
Appendix J

Water Supply Impact Assessment

Section 12A Planning Application for Proposed Amendments to the Tung Chung Valley Outline Zoning Plan to Rezone “Residential (Group C)2” Zone to “Residential (Group B)” Zone in Support of Private Residential Development at Various Lots in D.D. 1 Tung Chung and Adjoining Government Land, Tung Chung, Lantau Island

Water Supply Impact Assessment

December 2024

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1. Introduction

1.1 Background

- 1.1.1 AECOM Asia Company Limited (AECOM) was commissioned by the project proponent to act as the engineering consultant to conduct a Water Supply Impact Assessment (WSIA) for a private residential development in Tung Chung, Lantau Island.
- 1.1.2 The Application Site, with a total site area of 33,808m², is mostly covered by vegetation and with some open space areas and car parking areas. The Site is located at the west side of Chung Mun Road, within Ngau Au. The Application Site is also next to the outlet discharge point of Tung Chung Bay. The location of the Application Site is shown in **WSIA/Figure 1**.
- 1.1.3 The Application Site is currently zoned “Residential (Group C)2” with a maximum plot ratio of 1 on the Approved Tung Chung Valley Outline Zoning Plan No. S/I-TCV/2. The Applicant now proposes to increase the domestic plot ratio to not more than 2.10 to optimise valuable land resources and infrastructural capacity.
- 1.1.4 This WSIA report serves as a supporting document for rezoning the Site from “Residential (Group C)2” Zone to “Residential (Group B)” Zone.

1.2 Objective of this Submission

- 1.2.1 This report outlines the assessment results of the potential water supply impacts caused by the Application Site. The main objectives of this assessment include the followings:
- (i) Review the existing water supply condition of the Application Site;
 - (ii) Estimates the water demand of the Application Site;
 - (iii) Propose water supply mitigation measures where appropriate to mitigate the potential water supply impact.

1.3 Nomenclature

1.3.1 The following abbreviations and shortened expressions in **Table 1** are adopted in this report.

ADWF	Average Dry Weather Flow
AECOM	AECOM Asia Company Limited
CIFSUS	Commercial and Industrial Floor Space Utilization Survey (PlanD)
DSD	Drainage Services Department
EPD	Environmental Protection Department
GFA	Gross Floor Area
mPD	Metres above Principal Datum
TCFWSR	Tung Chung Fresh Water Service Reservoir
SWSR	Salt Water Service Reservoir
PlanD	Planning Department
UFF	Unit Flow Factor
UDD	Unit Daily Demand
WSD	Water Supplies Department
WSIA	Water Supply Impact Assessment

Table 1 – Nomenclature

2. Development Proposal

2.1 The Proposed Development

- 2.1.1 The Application Site area is approximately 33,808m². The Application Site consists of 9 residential blocks, 1 covered private transport lay-by, 1 kindergarten and retail facilities. The residential blocks are ranging from 6 to 22 storeys above a 1 to 3-storey podium, providing about 1,783 units in total.
- 2.1.2 The anticipated completion year of the Application Site is 2030.
- 2.1.3 The Master Layout Plan (MLP) of the Application Site is shown in **WSIA/Figure 2**. The proposed development schedule is summarised in **Table 2** below.

	Proposed Development
Site Area	About 33,808m ²
GFA	About 78,292m ²
- Domestic Portion	About 70,997m ²
- Non-Domestic Portion	About 7,295m ²
Plot Ratio	Not more than 2.32
- Domestic Portion	Not more than 2.10
- Non-Domestic Portion	Not more than 0.22
Maximum Site Coverage	Not more than 33.3%
Maximum Building Height (main roof level)	
- Area (a)	Not more than 50mPD
- Area (b)	Not more than 80mPD
- Area (c)	Not more than 100mPD
No. of Storeys ⁽¹⁾	6 to 22 storeys above a 1 to 3 storey(s) podium
Domestic Portion	
Domestic GFA	About 70,997m ²
Domestic Plot Ratio	Not more than 2.10
No. of Blocks	9
No. of Units	About 1,783
Average Flat Size	About 39.8m ²
Anticipated Population ⁽²⁾	About 5,171
Private Open Space ⁽³⁾	Not less than 5,171m ²
Non-Domestic Portion – Commercial and Covered Private Transport Lay-by	
Commercial GFA ⁽⁴⁾	About 4,145m ²
Covered Private Transport Lay-by GFA	About 3,150m ²
Maximum Building Height	Not more than 19mPD
Residents’ Clubhouses ⁽⁵⁾	
Clubhouse GFA	About 3,000m ²
No. of Storeys	1

Table 2 – Key Development Parameters

Remarks:

- (1) Excluding basement floor(s) for car park and transfer plate; including above ground floors for commercial / covered private transport lay-by / ramp / E&M facilities / clubhouse / residential lobby / residential floors. The indicative typical floor-to-floor height is 3.25m which is subject to refinement at detailed design stage
- (2) Adopting a person per flat ratio of 2.9 as per Tertiary Planning Units 950 – 951 under 2021 Population Census covering the Application Site
- (3) Not less than 1m² per person in accordance with Hong Kong Planning Standards and Guidelines (HKPSG) requirement
- (4) Commercial GFA refers to commercial uses ('Eating Place' and 'Shop and Services'), 'School' (kindergarten, nursery, language, computer, commercial and tutorial schools, art school, ballet and other types of schools providing interest / hobby related courses), 'Place of Entertainment' and 'Place of Recreation, Sports or Culture'. A kindergarten with a GFA of about 930m² is proposed.
- (5) Residents' clubhouse GFA is based on the maximum GFA concession for clubhouse according to Buildings Department's Practice Note APP-104 and shall be disregarded from the total GFA calculation

3. Assessment Methodology

3.1 Unit Demand

- 3.1.1 Assumptions have been made for the unit daily demand (UDD) for each type of land use, for both fresh water and flush water. The UDD is used for estimating the total demand of the Application Site and the required water supply capacity to support the development.
- 3.1.2 The water supply demand estimation is presented in **Annex 1**.
- 3.1.3 The unit flow factors adopted for water demand estimation and calculation are summarised in **Table 3**.

Development Type	Flow Type	Fresh Water UDD (L/head/day)	Flush Water UDD (L/head/day)
Domestic	Private Residential – R2	300	70
Employees	Service Trades	40	/
School	Students	25	25

Table 3 – Unit Daily Demand adopted in Water Supply Impact Assessment

Note: Employee includes all non-domestic population except students.

3.2 Peaking Factors

- 3.2.1 The peaking demand factors below shall be adopted for design:
 - Peak flow rate in fresh water distribution mains = 3 x mean daily demand
 - Peak flow in flushing water distribution mains = 2 x mean daily demand
 - Peak flow rate in fresh water trunk mains = 1.5 x mean daily demand
 - Peak flow rate in flushing water trunk mains = 1.2 x mean daily demand
 - Peak flow rate in flushing water trunk mains also serve as distribution mains = 2 x mean daily demand

3.3 Fire-fighting

3.3.1 In addition to the aforementioned facilities of the Application Site, water supply for fire-fighting service has been considered in this WSIA. Fire-fighting requirement for residential zone is 6,000m³/day with discharge pressure of 17m head. The fire hydrant should be of standard pattern with minimum output pressure of 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. **Table 4** summarizes the fire-fighting requirements.

Requirements	Minimum Values
Minimum fresh water supply	6,000 m ³ /day
Discharge pressure	17m
Minimum output not less than 25 psi	4,000 L/min to last for an hour

Table 4 – Fire-Fighting Requirement

3.4 Residual Heads

3.4.1 The minimum residual heads at extremity of the fresh water and flush water supply systems for the Application Site are adopted as follow:

- Fresh water: 20m
- Flush water: 15m

3.5 Design Velocity

3.5.1 The desirable flow velocities for hydraulic checking are as follows:

Maximum velocity (under peak flow condition)

Fresh water mains:

>DN700	≤ 3 m/s
DN700 – DN525	≤ 2.5 m/s
DN450 – DN375	≤ 2 m/s
DN300 – DN200	≤ 1.5 m/s

Flush water mains:

≥DN1000	≤ 3 m/s
DN900 – DN800	≤ 2.5 m/s
DN700 – DN300	≤ 2 m/s
DN450 – DN300	≤ 1.5 m/s

Minimum velocity (under peak flow condition)

Fresh water mains: ≥ 0.9 m/s

Flush water mains : ≥ 0.9 m/s

3.5.2 The pipeline shall have a minimum gradient of 1:400. Pipes shall be laid at a minimum separation of 300mm away from existing utilities and underground structures.

4. Review on Existing Water Supply System

4.1 Existing Water Supply System

- 4.1.1 There is an existing DN80 DI fresh water distribution main running across the Application Site. It conveys fresh water from north to southwest of the Application Site and serving the existing Application Site and villages near the Site. The existing water supply layout refers to **WSIA/Figure 3**.
- 4.1.2 The Application Site is within the supply zone of Tung Chung Fresh Water Service Reservoir (TCFWSR).
- 4.1.3 According to WSD information, the existing TCFWSR supplying Tung Chung New Town and the Hong Kong International Airport has a storage capacity of 41,700 m³. The Tung Chung Fresh Water Supply System is uprated under WSD Contract No. 4/WSD/17. The total storage capacity of TCFWSR is increased to 81,700m³ after uprating.
- 4.1.4 Currently, there is no salt water supply system at the Application Site. Temporary mains for flushing (TMF) system is currently adopted to supply flushing water for the Application Site. A series of existing DN300 DI water main is located along Chung Mun Road for TMF purpose.

4.2 Impact on Existing Water Supply System

- 4.2.1 The estimated daily fresh water demand for Application Site is 1,766 m³/day and the estimated daily flush water demand is 367m³/day. Please refer to **Annex 1** for the detailed water demand estimation calculation.
- 4.2.2 The fresh water demand of the Application Site (1,766 m³/day) will utilize approximately 2.2% of the design capacity of the uprated TCFWSR.
- 4.2.3 The peaking factor adopted for the sizing of fresh water distribution main is 3, such that the required peak flow rate for the Application Site is 0.061 m³/s.
- 4.2.4 The peaking factor adopted for the sizing of salt water distribution main is 2, such that the required peak flow rate for the Application Site is 0.009 m³/s.

5. Mitigation Measures

5.1 Upgrading of Tung Chung Fresh Water Supply System

- 5.1.1 As mentioned in Section 4.1.3, an upgrading of Tung Chung Fresh Water Supply System is carried out under WSD Contract No. 4/WSD/17. The total capacity of TCFWSR has increased to 81,700m³ serving the proposed housing and commercial developments in Tung Chung New Town.
- 5.1.2 The Application Site will acquire fresh water from the upgraded Tung Chung Fresh Water Supply System. A DN250 fresh water main is proposed to be tee-off from existing DN600 fresh water main at the interception of Yu Tung Road and Chung Mun Road. The location of proposed DN250 tee-off pipe refers to **WSIA/Figure 4**.
- 5.1.3 According to hydraulic review of sizing of proposed lead-in water main for Application Site, the fresh water lead-in size required is 250mm diameter. The Application Site will utilize approximately 83% capacity of proposed DN250 fresh water lead-in. The hydraulic checking of lead-in fresh water main for Application Site refers to **Annex 2**.
- 5.1.4 According to hydraulic review of existing fresh water main, the Application Site will utilize approximately 4% capacity of existing DN600 fresh water main. The hydraulic review of existing fresh water main refers to **Annex 3**.

5.2 Public Salt Water Supply System

- 5.2.1 As mentioned in Section 4.1.4, there is currently no salt water supply for the Application Site. CEDD initiated the construction of Tung Chung Salt Water Pumping Station and Salt Water Service Reservoir and laying of associated salt water mains for salt water supply to Tung Chung New Town Extension. The tentative completion date is 2024. The Application Site will start population intake after the operation of public salt water supply system.
- 5.2.2 For flushing water supply, a DN100 salt water main is proposed to be tee-off from existing DN300 water main (TMF) along Yu Tung Road. The Application Site occupied approximately 71% capacity of proposed DN100 salt water lead-in. The location of proposed DN100 tee-off pipe refers to **WSIA/Figure 4**. The hydraulic checking of proposed lead-in salt water main for Application Site refers to **Annex 2**.
- 5.2.3 According to hydraulic review of existing salt water main, the Application Site occupied approximately 8% capacity of existing DN300 (TMF) water main. The hydraulic review of existing salt water main refers to **Annex 3**.

5.3 Diversion of Existing Fresh Water Mains

- 5.3.1 As mentioned in Section 4.1.1, an existing DN80 DI fresh water distribution main running across the Application Site. The existing DN80 DI fresh water distribution main will be diverted and re-connected to existing fresh water main at Yu Tung Road and Chung Mun Road respectively to complete the loop system. The existing DN80 DI fresh water distribution mains within the Application Site will be demolished. The fresh water main diversion layout refers to **WSIA/Figure 4**.

6. Maintenance Responsibility

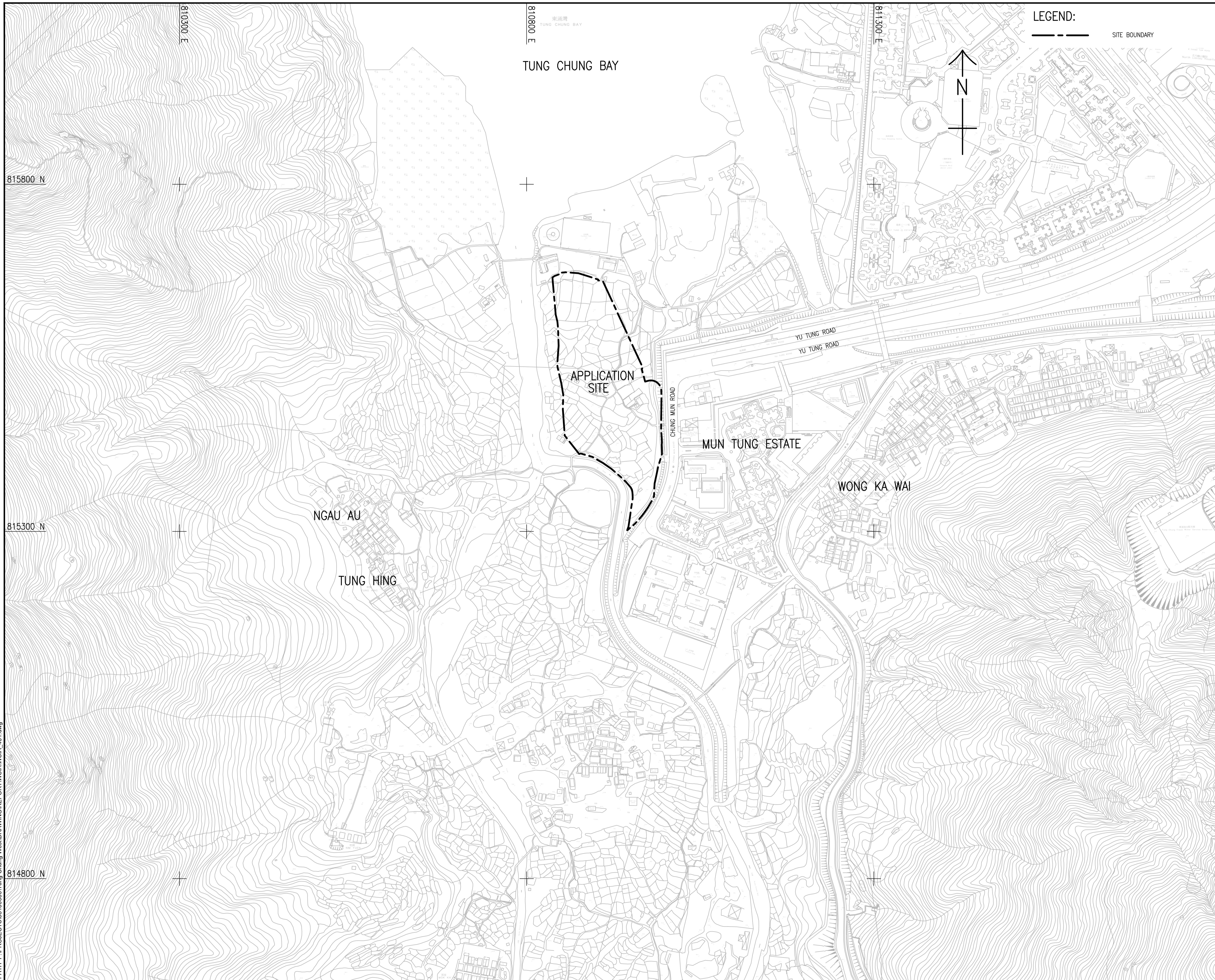
- 6.1.1 The Applicant is responsible for the construction and maintenance of all water supply facilities within the Application Site boundary, including all internal watermains and water supply lead-in valves.
- 6.1.2 The proposed fresh water main tee-off from public fresh water main is proposed to be handed over to the government after construction. The Applicant is responsible for the construction.
- 6.1.3 The proposed salt water main tee-off from public salt water main is proposed to be handed over to the government after construction. The Applicant is responsible for the construction.

7. Conclusion

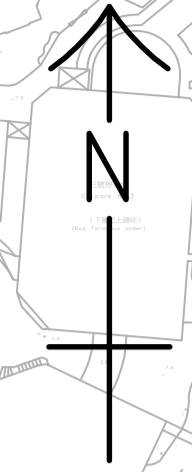
- 7.1.1 The Application Site is designated for residential use under the current OZP with a plot ratio of 1. The Applicant proposes to have a domestic plot ratio of 2.1 for the site by rezoning the site from "R(C)2" to "R(B)". The WSIA has been carried out to assess the impact on the existing water supply system due to the proposed development.
- 7.1.2 The fresh water demand of the Application Site is 1,766m³/day and the flushing water demand is 367m³/day.
- 7.1.3 A DN250 fresh water main is proposed to be tee-off from existing DN600 fresh water main along Yu Tung Road. The Application Site occupied approximately 4% capacity of existing DN600 fresh water main.
- 7.1.4 A DN100 salt water main is proposed to be tee-off from existing DN300 (TMF) water main along Yu Tung Road. The Application Site occupied approximately 8% capacity of existing DN300 (TMF) water main.
- 7.1.5 The Application Site will acquire fresh water from the updated Tung Chung Fresh Water Supply System while the Application Site will acquire flushing water from public salt water system once the public salt water supply system is completed by CEDD. It is concluded that no adverse impact to the water supply system is envisaged.

End of Report

Figures



LEGEND:
 --- SITE BOUNDARY



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 SECTION 12A PLANNING APPLICATION FOR PROPOSED AMENDMENTS TO THE TUNG CHUNG VALLEY OUTLINE ZONING PLAN TO REZONE "RESIDENTIAL (GROUP C)2" ZONE TO "RESIDENTIAL (GROUP B)" ZONE IN SUPPORT OF PRIVATE RESIDENTIAL DEVELOPMENT AT VARIOUS LOTS IN D.D. 1 TUNG CHUNG AND ADJOINING GOVERNMENT LAND, TUNG CHUNG, LANTAU ISLAND

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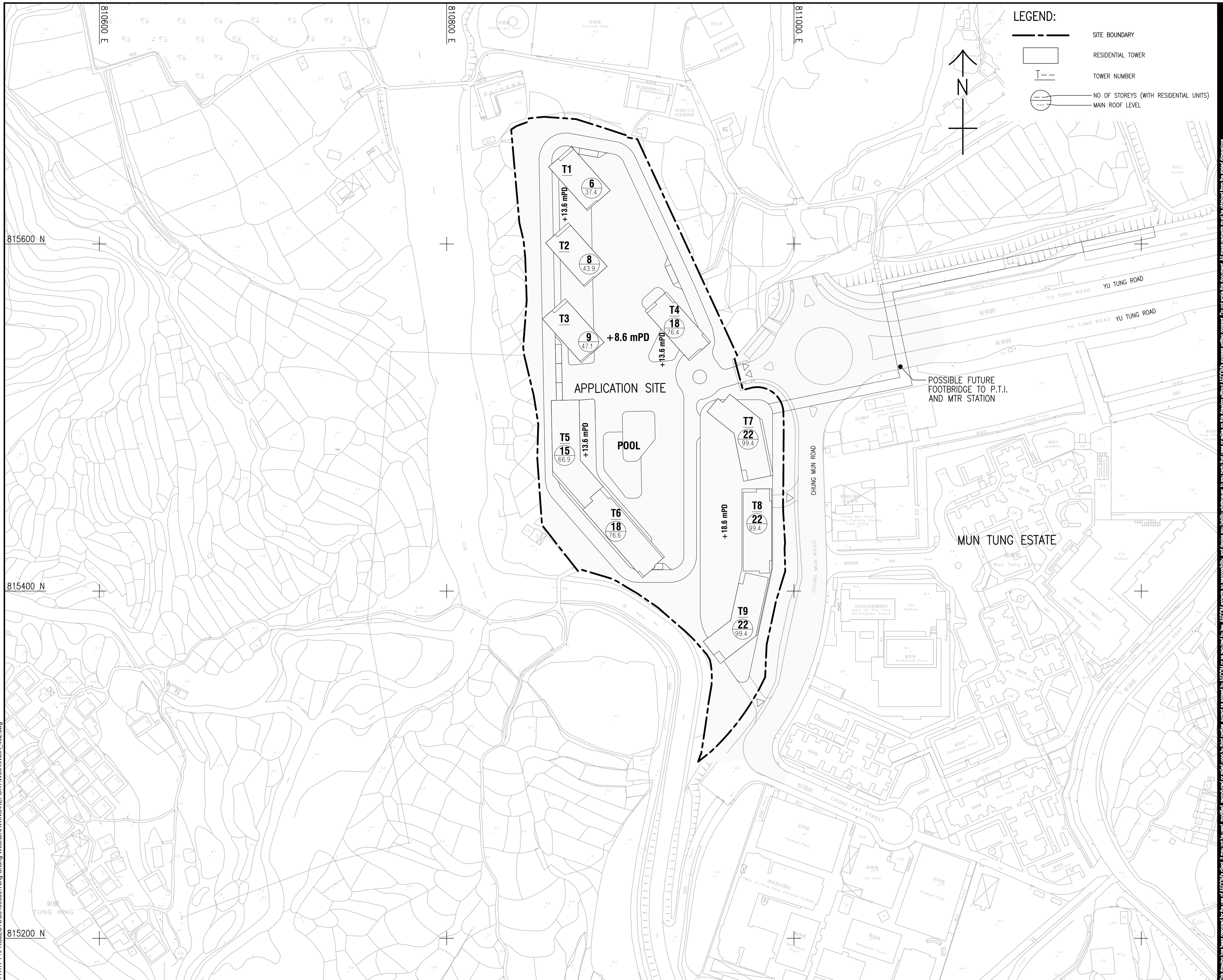
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 TUNG CHUNG WEST/WSIA/FIGURE 1

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LEGEND:

- SITE BOUNDARY
- ▭ RESIDENTIAL TOWER
- T-- TOWER NUMBER
- NO OF STOREYS (WITH RESIDENTIAL UNITS)
- MAIN ROOF LEVEL



PROJECT
項目

SECTION 12A PLANNING APPLICATION FOR PROPOSED AMENDMENTS TO THE TUNG CHUNG VALLEY OUTLINE ZONING PLAN TO REZONE "RESIDENTIAL (GROUP C)2" ZONE TO "RESIDENTIAL (GROUP B)" ZONE IN SUPPORT OF PRIVATE RESIDENTIAL DEVELOPMENT AT VARIOUS LOTS IN D.D. 1 TUNG CHUNG AND ADJOINING GOVERNMENT LAND, TUNG CHUNG, LANTAU ISLAND

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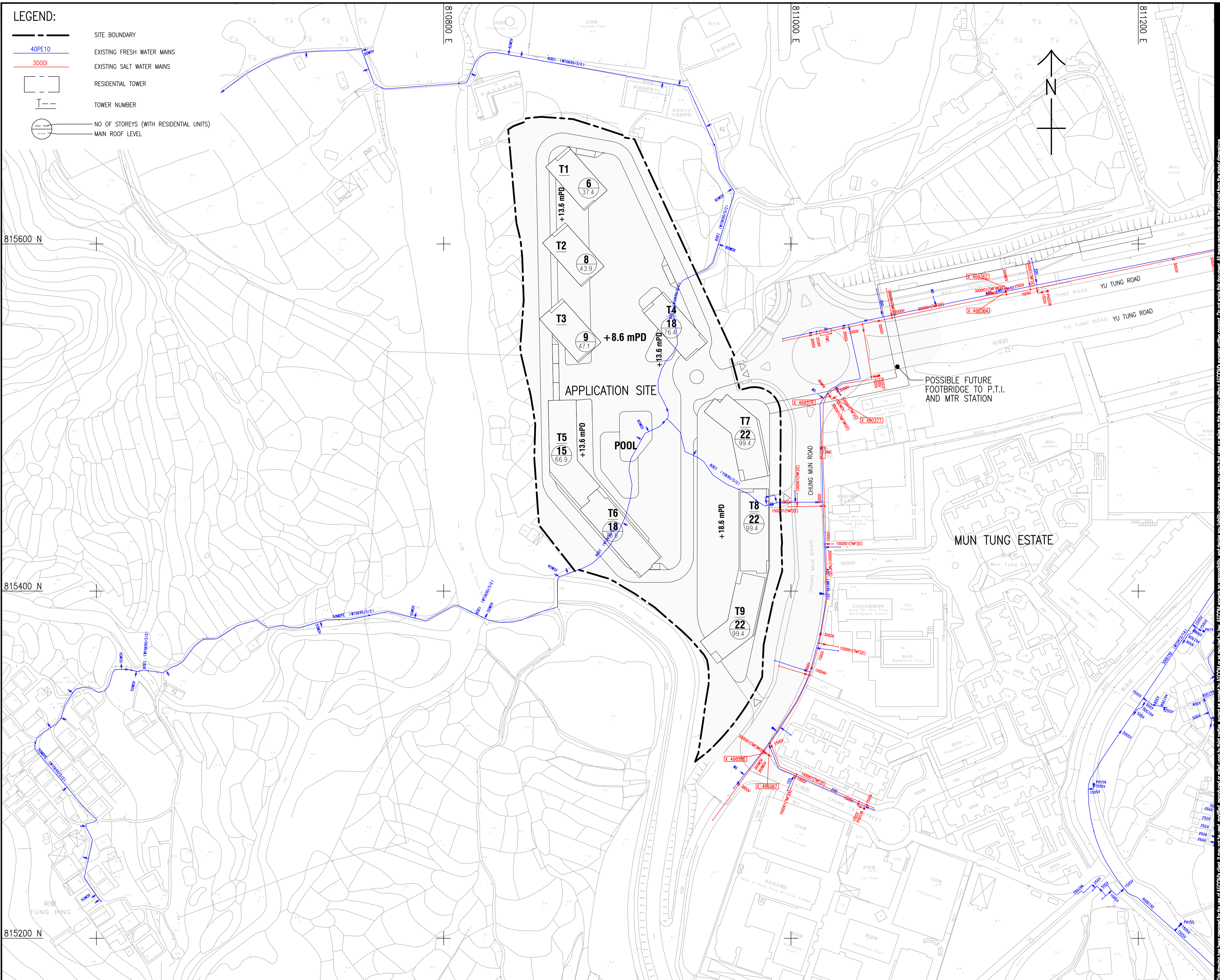
MASTER LAYOUT PLAN

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TUNG CHUNG WEST/WSIA/FIGURE 2

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- LEGEND:**
- SITE BOUNDARY
 - 40PE10 EXISTING FRESH WATER MAINS
 - 300DI EXISTING SALT WATER MAINS
 - RESIDENTIAL TOWER
 - TOWER NUMBER
 - NO. OF STOREYS (WITH RESIDENTIAL UNITS)
 - MAIN ROOF LEVEL



PROJECT
 SECTION 12A PLANNING APPLICATION FOR PROPOSED AMENDMENTS TO THE TUNG CHUNG VALLEY OUTLINE ZONING PLAN TO REZONE "RESIDENTIAL (GROUP C)2" ZONE TO "RESIDENTIAL (GROUP B)" ZONE IN SUPPORT OF PRIVATE RESIDENTIAL DEVELOPMENT AT VARIOUS LOTS IN D.D. 1 TUNG CHUNG AND ADJOINING GOVERNMENT LAND, TUNG CHUNG, LANTAU ISLAND

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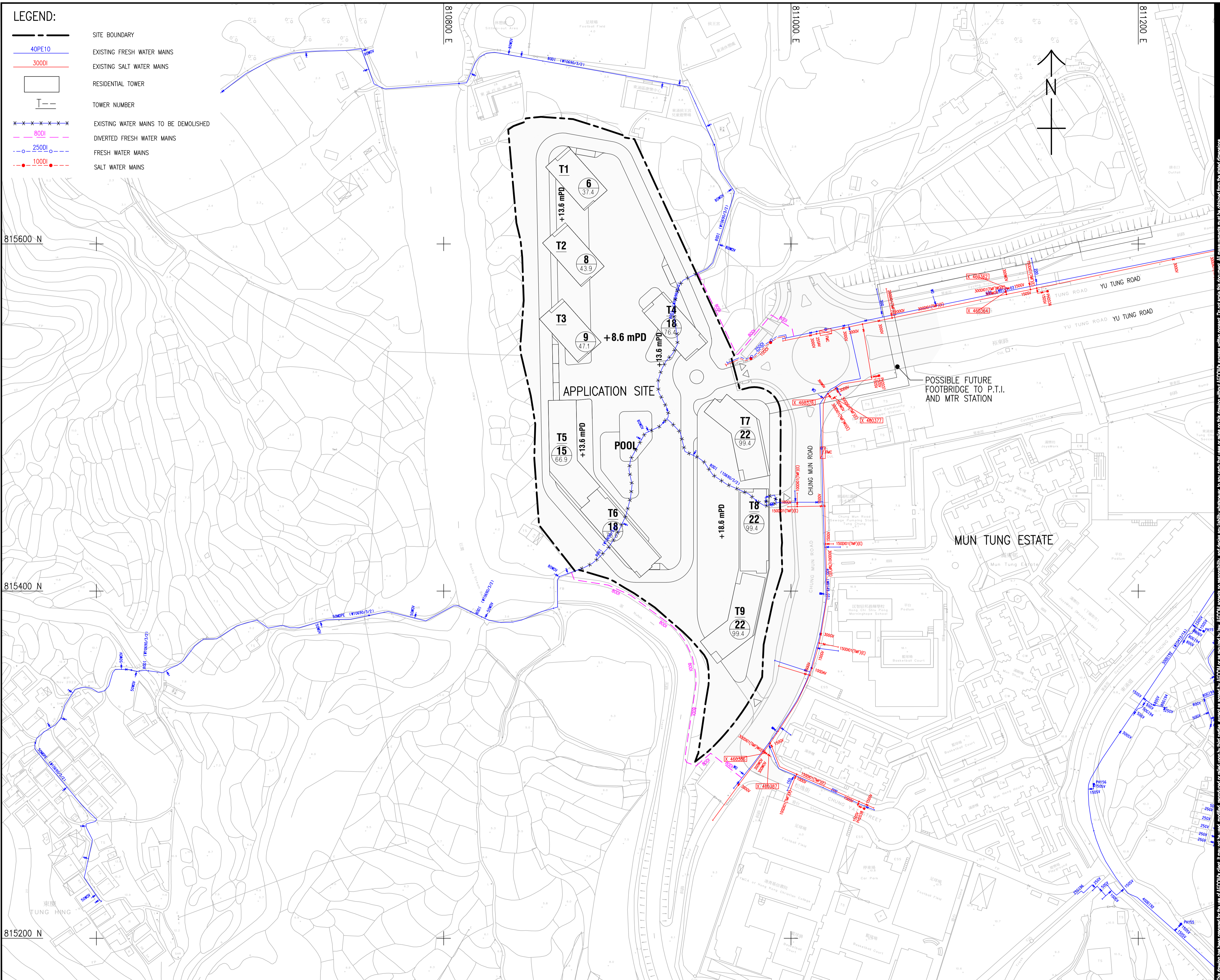
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 協議編號:

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 圖紙名稱: WATER SUPPLY LAYOUT PLAN

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Annex 1

Water Demand Estimation

Annex 1

Application Site Development Design Population

Indicative Development Schedule

Site Area (m ²)	33,808
Plot Ratio	2.100
Domestic GFA (m ²)	70,997
Total Flat	1,783
Retail (m ²)	3,215
Clubhouse (m ²)	3,000
Kindergarten GFA (m ²)	930

Design Population⁽³⁾

	Design Population	
Private Residential	2.9 residents/flat	5,171
Retail	3.5 workers/100m ²	113
Clubhouse	3.3 workers/100m ²	99
No. of student ⁽²⁾ (Kindergarten)	30 students/Class	270
No. of staff ⁽¹⁾ (Kindergarten)	1 teacher/11 students	25

Note:

(1) 11-to-1 Qualified Kindergarten Teachers to Children Ratio is adopted according to Education Bureau Circular No. 12/2020

(2) 9 classes and 30 students per class are assumed

(3) In accordance with Commercial and Industrial Floor Space Utilization Survey published by Planning Department,

3.5 workers/100m² for Retail Trade

3.3 workers/100m² for Clubhouse

Annex 1

Summary of Water Demand for Application Site

Population ⁽¹⁾	Supply	User	Unit Demand (L/h/d) (Assumed)			Fresh Water Demand (m ³ /d)	Flush Water Demand (m ³ /d)
			Private Housing	School	Service Trade		
5,171 (Private Housing)	Fresh Water	Residents	300	-	-	1,551	-
	Flushing Water	Residents	70	-	-	-	362
295 (Kindergartens)	Fresh Water	Student & Staff	-	25	-	7	-
	Flushing Water	Student & Staff	-	25	-	-	7
5,171 (Service Trade)	Fresh Water	Employee	-	-	40	207	-
	Flushing Water	Employee	-	-	-	-	-
Total						1,766	369

Remark:

(1) Population reference to Table 2 - Key Development Parameters.

Annex 2

Hydraulic Review of Proposed Lead-in

Annex 2 - Hydraulic Review of Proposed Lead-in Water Mains

Flushing Water Demand

Estimated Flushing Water Demand	369	m ³ /day
	0.0043	m ³ /s

Fresh Water Demand

Estimated Fresh Water Demand	1766	m ³ /day
	0.0204	m ³ /s

Hydraulic Review for Proposed DN250 Fresh Water Lead-in		
Fresh water demand	1766	m ³ /day
Peak factor ⁽¹⁾	3.0	
Peak flow rate from development site	0.061	m ³ /s
Size of existing water main	250	mm
Cross section area	0.049	m ²
Flow velocity limit for DN250 ⁽²⁾	1.5	m/s
Flow velocity of DN250	1.3	m/s
The percentage of DN250 occupied by the development site	83	%

Water demand from the Application Site is equivalent to 83% of DN250 capacity.

Hydraulic Review for Proposed DN100 Flushing Water Lead-in		
Flushing water demand	369	m ³ /day
Peak factor ⁽¹⁾	2.0	
Peak flow rate from development site	0.009	m ³ /s
Size of existing water main	100	mm
Cross section area	0.008	m ²
Flow velocity limit for DN100 ⁽²⁾	1.5	m/s
Flow velocity of DN100	1.1	m/s
The percentage of DN100 occupied by the development site	71	%

Water demand from the Application Site is equivalent to 71% of the existing DN100 capacity.

Annex 3

Hydraulic Review of Existing Water Mains

Annex 3 - Hydraulic Review of Existing Water Mains

Flushing Water Demand

Estimated Flushing Water Demand	369	m ³ /day
	0.0043	m ³ /s

Fresh Water Demand

Estimated Fresh Water Demand	1766	m ³ /day
	0.0204	m ³ /s

Hydraulic Review for Existing DN600 Fresh Water Main		
Fresh water demand	1766	m ³ /day
Peak factor ⁽¹⁾	1.5	
Peak flow rate from development site	0.031	m ³ /s
Size of existing water main	600	mm
Cross section area	0.283	m ²
Flow velocity limit for DN600	2.5	m/s
Capacity of DN600	0.708	m ³ /s
The percentage of DN600 occupied by the development site	4	%

Water demand from the Application Site is equivalent to 4% of DN600 capacity.

(1) Peaking Factor 1.5 is adopted for capacity checking of existing fresh water trunk mains

Hydraulic Review for Existing DN300 Flushing Water Main		
Flushing water demand	369	m ³ /day
Peak factor ⁽¹⁾	2.0	
Peak flow rate from development site	0.009	m ³ /s
Size of existing water main	300	mm
Cross section area	0.071	m ²
Flow velocity limit for DN300	1.5	m/s
Capacity of DN300	0.107	m ³ /s
The percentage of DN300 occupied by the development site	8	%

Water demand from the Application Site is equivalent to 8% of the existing DN300 capacity.

(1) Peaking factor 2 is adopted for capacity checking of existing flushing water trunk mains assuming the existing flushing trunk main also serves as a distribution main.

