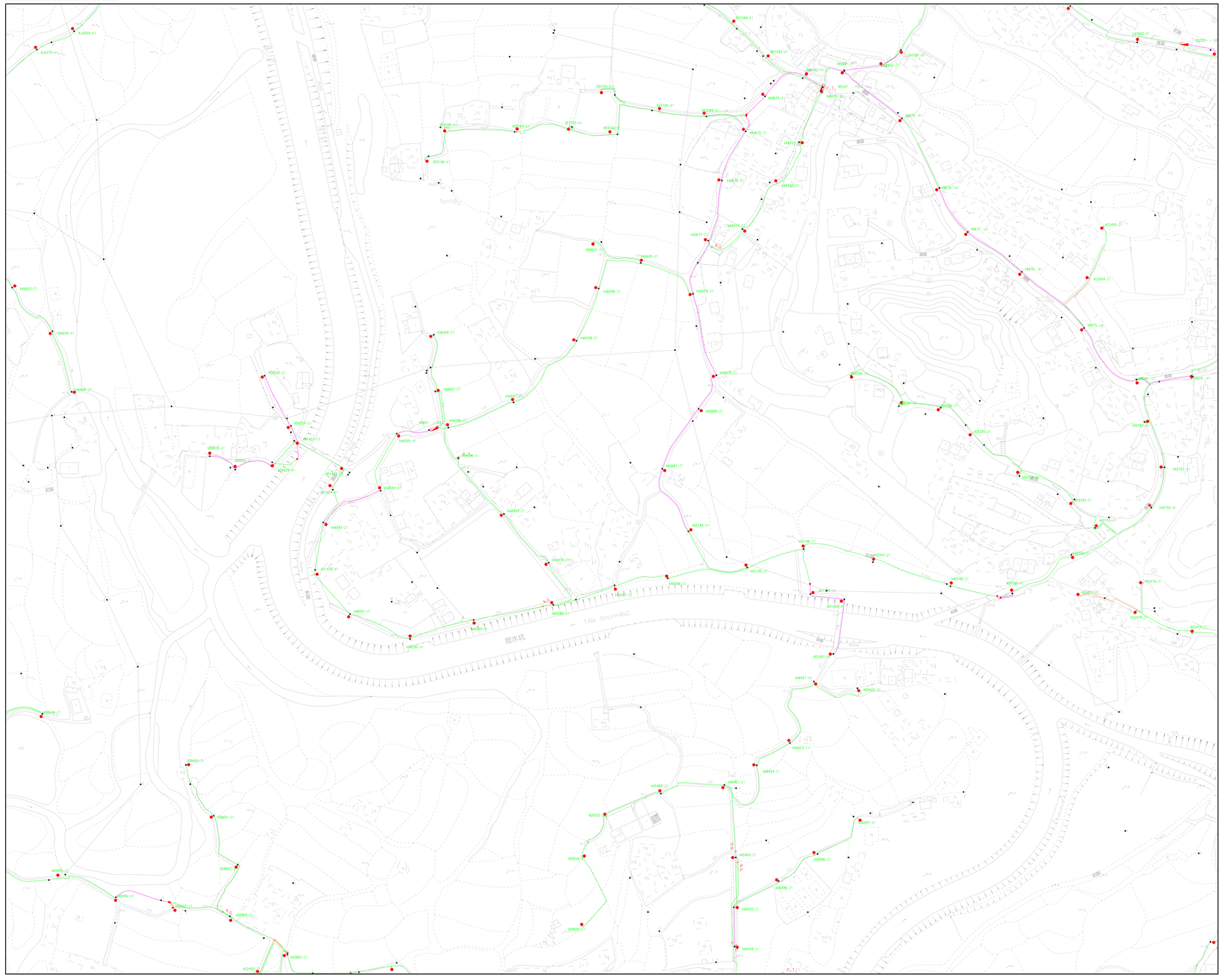
Map Sheet: 2SE-19D



Oct 2015

Appendix E3

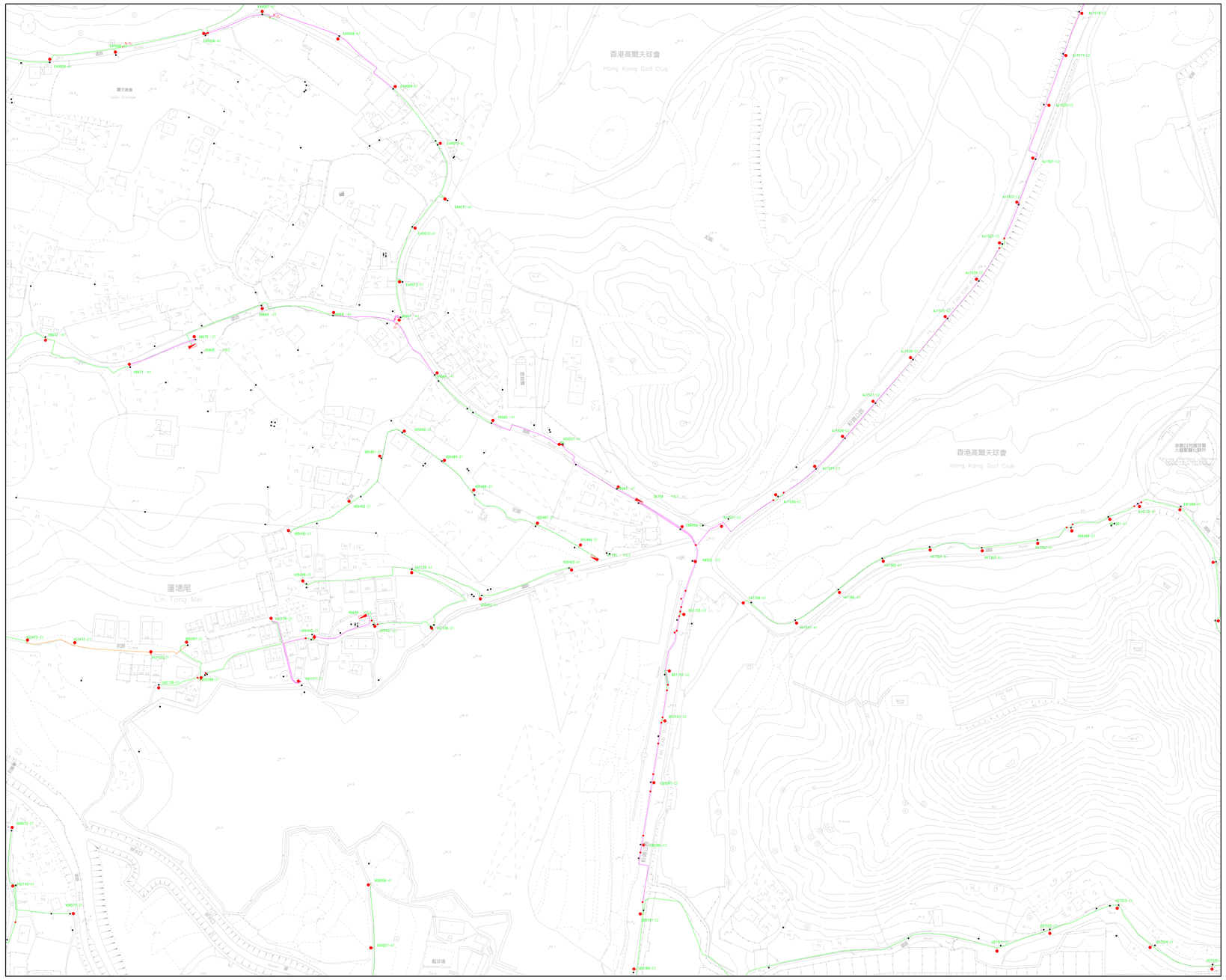
Map Sheet: 2SE-20A



Oct 2015

Appendix E3

Map Sheet: 2SE-20B



Oct 2015

Appendix E3

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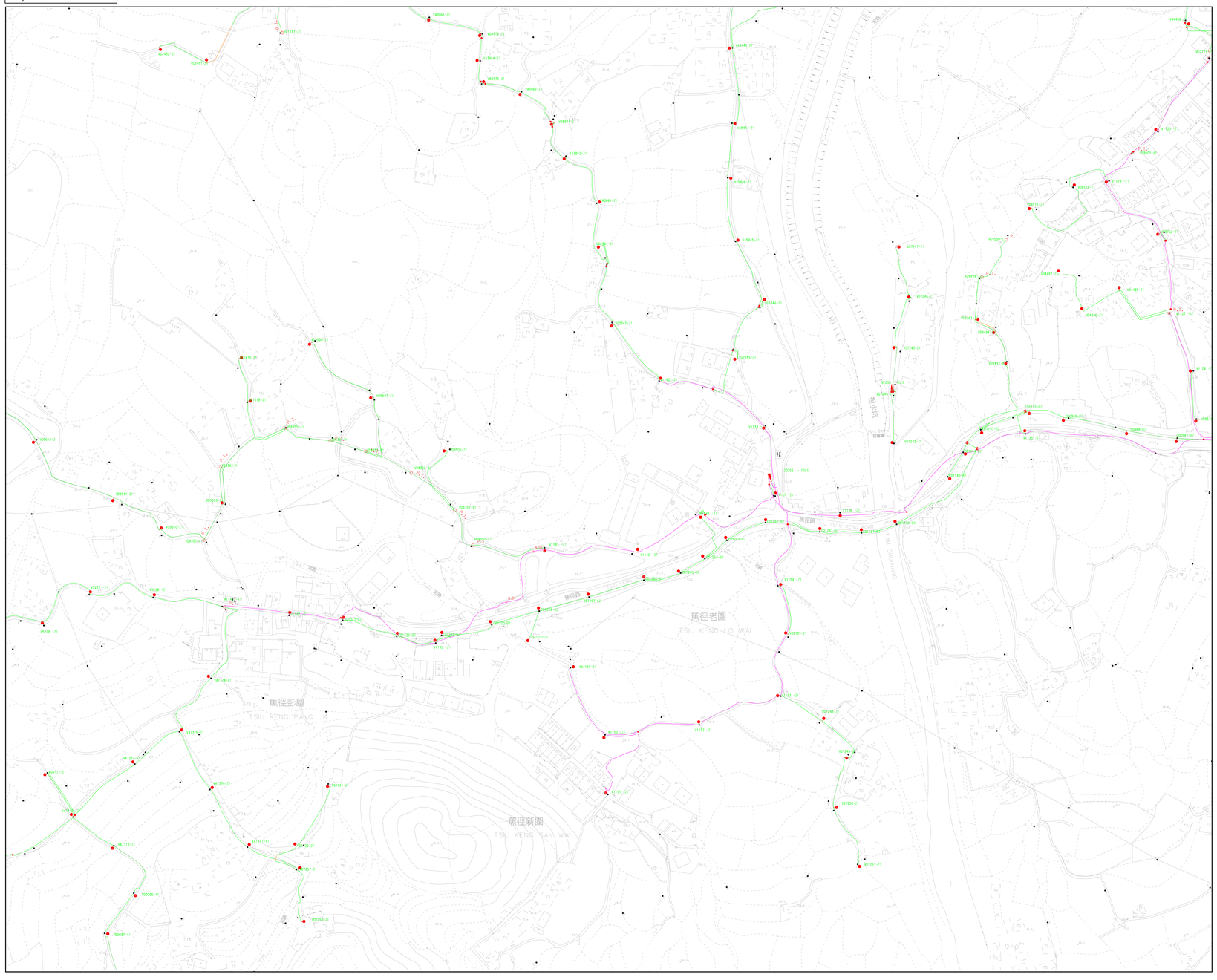
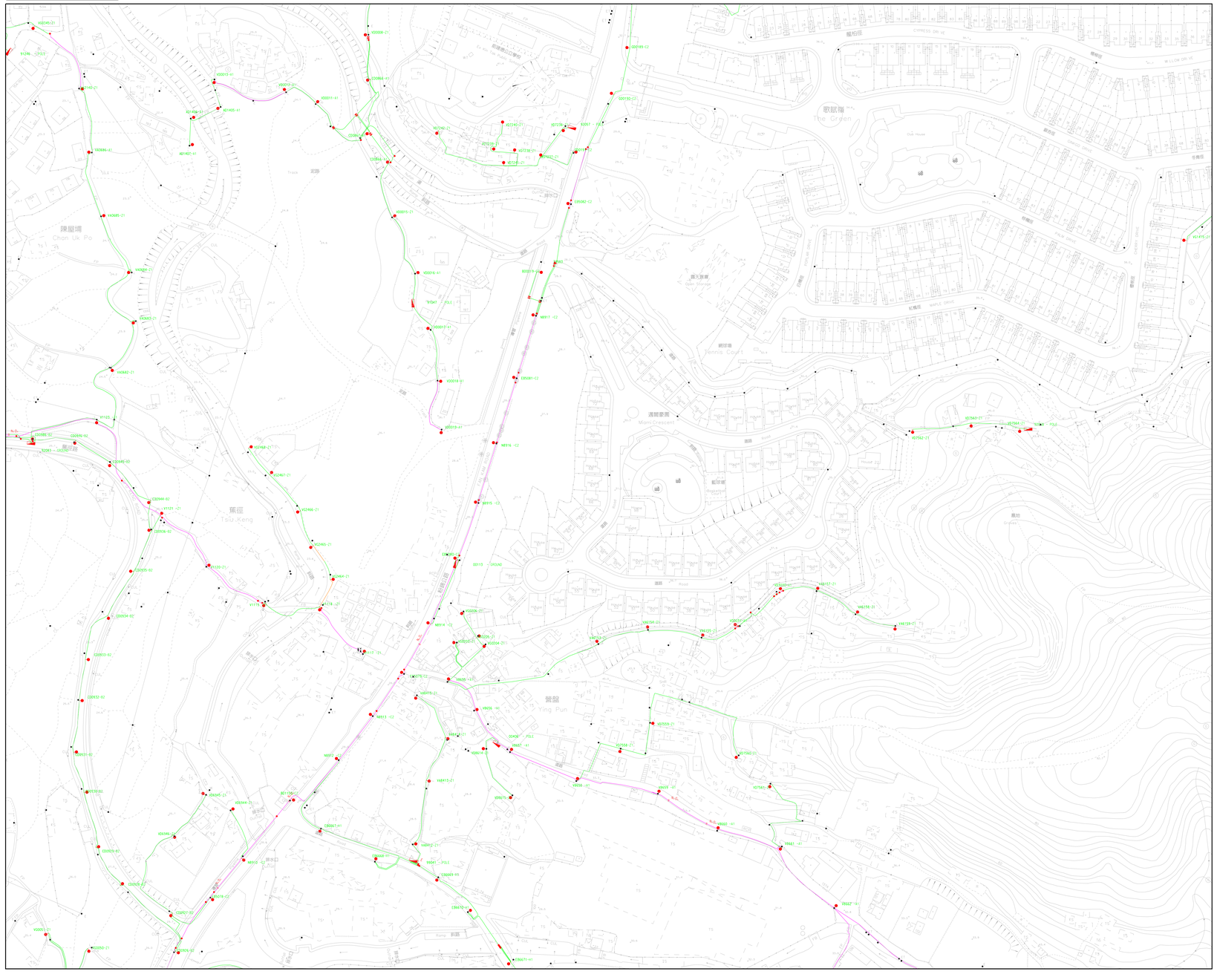


Oct 2015

Appendix E3

Map Sheet: 2SE-20D



Oct 2015

Appendix E3

N

NOTES :

1. ALL LEVELS ARE IN METRES ABOVE H.K.P.D.
2. CO-ORDINATES ARE OF HONG KONG 1980 GRID SYSTEM
3. CO-ORDINATES OF LOWER LEFT SHEET CORNER:
4. DISCLAIMER:
   ALL INFORMATION CONTAINED IN THIS DRAWING ARE COMPILED FOR GENERAL INFORMATION PURPOSE. THE POSITIONS AND ALIGNMENTS OF THE EQUIPMENT ARE APPROXIMATE ONLY. THIS DIVISION ACCEPTS NO RESPONSIBILITY FOR ANY LOSS OR DAMAGE WHATSOEVER ARISING OUT OF OR IN CONNECTION WITH ANY INFORMATION ON THIS DRAWING. EXTREME CARE SHALL BE EXERCISED WHEN WORKING IN CLOSE PROXIMITY TO OUR EQUIPMENT.

5. LIGHTING INFORMATION UPDATED
6. YOUR REFERENCE NO.:
7. SURVEY MAP NO.:
8. SHEET OF

LEGEND :

- Single-Arm Lighting Column
- Double-Arm Lighting Column
- Single-Arm Public Lighting Under Bridge
- Double-Arm Public Lighting Under Bridge
- Stagger Public Lighting
- Soffit Lighting
- W.M. Wall-Mounted Lighting
- Fluorescent Lamp
- Tram Shelter
- Highmast
- P.T. Post Top Lighting
- Subway Sign Lighting
- Controller/Pillar
- Drawpit
- Cable Joint
- Bollard
- D.S. Directional Sign
- Control Gear Box
- N.O. Normal Open Point
- G.S. Gantry Sign
- Underground Public Lighting Cable
- WM — Wall-Mounted Public Lighting Cable
- OHL — Public Lighting Overhead Line
- S — Public Lighting Cable with Shallow Cover
- ?? — Suspected Public Lighting Cable Routing Underground
- SDn — Existing Public Lighting Cross Road Spare Duct Minimum 900mm Depth*
- SDn — Existing Public Lighting Cross Road Spare Duct Less Than 900mm Depth*

Remarks : n = Number of Spare Duct Reserved

Cable suspected without ducts are marked with PURPLE colour

No.	Date	Description	Initial

REVISION

Contract No.

File No.

Project No. Nil

Contract

Drawing Title

PUBLIC LIGHTING INFORMATION

Drawing No.

Scale 1:1000 Approx.

Office

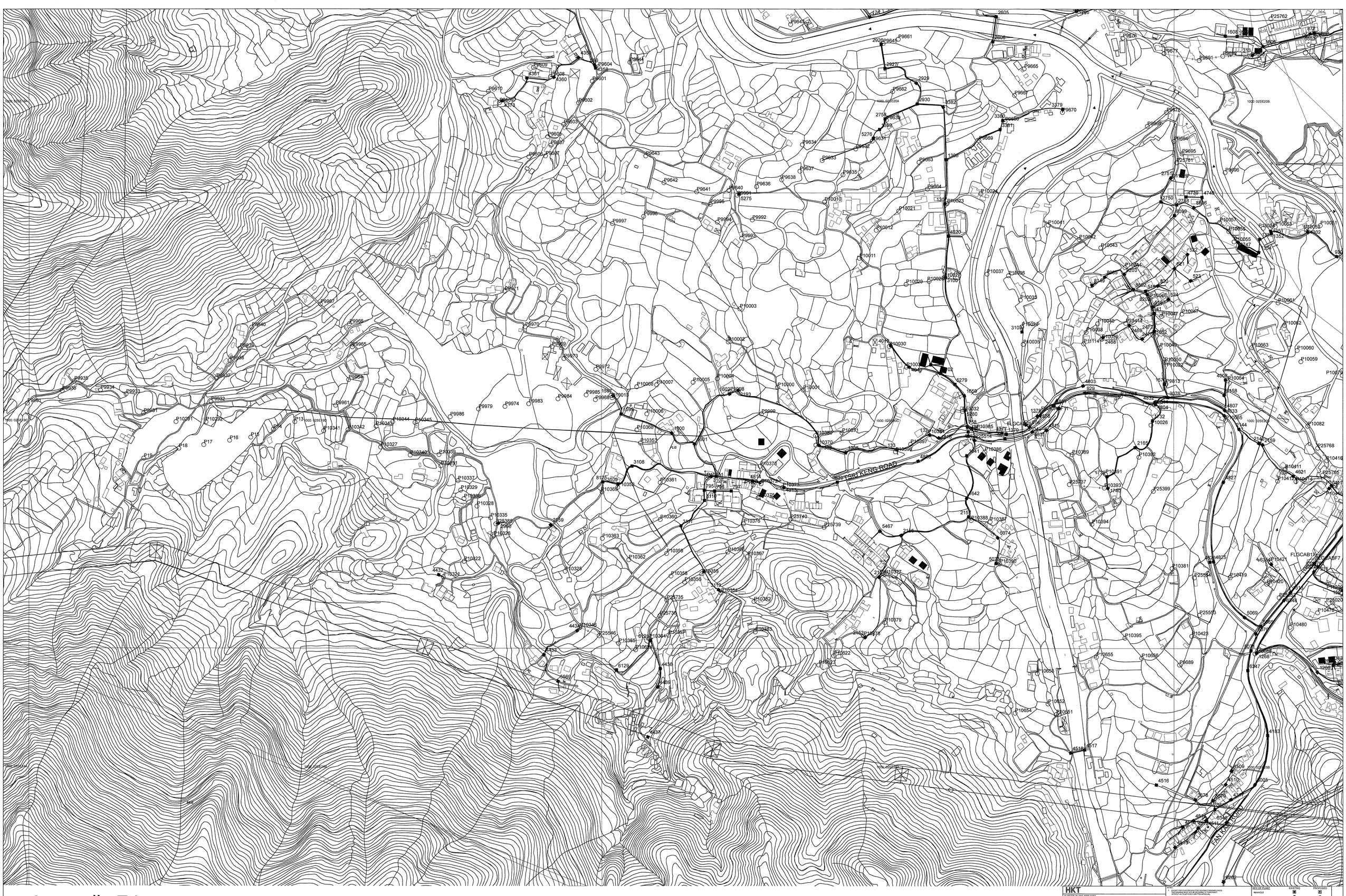
LIGHTING DIVISION

HIGHWAYS DEPARTMENT HONG KONG 路政署 香港

0 20 40 60 80 100 m

1 : 1 000 SCALE BAR

Appendix E4


TSUEN KENG ROAD
FAN KAM ROAD
HKT
OUTSIDE PLANT SERVICES
EXCH. AREA : FLG
SURVEY MAP No: 029E19B, 19D, 20A, 20B, 20C, 20D, 24B, 25A, 29B
LU REF. No. 8736566DE1116152
PREP. EMPC SCALE 1:1000
CHD. Cheung Eric C H DATE 08/03/2016
DWG. No. HKT-20160808-0315-R-INT-02
KEY OF PLANT
EXISTING
PROPOSED
MANHOLE
JOINT BOX
DUCT
CABLE
POLE
CABINET
BURIED COUPLING
Map data reproduced with permission of the director of lands, (C) Hong Kong Government

Appendix E4

HKT	
OUTSIDE PLANT SERVICES	
EXCH. AREA : FLG	
SURVEY MAP No.	025E14D, 15C, 19B, 19D, 20A, 20C
UU REF. No. 673995/60/61116162	
PREP. EMPC	SCALE 1:1500
CKD. Cheung Eric C H	DATE 06/05/2016
DWG. No.	HKT-20160308-0015-R-HKT-01

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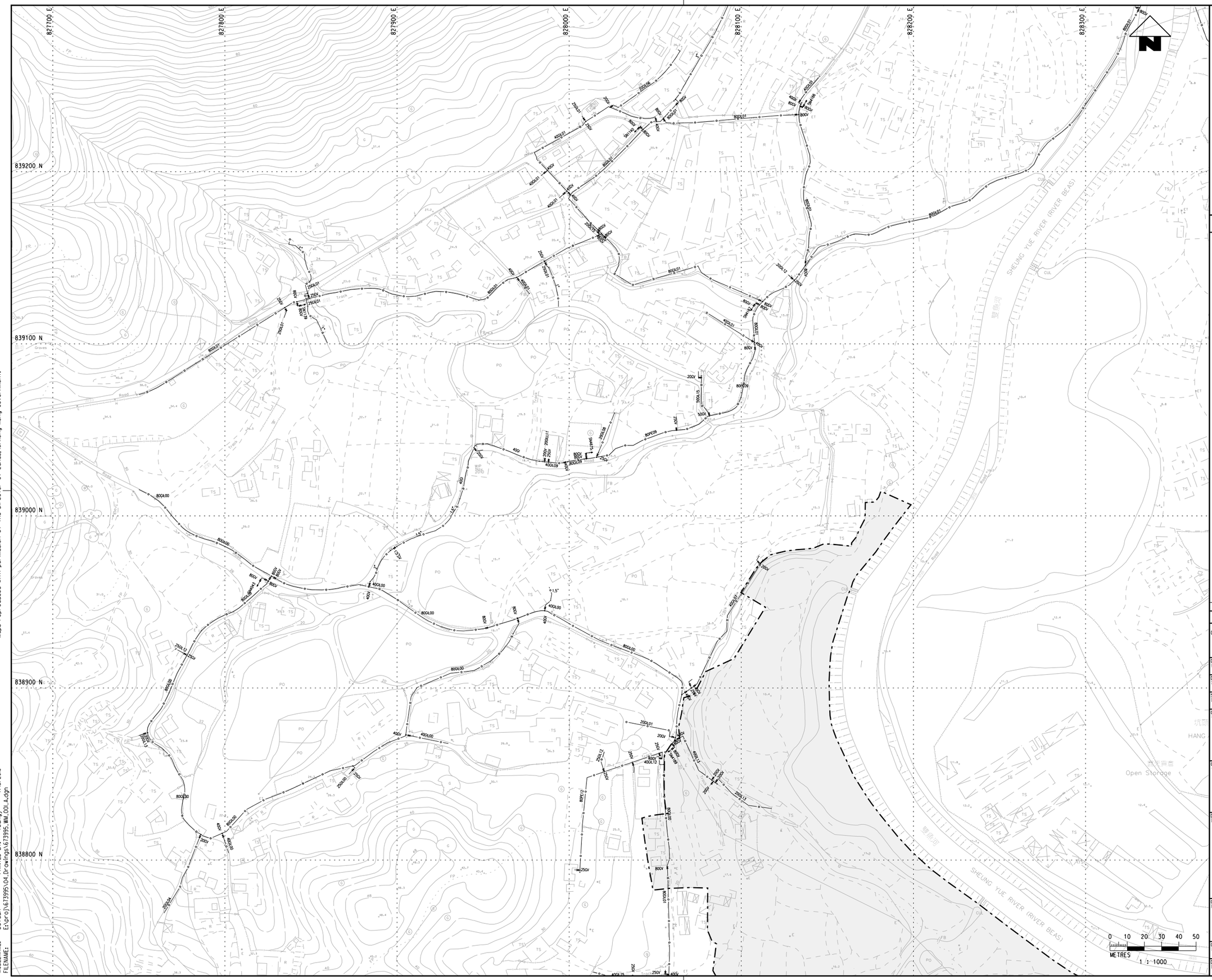
1. EXCEPT FOR YOUR PROSPECTIVE CONTRACTOR/EMPLOYEES, THIS DRAWING MUST NOT BE RELEASED TO THIRD PARTY WITHOUT HK TELEPHONE'S WRITTEN APPROVAL.
2. THIS INFORMATION IS ACCURATE AT THE DATE BELOW, BUT PLANT RECORDS FOR CONFIRMATION MAY TAKE PLACE DURING EXCAVATION.
3. THE POSITION OF PLANT INDICATED ON THIS DRAWING IS APPROXIMATELY ONLY. ACTUAL DEPTH AND POSITION OF PLANT MUST BE ESTABLISHED BEFORE COMMENCEMENT OF WORK BECAUSE VARIATIONS OF DEPTH AND LINE MAY OCCUR. EXTREME CARE MUST BE EXERCISED WHEN EXCAVATIONS ARE MADE IN PROXIMITY TO SUCH PLANT.
4. REACH NETWORKS HONG KONG LIMITED'S PLANT INCLUDED.

KEY OF PLANT	EXISTING	PROPOSED
MANHOLE		
JOINT BOX		
DUCT		
CABLE		
POLE		
CABINET		
BURIED COUPLING		



SHEET 1
SHEET 2 SHEET 3
SHEET 4 SHEET 5 SHEET 6
SHEET 7 SHEET 8 SHEET 9
SHEET 10

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 核快	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	26APR16	EL

DRAWN BY: 繪圖 VICTOR TSANG	CHECKED BY: 復核 MABLE LEUNG
DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:1000 @ A1	DATE: 日期 26APR2016

CLIENT: 委託人

土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合約

AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK
FEASIBILITY STUDY

DRAWING TITLE: 圖樣名稱

EXISTING WATERMAINS
SHEET 1 OF 10

CONSULTANT: 顧問

ch2m.

CAD FILE: 電腦圖檔案 673995_WM_001_A.DGN

DRAWING NO.: 圖號 673995/WM/001

REV.: 修訂 A

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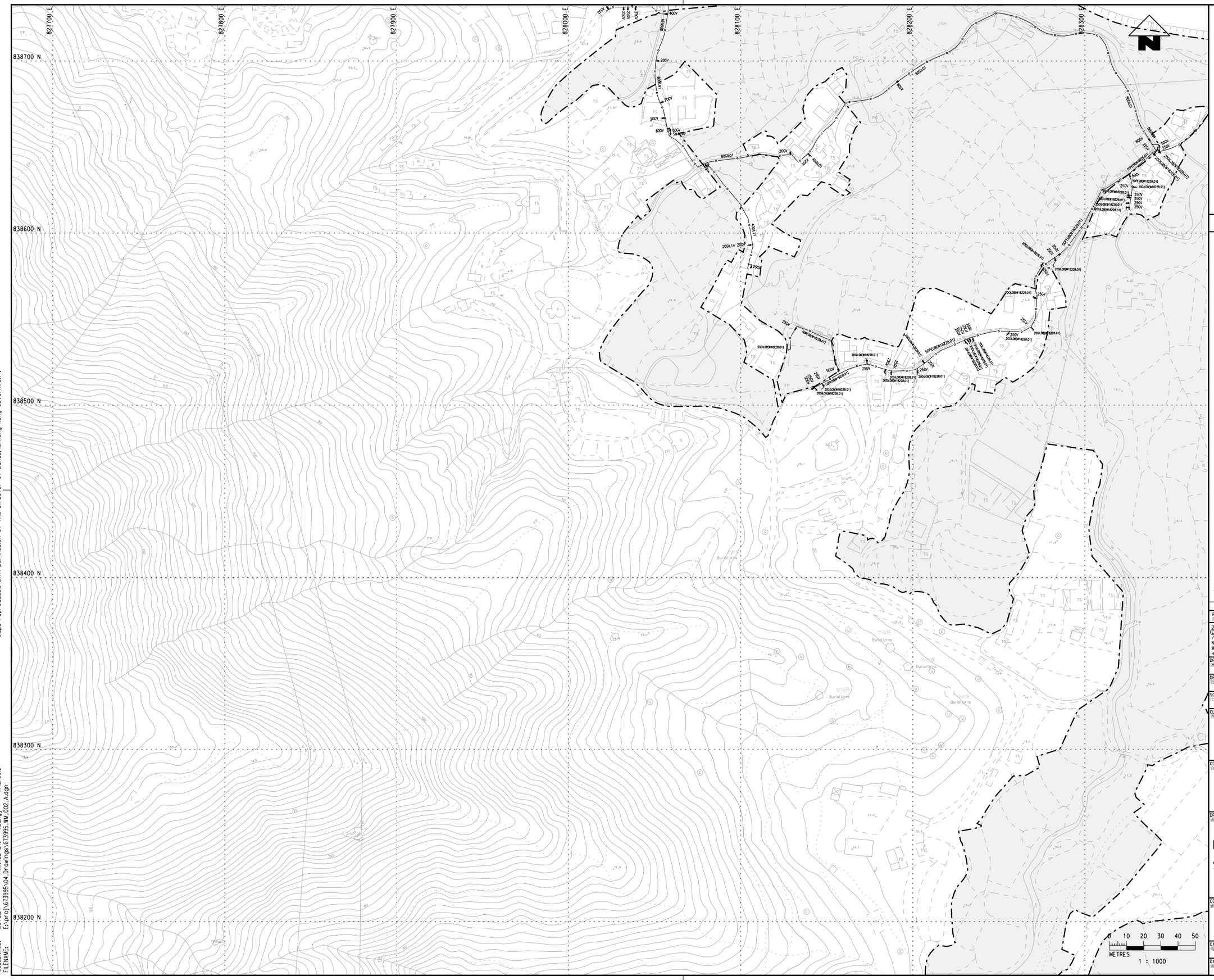

SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5
SHEET 6
SHEET 7
SHEET 8
SHEET 9
SHEET 10

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 核核	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	26APR16	EL

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DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:1000 @ A1	DATE: 日期 26APR2016

CLIENT: 委託人

土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合約

AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖標題

EXISTING WATERMAINS
SHEET 2 OF 10

CONSULTANT: 顧問

ch2m.

CAD FILE: 電腦圖檔案 673995_WM_002_A.DGN

DRAWING NO.: 圖號 673995/WM/002

REV.: 修訂 A

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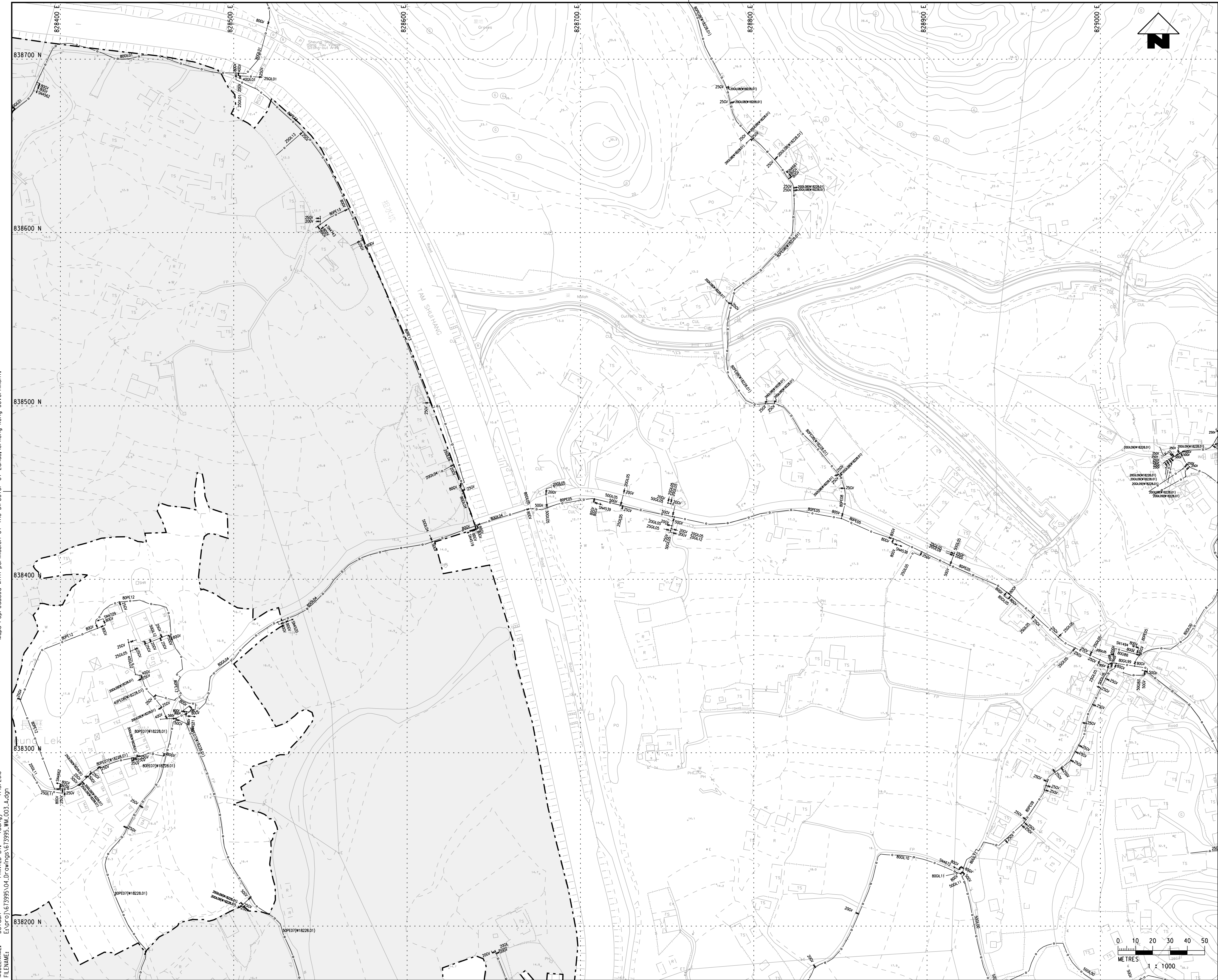

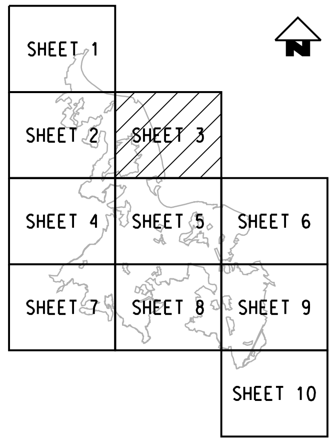

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 複核	DATE 日期	APPROVED 批准
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CHECKED BY: 複核 MABLE LEUNG
DESIGNED BY: 設計 SHIRLEY KWOK
APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:1000 @ A1
DATE: 日期 26APR2016

CLIENT: 委託人
土木工程拓展署
CEDD Civil Engineering and Development Department

CONTRACT: 合約
AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK
FEASIBILITY STUDY

DRAWING TITLE: 圖標題
EXISTING WATERMAINS
SHEET 3 OF 10

CONSULTANT: 顧問
ch2m

CAD FILE: 電腦圖檔案 673995_WM_003_A.DGN
DARWING NO.: 圖號 673995/WM/003
REV.: 修訂 A

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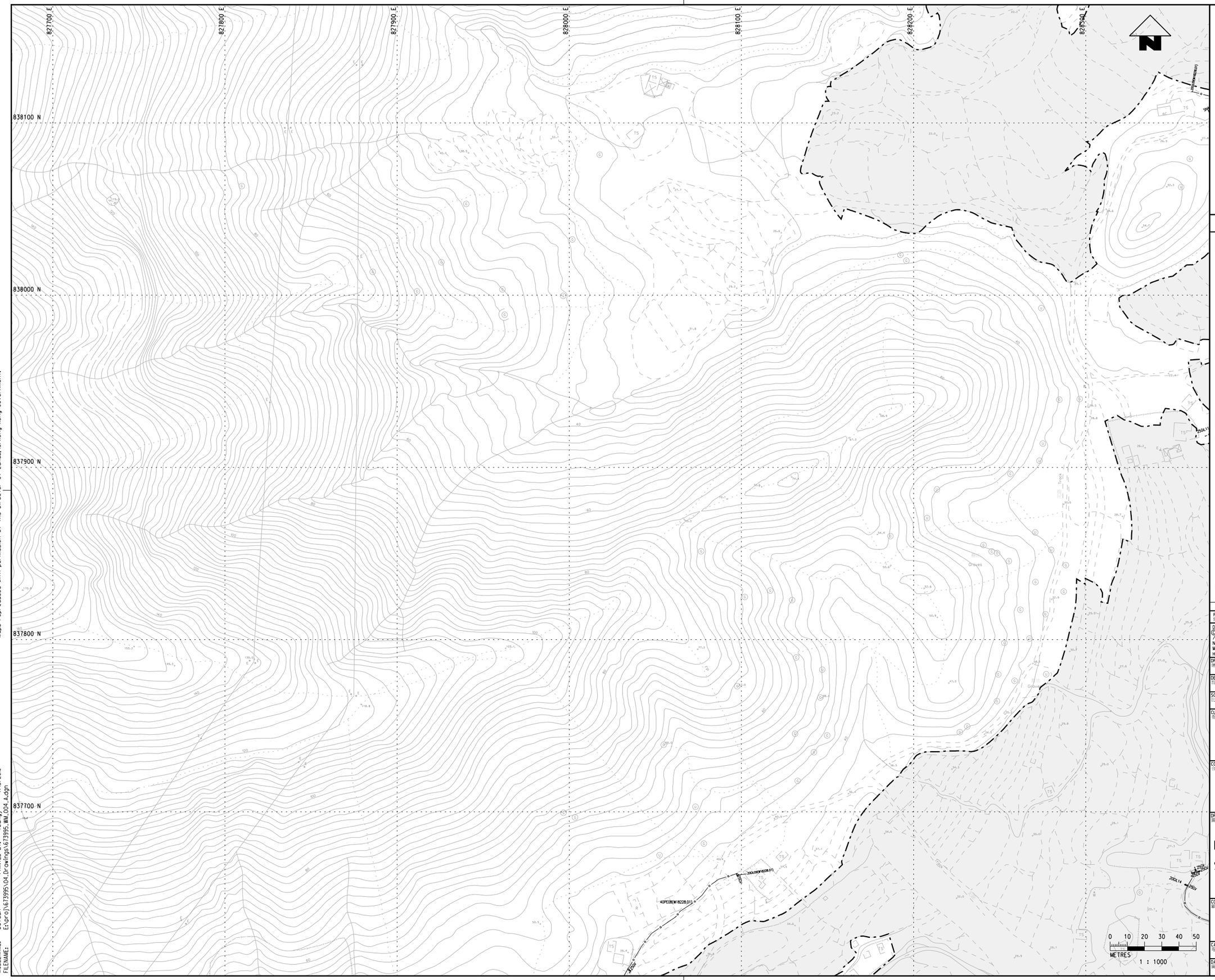

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SHEET 4
SHEET 5
SHEET 6
SHEET 7
SHEET 8
SHEET 9
SHEET 10

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 複核	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	26APR16	EL

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土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合約
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ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK
FEASIBILITY STUDY

DRAWING TITLE: 圖標題
EXISTING WATERMAINS
SHEET 4 OF 10

CONSULTANT: 顧問
ch2m SM

CAD FILE: 電腦圖檔案 673995_WM_004_A.DGN

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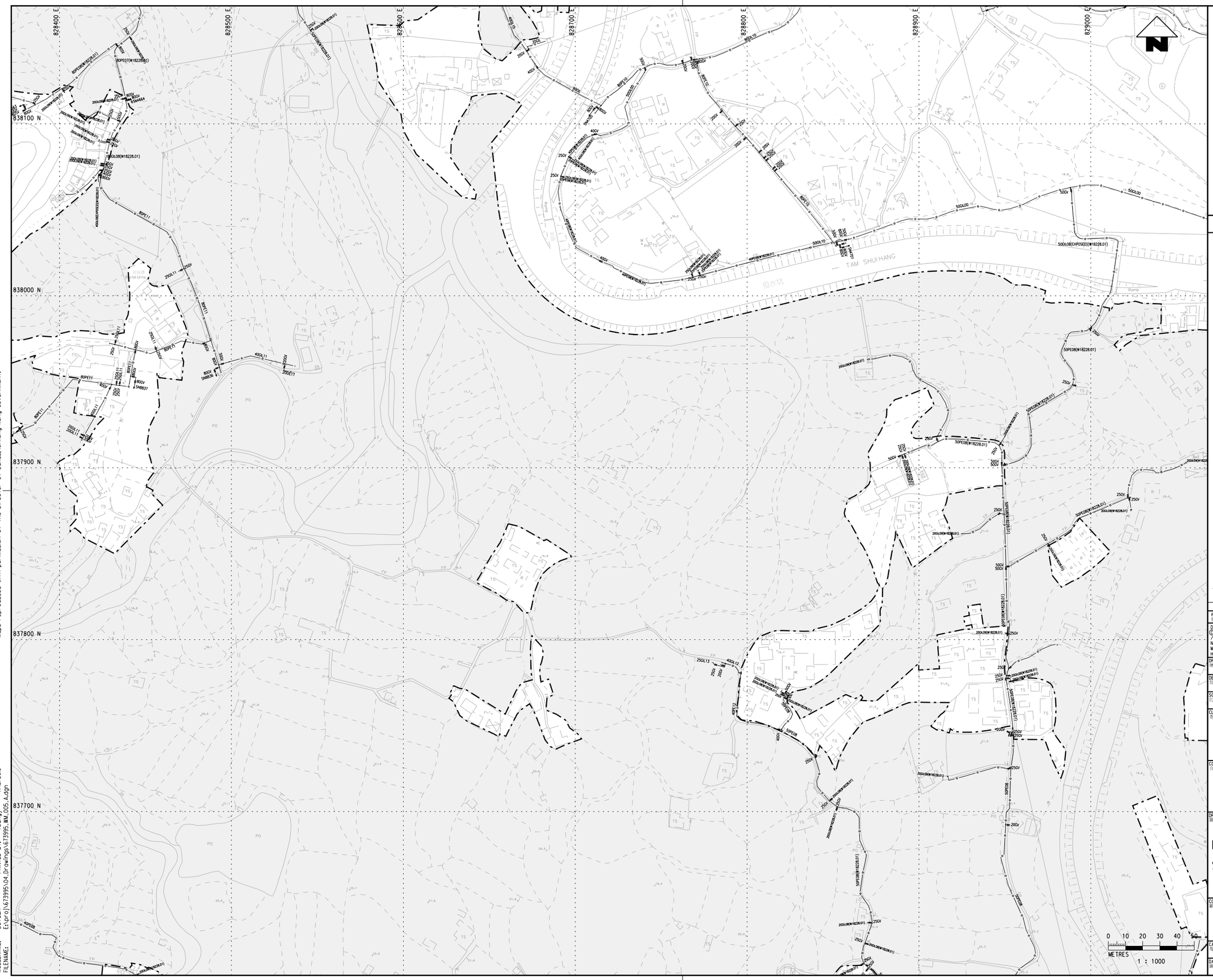

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SHEET 2
SHEET 3
SHEET 4
SHEET 5
SHEET 6
SHEET 7
SHEET 8
SHEET 9
SHEET 10

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 核對	DATE 日期	APPROVED 批准
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CONTRACT: 合約

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ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖樣題

EXISTING WATERMAINS
SHEET 5 OF 10

CONSULTANT: 顧問

ch2m. SM

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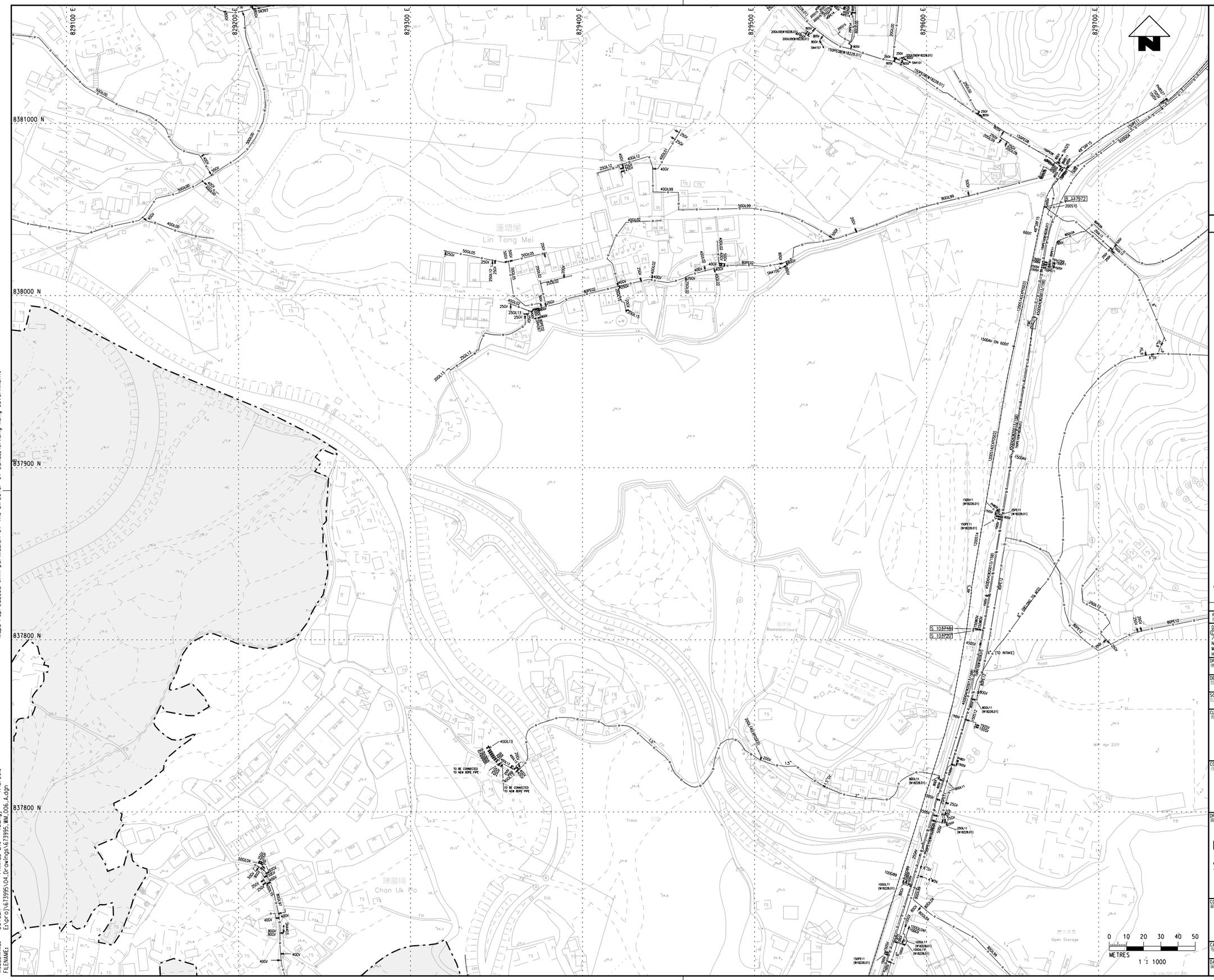

SHEET 1
SHEET 2 SHEET 3
SHEET 4 SHEET 5 SHEET 6
SHEET 7 SHEET 8 SHEET 9
SHEET 10

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 核對	DATE 日期	APPROVED 批准
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ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖樣題

EXISTING WATERMAINS
SHEET 6 OF 10

CONSULTANT: 顧問

ch2m. SM

CAD FILE: 電腦圖檔案 673995_WM_006_A.DGN

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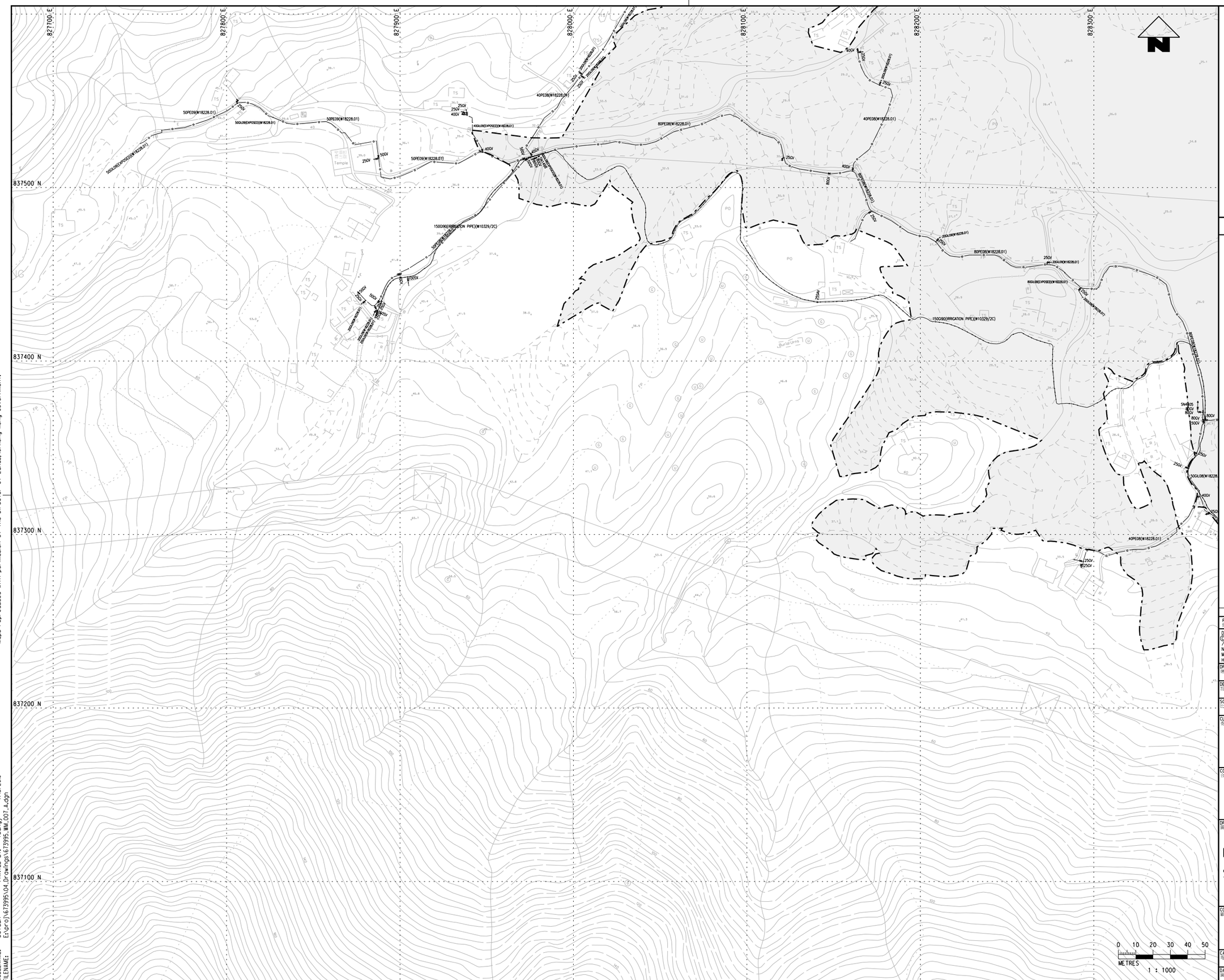

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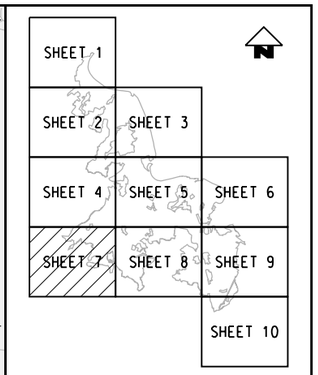

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 核對	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	26APR16	EL

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DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:1000 @ A1	DATE: 日期 26APR2016

CLIENT: 委託人

土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合約

AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖檔題

EXISTING WATERMAINS
SHEET 7 OF 10

CONSULTANT: 顧問

ch2m.

CAD FILE: 電腦圖檔案	673995_WM_007_A.DGN
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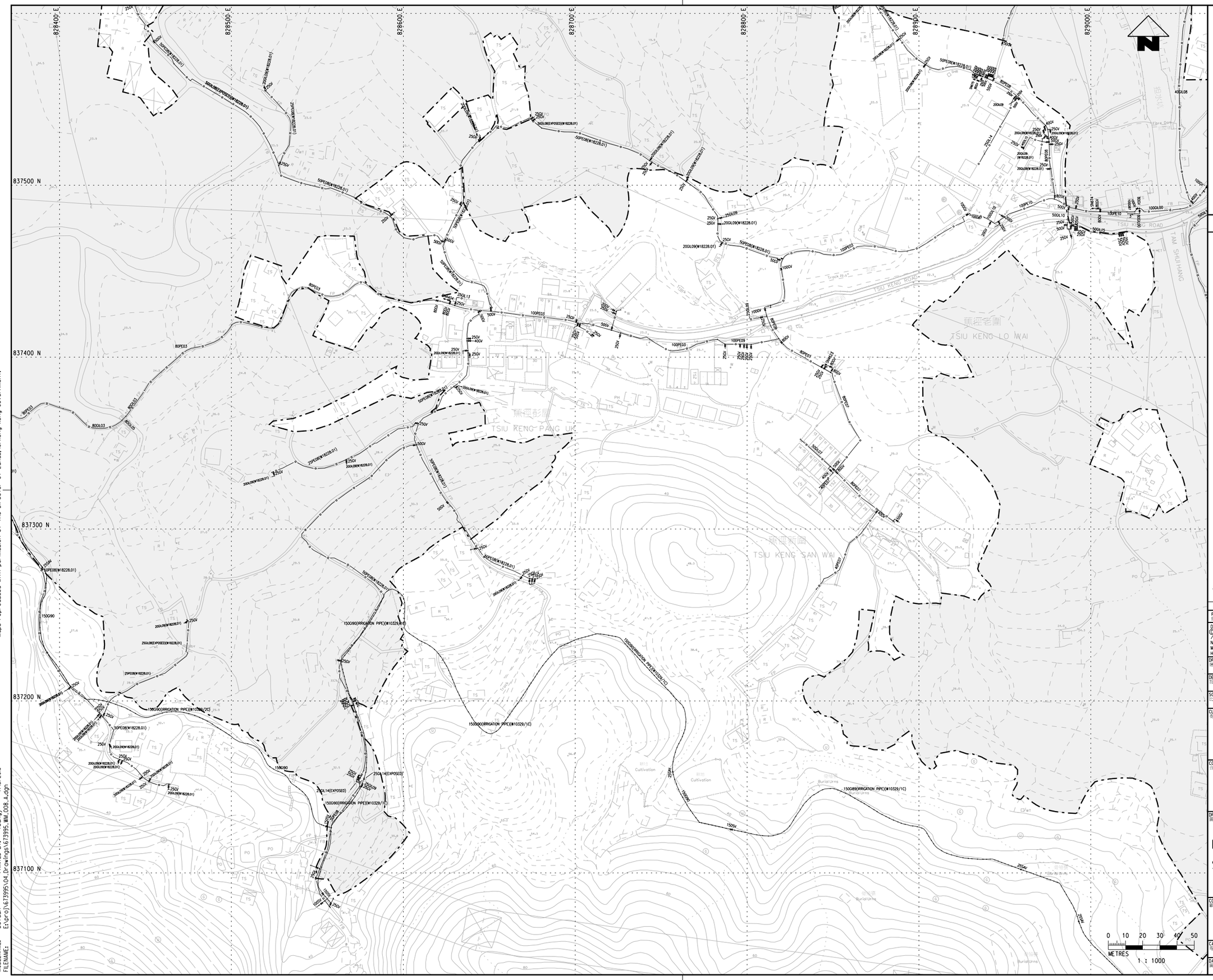

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 核准	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	26APR16	EL

DRAWN BY: 繪圖 VICTOR TSANG	CHECKED BY: 復核 MABLE LEUNG
DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:1000 @ A1	DATE: 日期 26APR2016

CLIENT: 客戶人

土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合同

AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK
FEASIBILITY STUDY

DRAWING TITLE: 圖則標

EXISTING WATERMAINS
SHEET 8 OF 10

CONSULTANT: 顧問

ch2m.

CAD FILE: 電腦圖檔案	673995_WM_008_A.DGN
DRAWING NO.: 圖號	673995/WM/008
REV.: 修訂	A

SHEET 1
SHEET 2 SHEET 3
SHEET 4 SHEET 5 SHEET 6
SHEET 7 SHEET 8 SHEET 9
SHEET 10

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 核核	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	26APR16	EL

DRAWN BY: 繪圖 VICTOR TSANG	CHECKED BY: 核核 MABLE LEUNG
DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:1000 @ A1	DATE: 日期 26APR2016

CLIENT: 委託人

土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合約

AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖標題

EXISTING WATERMAINS
SHEET 9 OF 10

CONSULTANT: 顧問

ch2m. SM

CAD FILE: 電腦圖檔案 673995_WM_009_A.DGN

DARWING NO.: 圖號 673995/WM/009

REV.: 修訂 A

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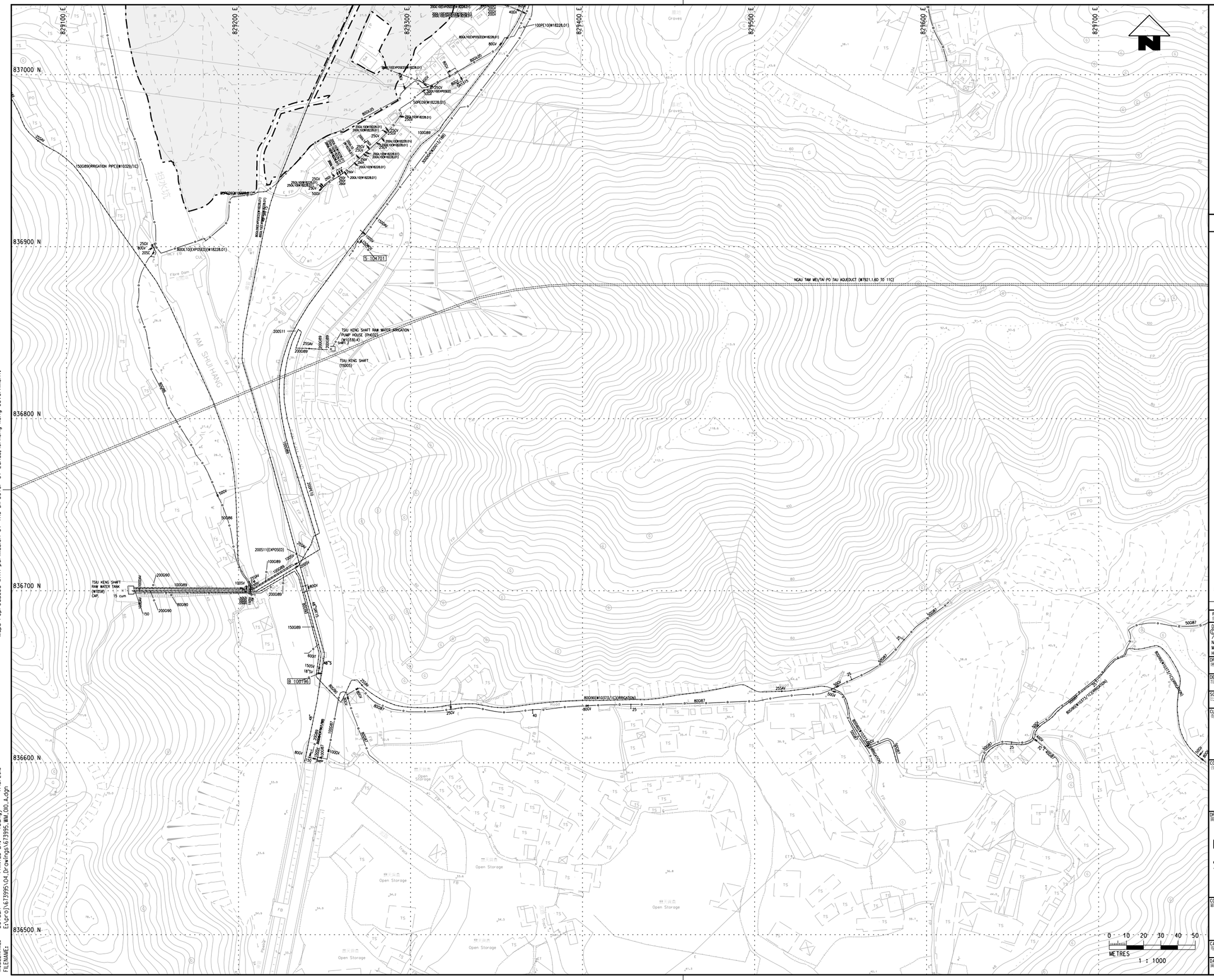

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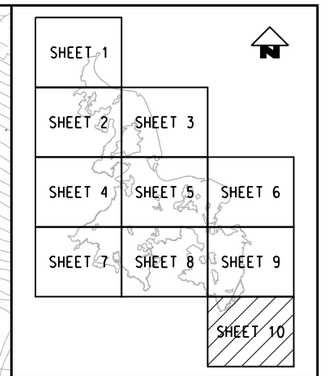

KEY LOCATION PLAN

LEGEND :

PROPOSED AGRICULTURAL PARK

WATERWORKS

EXISTING FRESH WATER

Appendix E5

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SCALE: 比例 1:1000 @ A1	DATE: 日期 26APR2016

CLIENT: 客戶人

土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合同

AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖則題

EXISTING WATERMAINS
SHEET 10 OF 10

CONSULTANT: 顧問

ch2m. SM

CAD FILE: 電腦圖檔案	673995_WM_010_A.DGN
DRAWING NO.: 圖號	673995/WM/010
REV.: 修訂	A

Appendix E6

香港中華煤氣有限公司
The Hong Kong and China Gas Company Limited

24 March 2016

Your Ref.: 673995/60/61116162
Our Ref. : UNE2016/00714/N

CH2M
Halcrow China Limited
Room 09-19, Level 27, Tower 1
Millennium City 1
388 Kwun Tong Road
Kwun Tong, Kowloon

Attn. : Mable Leung

Dear Sirs

Re: Agreement No. NTE/01/2016 Engineering Feasibility Study for the Establishment of an Agricultural Park - Feasibility Study

We refer to your letter dated 02 March 2016 and write to advise that as far as our records show, there is no gas pipe within this site. However, there is the possibility that some gas pipes, particularly those laid long time ago or laid by other Registered Gas Contractors, may not appear in our records. In the case of some unknown pipes being exposed during your construction work or for the matters related to existing pipeline, you may contact Mr. K T Lai on telephone no. 2963 1851 or Mr Chan Yuen Lok on 2963 1811 to arrange for a joint site inspection regarding the pipe location. .

If your work involves construction of new manholes or performing operation in existing manholes, we recommend sealing off all the duct openings in new/existing manholes, to avoid accumulation of hazardous gas in manholes, which might create a dangerous explosive environment.

Yours faithfully

Eric F Tsang
System Development Manager

ET/une

Encl Get All Safe Leaflet

Appendix E6

For Reference Only

General Requirements For Construction Work Adjacent to Existing Gas Station (GS)

1. Contact HKCG at least one month in advanced for site inspection before commencement of construction work adjacent to the GS.

2. Should any vibration is induced by the construction work, the vibration force acting on the gas facilities inside GS should not more than 13mm/s PPV and 0.1mm vibrational amplitude.

3. The station access shall be maintained at all time.

4. The site should be kept reasonably level, adequately drained and free from flooding, landslip and subsidence.

5. The contractor should keep clear of the existing drainage system for preventing the station from flooding throughout the construction period.

6. Minimum clearance from inlet and outlet gas pipeline of GS shall be 2.5 metres and the span of the exposed pipe section should not be longer than 8 metres and 2.2 metres for steel and D.I. gas pipes respectively.

7. Minimum clearance from the station boundary shall be 1.0 metre from the toe wall of palisade fence and the fence should never be used as a path or a conductor for welding process.

8. Operating range of any tower crane or lifting appliances should be outside GS. Risk assessment should be conducted so that the gas facilities inside GS will not be affected even in case the worst of tower crane / high-rise scaffolding collapse especially during strong wind season,

9. In case of emergency, contact HKCG at 2880 6999 which is manned 24 hours.

Appendix E6

For Reference Only

General Requirements For Construction Work In The Vicinity Of Gas Main

1. Notification of work should be circulated as stipulated in the Excavation Permit issued by Highways. The same procedure should also be followed for construction site other than Highways' area.

2. Contact HKCG at least 3 days in advance for excavation adjacent to gas pipe. Site meeting to be arranged whenever required. HKCG could be contacted via 29631811 or 28806999 in case of emergency.

3. When excavation is to be carried out adjacent to a gas main, the exact alignment and profile must be ascertained by a series of hand-dug trial holes.

4. BORING AND DRILLING IN THE VICINITY OF GAS MAIN IS STRICTLY PROHIBITED. HKCG must be consulted first should this work be required.

5. No excavator is allowed for excavation at 1 metre around the gas pipe.

6. No naked flame is allowed adjacent to the gas pipe.

7. Do not encase, even temporarily, part or all of our gas pipes in any form of concrete structure.

8. To avoid the risk of gas accumulation leading to any tragedy, no gas pipe is allowed being enclosed in confined space such as long decked over trench.

   8.1 In case the proposed deck of trench will cover any gas pipe, it should be considered to adjust the trench alignment and/or the working method at the planning stage. Should any gas pipe required to be diverted, the request should be made to HKCG and the diversion should be completed before the trench is decked.

   8.2 If inevitably any gas pipe to be left in the decked trench, prior agreement should be sought from HKCG. Adequate protection measure such as partition should be built to separate the gas pipe from the confined space under deck.

9. No machinery should sit directly above our metal iron gas pipes.

10. The velocity and amplitude of vibration acting on the gas pipe by the work must not exceed 25mm/s peak particle velocity and 0.2mm respectively.

11. The velocity and amplitude of vibration acting on the gas governor by the work must not exceed 13mm/s peak particle velocity and 0.1mm respectively.

12. Vibration monitoring records should be forwarded to HKCG for reference.

13. Excavation running close and parallel to the gas pipe should be avoided. Should such excavation be required, discussion/agreement must be sought from HKCG. Any mechanical joint to be exposed, the working party shall inform HKCG in advance and make provision to HKCG for leak detection and bolts replacement where necessary.

14. Suspension of gas pipe to be agreed with HKCG.

15. The gas pipe would normally have a cover of 450mm and 900mm in footpath and carriageway respectively. However, there are cases where gas mains have cover less than the before stated figures. Steel protection plates would normally be laid on top of shallow cover pipe. Due care should be given in subsequent excavation with the presence of steel plate.

16. Report any damage, even superficial, to HKCG for remedial action.

For Reference Only

17. Access to HKCG's installations should be maintained at all times for regular inspection and emergency repair.

18. Sufficient clearance to be maintained for both safety and maintenance purpose. Normally, 600mm and 300mm clearance is required for steel and all other gas pipe respectively.

19. No exposed PE gas pipe under steel deck is allowed as welding slag from the jointing of steel deck may damage the gas pipe underneath unless proper protection agreed by HKCG. In other occasion, exposure of PE pipes should be avoided as far as practicable. Where exposure of PE pipes is inevitable, fire resistance protection wrapping of the exposed PE pipes should be installed and agreed with HKCG prior to application.

20. In case of emergency, contact HKCG at 28806999 which is manned 24 hours. If a gas leak is suspected, immediately stop work and evacuate the site personnel from the trenches. It should be noted that gas might travel through underground drains or conduits to other areas of the site. Evacuate the personnel from these areas if this is suspected.

21. HKCG should be consulted prior to any cutting or removal of a decommissioned gas pipe. As there may be residue gas inside a decommissioned gas pipe, cutting should only by employed by mechanical cutter or hack saw. In all circumstances, oxy-acetylene cutting SHOULD NOT be employed for cutting a decommissioned gas pipe.

22. Should there be settlement expected to be caused by the work, the predicted settlement contour should be forwarded to HKCG for assessment of the impact.

23. For plantation work with tree guard installation, the exact location and depth of the gas pipe should be confirmed by hand-dug trial holes prior to the driven of the tree guard into the ground to avoid damage of gas pipe underneath.

24. Due care should be given to the ancillary equipment attached to the gas main. Cathodic protection is installed for corrosion-resistant purpose and it has some cables linking from the gas pipe to the anodes and connected in a junction box placed in a pit. The anodes are normally installed at 1m away from the pipe whilst the anodes junction boxes would be installed at footpath at a distance from those gas main laid under carriageway.

25. The Code of Practice "Avoiding danger from gas pipes" has been prepared by the Gas Authority and approved and brought into effect in accordance with the provisions of section 9 of the Gas Safety Ordinance Cap 51 (the Ordinance). Its purpose is to provide practical guidance in respect of the requirements of the Ordinance and the Gas Safety (Gas Supply) Regulations (the regulations) concerning the avoidance of damage to gas pipes. These requirements are more specifically defined in regulation 23A of the regulations as follows-

> *"23A. Works in the vicinity of gas pipes*
>
> *1) No person shall carry out, or permit to be carried out, any works in the vicinity of a gas pipe unless he or the person carrying out the works has, before commencing the works, taken all reasonable steps to ascertain the location and position of the gas pipe.*
>
> *2) A person who carries out, or who permits to be carried, any works in the vicinity of a gas pipes shall ensure that all reasonable measures are taken to protect the gas pipe from damage arising out of the works that would be likely to prejudice safety."*

Appendix E6

香港中華煤氣有限公司
The Hong Kong and China Gas Company Limited

保護地下煤氣設施

1. 確保已取得煤氣公司圖則以找出煤氣管之大約位置。
2. 使用喉管探測器及手掘探孔確定煤氣管正確位置。
3. 切勿在煤氣管附近操作重型機械。
4. 小心西粉豎管及陰極保護裝置之電線。
5. 在喉管附近切勿使用明火。
   對外露喉管提供足夠支撐。
   盡量避免外露聚乙烯喉管。
6. 如有需要，請與煤氣公司聯絡，召開工地會議。
   - 電話：2765-5606

損毀氣體喉管可導致煤氣洩漏，危害施工者本身安全及公眾安全。

根據氣體安全規例規定在氣體喉管附近進行工程的人士須確保：

- 採取合理步驟以確定氣體喉管所在位置；及
- 採取合理措施以保護氣體喉管不受損壞。
- 抵觸法例最高可被罰款200,000元及監禁12個月。

緊急事故時：

- 停止在嗅到煤氣味的位置及附近施工。
- 熄滅所有火種。
- 離開漏氣地點。
- 在安全地點致電999報警或2880-6999通知煤氣公司。

N

CHAN UK PO

837 600N

CH.4+50

CH.5+00

CH.5+50

CH.6+00

CH.6+50

CH.7+00

CH.7+50

CONNECT TO EXISTING IRRIGATION

CONNECT TO EXISTING IRRIGATION

DOG YARD

EXISTING IRRIGATION CHANNEL

EXISTING CHANNEL

EXISTING 300mm WIDE AFCD IRRIGATION CHANNEL

CONNECT TO EXISTING DRAINAGE

EXISTING OUTFALL TO BE DEMOLISHED AND PROVIDE CONNECTING TO M2.34

CUT LINE A-A

CUT LINE B-B

OUTFALL NO. 1a

OUTFALL NO. 1b

OUTFALL NO. 2

OUTFALL NO. 1c

SODIC TO SITE BOUNDARY CONNECT TO EXISTING IRRIGATION DRAIN

SODIC TO SITE BOUNDARY CONNECT TO EXISTING IRRIGATION DRAIN

2 # 225ø S.W.S.(C) WITH 150mm COVER SURROUND

TAM SHUI HANG

TSIU KENG

837 500N

837 400N

829 300E

829 350E

829 400E

SCALE 1:1:1

0 10 20 30 40 50 60 70 80 90 100mm SCALE 1:1:1

NOTES:

1. NOTES AND LEGEND REFER TO DRAWING No. HWDHY0516-DW0021-Z.
2. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWINGS No. HWDHY0516-DW0021-Z & DW0023-Z.

Appendix E7

no.	description	checked and approved	date
2	AS CONSTRUCTED		12.06.15

REVISION

	post	name	signature	date
designed	E/NT1-3	P. L. KAN	SIGNED	12/05
drawn	TO/2-1	D. Y. LEUNG	SIGNED	30.11.05
checked	E/NT1-3	P. L. KAN	SIGNED	12/05

approved

SIGNED
W.K. KWAN 12/05
Senior Engineer / NT1 Date

contract no. HY/2005/16

file no. HCW/RRD/N6

project no. ND037

contract

CONSTRUCTION OF ACCESS ROADS AT LUNG MEI, TAI PO AND TSIU KENG, SHEUNG SHUI

drawing title

TSIU KENG - DRAINAGE LAYOUT

(SHEET 2 OF 3)

drawing no. HWDHY0516-DW0022-Z

scale 1 : 500

office

WORKS DIVISION

HIGHWAYS DEPARTMENT HONG KONG

\STO_2\N2_CS_01\NT\2005\16 Tsiu Keng, Sheung Shui\HWDHY0516-DW0022-Z.dgn

B1 1000x707

NOTES:

1. NOTES AND LEGEND REFER TO DRAWING No. HWDHY0516-DW0021-Z.
2. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWINGS No. HWDHY0516-DW0021-Z & DW0022-Z.

Appendix E7

no.	description	checked and approved	date
Z	AS CONSTRUCTED		12.05.15

REVISION

	post	name	signature	date
designed	E/NT1-3	P. L. KAN	SIGNED	12/05
drawn	TO/2-1	O. Y. LEUNG	SIGNED	30.11.05
checked	E/NT1-3	P. L. KAN	SIGNED	12/05

approved

SIGNED
W.K. KWAN 12/05
Senior Engineer / NT1 Date

contract no.	HY/2005/16
file no.	HCW/RRD/N6
project no.	ND037

contract

CONSTRUCTION OF ACCESS ROADS AT LUNG MEI, TAI PO AND TSIU KENG, SHEUNG SHUI

drawing title

TSIU KENG - DRAINAGE LAYOUT

(SHEET 3 OF 3)

drawing no.	scale
HWDHY0516-DW0023-Z	1 : 500

office

WORKS DIVISION

HIGHWAYS DEPARTMENT HONG KONG

\STO_2\R2_05_01\HY\2005\16 Tsiu Keng, Sheung Shui\HWDHY0516-DW0023-Z.dgn B1 1000x707

KEY PLAN
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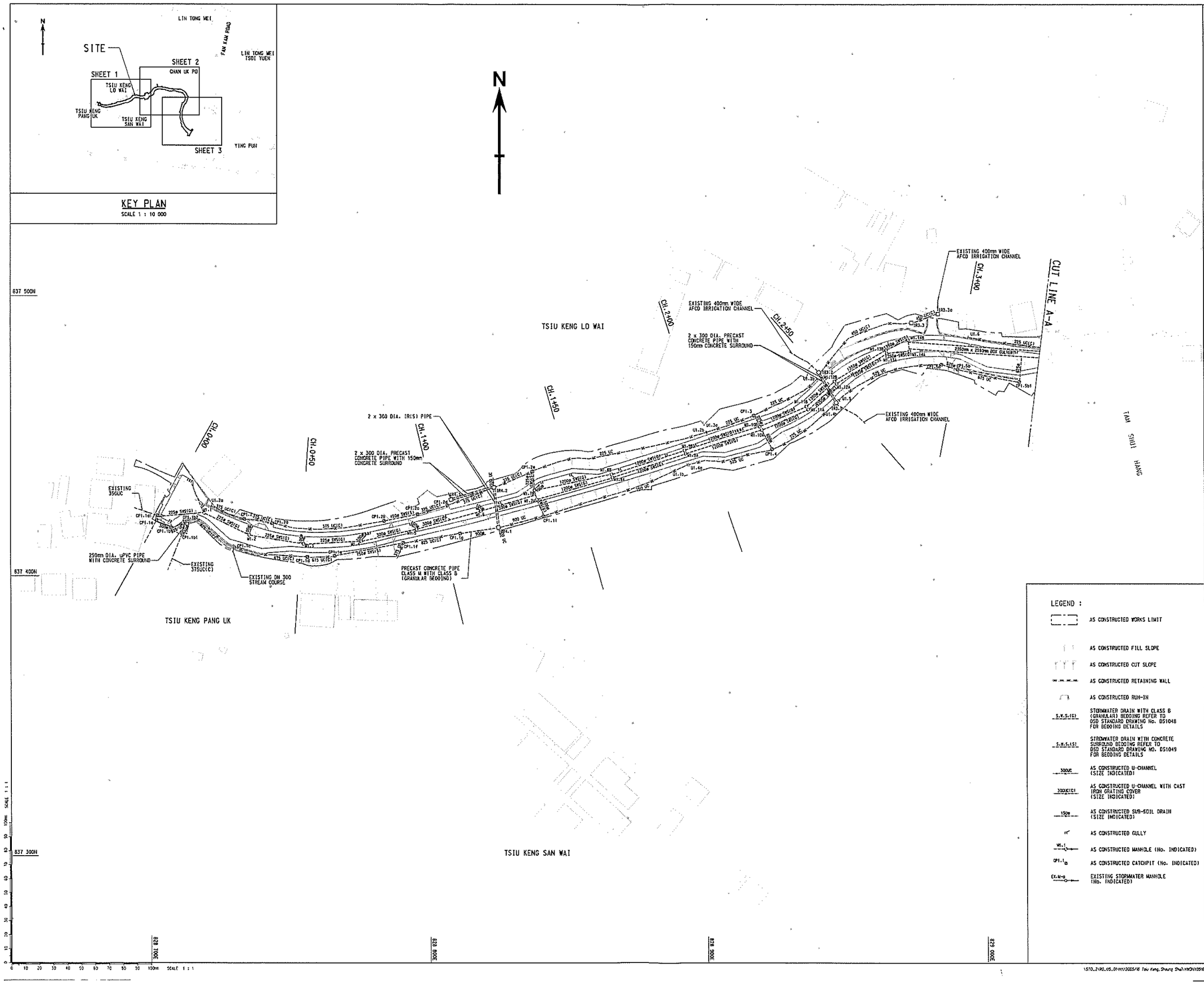
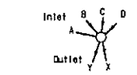


LEGEND :

- AS CONSTRUCTED WORKS LIMIT
- AS CONSTRUCTED FILL SLOPE
- AS CONSTRUCTED CUT SLOPE
- AS CONSTRUCTED RETAINING WALL
- AS CONSTRUCTED RUN-IN
- S.W.S.(C) — STORMWATER DRAIN WITH CLASS B (GRANULAR) BEDDING REFER TO DSD STANDARD DRAWING No. DS1048 FOR BEDDING DETAILS
- S.W.S.(S) — STORMWATER DRAIN WITH CONCRETE SURROUND BEDDING REFER TO DSD STANDARD DRAWING NO. DS1049 FOR BEDDING DETAILS
- 300UC — AS CONSTRUCTED U-CHANNEL (SIZE INDICATED)
- 300U(C)(C) — AS CONSTRUCTED U-CHANNEL WITH CAST IRON GRATING COVER (SIZE INDICATED)
- 150S — AS CONSTRUCTED SUB-SOIL DRAIN (SIZE INDICATED)
- AS CONSTRUCTED GULLY
- MH.1 — AS CONSTRUCTED MANHOLE (No. INDICATED)
- CP1.1 — AS CONSTRUCTED CATCHPIT (No. INDICATED)
- EX.M-0 — EXISTING STORMWATER MANHOLE (No. INDICATED)

NOTES:

1. ALL DIMENSIONS WERE IN MILLIMETRES.
2. ALL LEVELS WERE IN METRES ABOVE H.K.P.D.
3. DIMENSIONS WERE NOT TO BE SCALED OFF FROM DRAWING.
4. EXACT LEVELS AND DIMENSIONS WERE TO BE VERIFIED ON SITE AS DIRECTED BY THE ENGINEER.
5. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWINGS No. HWDHY0516-DW0022-Z & DW0023-Z.
6. MANHOLE AND CATCHPIT SCHEDULES REFER TO DRAWING No. HWDHY0516-DW0024-Z.
7. TYPICAL DRAINAGE DETAILS WERE SHOWN IN DRAWINGS No. HWDHY0516-DW0026-Z.
8. UNLESS OTHERWISE STATED, ALL OUTLET PIPES FROM GULLIES SHOULD BE 150mm DIAMETER WITH CONCRETE SURROUND.
9. KERB OVERFLOW WEIR TYPE SHOULD BE K1-45DY AND DETAILS SHOULD BE IN ACCORDANCE WITH RyD STANDARD DRAWING No. H3123.
10. FOR DIVERSION DETAILS OF IRRIGATION CHANNELS, REFER TO DRAWINGS No. HWDHY0516-DW0025-Z, DW0026-Z & DW0027-Z.
11. LABELLING FOR INVERT LEVELS AT MANHOLE / CATCHPIT FOLLOWED THE CLOCKWISE DIRECTION.



Appendix E7

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checked	E/NT1-3	P. L. KAN	SIGNED	12/05

approved

SIGNED.
W.K. KWAN — Senior Engineer / NT1 — 12/05 date

contract no.	HY/2005/16
file no.	HCW/RRD/N6
project no.	N0037

contract

CONSTRUCTION OF ACCESS ROADS AT LUNG MEI, TAI PO AND TSIU KENG, SHEUNG SHUI

drawing title

TSIU KENG - DRAINAGE LAYOUT

(SHEET 1 OF 3)

drawing no.	scale
HWDHY0516-DW0021-Z	1 : 500 OR AS SHOWN

office

WORKS DIVISION

HIGHWAYS DEPARTMENT HONG KONG

\510_2\N2_05_01-HY\2005\16 Tsiu Keng, Sheung Shui\HWDHY0516-DW0021-Z.dgn

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Appendix F

Registered Geotechnical Features

F1 Details of the identified features within or in the vicinity of the Agri-Park

F2 Slope Record for Feature No. 2SE-D/C168 (extracted from Slope Information System)

Drawing No.	Title
673995/GA/001 to 005	Registered Slope and Retaining Walls (Sheets 1 to 5)
673995/GA/006	Proximity of natural Terrain to Kwu Tung Agri-Park

Appendix F1: Summary of the identified features within or in the vicinity of the Agri-Park

No.	Feature No.	Slope Portion			Wall Portion			Crest Influence Zone[1] (m)	Travel Angle[2] (°)	Toe Influence Zone[3] (m)	Located within the Agri-Park (Yes/No)	Distance from Farmland (m)	Distance from the Proposed Infrastructure / Park Facilities (m)	Affect or be affected the Proposed Infrastructure / Park Facilities? (Yes / No)	Checking Status	Maintenance Party
		Height (m)	Length (m)	Average Angle (°)	Height (m)	Length (m)	Average Angle (°)									
1	2SE-D/C166	4.0	51	40	-	-	-	4.0	30	3	Yes	0	-	No	*	LandsD
2	2SE-D/CR167	2.5	40	20	1.5	40	90	4.0	30	3	Yes	0	-	No	*	LandsD
3	2SE-D/C168	5.0	90	50	-	-	-	5.0	20	9	Yes	0	0 (Road)	Yes	Feature was improved by prescriptive measures and the works were completed on 17 Apr 2015	LandsD
4	2SE-D/C169	3.0	45	35	-	-	-	3.0	30	2	Yes	0	60 (Road)	No	*	LandsD
5	2SE-D/C170	3.5	35	30	-	-	-	3.5	30	3	Yes	0	-	No	*	LandsD
6	2SE-D/C172	3.0	70	50	-	-	-	3.0	30	2	Yes	0	-	No	*	Mixed (Part 1: LandsD; Part 2: DD100 Lot46A)
7	2SE-D/CR178	3.5	28	45	1.5	18	90	5.0	30	4	Yes	0	-	No	*	LandsD
8	2SE-D/C196	4.0	45	50	-	-	-	4.0	30	3	Yes	0	60 (Road)	No	*	Private (DD100 Lot468)
9	2SE-D/C244	3.0	150	45	-	-	-	3.0	30	2	Yes	0	40 (Storage facilities & road)	No	*	Mixed (Part 1: DD100 Lot139; Part 2: LandsD)
10	2SE-D/C328	3.6	8	35	-	-	-	3.6	30	3	Yes	0	-	No	*	Mixed (Part 1: LandsD; Part 2: DD100 Lot1301; Part 3:DD100 Lot1314)
11	2SE-D/CR409	4.5	41	65	3.5	12	80	4.5	20	8	Yes	0	15 (Road)	No	*	LandsD
12	2SE-D/R47	-	-	-	3.5	74	86	3.5	30	3	Yes	0	-	No	*	LandsD
13	2SE-D/C38	3.0	15	45	-	-	-	3.0	30	2	No	30	-	No	*	LandsD
14	2SE-D/C46	4.5	60	65	-	-	-	4.5	20	8	No	45	-	No	*	LandsD
15	2SE-D/C47	6.0	20	50	-	-	-	6.0	20	10	No	15	-	No	*	LandsD
16	2SE-D/C84	4.0	30	60	-	-	-	4.0	30	3	No	45	-	No	*	LandsD
17	2SE-D/C85	4.0	25	55	-	-	-	4.0	30	3	No	90	-	No	*	LandsD
18	2SE-D/C87	3.0	25	50	-	-	-	3.0	30	2	No	40	-	No	*	LandsD
19	2SE-D/C193	3.0	44	40	-	-	-	3.0	30	2	No	0	-	No	*	Mixed (Part 1: DD98 Lot556; Part 2: LandsD)
20	2SE-D/C199	11.8	85	45	-	-	-	11.8	20	21	No	15	-	No	*	LandsD
21	2SE-D/C220	9.0	32	40	-	-	-	9.0	20	16	No	15	-	No	*	LandsD
22	2SE-D/C224	3.7	20	60	-	-	-	3.7	30	3	No	45	-	No	*	LandsD
23	2SE-D/C225	4.5	34	50	-	-	-	4.5	20	8	No	5	-	No	*	LandsD
24	2SE-D/C410	3.0	15	50	-	-	-	3.0	30	2	No	30	-	No	*	LandsD
25	2SE-D/C448	3.5	156	30	-	-	-	3.5	30	3	No	0 (Crest)	-	No	*	DSD
26	2SE-D/CR450	4.0	140	26	1.6	10	90	4.0	30	3	No	5 (Crest)	-	No	*	DSD
27	2SE-D/DT5	24.0	105	20	-	-	-	24.0	20	42	No	5	-	No	*	LandsD
28	2SE-D/F55	5.0	42	45	-	-	-	5.0	20	9	No	15	-	No	*	LandsD
29	2SE-D/FR3	4.0	55	45	1	35	85	4.0	20	7	No	0	-	No	*	HyD

Remarks:
(1) Crest Influence zone = Height of Feature
(2) Travel angles are referred to extreme cases of Clause 5.2.2 of GEO Technical Guidance Note No. 15 (TGN 15)
(3) Toe Influence zone = Height of Feature / tan (Travel angle) - Crest Influence Zone
* Checking status of the features that are not affected or vice versa by the project is not presented here.

BASIC INFORMATION

Location:	Hang Tau, Sheung Shui
SIFT Ref.:	2SE-14D/S 5
First Registration Date:	02-Dec-1997
Ranking Score (NPRS):	1 (LPMit)
Sift Class:	C1
Data Source:	EI
Approximate Coordinates:	Easting: 828085 Northing: 838849

CONSEQUENCE-TO-LIFE CATEGORY

Facility at Crest:	Road/footpath with very low traffic density
Distance of Facility from Crest (m):	0
Facility at Toe:	Cottage, licensed and squatter area
Distance of Facility from Toe (m):	1
Consequence-to-life Category:	1
Remarks:	N/A

SLOPE PART

(1) Max. Height (m): 5 Length (m): 90 Average Angle (deg): 50

WALL PART

N/A

MAINTENANCE RESPONSIBILITY

(1) Sub Div.: 0 Government Feature Party: Lands D Agent: Lands D Land Cat.: 5b(vi) Reason Code: 62 MR Endorsement Date: 03-Nov-1998

DETAILS OF SLOPE / RETAINING WALL

Date of Inspection: 24-Oct-2001
Data Source: EI
Slope Part Drainage: (1) Position: Toe Size(mm): 201

Wall Part Drainage: N/A

SLOPE PART

Slope Part (1)
Surface Protection (%): Bare: 0 Vegetated: 100 Chunam: 0 Shotcrete: 0 Other Cover: 0
Material Description: Material type: Soil Geology: Other geology
Berm: No. of Berms: N/A Min. Berm Width (m): N/A
Weepholes: Size (mm): N/A Spacing (m): N/A

WALL PART

N/A

SERVICES

(1) Utilities Type: Water Main Size(mm): 80 Location: On crest Remark: N/A

CHECKING STATUS INFORMATION

N/A

BACKGROUND INFORMATION

GIU Cell Ref.:	2SE14D2
Map Sheet Reference (1:1000):	2SE-14D
Aerial Photos:	Photo Number (Year) Y10045 (1963) Y10046 (1963)
Nearest Rainguage Station (Station Number):	Sheung Shui Water Treatment Plant, Fu Tei Au Road (N34)
Data Collected On:	24-Oct-2001
Date of Construction, Subsequent Modification and Demolition:	Modification: Constructed Before: 1963 After: N/A Modification: Constructed Before: 1963 After: N/A
Related Reports/Files or Documents:	N/A
Remarks:	N/A
Follow Up Actions:	N/A

DH-Order (To Be Confirmed with Buildings Department): None

Advisory Letter (To Be Confirmed with Buildings Department): None

LPMIS: None

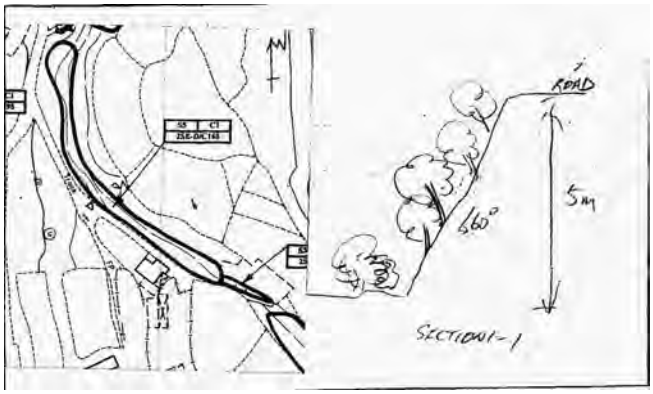
ENHANCED MAINTENANCE INFORMATION

From Maintenance Department: (Last Updated Date: 12-Nov-2013)
Upgraded by:
- Prescriptive Design Using GEO Report No. 56: N/A
- Non-prescriptive Design Including Conventional Design: N/A

Improved by:
- Type 1 / Type 2 Prescriptive Measures: Yes
- Type 3 Prescriptive Measures (not up to upgrading standard): Yes
- Actual Completion Date: 17-Apr-2015

STAGE 1 STUDY REPORT

Inspected On: 23-Sep-1997
Weather: Mainly Fine
District: MW



Section No: 1-1
Height(m): H1: 5 H2: 0
Type of Toe Facility: Cottage, licensed and squatter area

Distance from Toe(m): 1
Type of Crest Facility: Road/footpath with very low traffic density

Distance from Crest(m): 0
Consequence Category: 3
Engineering Judgement: P

Section No: 2-2
Type of Toe Facility: N/A

Distance from Toe(m): 0
Type of Crest Facility: N/A

Distance from Crest(m): 0
Consequence Category: 3
Engineering Judgement: P

Sign of Seepage:	Slope: No signs of seepage Wall: N/A
Criterion A satisfied:	N
Sign of Distress:	Slope: None
Criterion D satisfied:	N
Non-routine maintenance required:	N
Note:	N/A
Masonry wall/Masonry facing:	N
Note:	N/A
Consequence category (for critical section):	3
Observations:	N/A
Emergency Action Required:	N
Action By:	N/A

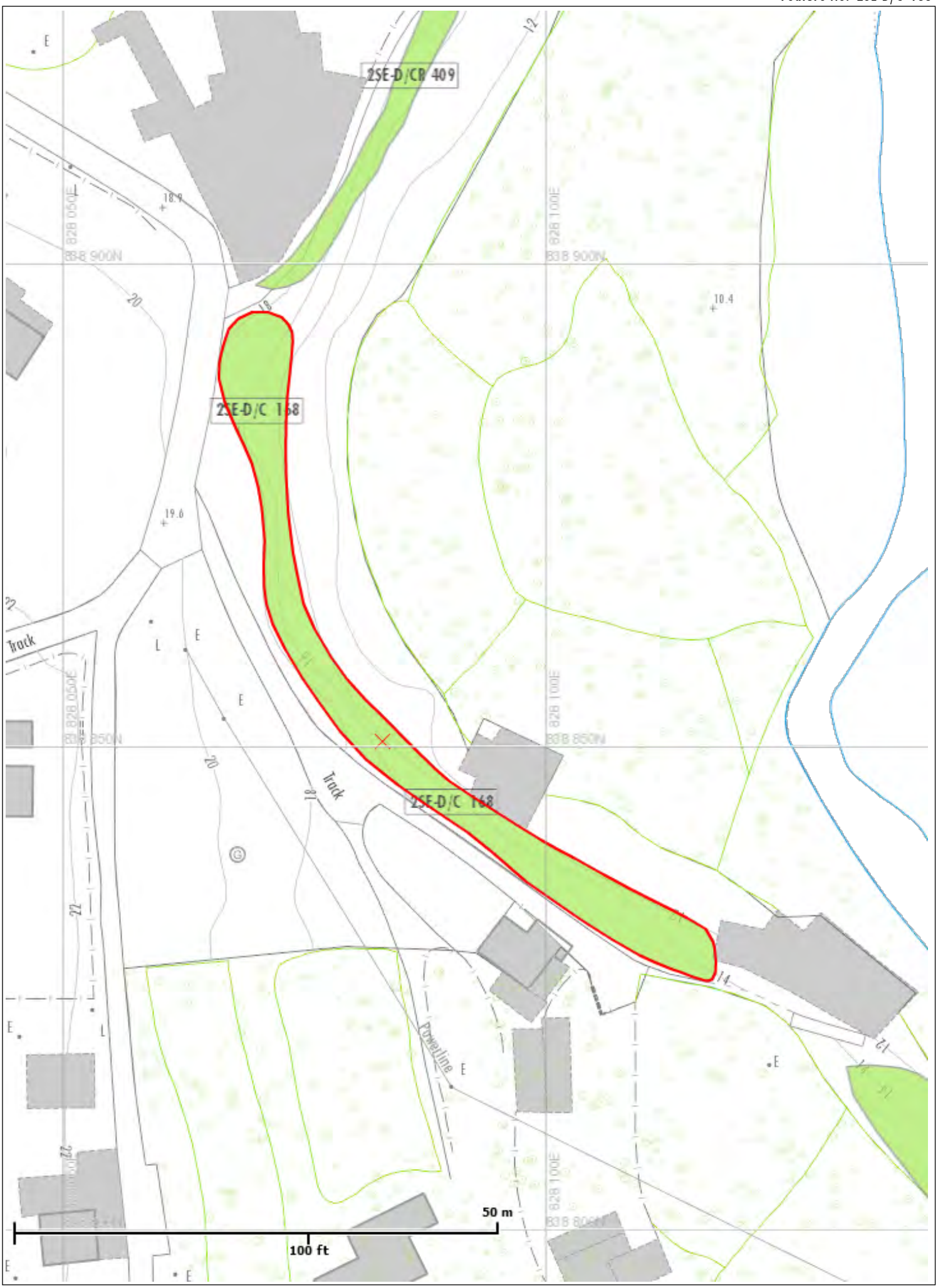
ACTION TO INITIATE PREVENTIVE WORKS

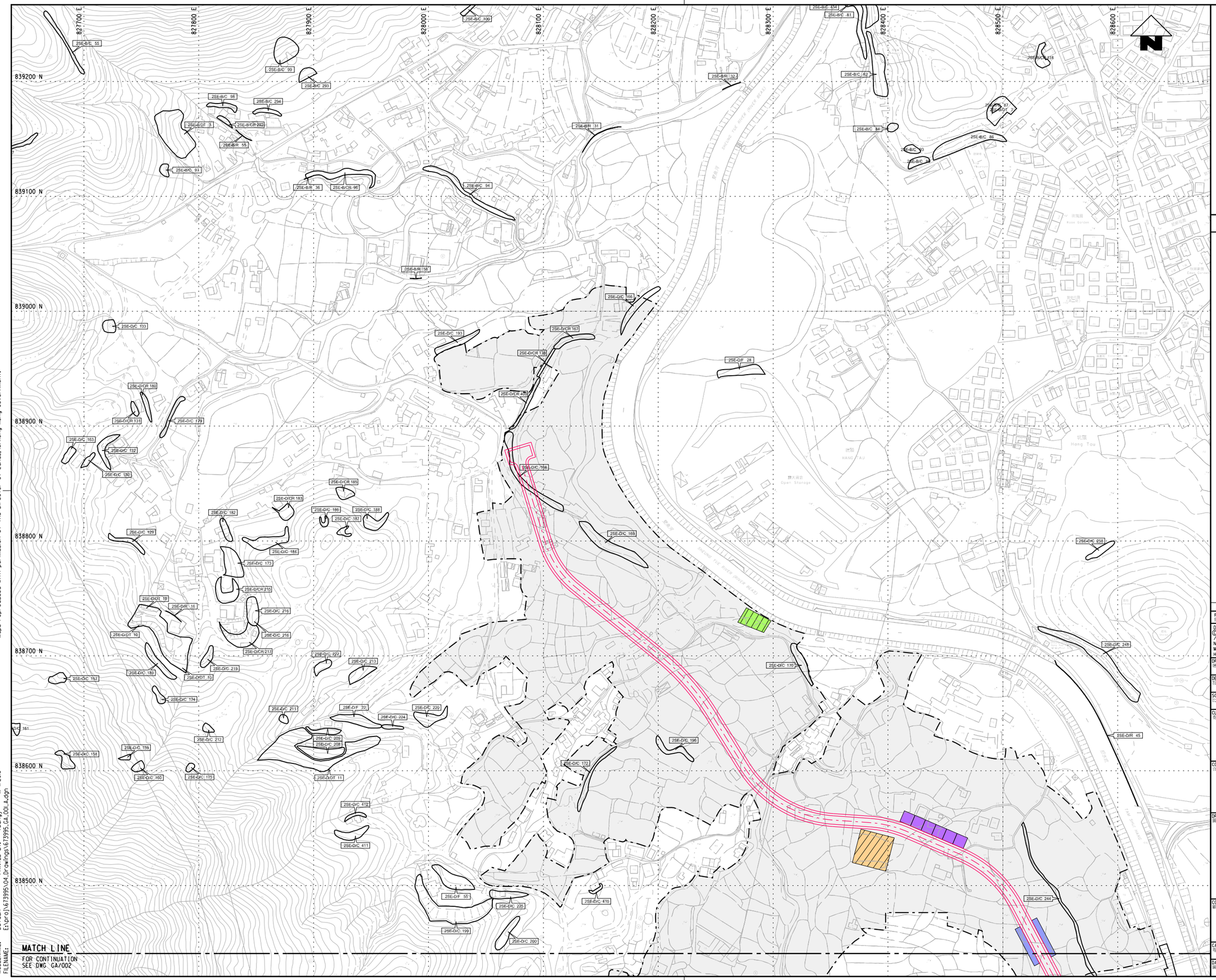
Criterion A/Criterion D:	N/A
Action By:	N/A
Further Study:	Y
Action By:	Private and Government

OTHER EXTERNAL ACTION

Check / repair Services:	N
Action By:	N/A
Non-routine Maintenance:	N
Action By:	N/A

PHOTO


2SE-D/CR 409
2SE-D/C 168
2SE-D/C 168
Track
Track
Powerline
50 m
100 ft



KEY LOCATION PLAN

LEGEND :

- REGISTERED SLOPE IN VICINITY
- PROPOSED AGRICULTURAL PARK
- 2SE-D/C 268 — REGISTERED FEATURE NUMBER
- REGISTERED RETAINING WALL

MATCH LINE
FOR CONTINUATION
SEE DWG GA/002

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 複核	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	29APR16	EL

DRAWN BY: 繪圖 VICTOR TSANG	CHECKED BY: 複核 MABLE LEUNG
DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:3000 @ A3	DATE: 日期 29APR2016

CLIENT: 委託人
CEDD 土木工程拓展署 Civil Engineering and Development Department

CONTRACT: 合約
AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖標題
REGISTERED SLOPE AND RETAINING WALLS
(SHEET 1 OF 5)

CONSULTANT: 顧問 ch2m.

CAD FILE: 電腦圖檔案 673995_GA_001_A.DGN

DRAWING NO.: 圖號 673995/GA/001 REV.: 修訂 A

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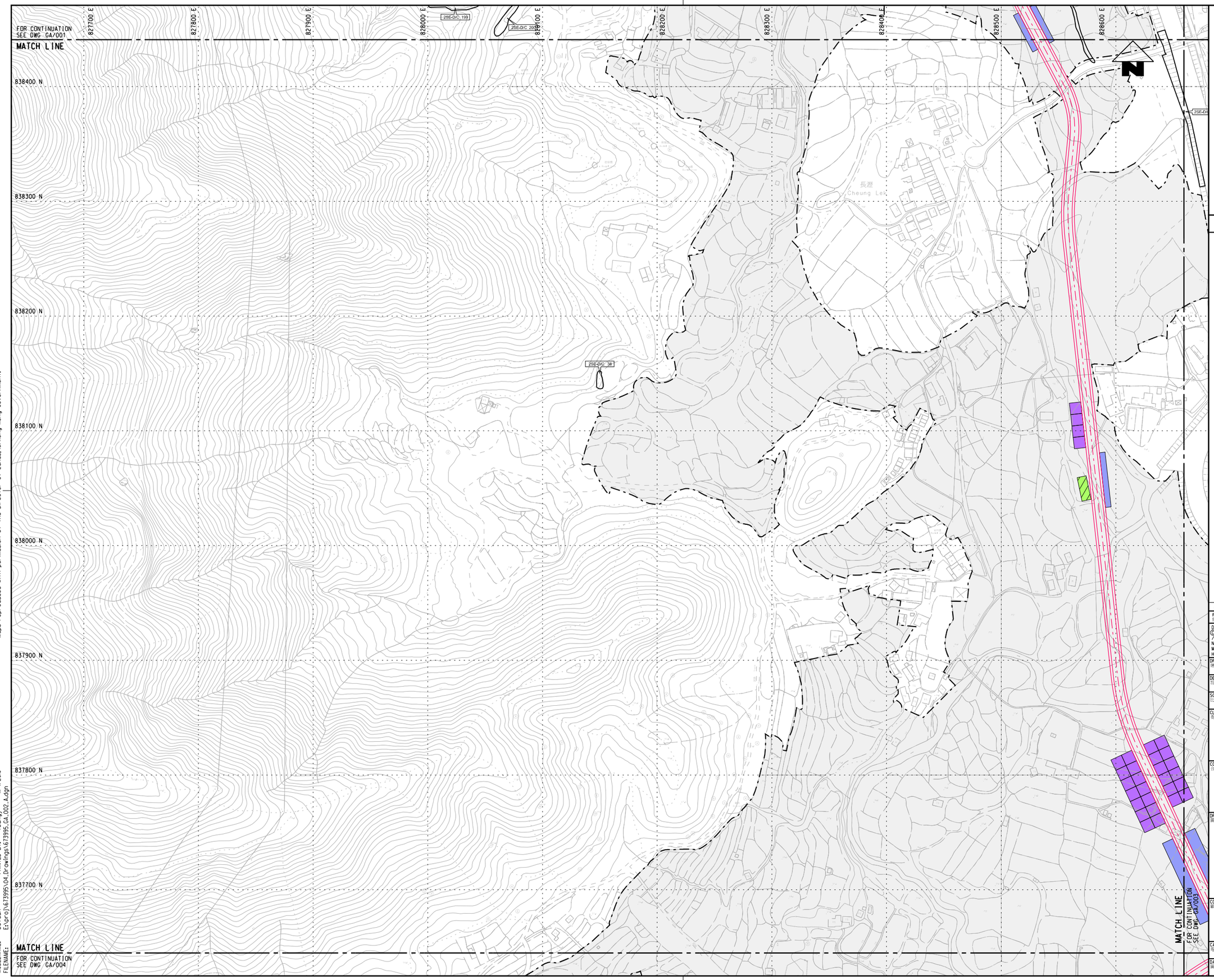
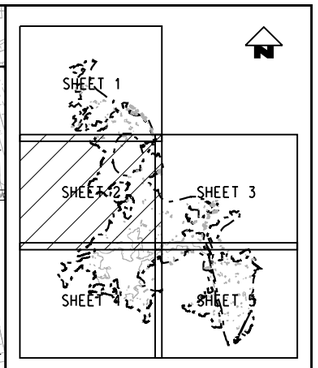
11/4/2016





KEY LOCATION PLAN

LEGEND :

- REGISTERED SLOPE IN VICINITY
- PROPOSED AGRICULTURAL PARK
- 2SE-D/C 268 — REGISTERED FEATURE NUMBER
- REGISTERED RETAINING WALL

0 30 60 90 120 150
METRES
1 : 3000

REV. 修訂	DESCRIPTION 內容/摘要	CHECKED 核對	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	29APR16	EL

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DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:3000 @ A3	DATE: 日期 29APR2016

CLIENT: 委託人
土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合約
AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK
FEASIBILITY STUDY

DRAWING TITLE: 圖樣名
REGISTERED SLOPE AND RETAINING WALLS (SHEET 2 OF 5)

CONSULTANT: 顧問
ch2m.

CAD FILE: 電腦圖檔案 673995_GA_002_A.DGN

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REV.: 修訂 A

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11/4/2016

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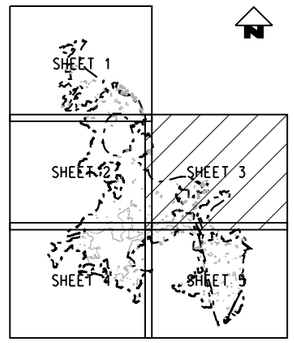
11/4/2016



KEY LOCATION PLAN

LEGEND :

- REGISTERED SLOPE IN VICINITY
- PROPOSED AGRICULTURAL PARK
- 2SE-D/C 268 — REGISTERED FEATURE NUMBER
- REGISTERED RETAINING WALL

0 30 60 90 120 150
METRES
1 : 3000

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 核查	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	29APR16	EL

DRAWN BY: 繪圖	VICTOR TSANG	CHECKED BY: 複核	MABLE LEUNG
DESIGNED BY: 設計	SHIRLEY KWOK	APPROVED BY: 批准	ERIC LI
SCALE: 比例	1:3000 @ A3	DATE: 日期	29APR2016

CLIENT: 委託人
CEDD 土木工程拓展署 Civil Engineering and Development Department

CONTRACT: 合約
AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖標題
REGISTERED SLOPE AND RETAINING WALLS (SHEET 3 OF 5)

CONSULTANT: 顧問
ch2m.

CAD FILE: 電腦圖檔案 673995_GA_03_A.DGN

DRAWING NO.: 圖號 673995/GA/003 REV.: 修訂 A

FOR CONTINUATION
SEE DWG GA/002

MATCH LINE

827700 E | 827800 E | 827900 E | 828000 E | 828100 E | 828200 E | 828300 E | 828400 E | 828500 E | 828600 E

837600 N
837500 N
837400 N
837300 N
837200 N
837100 N
837000 N
836900 N

TSIU KENG

2SE-D/C 46
2SE-D/C 47
2SE-D/C 84
2SE-D/C 88
2SE-D/C 87
2SE-D/C 85
2SE-D/DT 6
2SE-D/DT 5
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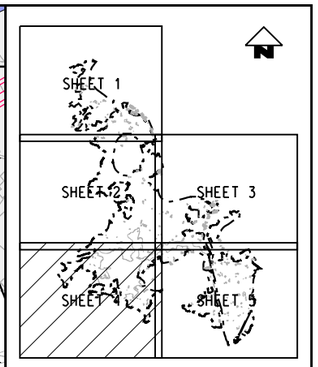
2SE-D/C 462
2SE-D/DT 12
2SE-D/DT 327

MATCH LINE
FOR CONTINUATION
SEE DWG GA/005



KEY LOCATION PLAN

LEGEND :

- REGISTERED SLOPE IN VICINITY
- PROPOSED AGRICULTURAL PARK
- 2SE-D/C 268 — REGISTERED FEATURE NUMBER
- REGISTERED RETAINING WALL

0 30 60 90 120 150
METRES
1 : 3000

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 複核	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	29APR16	EL

DRAWN BY: 繪圖 VICTOR TSANG	CHECKED BY: 複核 MABLE LEUNG
DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:3000 @ A3	DATE: 日期 29APR2016

CLIENT: 委託人
土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合約
AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK FEASIBILITY STUDY

DRAWING TITLE: 圖標題
REGISTERED SLOPE AND RETAINING WALLS (SHEET 4 OF 5)

CONSULTANT: 顧問
ch2m SM

CAD FILE: 電腦圖檔案 673995_GA_004_A.DGN

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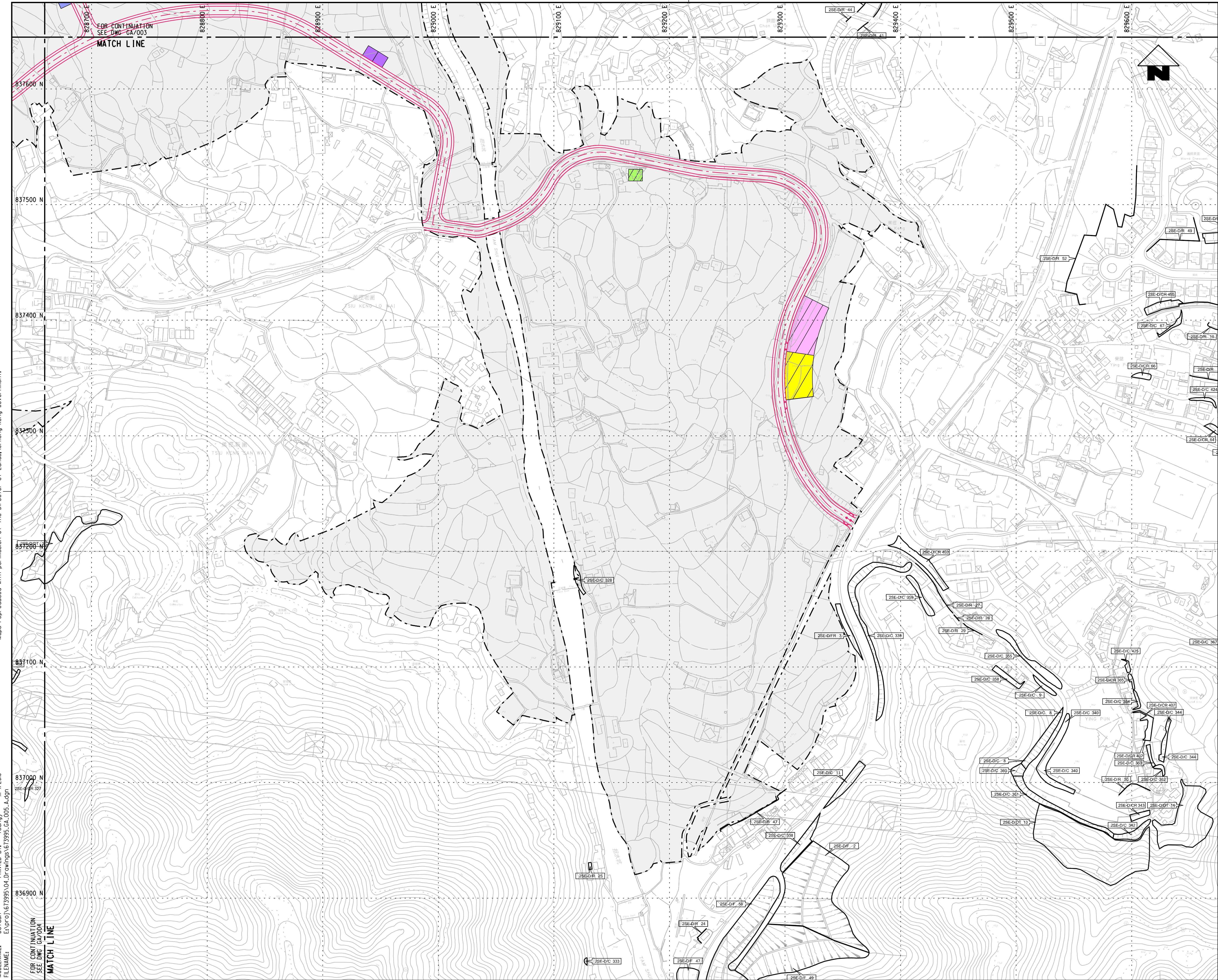

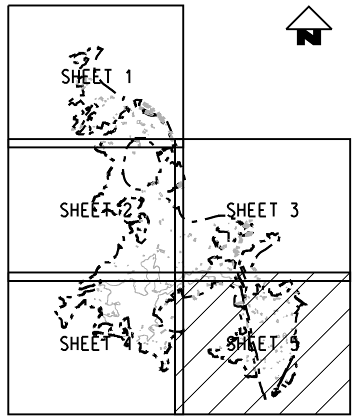

KEY LOCATION PLAN

LEGEND :

REGISTERED SLOPE IN VICINITY

PROPOSED AGRICULTURAL PARK

2SE-D/C 268 REGISTERED FEATURE NUMBER

REGISTERED RETAINING WALL

0 30 60 90 120 150
METRES
1 : 3000

REV. 修訂	DESCRIPTION 內容摘要	CHECKED 複核	DATE 日期	APPROVED 批准
A1	1st ISSUE	ML	29APR16	EL

DRAWN BY: 繪圖 VICTOR TSANG	CHECKED BY: 複核 MABLE LEUNG
DESIGNED BY: 設計 SHIRLEY KWOK	APPROVED BY: 批准 ERIC LI
SCALE: 比例 1:3000 @ A3	DATE: 日期 29APR2016

CLIENT: 委託人
土木工程拓展署
Civil Engineering and Development Department

CONTRACT: 合約
AGREEMENT NO. NTE/01/2016
ENGINEERING FEASIBILITY STUDY FOR THE ESTABLISHMENT OF AN AGRICULTURAL PARK
FEASIBILITY STUDY

DRAWING TITLE: 圖標題

REGISTERED SLOPE AND RETAINING WALLS

(SHEET 5 OF 5)

CONSULTANT: 顧問
ch2m

CAD FILE: 電腦圖檔案 673995_GA_005_A.DGN

DARWING NO.: 圖號 673995/GA/005 REV.: 修訂 A

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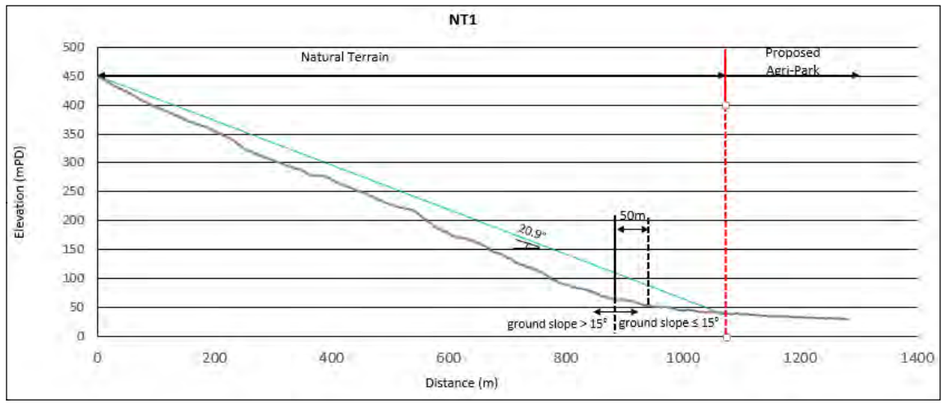
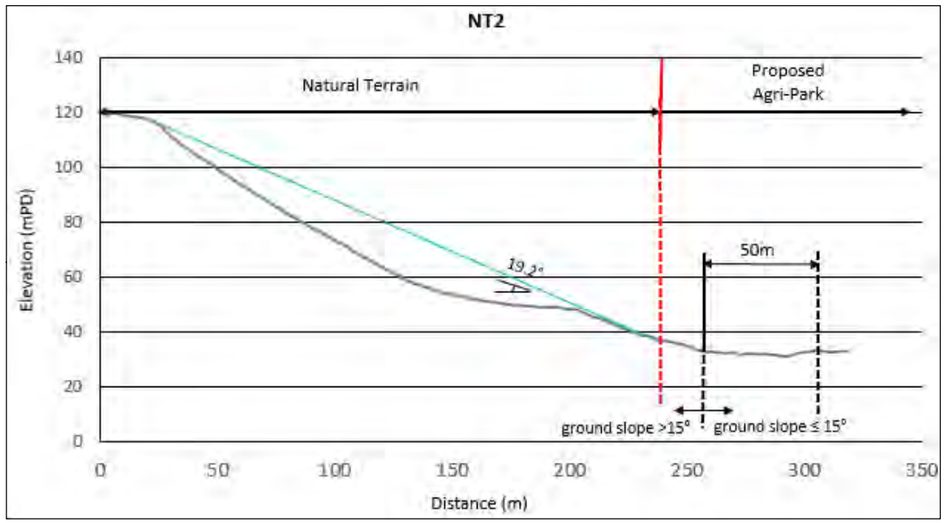
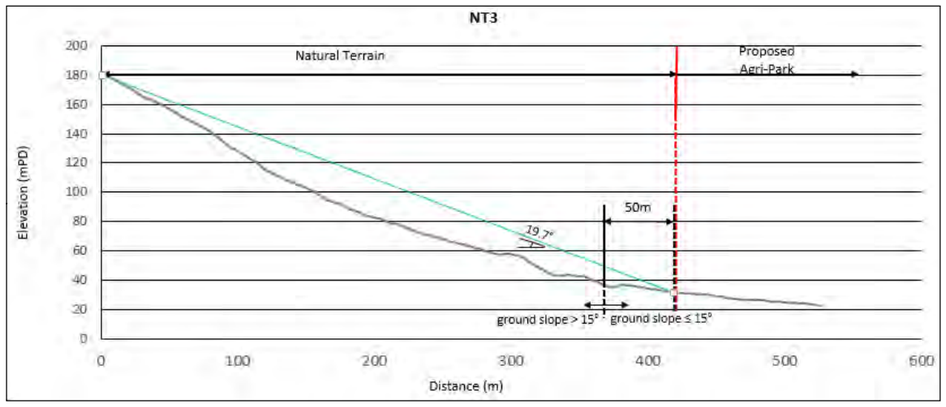
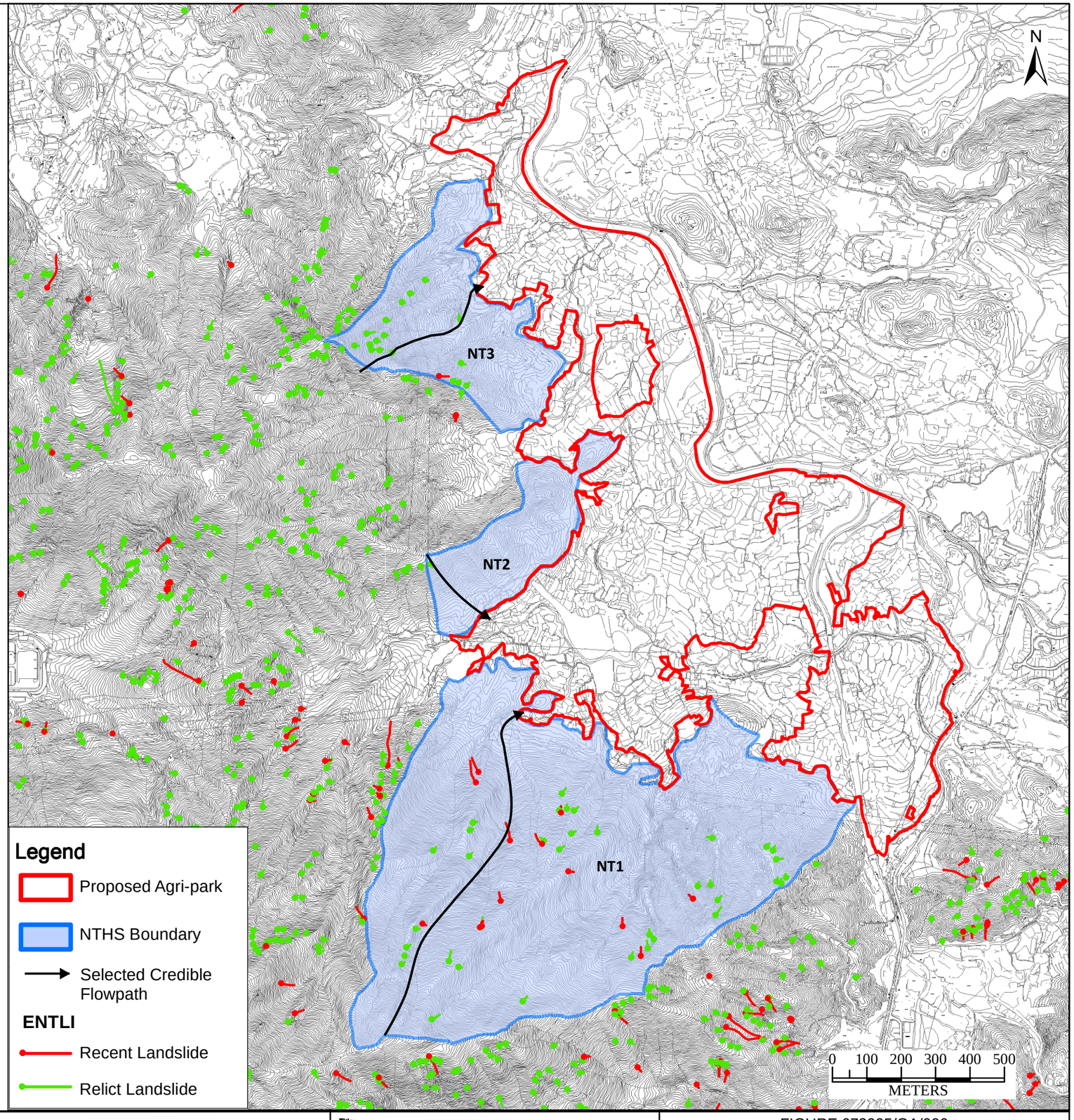
Angular Elevation from Natural Terrain to the Proposed Agri-Park









Client: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Consultant: ch2m	Contract: Agreement No. NTE/01/2016 Engineering Feasibility Study For The Establishment of an Agricultural Park - Feasibility Study	Title: Proximity of Natural Terrain to Kwu Tung Agri-park	FIGURE 673995/GA/006

Checked By	Scale	Rev.
DY	1:12,500@ A3	0
Designed By	**Drawn By**	**Date**
XS	XS	29/04/2016

Appendix G

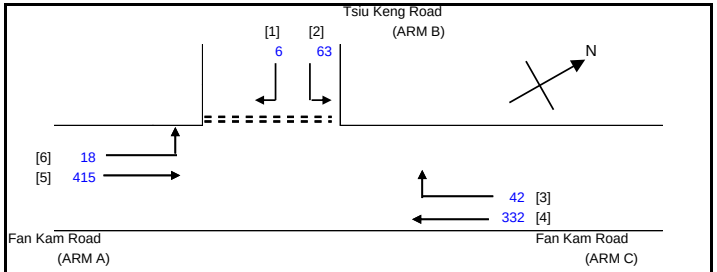
Traffic Data Records

G1 Traffic Count Data & Preliminary Junction Capacity Check

G2 Data Sheet of Station 6212 (ATC 2015)

Appendix G1: Traffic Count Data & Preliminary Junction Capacity Check

OZZO TECHNOLOGY (HK) LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
FS for the Establishment of an Agricultural Park	**2016 AM Peak**	PROJECT NO.: 80920	PREPARED BY:	NK	Nov-16
J1 : Junction of Fan Kam Road / Tsiu Keng Road		FILENAME : anKamRdTsuiKengRd_P.xls	CHECKED BY:		
2016 AM Peak Hour Traffic Flows			REVIEWED BY:		



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	6.40	(metres)
W cr	=	0	(metres)
q a-b	=	18	(pcu/hr)
q a-c	=	415	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	3.20	(metres)
Vr c-b	=	80	(metres)
q c-a	=	331.5	(pcu/hr)
q c-b	=	41.5	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.30	(metres)
W b-c	=	3.30	(metres)
Vl b-a	=	120	(metres)
Vr b-a	=	100	(metres)
Vr b-c	=	100	(metres)
q b-a	=	6	(pcu/hr)
q b-c	=	63	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.9325977
E	=	0.9496922
F	=	0.9232228
Y	=	0.7792

THE CAPACITY OF MOVEMENT :

Q b-a	=	402			
Q b-c	=	594	Q b-c (O) =	591.8	
Q c-b	=	575			

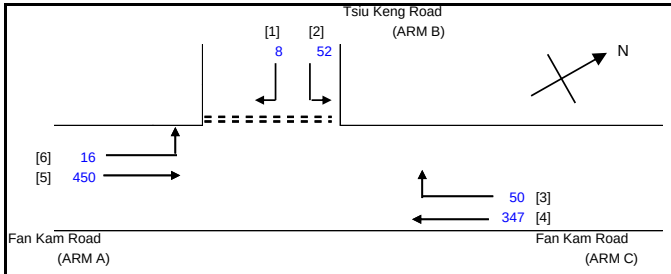
TOTAL FLOW = 874 (PCU/HR)

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.0149
DFC b-c	=	0.1061
DFC c-b	=	0.0722

CRITICAL DFC = 0.11

OZZO TECHNOLOGY (HK) LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
FS for the Establishment of an Agricultural Park	**2016 PM Peak**	PROJECT NO.: 80920	PREPARED BY:	NK	Nov-16
J1 : Junction of Fan Kam Road / Tsiu Keng Road		FILENAME : anKamRdTsuiKengRd_P.xls	CHECKED BY:		
2016 PM Peak Hour Traffic Flows			REVIEWED BY:		



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	6.40	(metres)
W cr	=	0	(metres)
q a-b	=	16	(pcu/hr)
q a-c	=	450	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	3.20	(metres)
Vr c-b	=	80	(metres)
q c-a	=	346.5	(pcu/hr)
q c-b	=	49.5	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.30	(metres)
W b-c	=	3.30	(metres)
Vl b-a	=	120	(metres)
Vr b-a	=	100	(metres)
Vr b-c	=	100	(metres)
q b-a	=	8	(pcu/hr)
q b-c	=	52	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.9325977
E	=	0.9496922
F	=	0.9232228
Y	=	0.7792

THE CAPACITY OF MOVEMENT :

Q b-a	=	388			
Q b-c	=	585	Q b-c (O) =	582	
Q c-b	=	566			

TOTAL FLOW = 920.5 (PCU/HR)

COMPARISION OF DESIGN FLOW TO CAPACITY:

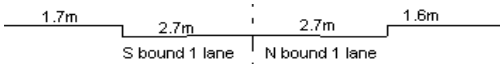
DFC b-a	=	0.0206
DFC b-c	=	0.0880
DFC c-b	=	0.0875

CRITICAL DFC = 0.09

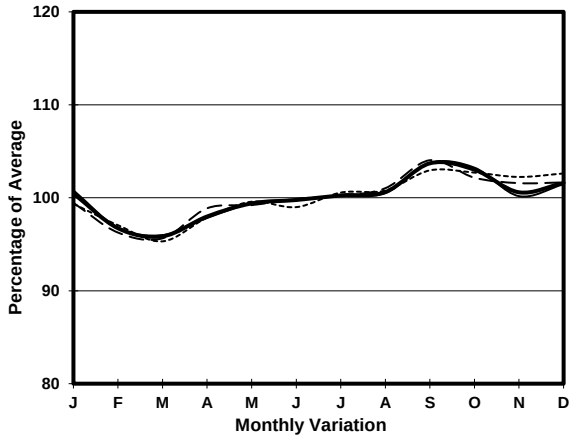
Appendix G2: Data Sheet of Station 6212

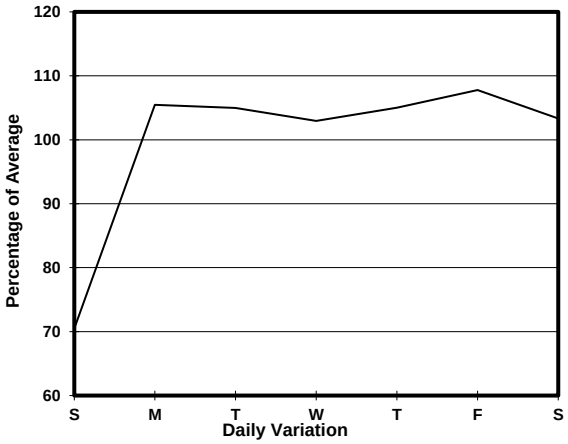
YEAR 2014 **LINK** FAN KAM RD (from KAM TIN RD to CASTLE PEAK RD)

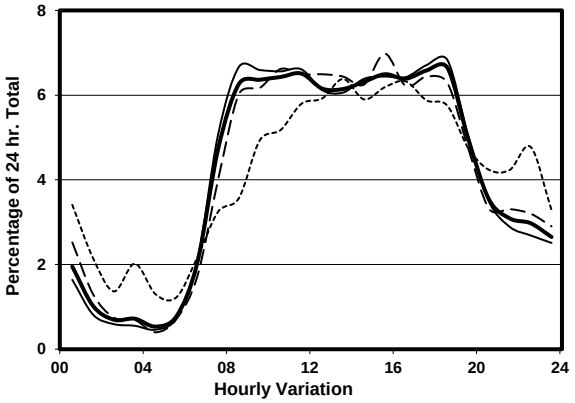
COVERAGE (B) STATION 6212
ROAD NETWORK MAJOR
ROAD TYPE RURAL ROAD

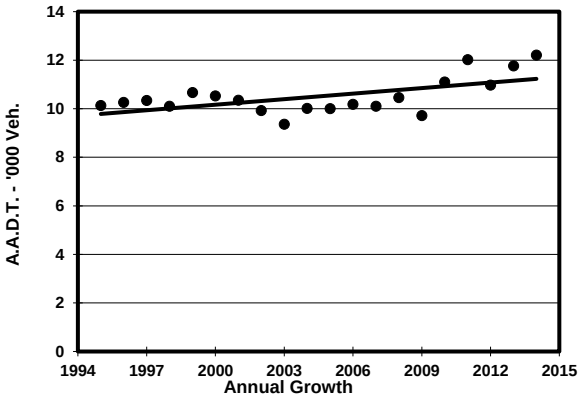


1. TRAFFIC FLOW VARIATION AND GROWTH









All day Mon.- Fri. Sat. Sun.

2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

Parameter	All - Day	Mon. - Fri.	Sat.	Sun.
SOUTH BOUND				
A.A.D.T.	6390	6880	6270	4790
R 12 / 24 - %	75.2	76	74.2	70.1
R 16 / 24 - %	90	90.4	90.1	86.6
AM Peak Hour	0800-0900	0800-0900	0800-0900	0900-1000
One-way flow at AM peak hour	410	450	460	240
T - % (AM)	-	8.9	-	-
PM Peak Hour	1800-1900	1800-1900	1800-1900	1700-1800
One-way flow at PM peak hour	420	460	400	330
T - % (PM)	-	4.2	-	-
Prop.of commercial vehicles - 16 hr.	-	9.2	-	-
NORTH BOUND				
A.A.D.T.	5820	6180	6560	3950
R 12 / 24 - %	74.9	77	74.7	59
R 16 / 24 - %	89.1	90.8	88	78.9
AM Peak Hour	0900-1000	0900-1000	0900-1000	0900-1000
One-way flow at AM peak hour	400	450	430	200
T - % (AM)	-	11.2	-	-
PM Peak Hour	1700-1800	1700-1800	1700-1800	1600-1700
One-way flow at PM peak hour	410	450	450	230
T - % (PM)	-	9.5	-	-
Prop.of commercial vehicles - 16 hr.	-	10	-	-

3. OTHER INFORMATION AND COMMENT

4. Vehicle classification and occupancy - Monday to Friday

Time		Class of vehicle									
		Motor Cycle	Private Car	Taxi	Private LB	PLB	Goods veh.		Non Fr. Bus	Fr. Bus	
							Light	M & H		SD	DD
0700-0800	Pro	5.3	32.0	10.7	2.1	8.5	20.3	14.9	4.3	0.5	1.3
	Ocp	1.0	1.3	1.5	4.5	11.4	1.7	1.1	14.5	20.5	59.2
0800-0900	Pro	2.1	38.2	13.5	3.5	5.0	26.2	9.9	0.7	0.4	0.5
	Ocp	1.0	1.3	1.4	8.4	13.6	1.5	1.4	20.0	39.5	28.0
0900-1000	Pro	1.3	45.2	18.1	0.6	4.5	19.4	9.7	0.0	0.5	0.6
	Ocp	1.0	1.3	2.1	1.0	7.6	1.4	1.0	0.0	21.0	15.8
1000-1100	Pro	0.7	43.1	10.1	2.2	5.7	28.0	7.9	1.4	0.4	0.5
	Ocp	1.0	1.2	1.6	2.0	9.0	1.4	1.3	1.0	11.5	14.3
1100-1200	Pro	0.0	44.4	10.7	0.8	3.8	22.2	15.3	1.5	0.6	0.6
	Ocp	0.0	1.2	1.4	2.0	6.8	1.1	1.2	1.5	19.7	4.3
1200-1300	Pro	2.1	45.6	9.8	2.1	3.5	24.6	10.5	0.7	0.5	0.5
	Ocp	1.0	1.4	1.0	5.0	10.4	1.5	1.0	1.0	7.3	14.3
1300-1400	Pro	0.7	43.9	14.2	0.0	2.8	25.5	11.3	0.7	0.4	0.5
	Ocp	1.0	1.3	1.5	0.0	9.5	1.5	1.1	7.0	17.0	18.3
1400-1500	Pro	0.0	39.4	12.7	0.6	1.3	34.9	9.5	0.6	0.5	0.5
	Ocp	0.0	1.5	2.2	1.0	16.5	1.6	1.1	1.0	10.3	16.0
1500-1600	Pro	0.0	39.4	13.6	0.7	2.1	37.2	5.0	0.7	0.5	0.7
	Ocp	0.0	1.3	1.5	5.0	9.3	1.4	1.1	1.0	16.3	9.8
1600-1700	Pro	1.3	50.5	11.3	2.0	2.7	25.3	5.3	0.7	0.3	0.7
	Ocp	1.0	1.4	1.4	6.7	11.5	1.4	1.1	1.0	23.0	24.3
1700-1800	Pro	1.9	52.1	10.5	4.3	1.9	21.1	7.4	0.0	0.3	0.5
	Ocp	1.0	1.3	1.6	1.7	17.0	1.5	1.0	0.0	31.5	26.7
1800-1900	Pro	0.5	68.5	13.2	0.0	3.3	8.8	3.8	1.1	0.3	0.5
Peak hour	Ocp	1.0	1.4	1.7	0.0	15.3	1.4	1.0	18.0	25.5	43.0
1900-2000	Pro	3.3	61.9	10.0	0.0	7.5	15.1	0.0	0.8	0.6	0.6
	Ocp	1.0	1.4	1.5	0.0	8.3	1.2	0.0	13.0	32.7	10.7
2000-2100	Pro	0.9	59.7	17.2	0.0	3.6	13.6	3.6	0.0	0.5	0.9
	Ocp	2.0	1.4	1.4	0.0	8.0	1.3	1.0	0.0	9.5	16.8
2100-2200	Pro	0.0	50.3	28.1	0.0	9.4	8.2	2.3	0.0	0.3	1.5
	Ocp	0.0	1.4	1.5	0.0	6.8	1.1	1.0	0.0	13.0	9.4
2200-2300	Pro	4.2	53.1	23.8	0.0	5.6	7.0	4.2	0.0	0.7	1.4
	Ocp	1.0	1.2	1.6	0.0	5.5	1.4	1.0	0.0	13.0	12.0
16 hours	Pro	1.4	48.2	13.6	1.3	4.1	21.9	7.7	0.8	0.4	0.7
	Ocp	1.0	1.3	1.6	4.2	10.0	1.5	1.1	8.4	19.4	21.2

Legend

Pro. Proportion of vehicles in % (Sum may not add up to 100% due to figure rounding)
Ocp. Average occupancy of vehicles
M&H Medium and Heavy