

Appendix F

Water Supply Impact Assessment

Hong Kong International Innovation and
Technology Hub Limited

**S12A Planning Application for
Proposed Innovation and
Technology Hub at Various Lots
in D.D. 82 and D.D. 86 and
Adjoining Government Land,
Man Kam To, New Territories**

Water Supply Impact Assessment

This report takes into account the particular
instructions and requirements of our client.

It is not intended for and should not be relied
upon by any third party and no responsibility
is undertaken to any third party.

Job number

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1 Introduction

1.1 Background

- 1.1.1 The Applicant proposes amendments to the Approved Man Kam To Outline Zoning Plan No. S/NE-MKT/4 (“the OZP”) by rezoning the Application Site from “Agriculture” (“AGR”), “Green Belt” (“GB”) and “Government, Institution or Community” (“G/IC”) to a tailor-made “Other Specified Uses” (“OU”) annotated “Innovation and Technology Hub”, with a maximum non-domestic gross floor area (GFA) of 365,180 m² and a maximum domestic GFA of 170,400 m² (including dormitory) and maximum building heights (BH) of 80, 90, 110 and 120 meters above principal datum (mPD) for four sub-areas respectively, to facilitate the development of the proposed Innovation and Technology (I&T) Hub.

Currently, the Application Site is largely vacant with vegetation and inactive farmland, and covers a portion of the access road from Lin Ma Hang Road leading to the existing River Ganges Pumping Station.

The Application Site, with a site area of about 125,863 m², is located at Man Kam To in the North District. It is on a gentle sloping from site level of about 6mPD near Ping Yuen River to 25mPD near the eastern foot of Lo Shue Ling. The Application Site includes the Development Site (of an area about 102,461 m²) and remaining land parcels adjoining the development site for better rationalisation of boundary and land use zoning.

1.2 Purpose of this Report

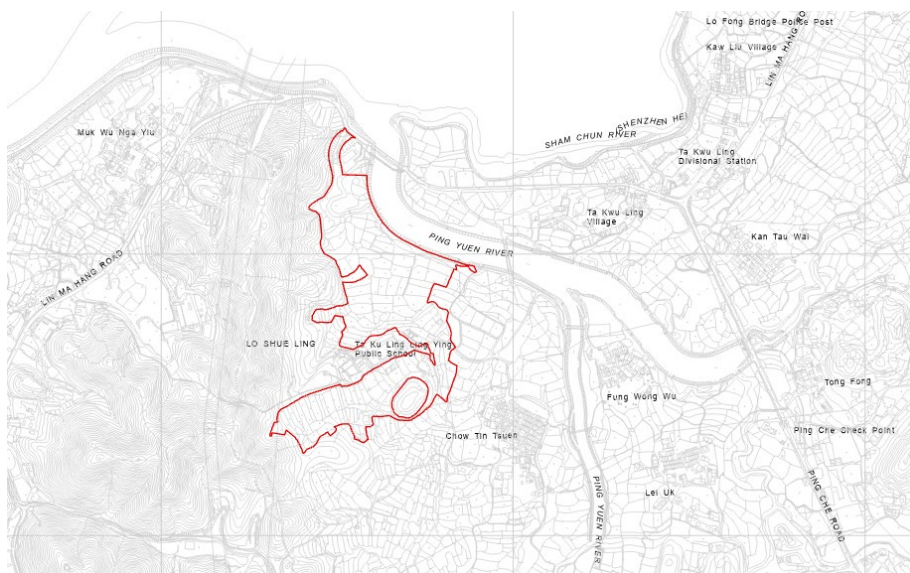
- 1.2.1 The purpose of the Water Supply Impact Assessment (WSIA) Report is to:
- Assess the potential impact of the proposed development on the existing water mains and installations maintained by WSD; and
 - Provide recommendations for mitigation measures and other improvement works where necessary to address the potential impact identified.

2 Project Description

2.1 Site Area

The Development Site is located in Man Kam To, New Territory, bounded by Ping Yuen River to the northeast, Lo Shue Ling to the west and Chow Tin Tsuen to the east. There is an existing public school surrounded by the site, as shown in **Figure 2.1**. In the vicinity of the Site there are mainly scattered village houses and agricultural land. A master layout plan of the Indicative Scheme in the Development Site is enclosed in **Appendix A**.

Figure 2.1: Location Plan of the Development Site



- 2.1.1 The current zoning of the Site is “AGR”, “GB”, and “G/IC” under the approved Man Kam To Outline Zoning Plan (OZP) No. S/NE-MKT/4. The total area of the Development Site is approximately 102,461 m², and the total area of the Application Site is 125,863 m².

2.2 Development Parameters

- 2.2.1 The development parameters of the Indicative Scheme are presented in **Table 2.1**:

Table 2.1: Key Development Parameters Table

	Indicative Scheme
Application Site Area ⁽¹⁾	About 125,863 m ²
Development Site Area	About 102,461 m ²
Total Plot Ratio ⁽²⁾	5.23
- Non-Domestic PR	3.57
- Domestic PR	1.66
Total Gross Floor Area	535,580 m ²

- Non-Domestic GFA	365,180 m ²	
• <i>R&D Centre</i>	268,780 m ²	
• <i>Data Centre</i>	86,400 m ²	
• <i>Commercial Centre</i>	9,276 m ²	
• <i>Kindergarten</i> ⁽³⁾	724 m ²	
• Domestic GFA	170,400 m ²	
• <i>Ancillary Dormitories</i>	63,900 m ²	
• <i>Other Residential Uses</i>	106,500 m ²	
• Clubhouse GFA ⁽⁴⁾	3,500 m ²	
Building Height		
• <i>R&D Centre</i>	Building Height	83m
	mPD	90mPD
	No. of Storeys ⁽⁵⁾	16
• <i>Data Centre</i>	Building Height	73m
	mPD	80mPD
	No. of Storeys ⁽⁵⁾	12
• <i>Commercial Centre</i>	Building Height	30m
	mPD	37mPD
	No. of Storeys ⁽⁵⁾	6
• <i>Ancillary Dormitories</i>	Building Height	99-102.15m
	mPD	110mPD
	No. of Storeys ⁽⁶⁾	30-31
• <i>Other Residential Uses</i>	Building Height	99-105.3m
	mPD	120mPD
	No. of Storeys ⁽⁶⁾	30-32
Anticipated No. of Working Population		6,207
• <i>R&D Centre</i> ⁽⁷⁾	5,375	
• <i>Data Centre</i> ⁽⁸⁾	432	
• <i>Commercial</i> ⁽⁹⁾	400	
No. of Units		3,712
• <i>Ancillary Dormitories</i>	1,392	
• <i>Other Residential uses</i>	2,320	
Average Flat Size ⁽¹⁰⁾		35.5 m ²
Anticipated Population ⁽¹¹⁾		10,022
• <i>No. of Tenants of Ancillary Dormitories</i>	3,758	
• <i>No. of Population of Other Residential Uses</i>	6,264	
Local Open Space		Not less than 13,126 m ²
• <i>For Workers</i>	Not less than 3,104 m ²	
• <i>For Residents</i>	Not less than 10,022 m ²	
Target Completion Year		2028

Remarks:

⁽¹⁾ Application Site includes the Development Site and remaining land parcels adjoining the Development Site for better rationalisation of boundary and land use zoning.

⁽²⁾ PR calculations are based on the area of Development Site. May not add up due to rounding.

⁽³⁾ The kindergarten with 6-classroom of about 724m² GFA fulfils the minimum floor space requirement specified in the EBD's Operation Manual for Pre-primary Institute. Indicative only, subject to detailed design.

⁽⁴⁾ According to APP-104, a maximum area of 3,500m² can be applied for GFA concession for a development with domestic GFA of >100,000m² to 125,000m². The clubhouse GFA (intended for use by residents of Other Residential Uses) is proposed to be exempted from GFA calculation.

⁽⁵⁾ The no. of storeys excludes basement carparks.

⁽⁶⁾ The no. of storeys excludes 1-storey lobby and basement carparks.

⁽⁷⁾ An assumption of 50m² per worker is assumed for R&D Centre, with reference to Employment Density Guide (3rd Ed.) in the UK.

⁽⁸⁾ An assumption of 200m² per worker is assumed for Data Centre, with reference to Employment Density Guide (3rd Ed.) in the UK.

⁽⁹⁾ An assumption of 25m² per worker is assumed for commercial uses (retail, F&B), with reference to HKPSG Chapter 5.

⁽¹⁰⁾ Average flat size is assumed as 35.5m² which has excluded area required for corridor, lift shaft, lobby, staircase, etc.

⁽¹¹⁾ A person per flat (PPF) ratio of 2.7 is assumed, according to the average household size of the Territory and North District in 2021 Census.

3 Water Supply Impact Assessment

3.1 Methodology and Design Criteria

Methodology

3.1.1 The following approach is adopted in carrying out the Water Supply Impact Assessment.

- Identify the scope of the development;
- Determine the water demand of the development;
- Identify the existing water supply system within and in the vicinity of the proposed development boundary;
- Examine the impact arising from new water demand from the proposed development on the existing source of supply and the system capacity; and
- Identify improvement and upgrading works.

Design Criteria

Unit Demands

3.1.2 The water demand for the proposed development has been estimated generally based on unit water demand in WSD's Departmental Instruction (DI) 1309 and the latest WSD planning standards.

3.1.3 The unit demands for some of the land uses used in the estimation of the freshwater and flushing water demands are obtained from EPD's "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning" (GESF).

3.1.4 The following unit demands presented in **Table 3.1** below have been adopted for estimating the fresh and flushing water demands for the Proposed Development.

Table 3.1 Unit Water Demands

Development Type	Fresh Water	Flushing Water	Unit
Commercial Employee	30	50	litre/employee/day
J4 ¹	230	50	litre/employee/day
J11 ²	230	50	litre/employee/day

¹ Reference is made to EPD's GESF – According to EPD's GESF, some approaches of determining UFFs of J4 employees had assigned a unit flow of 0.200 m³/day for "J4 Wholesale & Retail".

² Reference is made to EPD's GESF – According to EPD's GESF, some approaches of determining UFFs of J11 employees had assigned a unit flow of 0.200 m³/day for "J11 Community, Social & Personal Services".

Development Type	Fresh Water	Flushing Water	Unit
R1 ³	190	70	litre/person/day
Schools ⁴	25	25	litre/person/day
Irrigation ⁵	7	/	litre/m ² /day

Water Treatment Works (WTW):

3.1.5 1.2 times mean daily demand (MDD) for mean daily demand > 100 Million Litre per Day (MLD);

Fresh Water Service Reservoir (FWSR) Capacity:

3.1.6 In accordance with DI 1309, 75% of MDD shall be designed for storage capacity of FWSR in interconnected supply zones.

Peaking Factors for Trunk and Distribution Mains:

3.1.7 The peaking factors will be in accordance with WSD’s DI No. 1309 and are summarised below:

- Peak flow rates in freshwater trunk main supplying a single service reservoir – 1.5 times mean daily demand;
- Peak flow rates in distribution mains for fresh water – 3 times mean daily demand
- Peak flow rates in distribution mains for flush water – 2 times mean daily demand

Residual Head:

3.1.8 The residual head for the fresh water supply system will be assessed with the following design scenario:

- Fresh Water System – 20m.

3.2 Existing Water Supply System

3.2.1 The development falls within supply zone of Ping Che Fresh Water Service Reservoir (FWSR). Ping Che FWSR has a design storage capacity of 20,000 m³ with Top Water Level (TWL) as 87.0mPD. The application site is located approximately 3,200m from Ping Che FWSR.

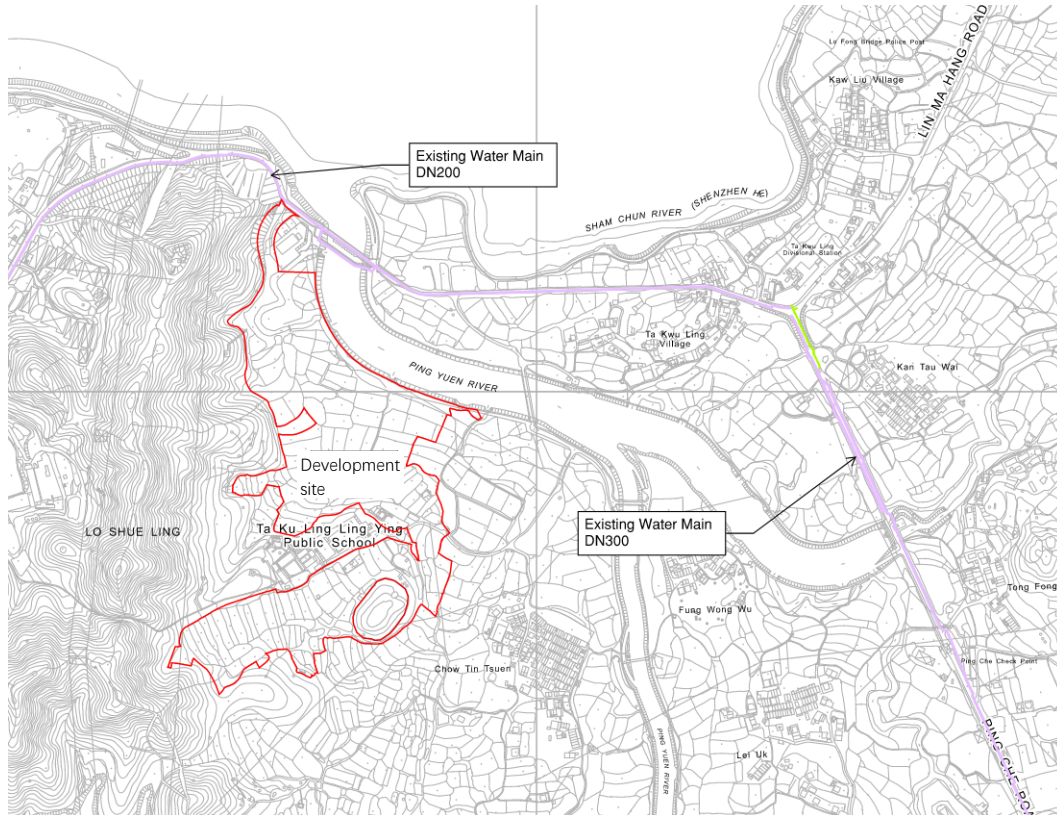
³ Reference is made to WSD DI No.1309 – According to DI No.1309, a service trade of “other rural areas” is added to the UFF of R1, which makes 190L/h/day of fresh water and 70L/h/day for flushing water.

⁴ Reference is made to WSD DI No.1309 Table 1.

⁵ Reference is made to Table 3-4 of WSD’s Technical Specifications on Grey Water Reuse and Rainwater Harvesting.

3.2.2 According to the received WSD water main record plans (**Appendix B**), a section of the existing DN300 freshwater main is identified about 600m east from the application site along Ping Che Road and a DN200 water main along Lin Ma Hang Road, as illustrated in **Figure 3.1**.

Figure 3.1: Existing Fresh Water Mains in the Vicinity of the Site



3.3 Water Demand Estimation

3.3.1 Water demand arising from the Proposed Development has been estimated based on WSD’s DI No. 1309 and EPD’s GESF as stipulated in **Section 3.1**.

3.3.2 The proposed development will generate a total fresh and flushing water demand approximately 2,272 m³/day and 1,012 m³/day respectively. In view of absence of the flushing water system in the vicinity of the Site, both the fresh water and flushing water demands (3,290 m³/day in total) arising from the existing development are met by fresh water. The water demand estimation for the proposed development is shown in **Appendix C**.

3.3.3 Peak flow rate of fresh water of the site is 3 times 3,290 m³/day which equals to 9,870 m³/day.

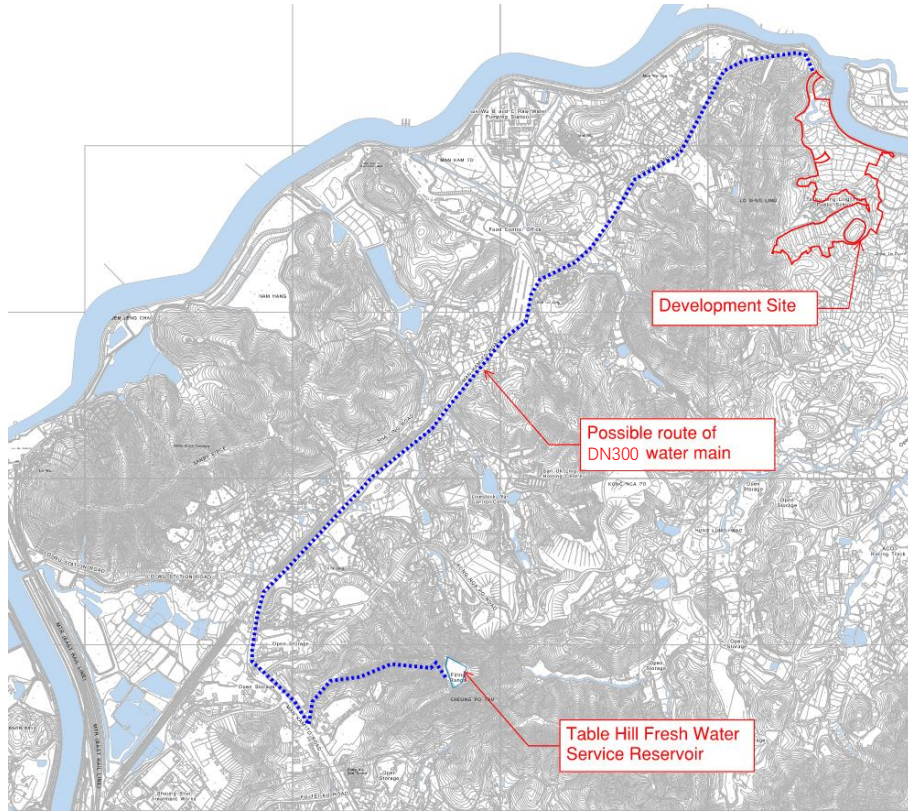
3.4 Potential Impact to Existing and Planned Waterworks Facilities

- 3.4.1 As per the Water Main Record Plans provided by WSD (**Appendix B**), there is a DN300 water main with a capacity of 10,992m³/day (under average velocity of 1.8m/s) was laid on the east side of the site. The total water demand from application site is 29.8% of capacity of distribution main. Considering the land use nature and the development status of the adjacent area, the potential impact of the application site to the distribution main is severe.
- 3.4.2 The proposed development is located in existing supply zone of Ping Che Fresh Water Service Reservoir (PC FWSR) which has no spare capacity to serve the development.
- 3.4.3 There is another FWSR close to the proposed development, which is Table Hill Fresh Water Service Reservoir (TBH FWSR). TBH FWSR has a design storage capacity of 27,450 m³ with Top Water Level (TWL) as 106.0mPD. The application site is located approximately 3,200m away. According to WSD recording, THB has spare capacity for the development, but the residual head may not be enough.

3.5 Proposed Water Supply System

- 3.5.1 It is noted that the site is nearby the study boundary of the Remaining Phase Development of the New Territories North (NTN) - Planning and Engineering Study for NTN New Town and Man Kam To – Investigation, CE 21/2021(CE) under CEDD. Since new waterworks infrastructures are required for the CE 21/2021(CE) Study for the long-term land supply in NTN New Town and Man Kam To, it is suggested to further liaise and check with WSD and CEDD whether it is appropriate and feasible to integrate the waterworks infrastructures required for both projects, which is subjected to the programme phasing of the two projects.
- 3.5.2 For temporary measure, a DN300 water main is proposed to be laid from the development to the primary distribution main of existing TBH FWSR. Further research is needed to determine both the feasibility of laying new water main and an off-site pump and sump system if necessary. Possible route of the new water main is shown in **Figure 3.2**.

Figure 3.2: Indicative Fresh Water Supply Connection to Application Site



4 Conclusion

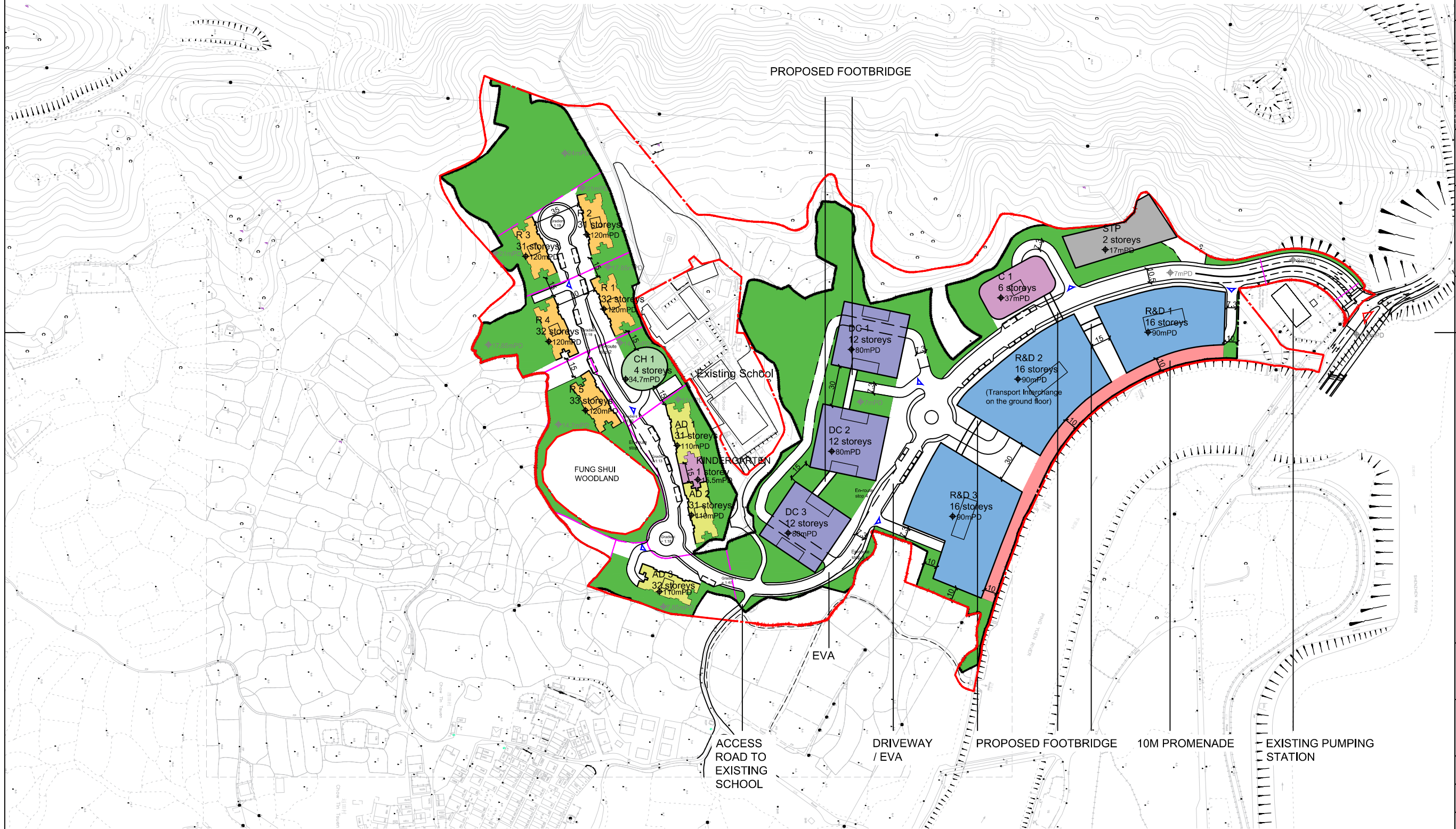
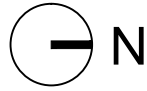
- 4.1.1 The Indicative Scheme will generate a total freshwater demand of 3,290 m³/day, which includes temporary main fresh (TMF) 1,012 m³/day.
- 4.1.2 For temporary measure, Table Hill Fresh Water Service Reservoir has the spare capacity for the site. But for the long term, new water infrastructure is necessary for future development.
- 4.1.3 This WSIA has proposed temporary measures of water supply for the Proposed Development to make up for the capacity of the water supply infrastructure in the existing supply zone. Detailed design on the proposed water supply scheme for the Proposed Development will be carried out at detailed design/ GBP submission stage should this application for plan amendment be approved.

Appendix A

Master Layout Plan

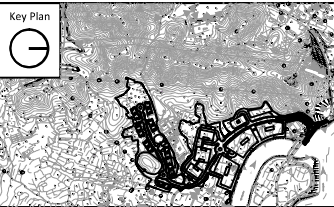
LEGEND

- - - - APPLICATION SITE BOUNDARY
- - - - DEVELOPMENT SITE BOUNDARY
- - - - SITE FORMATION LEVEL
- ▷ SITE RUN-IN/OUT
- ▷ ACCESS TO BASEMENT CARPARK
- R&D CENTRE
- DATA CENTRE
- RESIDENTIAL
- COMMERCIAL
- ANCILLARY DORMITORIES
- CLUBHOUSE
- LANDSCAPE AREA
- SEWAGE TREATMENT PLANT
- PROMENADE



Rev.	Date	Description

Notes
 1. Do not scale drawings. Dimensions govern.
 2. Verify dimensions in field. Notify WCWP of discrepancies.
 3. Dimensions in mm unless otherwise noted.
 4. Not for construction unless expressly certified.



Client
Hong Kong International Innovation Tech Hub

Consultants

Issue
Planning Application

RD Ref: RD 2/9188/10 (PT. II)
 FSD Ref: FP 8/9584/VII <131>

Authorized Person

Project
The Nexus

Project Number	Date
20027	20230629

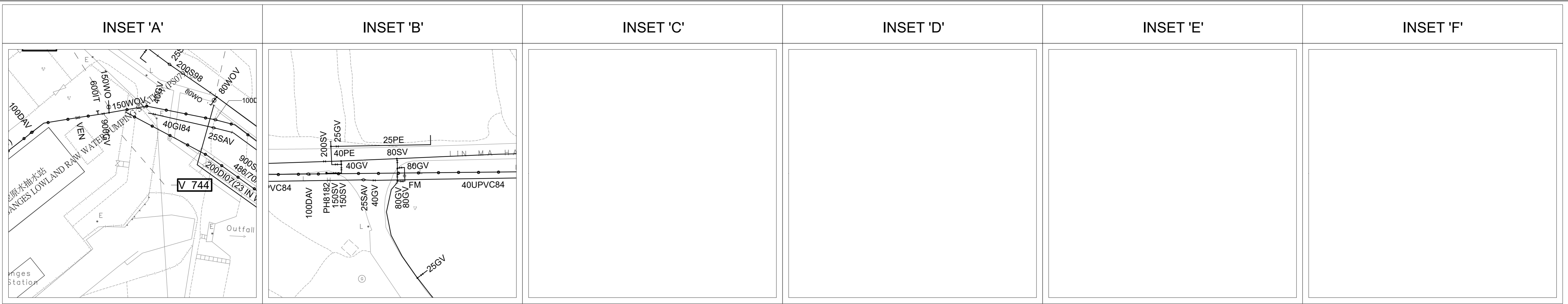
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Title
Master Layout Plan

Number	Revision
MLP-001	-

Appendix B

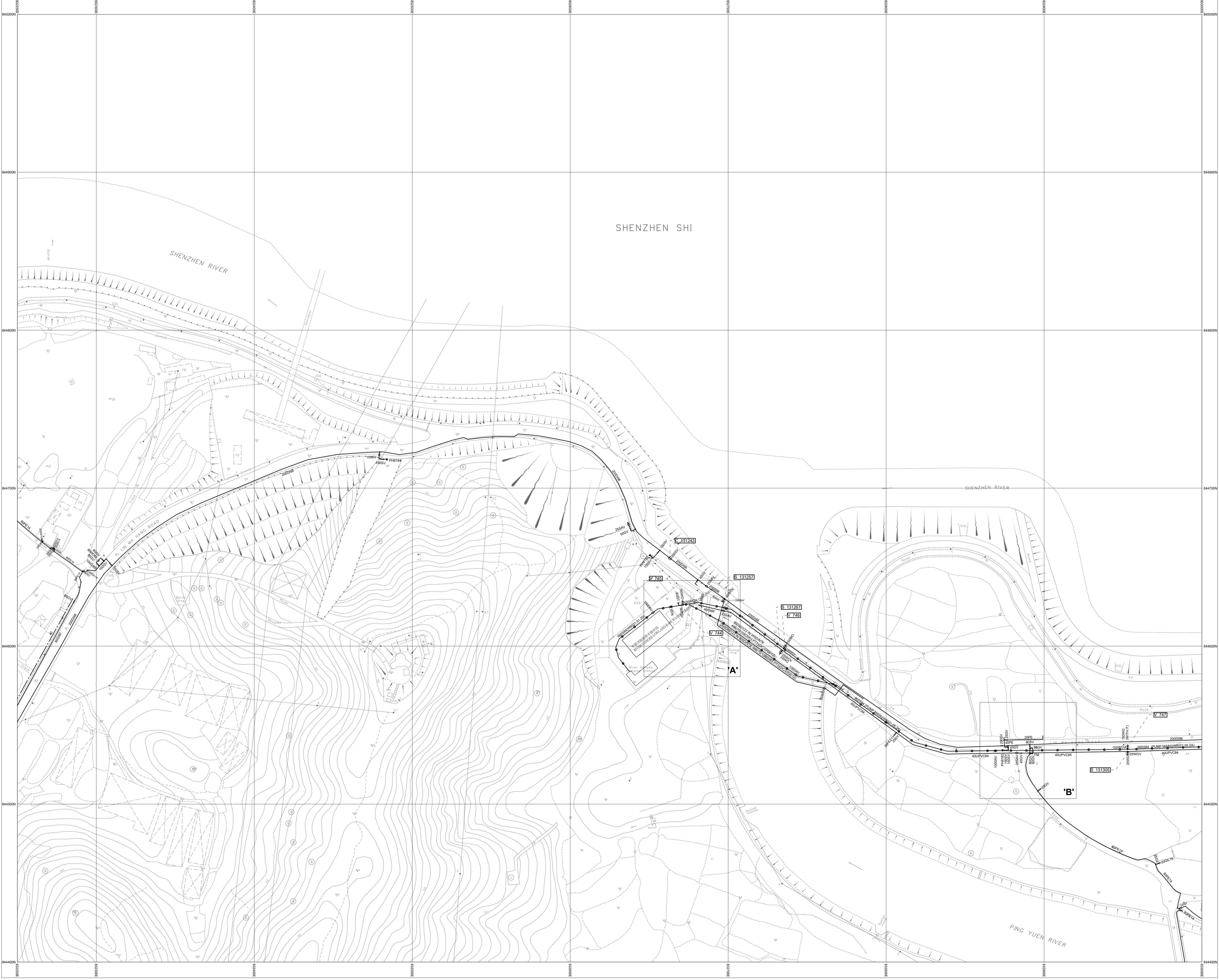
Existing WSD Water Main Record Plans



Scale 1:500

Scale 1:500

3-NW-12B



3-NW-17B

NOTES:
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FRESH WATER MAINS RECORD PLAN

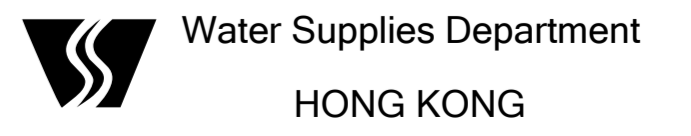
DATE REVISED : 10/05/2022

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RIVER GANGES F.W. P/S

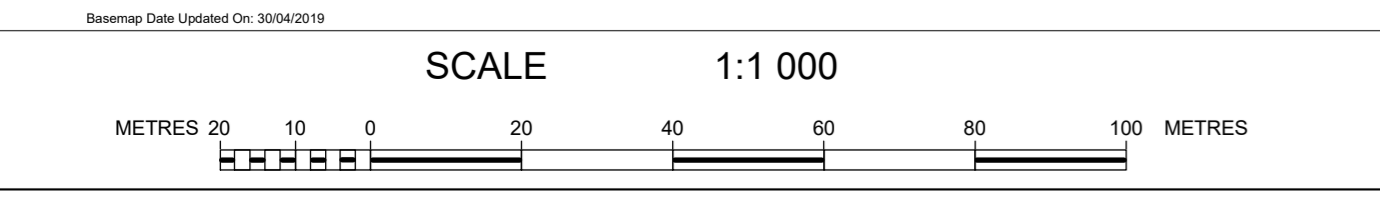
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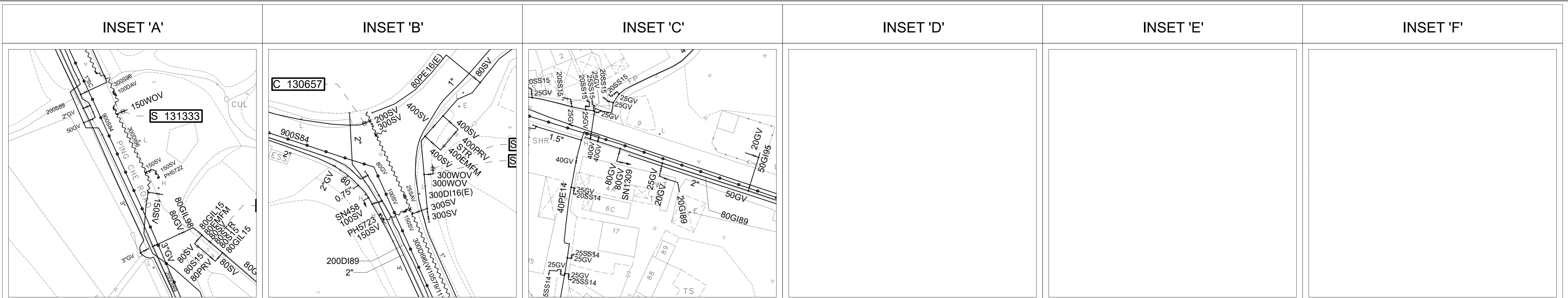
C.S. CHIN
 CE/MNE



Water Supplies Department
 HONG KONG

DATE: 09/11/1998





Scale 1:500

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3-NW-13A



3-NW-18A

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FRESH WATER MAINS RECORD PLAN

J/O LIN MA HANG ROAD & PING CHE ROAD

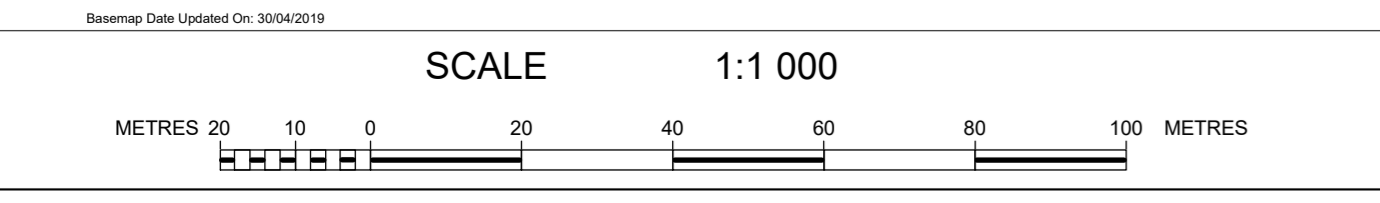
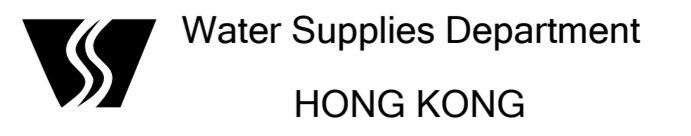
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INSET 'A'

INSET 'B'

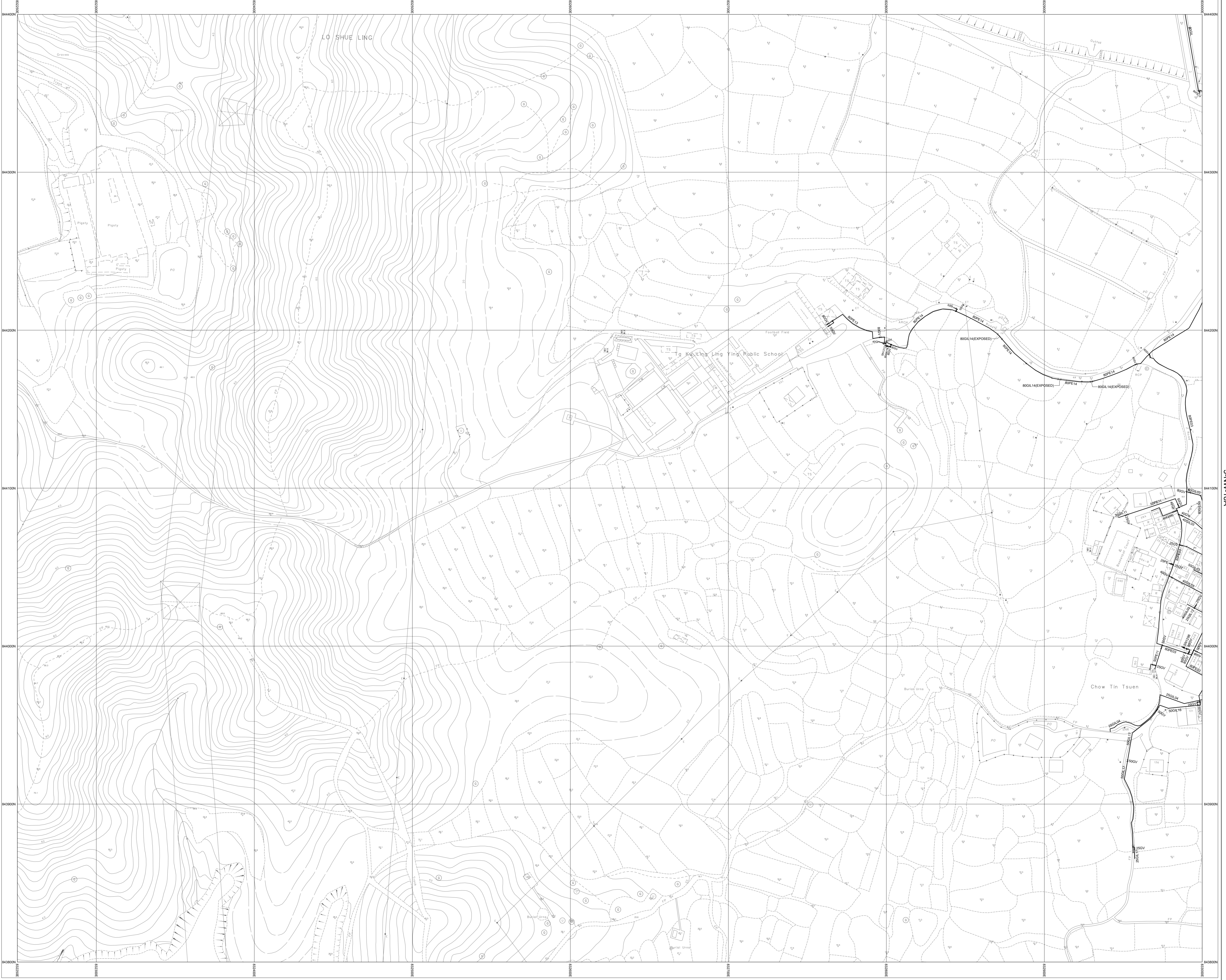
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INSET 'D'

INSET 'E'

INSET 'F'

3-NW-12D



3-NW-17D

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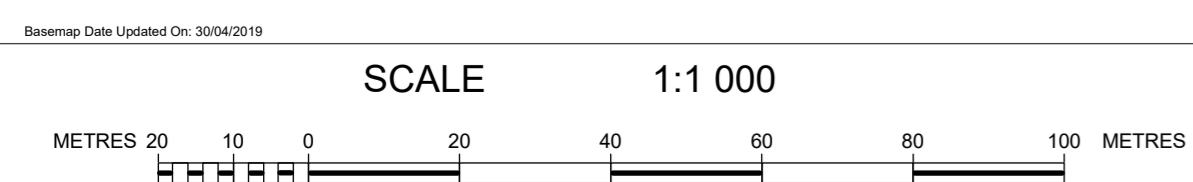
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FRESH WATER MAINS RECORD PLAN

CHOW TIN TSUEN, LO SHU LING



INSET 'A'

INSET 'B'

INSET 'C'

INSET 'D'

INSET 'E'

INSET 'F'

3-NW-13C



3-NW-17B

3-NW-18B

3-NW-18C

NOTES:

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SCALE 1:1 000

METRES 20 10 0 20 40 60 80 100 METRES

FRESH WATER MAINS RECORD PLAN

PING CHE ROAD, TONG FONG

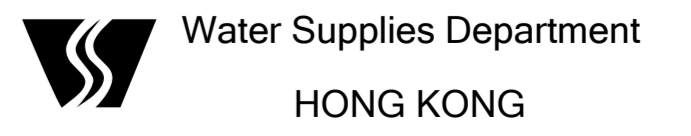
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Appendix C

Estimation of Fresh Water Demand

Appendix C : Water Demand Estimation from Proposed Development at Various Lots in D.D. 82 and D.D. 86, Man Kam To, New Territories

				Fresh Water Demand			Flusing Water Demand		Total Water Demand (m ³ /d)
	GFA's	Population/Area	Type	Total Freshwater UD	Units	Total Fresh water Demand	Flushing Water UD	Total Flushing Water Demand	
	(m2)	(nos.)		(l/h/day)		(m ³ /day)	(l/h/day)	(m ³ /day)	
Data Centre employee	86,400	432	Commercial Employee	30	(l/h/day)	13	50	22	35
R&D Centre employee	268,780	5375	Commercial Employee	30	(l/h/day)	161	50	269	430
Commercial	9,276	400	J4	230	(l/h/day)	92	50	20	112
Ancillary Dormitories	63,900	3,758	R1	190	(l/h/day)	714	70	263	977
Other Residential Uses	106,500	6,264	R1	190	(l/h/day)	1,190	70	438	1,629
Water Demand (m³/day)						2,170		1,012	3,182
Kindergarten Pupil	724	180	Schools	25	(l/h/day)	5	25	5	9
Kindergarten Staff		24	J11	230	(l/h/day)	6	50	1	7
Irrigation	13,126			7	(l/m ² /day)	92			92
Water Demand (m³/day)						102		0	108
Total Flow (m³/day)						2,272		1,012	3,290

NOTES:

- (1) UD for Data Centre employee as per GESF Table T-2 Commercial Employee.
- (2) UD for R&D Centre as per GESF Table T-2 Commercial Employee.
- (3) UD for Commercial as per GESF Table T-2 J4 Wholesale & Retail.
- (4) UD for Ancillary Dormitories as per WSD (DI)1309 Table 1 "R1" & Table 2 "other rural areas".
- (5) UD for Other Residential Uses as per WSD (DI)1309 Table 1 "R1" & Table 2 "other rural areas".
- (6) UD for Kindergarten Pupils Uses as per WSD (DI) 1309 Table 1 "Schools".
- (7) UD for Kindergarten Staffs Uses as per GESF Table T-2 J11 "Community, Social & Personal Service".