Appendix 10

Water Supply Impact Assessment

S.12A Planning Application
on the Draft Mai Po & Fairview Park OZP No. S/YL-MP/7
Rezoning from “Residential (Group D)” to “Residential (Group C) 1” Zone
for a Proposed Residential Development
at Various Lots in D.D. 104 and the Adjoining Government Land
in Yuen Long, N.T.

Water Supply Impact Assessment Report

December 2024

AECOM

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1. Introduction

1.1. Background

1.1.1. AECOM Asia Company Limited (AECOM) has been commissioned by the Applicant to conduct a Water Supply Impact Assessment (WSIA) in support of the S12A planning application to enable a medium-rise residential development on the Application Site.

1.1.2. The Application Site is bounded by Kam Pok Road to its immediate north and west, a village area and Ha Chuk Yuen Tsuen Road to its immediate east, and the existing Drainage Services Department (DSD) Chuk Yuen Floodwater Pumping Station (CYFPS) with its water retention pond to its immediate south. **Figure 1** presents the location of the Project.

1.1.3. The Application Site has been previously approved for a 2-storey house development (TPB Ref.: A/YL-MP/205 & 205-1). The current application aims to better utilise the land resource/development potential of the Site to increase flat supply without generating any insurmountable adverse impacts.

1.2. Objective of this Submission

1.2.1. The main objectives of this WSIA are as follows:

(i) Determine the water demand arising from the proposed development;

(ii) Assess the impact of the water demand arisen from the proposed development to the existing water supply system; and

(iii) Propose any appropriate mitigation measures, if required.

2. Development Proposal

2.1.1. The current scheme comprises mainly medium-rise residential development with a domestic plot ratio of 1.5 and non-domestic plot ratio of about 0.09. The site will accommodate 10 residential blocks with a height of 14 to 16 storeys, providing about 2,322 flats. Total domestic GFA is about 98,535m^2 and total commercial GFA of about 3,292m^2 planned for retail (about 2,363m^2) and kindergarten (about 929m^2). In addition, there will be a transport layby (not more than 2,400m^2) and social welfare facilities including a neighbourhood elderly center (NEC) (about 328m^2 NOFA), as well as other residential ancillary facilities(e.g. a basement carpark, residents' clubhouse, swimming pool and landscape area) within the site.

2.1.2. The Master Layout Plan (MLP) of the Proposed Development is illustrated in **Figure 2**. The details of the proposed development schedule are summarised in **Table 2-1** below:

Table 2-1: Development Schedule

Site Area	About 65,690 m^2
Domestic GFA	About 98,535 m^2
Commercial GFA (1)	About 3,292 m^2
Clubhouse GFA	About 3,449 m^2
No. of Units	2,322 Units
Anticipated Population (2)	6,502

Notes:
(1) Commercial GFA include commercial uses (2,363 m^2) and a 6-classroom kindergarten (929 m^2);
(2) A PPoF of 2.8 with reference to the average household size in Yuen Long District according to Statistics on Domestic Household Characteristics by District Council District in 2023.

3. Fire-Fighting Requirements

3.1.1. Water supply for fire-fighting service has been considered in this WSIA. Fire-fighting requirement for residential zone is 6,000m^3/day with discharge pressure of 17m head. The fire hydrant should be of standard pattern with minimum output pressure not less than 25 psi. With multiple hydrants operating at the same time, total output of not less than 4,000L/min shall last for 60 minutes. The fire-fighting requirements are summarized in **Table 3-1**.

Table 3-1 Fire-Fighting Requirements

Requirements	Minimum Values
Minimum Fresh Water Supply	6,000m^3/day
Discharge pressure	17m
Minimum output not less than 25 psi.	4,000L/min (5,760m^3/day) which lasts for an hour (i.e., 4,000×60 = 240,000L/ hour/day or 240m^3/hour/day)

4. Existing Water Supply System

4.1. Fresh Water Supply System

4.1.1. The layout plan showing the existing water distribution system in the vicinity of the Application Site is shown in **Figure 3**. According to Water Supplies Department's (WSD) record plan, an existing 200mm dia. fresh water main underneath Kam Pok Road and another existing 600mm dia. fresh water main underneath San Tam Road is available for connection to serve the subject proposed development, about 380m away from the development. According to WSD's water distribution layout, the fresh water in the vicinity of the site would be supplied by the Ngau Tam Mei Fresh Water Primary Service Reservoir.

4.1.2. There is an existing 50mm dia. fresh water main spanning across the Application Site from the east to west direction. The water main is connected to an existing 200mm dia. fresh water main underneath Kam Pok road at the western end and an existing 100mm dia. fresh water main underneath Ha Chuk Yuen Road at the eastern end.

4.2. Salt Water Supply System

4.2.1. According to WSD record, there is no existing salt water supply system in the vicinity of the Application Site.

5. Assessment Methodology

5.1. Assessment Assumptions

5.1.1. The mean daily unit demands for various classes of consumer given in WSD Departmental Instruction No.1309 are adopted for this assessment. A summary table of the mean daily unit demands used for different development types is shown in **Table 5-1**.

Table 5-1: Mean Daily Unit Demands

Development Type	Fresh Water (L/Head/Day)	Flushing Water (L/Head/Day)
Residential R2(1)	300	70
Service Trade - Yuen Long (2)	40	-
Kindergarten (3)	25	25
Development Type	Fresh Water (L/bed/Day)	Flushing Water (L/Head/Day)

The figures are based on WSD DI No. 1309.
(1) "Residential: R2 – All areas"
(2) "Service Trade - Yuen Long"
(3) "School Student"

5.2. Water Demand of Proposed Development

5.2.1. Upon completion of the proposed development, the Application Site will accommodate about 2,322 flats with expected average occupancy rate of 2.8 persons / unit. **Table 5-2** below shows the estimation of the population of the proposed development.

Table 5-2: Summary of the Proposed Residential Development

Residential	
No. of flats	2,322
Occupancy Rate	2.8 / unit
Residential Population[1]	6,502
Kindergarten Student [2]	160
NEC Employee [3]	Service Trade

Notes:
1. *A PPoF of 2.8 with reference to the average household size in Yuen Long District according to Statistics on Domestic Household Characteristics by District Council District in 2023.*
2. *The proposed kindergarten has 8 classrooms with an average class size of 20.*
3. *The no. of employee for NEC is included in service trade use.*

5.2.2. Estimated total water demands for the proposed development is summarized in **Table 5-3**.

Table 5-3: Estimated Water Demand

Accommodation Type	Data	Remark
Residential		
Residential Population	6,502	
Fresh Water Unit Demand (l/head/day)	340	Table 1 & 2, DI No. 1309; Included Service Trade [2]
Fresh Water Mean Daily Demand	2,211	m^3/day
Flushing Water Unit Demand (l/head/day)	70	Table 1, DI No. 1309
Flushing Water Mean Daily Demand	455	m^3/day
Kindergarten		
Student	160	
Fresh Water Unit Demand (l/head/day)	25	Table 1, DI No. 1309
Fresh Water Mean Daily Demand	4.0	m^3/day
Flushing Water Unit Demand (l/head/day)	25	Table 1, DI No. 1309
Flushing Water Mean Daily Demand	4.0	m^3/day
NEC (Employee)	-	Has been included in Service Trade [2]
Total Estimated Water Consumption of the Proposed Development	2,674	m^3/day

Fire-Fighting	
Fire-Fighting	6,000 m^3/day [1]

Note:

1. Daily water demand does not include water demand for fire-fighting.
2. Service Trade takes into account of all non-domestic water demand, excluding the school students. The water demand of NEC has been considered in Service Trade.

5.3. Impact of Existing Water Supply System

5.3.1. Since no existing salt water supply system is available in the vicinity of the development, the water supply for flushing would be counted on the fresh water demands.

5.3.2. The daily treatment rate of Ngau Tam Mei Fresh Water Treatment Works (NTMFWTW) is approximately 230,000m^3/day and the estimated water consumption of the proposed

development is approximately 2,674m^3/day, which is merely 1.16% of NTMFWTW's capacity. Therefore, the proposed development would not post a critical impact to the existing water treatment works.

5.3.3. Currently, the existing 200mm dia. water main along Kam Pok Road is not servicing any major developments, but according to WSD, it is reserved for firefighting service for the surrounding development. Alternative water supply source would be required to cater the proposed development. Another feasible water supply source is an existing 600mm dia. fresh water main underneath San Tam Road, about 380m away from the proposed development. The detailed calculation is shown in **Appendix 1**.

5.3.4. It is proposed that a section of an existing 50mm dia. fresh water main spanning across the proposed development would be abandoned and the ends of the water main would be capped to ensure service outside the development would be maintained.

6. Proposed Water Supply System

6.1.1. As there is no salt water supply available in the vicinity of the Proposed Development, the demand for flushing water would be met by using fresh water. Temporary fresh water main for flushing (TMF) is applied for the development. It is recommended that connection of salt water supply system is to be made to the Development when becomes available.

6.1.2. The existing 200mm dia. fresh water main along Kam Pok Road serves the surrounding development as firefighting purpose. The combined water demand for firefighting and the proposed development would exceed the capacity of the existing 200mm dia. water main.

6.1.3. Alternative water supply source from the existing 600mm dia. fresh water main underneath San Tam Road, about 380m away from the proposed development.

6.1.4. A new 300mm dia. water main is proposed along Kam Pok Road, tee-off from the existing 600mm dia. water main from San Tam Road, for water supply to the proposed development. The proposed 300mm dia. water main will serve both fresh and flushing water demand, a 200mm dia. lead-in proposed for fresh water and a separate 100mm dia. lead-in proposed for flushing water. According to results in **Appendix 1**, the water demand of the proposed development will utilize about 11% capacity of the existing 600mm dia. water main.

6.1.5. Therefore, the fresh and flushing water supply for the proposed development will be supplied by an existing 600mm dia. fresh water main underneath San Tam Road, about 380m away from the proposed development.

6.1.6. The current scheme comprises mainly medium-rise residential development with a domestic plot ratio of 1.5 and non-domestic plot ratio of about 0.078. The site will accommodate 10 residential blocks with a height of 14 to 16 storeys, providing about

2,322 flats with retail facilities. Total domestic GFA is about 98,535m^2 and total commercial GFA of about 3,292m^2 planned for retail (about 2,363m^2) and kindergarten (about 929m^2). In addition, there will be a transport layby and social welfare facilities including a neighbourhood elderly center (NEC) (about 666m^2)**, as well as other** residential ancillary **facilities**(e.g. a basement carpark, residents' clubhouse, swimming pool and landscape area) within the site. The general layout of the proposed development is shown in Figure 2.

The proposed alignment of the water mains is presented in **Figure 4**. The hydraulic calculation has confirmed the adequacy of the proposed water mains and the detailed calculation is shown in **Appendix 1.**

6.1.7. As previously mentioned, the existing 50mm dia. fresh water main within the proposed development would be properly abandoned and the ends of the water main would be capped to ensure services outside the development remains unaffected.

6.1.8. Connection of salt water supply system will be made to the development when available in future so as to minimize the fresh water demand.

6.1.9. The connection arrangement of the proposed water works will be confirmed with WSD in the detail design stage.

7. Proposed Fire-Fighting System

7.1.1. The size of the proposed water main for the fire-fighting system and associated fittings will be further developed in the detailed design stage.

7.1.2. The provision of fire hydrants and fire mains is in accordance with the relevant stipulations in "Technical Circular No. 4/2010: Fire Mains and Hydrants on New Trunk Roads and Elevated Highway Structures" published by Highway Department (HyD). The average spacing of fire hydrants to at-grade trunk road shall be at a distance of 100m. The detailed arrangement will be submitted to Fire Services Department (FSD) for approval during detailed design stage.

7.1.3. The provision of fire-fighting requirements are mentioned in **Section 3**. The water supply with discharge pressure of 1.7bar (17m head) and flow of 4,000L/min that lasts for one hour will be provided.

7.1.4. Hydraulic checking of the proposed pipe for fire-fighting demand is checked in **Appendix 1**.

8. Conclusions

8.1.1. According to WSD record, there is no existing salt water supply system in the vicinity of the Application Site.

8.1.2. As there is no salt water supply available in the vicinity of the Proposed Development, the demand for flushing water would be met by using fresh water. Temporary fresh water main for flushing (TMF) is applied for the development. It is recommended that connection of salt water supply system is to be made to the Development when becomes available.

8.1.3. The existing 200mm dia. fresh water main along Kam Pok Road serves the surrounding development as firefighting purpose. The combined water demand for firefighting and the proposed development would exceed the capacity of the existing 200mm dia. water main.

8.1.4. Alternative water supply source from the existing 600mm dia. fresh water main underneath San Tam Road, about 380m away from the proposed development.

8.1.5. A new 300mm dia. water main is proposed along Kam Pok Road, tee-off from the existing 600mm dia. water main from San Tam Road, for water supply to the proposed development. The proposed 300mm dia. water main will serve both fresh and flushing water demand, a 200mm dia. lead-in proposed for fresh water and a separate 100mm dia. lead-in proposed for flushing water.

8.1.6. Therefore, the fresh and flushing water supply for the proposed development will be supplied by an existing 600mm dia. fresh water main underneath San Tam Road, about 380m away from the proposed development.

Drawings

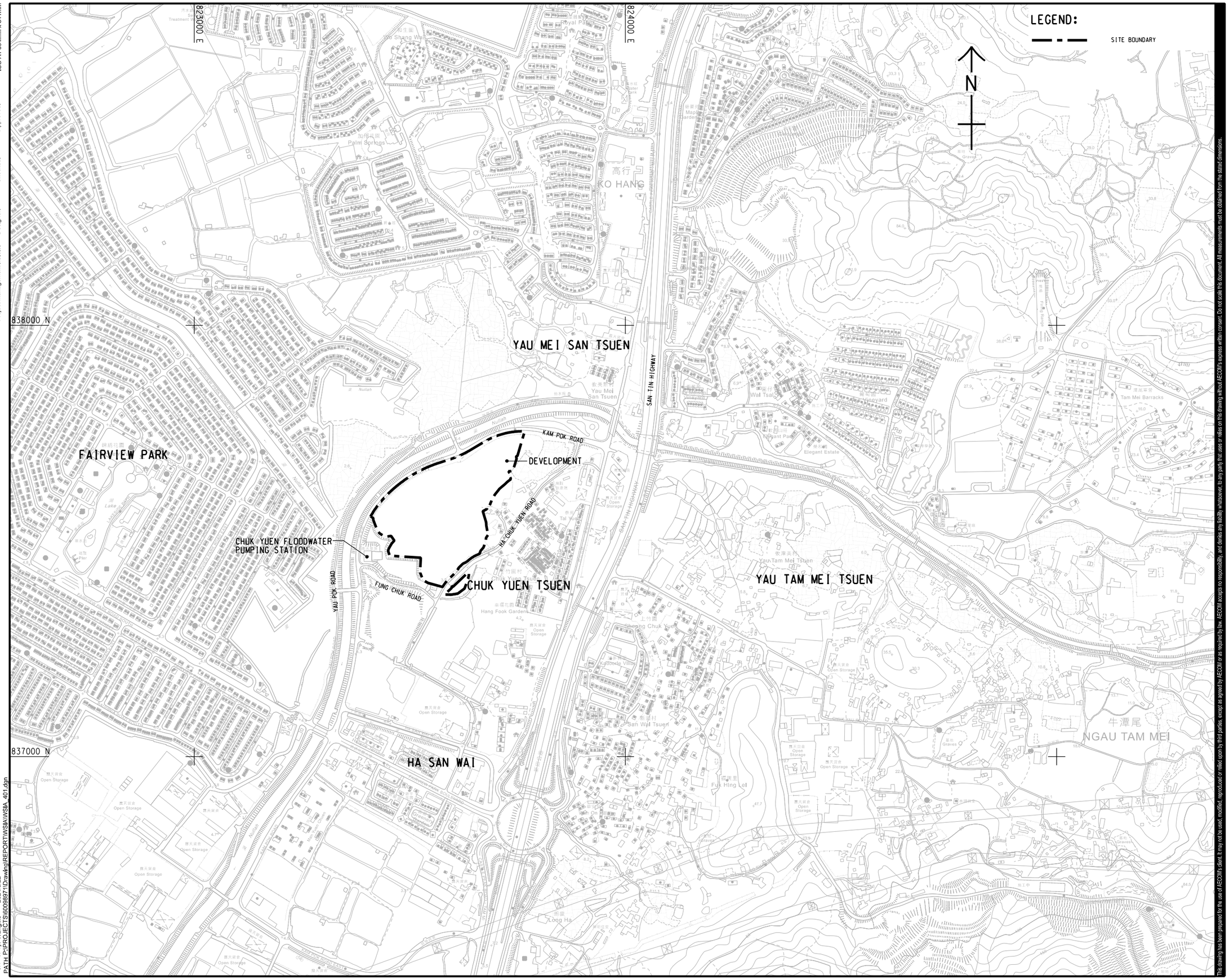
ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:



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PROJECT
項目

S.12A PLANNING APPLICATION ON THE DRAFT MAI PO & FAIRVIEW PARK OZP NO. S/YL-MP/7 REZONING FROM "RESIDENTIAL (GROUP D)" TO "RESIDENTIAL (GROUP C) 1" ZONE FOR A PROPOSED RESIDENTIAL DEVELOPMENT AT VARIOUS LOTS IN D.D. 104 AND THE ADJOINING GOVERNMENT LAND IN YUEN LONG, N.T.

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STATUS
階段

SCALE 比例
A3 1 : 8000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
LOCATION PLAN

SHEET NUMBER
圖紙編號
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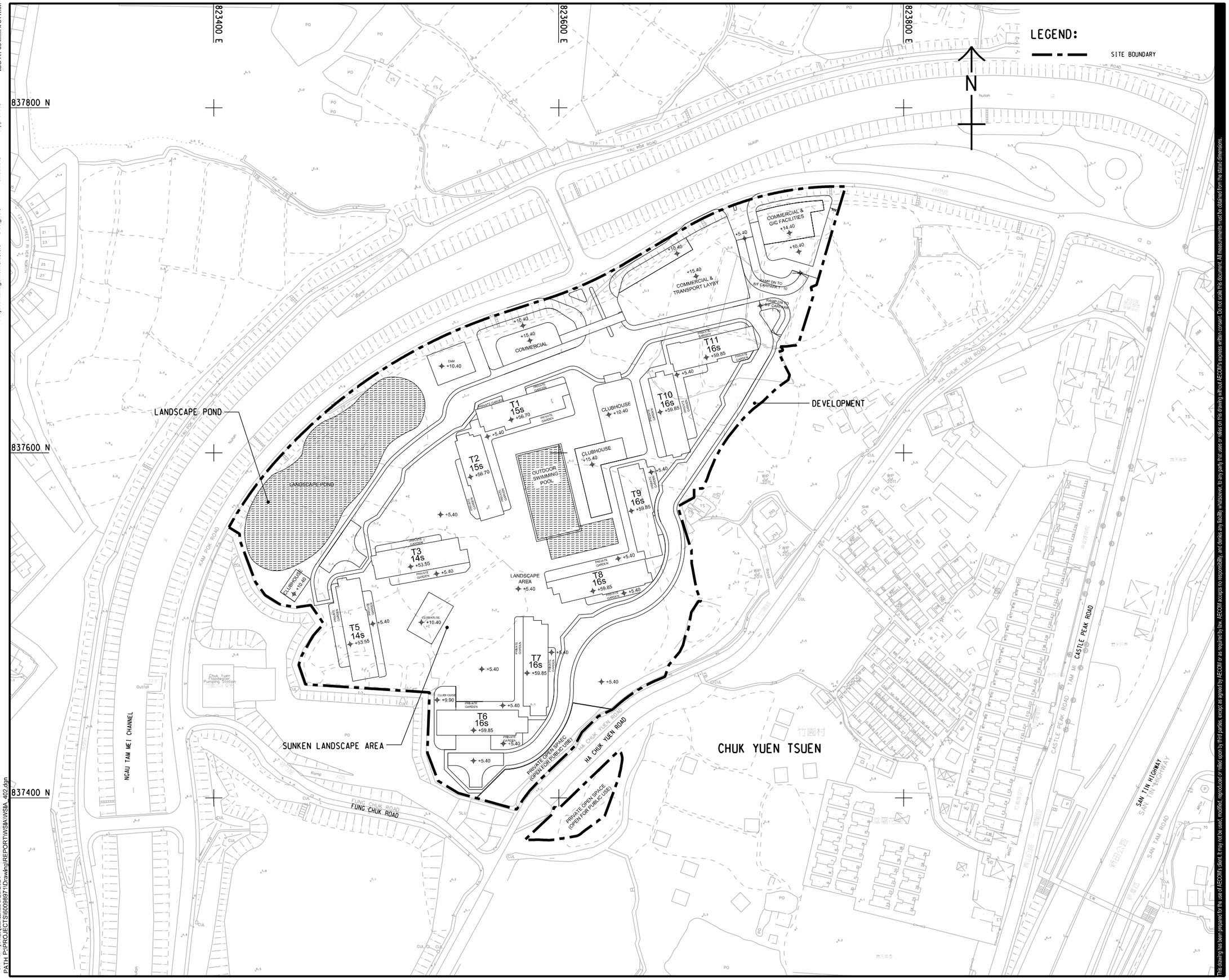

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狀況

SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 合約編號

SHEET TITLE
圖紙名稱
MASTER LAYOUT PLAN

SHEET NUMBER
圖紙編號
60098971/WSIA/FIGURE 2

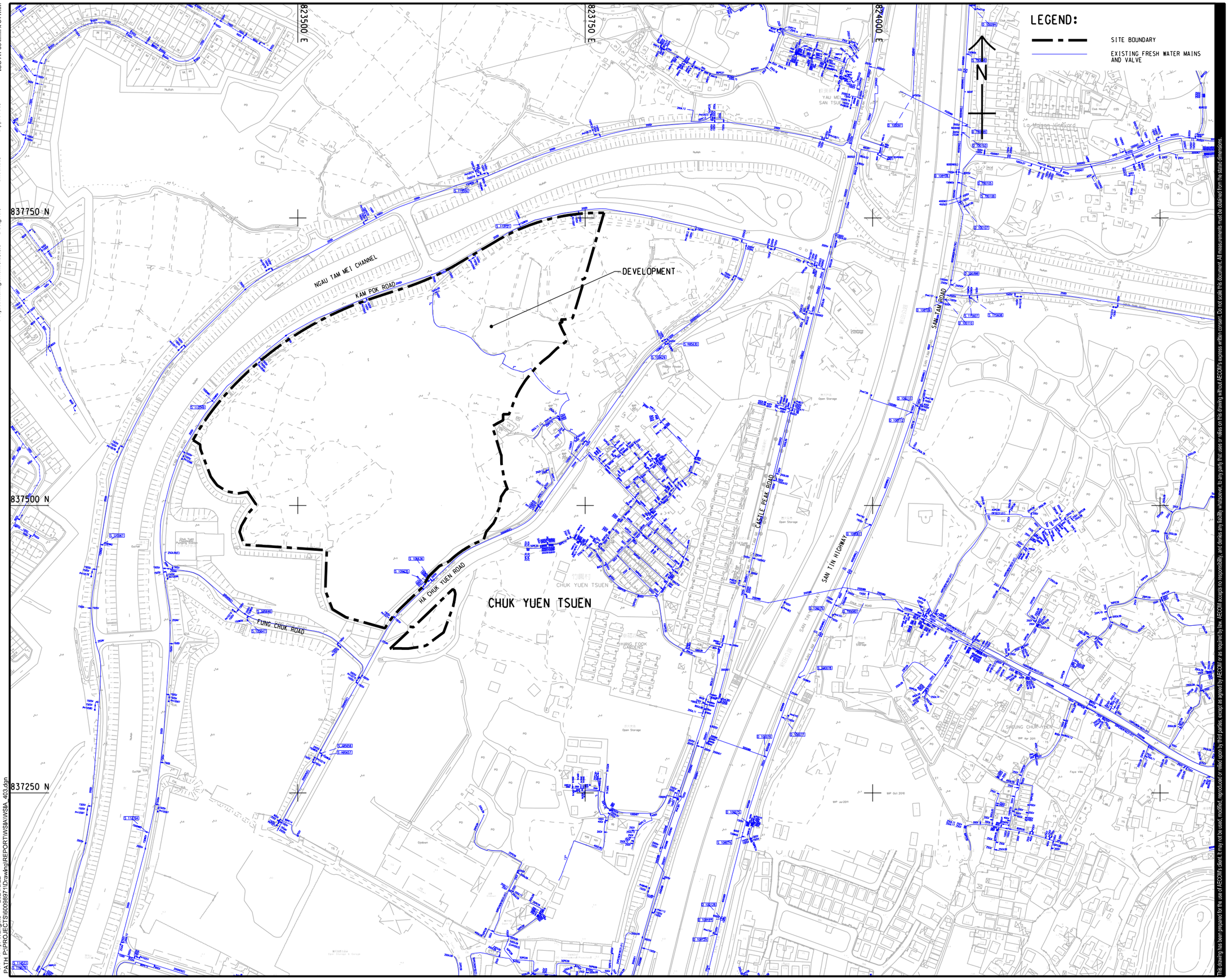
ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:



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SCALE 比例
A3 1 : 3000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
EXSITING FRESH WATER DISTRIBUTION LAYOUT PLAN

SHEET NUMBER
圖紙編號
60098971/WSIA/FIGURE 3

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

- SITE BOUNDARY
- EXISTING FRESH WATER MAINS AND VALVE
- FRESH WATER MAIN
- EXISTING WATER MAIN TO BE ABANDONED
- FLUSH WATER MAIN
- WATER MAIN

N

823600 E

823800 E

824000 E

837600 N

837400 N

837200

DETAIL '1'

EXISTING DN200 WATER MAIN (FOR FIRE FIGHTING)

WATER MAIN TO BE CAPPED

KAM POK ROAD

DN300

DN100

DN200

FOR FRESH WATER SUPPLY

FOR FLUSH WATER SUPPLY

DEVELOPMENT

WATER MAIN CONNECT TO EXISTING FRESH WATER MAIN

FP

NGAU TAM MEI CHANNEL

FUNG CHUK ROAD

HA CHUK YUEN ROAD

CASTLE PEAK ROAD

SAN TIN HIGHWAY

SAN TAM ROAD

YAU MEI SAN TSUEN

Chuk Yuen Upper Service Reservoir

Chuk Yuen Upper Pumping Station

Telephone Exchange

Happy House

Open Storage

DETAIL '1'
SCALE 1 : 1600

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項目

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STATUS
狀況

SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60098971

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
FRESH WATER DISTRIBUTION LAYOUT PLAN

SHEET 1 OF 2

SHEET NUMBER
圖紙號碼
60098971/WSIA/FIGURE 4

Appendix 1

Appendix 1

Hydraulic Calculation For Existing and Proposed water mains underneath San Tam Road

Estimated Fresh and Flush Water Demands for Entire Development Site	2673.82	m^3/day

Hydraulic Calculation for Existing Fresh Water Supply System to Entire Development

The required flow rate, Q_f for the entire development is:	2,674	m^3/day
	0.031	m^3/s
With reference to WSD's Departmental Instruction No. 1309, the peak factor for fresh water distribution mains is 3.		
Hence, the required peak flow rate for the development Q_{fp} is:	0.093	m^3/s
Internal diameter of existing DN600 water main	586	mm
Cross Section Area	0.270	m^2
It was assumed that the velocity of the existing water main is:	3	m/s
The flow rate of the existing water main is	0.80911	m^3/s
Hence, the percentage of the existing water main occupied by the development site is:	11	%

Hydraulic Calculation for Proposed Fresh and Flush Water Supply System to Entire Development

The required flow rate, Q_f for the entire development is:	2,674	m^3/day
	0.031	m^3/s
With reference to WSD's Departmental Instruction No. 1309, the peak factor for fresh water distribution mains is 3.		
Hence, the required peak flow rate for the development Q_{fp} is:	0.093	m^3/s
Internal diameter of proposed DN300 water main	282	mm
Cross Section Area	0.062	m^2
The peak velocity of the proposed water main is:	1.486	m/s

Notes:

1. According to Manual of Mainlaying Practice 2012 Edition, the maximum flow velocity under peak flow for both pumping mains and distribution mains should be less than 3 m/s.

Appendix 1

Hydraulic Calculation For Existing and Proposed water mains underneath San Tam Road (Fire Fighting Condition)

Fire Fighting Requirement		6000.00 m^3/day
Mean Daily Demand	**X 1**	2673.82 m^3/day
Total		8673.82 m^3/day

Existing Fresh Water Supply System

The required flow rate, Q_f for the entire development is:	8,674 m^3/day 0.100 m^3/s
Internal diameter of existing DN600 water main	586 mm
Cross Section Area	0.270 m^2
It was assumed that the velocity of the existing water main is:	3 m/s
The flow rate of the existing water main is	0.80911 m^3/s
Hence, the percentage of the existing water main occupied by the development site is:	12 %

Proposed Water Supply System

The required flow rate, Q_f for the entire development is:	8,674 m^3/day 0.100 m^3/s
Internal diameter of proposed DN300 water main	282 mm
Cross Section Area	0.062 m^2
The peak velocity of the proposed water main is:	1.607 m/s

Notes:

1. According to Manual of Mainlaying Practice 2012 Edition, the maximum flow velocity under peak flow for both pumping mains and distribution mains should be less than 3 m/s.