

Appendix D – Water Supply Impact Assessment

**Application for Permission under
Section 16 of the Town Planning
Ordinance (Cap. 131) for Proposed
“Flat” with “Commercial (1)” Zone of
STTL626 and STTL627 in Shatin**

Preliminary Water Supply Impact Assessment
(WSIA)

July 2026

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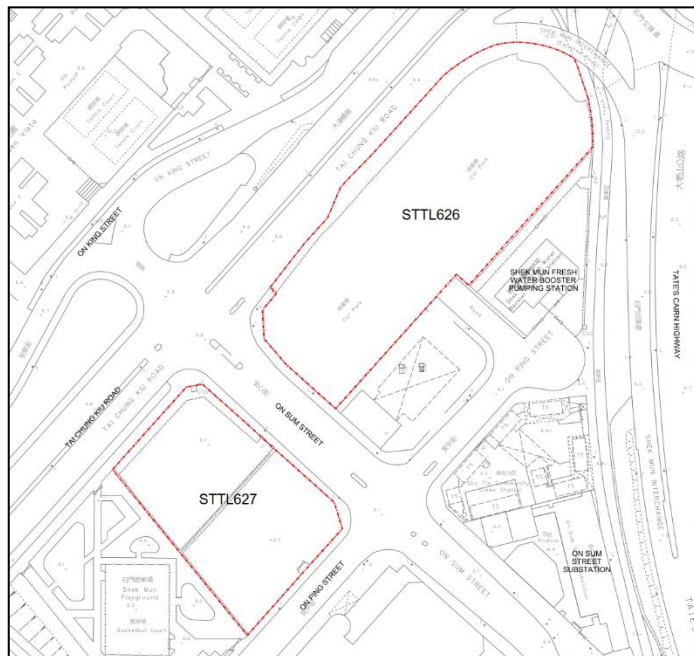
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1 INTRODUCTION

1.1 Study Background

- 1.1.1 The Government is committed to facilitating steady and continued land supply. The Government will continue to optimise the use of built-up land and its surrounding areas to meet the demand for housing and other development purposes in the short to medium term.
- 1.1.2 To achieve this objective, the Government has identified potential sites for conversion from commercial to residential use. Upon confirmation of the technical feasibility, a planning application will be submitted under section 16 of Town Planning Ordinance for consideration by the Town Planning Board.
- 1.1.3 On 15 August 2023, Mott MacDonald Hong Kong Limited (Mott) was commissioned by the CEDD's Housing Projects 3, Civil Engineering Office to undertake the "Term Consultancy for Site Formation and Infrastructure Works for Proposed Housing and Other Developments in Zone 1 (2023 – 2027) – Feasibility Study". Zone 1 mainly covers Shatin, Ma On Shan, Tsuen Wan and Kwai Ching, Lantau and outlying islands. On 31 October 2025, Task Order No. 4 (TO4) was instructed to conduct various technical assessments to support the town planning application for proposed private residential development at two development sites denoted as STTL626 (also known as ST-9353N) and STTL627 (also known as ST-9353S) respectively, located on the north and south sides of the section of On Sum Street between Tai Chung Kiu Road and On Ping Street in Shek Mun, Sha Tin. Location of the Site is shown in **Diagram 1-1**.

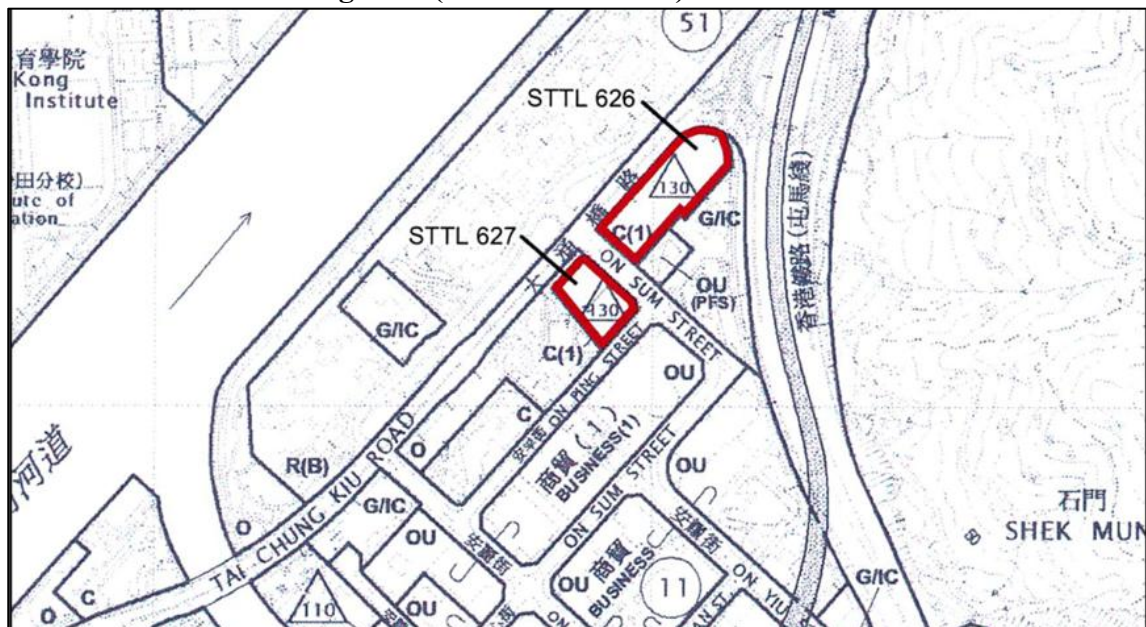
Diagram 1-1 **Location of the Site**



1.2 Site Description and Major Scope of Works

- 1.2.1 The two subject sites of this assignment STTL626 and STTL627, currently zoned "Commercial (1)" ("C(1)") on the approved Sha Tin Outline Zoning Plan (OZP) no. S/ST/40, cover a site area of approximately 0.80ha and 0.41ha respectively. Located at the northern fringe of the Shek Mun Business Area (Planning Area 11 in the OZP), the sites are generally bounded by Shek Mun Interchange to the north, Tai Chung Kiu Road (TCKR) to the northwest, Shek Mun Playground to the south, and On Ping Street (OPS) to the east, with On Sum Street (OSS) running along a corridor that separates the two sites. A hotel (Courtyard by Marriot Hong Kong Shatin) is located to the further southwest. Currently the STTL626 site is used as a fee-paying carpark (FPC) whereas the STTL627 site is vacant Government land. Both sites are formed flat ground, with an existing ground level at approximately +6mPD.
- 1.2.2 The proposed sites are covered by the approved Sha Tin Outline Zoning Plan (OZP) No. S/ST/40 and zoned as "C(1)", as shown in **Diagram 1-2**.

Diagram 1-2 Boundaries of the two sites under Approved Sha Tin Outline Zoning Plan (Plan No. S/ST/40)



Source: Sha Tin Outline Zoning Plan (Plan No. S/ST/40), Town Planning Board Portal

1.2.3 The design parameters of the Indicative Scheme for the Proposed Development are summarised in **Table 1.1** below.

Table 1.1 Target Design Parameters of the Indicative Scheme

	Development Parameters	
	STTL626	STTL627
Application Site Area	0.80Ha	0.41Ha
Planned Housing Type	Private Housing	
No. of Flats (Total No. of Flats : 1,456) ⁽¹⁾	962	494

Note:

(1) For technical assessment purpose, the adopted flat nos. for STTL626 and STTL627 are 1,100 and 451 (including 10% buffer) respectively. This is on conservative side since the total flat nos. of 1,551 (and consequently the design population) are larger than that in the Indicative Scheme.

1.2.4 This EFS aims to conduct the necessary technical assessments to support the town planning application for the proposed private residential developments for the two sites STTL626 and STTL627 in Shek Mun. The scope of work includes the followings:

- To conduct the technical assessments related to traffic and transport, drainage, sewerage, water supply and utilities;
- To assess environmental impacts and conduct quantitative risk assessments; and
- To prepare a Planning Report and to provide all necessary inputs to support and complete the planning application procedure.

1.2.5 Based on the information available, the technical assessments are currently scheduled for completion in March 2026 to initiate the Section 16 town planning application procedure in Q2 or Q3 2026. It is targeted that both sites will be included in the 2026/27 Land Sale Programme for private housing development.

1.3 Scope and Structure of this Report

1.3.1 In accordance with Clause 6.8 of the Brief, this Preliminary Water Supply Impact Assessment (WSIA) was prepared to present the following:

- To assess the water demands for the Site;
- take cognisance of the existing and proposed studies and projects which may have a bearing on the WSIA;
- ascertain the adequacy of waterworks facilities to support the Proposed Development and Infrastructure Works including fresh and salt water supply, fire hydrants, irrigation water, etc;
- ascertain there will be no adverse impact on the yield of water in the water gathering ground due to the Proposed Development and Infrastructure Works, and propose measures to avoid/minimise the loss of yield if any;
- assess any existing waterworks installations which would be affected by the works

of the Proposed Development and Infrastructure Works and propose recommendations, and advise feasibility of improvement/ modification/ diversion works/ layout where necessary;

- (f) identify needs for provision of any new waterworks, reserves and other improvement works to cope with the Proposed Development and Infrastructure Works. Automatic Meter Reading and some smart water supply initiatives shall be explored for the water supplies of the Proposed Development and Infrastructure Works. The Consultants shall consult WSD for the details of the smart water supply initiatives, if in need;
- (g) assess the short-term and long-term impacts on the existing and planned water supply systems arising from the Proposed Development and Infrastructure Works;
- (h) to evaluate technical feasibility of reducing potential demand of fresh water for flushing purpose;
- (i) to review and liaise with WSD for the latest Proposed Development layout and determine the location of connection point of the existing watermains;
- (j) identify need of any mitigation and protective measures such as diversion, reprovisioning and modification of waterworks facilities to cope with the Proposed Development and Infrastructure Works;
- (k) protect existing waterworks facilities and keep minimum disturbance to their normal operation during construction and in operation stage of the Proposed Development and Infrastructure Works; and
- (l) enable an agreement in principle to be reached between WSD and CEDD in respect of waterworks improvement works, mitigation and protection schemes, diversion schemes, reprovisioning works and/or modifications of waterworks facilities for incorporation in design and during construction of the Proposed Development and Infrastructure Works.

1.3.2 Following this introductory Section, this Report has the following remaining Sections:

- **Section 2: Methodology and Design Criteria;**
- **Section 3: Existing and Planned Water Supply Infrastructures;**
- **Section 4: Water Demand and Supply to the Development;**
- **Section 5: Water Supply Impact Assessment;**
- **Section 6: Conclusion.**

1.4 Nomenclature and Abbreviations

Abbreviations	Term
B/Ds	Government Bureaux/ Departments
CEDD	Civil Engineering and Development Department
CEO	Civil Engineering Office
CIFSUS	Commercial and Industrial Floor Space Utilization Survey (CIFSUS)
DI 1309	Departmental Instruction No. 1309
FEHD	Food and Environmental Hygiene Department
FPC	Fee-paying Carpark
FSD	Fire Services Department
FWSR	Fresh Water Service Reservoir
G/IC	Government/ Institution/ Community
LCSD	Leisure and Cultural Services Department
Mott	Mott MacDonald Hong Kong Limited
OPS	On Ping Street
OSS	On Sum Street
OZP	Outline Zoning Plan
PlanD	Planning Department
STT	Short-term Tenancy
SWPS	Seawater Booster Pumping Station
SWSR	Salt Water Service Reservoir
TCKR	Tai Chung Kiu Road
TWL	Top Water Level
TPB	Town Planning Board
TPEDM	Territorial Population and Employment Data Matrix
TPU	Tertiary Planning Unit
WSD	Water Supplies Department
WSIA	Water Supply Impact Assessment

2 METHODOLOGY AND DESIGN CRITERIA

2.1 General Assessment Methodology

2.1.1 The following approach and methodology have been adopted in this Waterworks Impact Assessment: -

- Estimate the water consumption demand of the Proposed Development;
- Identify the existing and planned water supply systems within the vicinity of the sites;
- Examine the impact on the water supply systems arising from the Proposed Development; and
- Identify improvement and upgrading works.

2.2 Design Parameters and Assumptions

2.2.1 The proposed water supply of the proposed housing development site is based on the following standards, guidelines and reference: -

- Departmental Instruction No. 1309 (DI 1309) by Water Supply Department (WSD);
- Manual of Main laying Practice (2012 Edition) by WSD;
- Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment by Fire Services Department (FSD);
- 2021 Population Census; and
- Commercial and Industrial Floor Space Utilization Survey (CIFSUS).

2.2.2 The unit demands used in estimating the fresh water and flushing water consumption for the Proposed Development are presented in **Table 2.1**. The unit demands are based on unit water demand in Water Supply Department's Departmental Instruction No. 1309. The following design parameters are adopted for the design of the proposed water supply system: -

Table 2.1 - Fresh and Flushing Water Unit Demand

Type	Unit	Fresh Water		Flushing Water
		Fresh Water	Service Trade	
Domestic				
Private Housing	l/h/d	230 ⁽ⁱ⁾	45 ⁽ⁱⁱ⁾	110 ⁽ⁱⁱⁱ⁾
Non-Domestic				
Integrated Children and Youth Services Centres (ICYSC) (within Site STTL 627)	l/h/d	100 ^(iv)	/	50 ^(v)
Remarks:				
(i) According to DI No. 1309, fresh water unit demand to be 230 l/h/d is adopted as the R1 private housing.				
(ii) According to DI No. 1309, fresh water service trade 45 l/h/d is adopted for Sha Tin area.				
(iii) Salt water unit demand 110 l/h/d is adopted for Sha Tin area to reflect the actual water consumption in the area.				
(iv) Fresh water unit demand 100 l/h/d is adopted for social welfare uses.				
(v) Salt water unit demand 50 l/h/d is adopted for social welfare uses.				

2.3 Assessment Parameters and Assumptions

Peak Factor

The minimum capacity of the distribution system should be sufficient for the following peak demands.

- Fresh Water Supply – 3 times mean daily demand
- Salt Water Supply – 2 times mean daily demand

For firefighting, the following peak demand factor is adopted.

- Fresh Water Supply – 1 times mean daily demand

Peak Flow Velocity

2.3.1 A maximum flow velocity of 3 m/s under peak flow for both pumping mains and distribution mains.

2.3.2 Flow velocity limit for fresh water distribution mains with pipe diameter:

- >DN700 , ≤ 3 m/s
- DN700 - DN 525 , ≤ 2.5 m/s
- DN450 – DN 375 , ≤ 2 m/s
- DN300 – DN 200 , ≤ 1.5 m/s

2.3.3 Flow velocity limit for salt water distribution mains with pipe diameter:

- $\geq$ DN1000 , ≤ 3 m/s

DN900 – DN800 , ≤ 2.5 m/s

DN700 – DN525 , ≤ 2 m/s

DN450 – DN300 , ≤ 1.5 m/s

Residual Head

2.3.4 According to WSD's DI 1309; Handbook on Plumbing Installation for Buildings; and Code of Practice for Minimum Fire Service Installations and Equipment, Testing and Maintenance of Installations and Equipment the following minimum residual heads shall be maintained.

- Fresh Water (Potable Water) Supply – 20 m (30m for existing buildings approved before 2006)
- Salt Water (Flushing Water) Supply – 15 m
- Firefighting (Potable Water) Supply – 17 m

2.4 Planned Data of the Proposed Development

2.4.1 The proposed Private Housing Development parameters are listed **Table 2.2** below: -

Table 2.2 – Parameters for the Development

Development Parameter	Type	Development Details	Design Population (head)
Domestic Flow			
Private Housing in STTL626	Domestic (Residential R1)	1,000 units	2,800 ⁽ⁱ⁾ (3,080 with 10% allowance)
Private Housing in STTL627	Domestic (Residential R1)	410 units	1,148 ⁽ⁱ⁾ (1,263 with 10% allowance)
Non-Domestic Flow			
Retail in STTL626	Retail	1,603m ²	-
Retail in STTL627		823m ²	
Integrated Children and Youth Services Centres (ICYSC)	Social Welfare Uses	163 m ² GFA (in Site STTL 627)	11
Remark: -			
i. Household size of 2.8 is adopted for the proposed development according to Table 201b in 2021 Population Census.			

3 EXISTING AND PLANNED WATER SUPPLY INFRASTRUCTURES

3.1 Existing and Planned Fresh Water Supply System

3.1.1 According to WSD's fresh water supply zone (refer to **Appendix A**), the Site falls within the fresh water supply zone of existing A Kung Kok Fresh Water Service Reservoir (FWSR).

3.1.2 The existing A Kung Kok FWSR have the design capacity of 17,745 m³ with Top Water Level (TWL) of +75mPD approximately as summarized in **Table 3.1** below.

Table 3.1 – Fresh Water Service Reservoirs for the Site

Reservoir	Capacity (m ³)	Top Water Level (mPD)	Invert Level (mPD)
A Kung Kok FWSR	17,745	+75.000	+67.370

3.1.3 From the WSD freshwater mains record plan, there is freshwater main sized 600mm to 150mm along A Kung Kok FWSR to On Ping Street with approximately 2.1km. See **Appendix C**.

3.2 Existing and Planned Salt Water Supply System

3.2.1 According to the WSD's saltwater mains record plan, salt water to the current location of the sites is supplied by existing To Shek Salt Water Service Reservoir (SWSR) and Sha Tin West SWSR as shown in **Appendix B**. Sha Tin Seawater Booster Pumping Station (SWPS), which provides salt water to To Shek SWSR and Sha Tin West SWSR, has been fully committed and has no spare capacity to provide salt water supply to the developments.

3.2.2 To Shek SWSR has the design capacity of 4,401m³ with Top Water Level (TWL) of +85.35mPD and Sha Tin West SWSR has the design capacity of 5,000m³ with TWL of +83.80mPD approximately as summarized in **Table 3.2** below.

Table 3.2 – Salt Water Service Reservoirs for the Site

Reservoir	Capacity (m³)	Top Water Level (mPD)	Invert Level (mPD)
To Shek SWSR	4,401	+85.350	+80.750
Sha Tin West SWSR	5,000	+83.80	+79.20

- 3.2.3 From the WSD salt water mains record plan, there are salt water mains sized 700mm to 150mm along To Shek SWSR to On Ping Street with approximately 3.4km located at the north-east of the Site. See **Fig. MMH/CE19/TO4/WSIA/FIG/2.2.**

4 WATER DEMAND AND SUPPLY TO THE DEVELOPMENT

4.1 Estimated Water Demand under the Proposed Development

- 4.1.1 Based on the unit water demand listed in **Table 2.1** and the proposed flat of private housing development, the mean daily fresh water and salt water demand for the Proposed Development are estimated to be about 1.194MLD (Peak demand of 3.582MLD) and 0.478MLD (Peak demand of 0.956MLD) respectively. The details of the water demand estimation are shown in **Table 4.1** and **Appendix G1**.

Table 4.1 – The Summary of Water Supply for Proposed Development

Site	Development Type	Mean Fresh Water Demand (MLD)	Peak Fresh Water Demand (MLD) ⁽¹⁾	Total Mean Flushing Water Demand (MLD)	Peak Flushing Water Demand (MLD) ⁽¹⁾
Domestic Flow					
STTL626	Private Housing Development	0.847	2.541	0.339	0.678
STTL627	Private Housing Development	0.347	1.042	0.139	0.278
Non-Domestic Flow					
Integrated Children and Youth Services Centres (ICYSC)	Social welfare (proposed within STTL627)	0.0011	0.0033	0.00055	0.0011
	Total	1.1951	3.5863	0.47855	0.9571

Remark:

- (1) According to the estimation approach and peak factor mentioned in **Section 2.3**.

4.2 Proposed Works of Fresh Water and Flushing Water Supply

Fresh Water Supply

- 4.2.1 The estimated mean daily fresh water demand of the site is 1.1941MLD and the peak flow for the fresh water distribution main is 3.5863MLD.
- 4.2.2 As shown in **MMH/CE19/TO4/WSIA/FIG/3.1** and **Appendix E**, 1 connection of DN100 fresh water main is proposed to distribute the fresh water for Site STTL627, which is proposed to tee-off at the DN200 fresh water main at On Ping Street. While for Site STTL626, another DN150 fresh water main is proposed as a connection from existing DN200 main at On Ping Street.

- 4.2.3 To enhance the fresh water quality to the subject site, strainers/valve on both distribution main and by-pass water main will be installed before the connection point to the subject site.
- 4.2.4 It is noted that there are existing DN20 – DN50 fresh water mains located within the sites. As the fresh water demand by the development would be supplied by the proposed fresh water mains as discussed above, it is proposed to remove / abandon the existing DN20 – DN50 fresh water mains to facilitate the future development. See **Fig. MMH/CE19/TO4/WSIA/FIG/3.1**.

Flushing Water Supply

- 4.2.5 The estimated mean daily flushing water demand of the site is 0.47855MLD and the peak flow demand is 0.9571MLD.
- 4.2.6 As shown in **MMH/CE19/TO4/WSIA/FIG/3.2** and **Appendix F**, 2 connections of DN100 salt water mains are proposed to distribute the salt water for Site STTL627 and Site STTL626 respectively. For Site STTL627, the main is proposed to tee-off at the existing DN150 salt water mains at On Ping Street. For Site STTL626, the main is proposed to tee-off at the existing DN150 salt water mains at On Sum Street.

Recycled Water

- 4.2.7 To save precious water resources, minimise environmental impact and reduce overall sewage load of Treatment Work, the use of recycled water will be explored through the Site. Used fresh water from bathroom wash basins, showers, sinks and washing machines etc. are major sources of recycled water, as well as rainwater from roof catchment and downpipes are also potential sources. Toilet flushing and street cleansing, etc. are the recommended use of recycled water after further processing treatment.
- 4.2.8 Considered the practices of recycle water will be subjected to the maintenance departments after completion of site, e.g. the developer, WSD, FEHD and LCSD etc, the abovementioned recycle water usages are only preliminary suggested from the water conservation point of view.

5 WATER SUPPLY IMPACT ASSESSMENT

5.1 Proposed Fresh Water Supply

5.1.1 According to **Appendix G4 (control points refer to Appendix E)**, the estimated peak flow velocity of the proposed DN100 fresh water main to Site STTL627 and proposed DN150 fresh water main to Site STTL626 are 1.71m/s and 1.97m/s.

5.1.2 Based on the preliminary hydraulic calculation as provided in **Appendix G4 (control points refer to Appendix E)**, the estimated residual heads for the Proposed Development at Site STTL627 and STTL626 are 41.17m and 37.41m respectively, which would be above the requirement of 20m.

5.2 Fresh Water Service Reservoir Capacity

5.2.1 Under 2021-based Territorial Population and Employment Matrix (TPEDM), the supply zone of existing A Kung Kok FWSR covers the Tertiary Planning Unit (TPU) 756. For assessment purpose, the said TPU is adopted for the analysis of the water demand projections of A Kung Kok FWSR. The populations for year 2031 have been extracted to evaluate total mean fresh water demand for the supply zone in population intake year for the development. A detailed breakdown of fresh water demand for the concerned TPUs has been included in **Appendix G1**.

5.2.2 In view of the fact that TPU 755 and TPU 756 are not entirely served by the supply zone of A Kung Kok FWSR, a reduced portion of the TPUs' population has been applied in estimating fresh water demand.

5.2.3 The mean daily fresh water demand to be served by A Kung Kok FWSR for year 2031 based on the 2021-based TPEDM is summarized in **Table 5.1** below.

Table 5.1 - Estimation of Mean Daily Fresh Water Demand Served by A Kung Kok FWSR

Area ⁽¹⁾	Population Type	Mean Daily Demand (MLD)	Required Capacity of FWSR for Existing Population and Proposed Development (m ³) ⁽²⁾	A Kung Kok FWSR Existing Capacity (m ³) ⁽³⁾
25% of TPU 755	Resident	5.448	-	-
	Residential-setting	0.046		
	Industrial	0.008		
	Office , commercial, hotel, G/IC related and others	0.130		
40% of TPU Zone 756	Resident	10.483		
	Residential-setting	0.208		
	Industrial	0.366		
	Office , commercial, hotel, G/IC related and others	2.102		
Site STTL	Private Housing	1.195		

Area ⁽¹⁾	Population Type	Mean Daily Demand (MLD)	Required Capacity of FWSR for Existing Population and Proposed Development (m ³) ⁽²⁾	A Kung Kok FWSR Existing Capacity (m ³) ⁽³⁾
626 & 627	(include non-domestic)			
Total		19.987	16,989	17,745

Remark:

(1) For TPU's which partly encroach the supply zone of A Kung Kok FWSR, a reduced portion of the TPUs' population has been applied to each of those TPUs in the calculation of water demand.

(1) 85% of mean daily demand applied in Interconnected Supply Zones according to DI No.1309 by WSD.

(2) Total capacity of A Kung Kok FWSR.

5.2.4 It is noted that the existing A Kung Kok FWSR with the total capacity of 17,745m³ could cater the additional fresh water demand for the proposed site after year 2031.

5.3 Proposed Flushing Water Supply

5.3.1 The estimated peak flow velocity of the proposed DN100 salt water mains are 0.45m/s and 1.11m/s for Site STTL627 and Site STTL626 according to **Appendix G6 (control points refer to Appendix F)**.

5.3.2 The proposed DN100 salt waters mains are proposed to connect to the existing DN150 salt water mains at On Ping Street and On Sum Street, to be served by Sha Tin West Salt Water Service Reservoir/Sha Tin Salt Water Booster Pumping Station / To Shek Salt Water Service Reservoir. Based on the preliminary hydraulic calculation as provided in **Appendix G6 (control points refer to Appendix F)**, the estimated residual heads for the Site STTL627 and STTL626 are 20.37m and 17.08m respectively, which would be above the requirement of 15m.

5.4 Salt Water Service Reservoir Capacity

5.4.1 Under 2021-based Territorial Population and Employment Matrix (TPEDM), the supply zone of existing To Shek SWSR and Sha Tin West SWSR covers the Tertiary Planning Unit (TPU) 754, 755, 756 and 759. For assessment purpose, the said TPU is adopted for the analysis of the water demand projections of To Shek SWSR and Sha Tin West SWSR. The populations for year 2031 have been extracted to evaluate total mean fresh water demand for the supply zone in population intake year for the development. A detailed breakdown of salt water demand for the concerned TPUs has been included in **Appendix G1**.

5.4.2 In view of the fact that some TPUs (TPU 754 and TPU 756) are not entirely served by the supply zones of To Shek SWSR and Sha Tin West SWSR, 75% of the TPUs' population has been applied in estimating salt water demand.

5.4.3 The mean daily salt water demand to be served by To Shek SWSR and Sha Tin West SWSR for year 2031 based on the 2021-based TPEDM is summarized in **Table 5.2** below.

Table 5.2 – Estimation of Mean Daily Flushing Water Demand Served by To Shek SWSR and Sha Tin West SWSR

Area ⁽¹⁾	Population Type	Mean Daily Demand (MLD)	Required Capacity of SWSR for Existing Population and Proposed Development (m ³) ⁽²⁾	To Shek SWSR and Sha Tin West SWSR Existing Capacity (m ³) ⁽³⁾
75% of TPU 754	Resident	4.859	-	-
	Residential-setting	0.047		
	Industrial	0.015		
	Office , commercial, hotel, G/IC related and others	0.206		
TPU 755	Resident	8.718		
	Residential-setting	0.046		
	Industrial	0.005		
	Office , commercial, hotel, G/IC related and others	0.130		
75% of TPU 756	Resident	7.862		
	Residential-setting	0.098		
	Industrial	0.114		
	Office , commercial, hotel, G/IC related and others	0.985		
TPU 759	Resident	12.430		
	Residential-setting	0.154		
	Industrial	0.045		
	Office , commercial, hotel, G/IC related and others	0.424		
Site STTL 626 & 627	Private Housing (include non-domestic)	0.479		
Total		36.616	9,154	9,401

Remark:

- (2) For TPU's which partly encroach the supply zone of To Shek SWSR and Sha Tin West SWSR, 75% of the TPUs' population has been applied in the calculation of water demand.
- (3) 25% of mean daily demand applied according to DI No.1309 by WSD.
- (4) Total capacity of To Shek SWSR and Sha Tin West SWSR.

5.4.4 It is noted that the existing To Shek SWSR and Sha Tin West SWSR with the total capacity of 9,401m³ could cater the additional salt water demand for the proposed site after year 2031.

5.5 Salt Water Pumping Station Capacity

5.5.1 The subject sites are currently within the SW Supply Zones Sha Tin West SWSR / Sha Tin Seawater Booster PS / To Shek SWSR. The existing salt water supply system cannot cope with the additional salt water demand arising from the proposed development. Thus, uprating of Sha Tin Seawater Booster PS is required for providing flushing water supply to the development.

- 5.5.2 Following liaison with the relevant government departments, WSD will undertake the necessary improvement works at the Sha Tin Seawater Booster Pumping Station to accommodate the additional saltwater demand generated by the private developments at the subject sites. Further liaison with WSD may be conducted to fully confirm the planned capacity of the Sha Tin Seawater Booster Pumping Station.

6 CONCLUSION

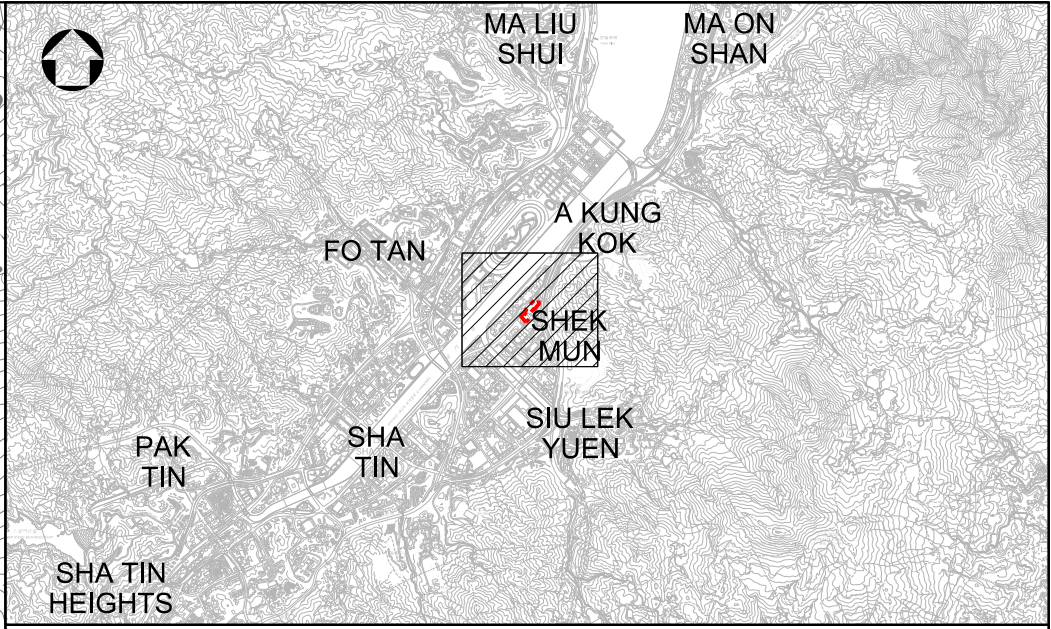
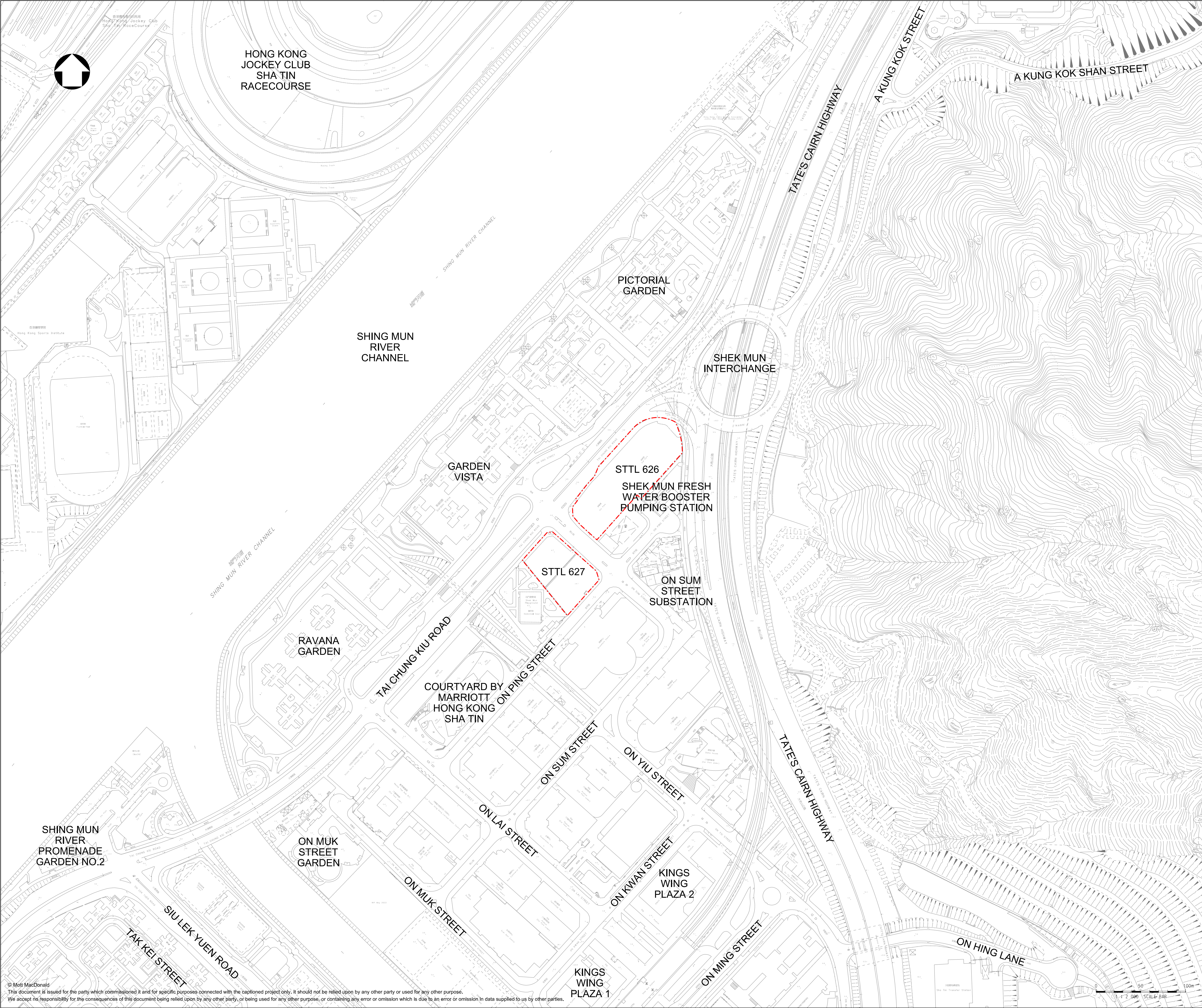
6.1 Fresh Water Supply

- 6.1.1 The total fresh water demand estimate for the sites is approximately 1.194MLD while the sites falls within the existing fresh water supply zone of existing A Kung Kok FWSR
- 6.1.2 1 no. of DN150 fresh water main is proposed as a connection from existing DN200 main at On Ping Street to Site STTL626. Another DN100 fresh water main is proposed to connect to the existing DN200 fresh water distribution main at On Ping Street to Site STTL627. Existing DN20 – DN50 fresh water mains located within the sites are proposed to be abandoned.
- 6.1.3 The capacity of the existing A Kung Kok FWSR could meet the required capacity of FWSR coping with current supply zone population natural growth and the proposed site with intake after 2031.

6.2 Flushing Water Supply

- 6.2.1 The total flushing water demand estimate for the Site is approximately 0.478MLD while salt water is supplied from existing To Shek SWSR.
- 6.2.2 1 no. of DN100 salt water main is proposed to connect STTL626 to the existing DN150 salt water distribution main at On Sum Street. Another DN100 salt water main is proposed to connect STTL627 to the existing DN150 salt water distribution main at On Ping Street.
- 6.2.3 The subject sites are currently within the SW Supply Zones Sha Tin West SWSR / Sha Tin Seawater Booster PS / To Shek SWSR. The existing salt water supply system cannot cope with the additional salt water demand arising from the proposed development. Thus, uprating of Sha Tin Seawater Booster PS is required for providing flushing water supply to the development.
- 6.2.4 In view of the above, WSD will undertake the necessary improvement works at the Sha Tin Seawater Booster Pumping Station to accommodate the additional saltwater demand generated by the private developments at the subject sites.

Figures



KEY PLAN

LEGEND:

APPLICATION SITE BOUNDARY

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Title

GENERAL LAYOUT PLAN

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1:2000	PRE	P1	

Drawing Number

MMH/CE19/TO4/WSIA/FIG/1.1



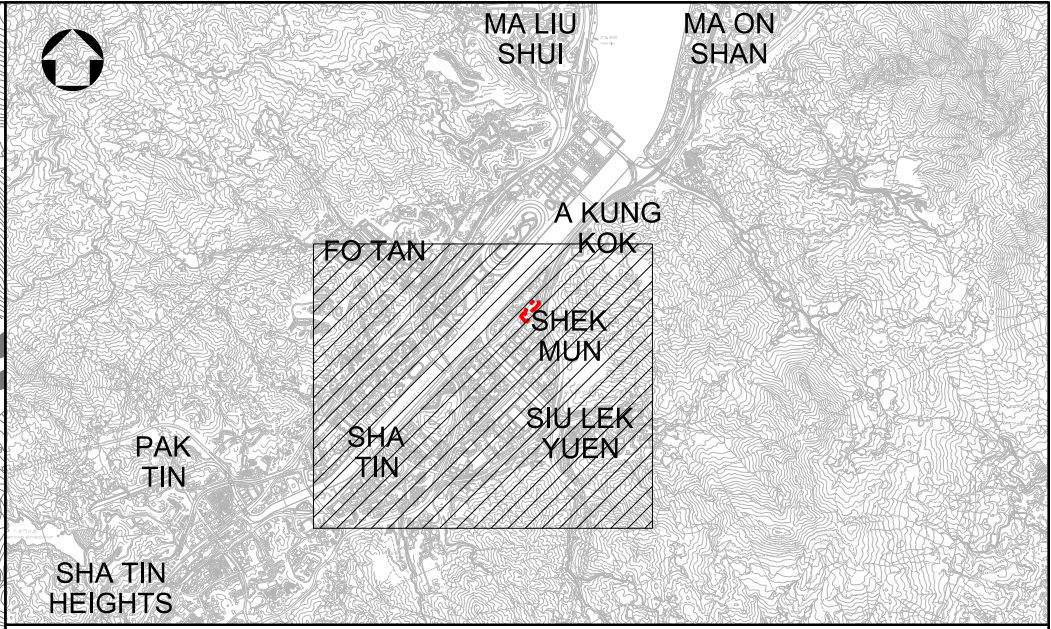
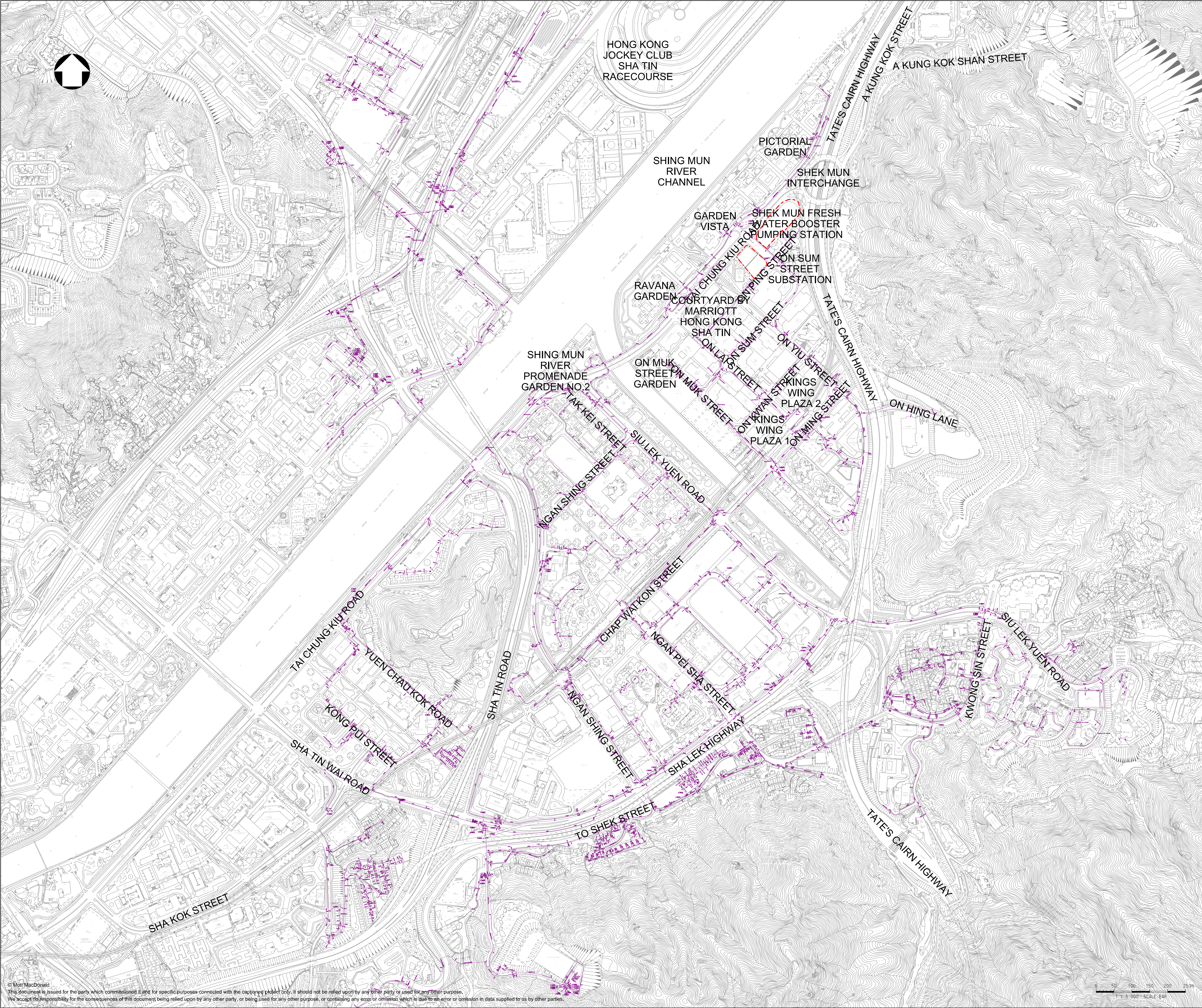
 APPLICATION SITE BOUNDARY
 EXISTING FRESH WATER MAIN

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TASK ORDER NO.4

EXISTING FRESH WATER MAINS

Drawing Number
MMH/CE19/TO4/WSIA/FIG/2.1



KEY PLAN

LEGEND:

- APPLICATION SITE BOUNDARY
- EXISTING SALT WATER MAIN

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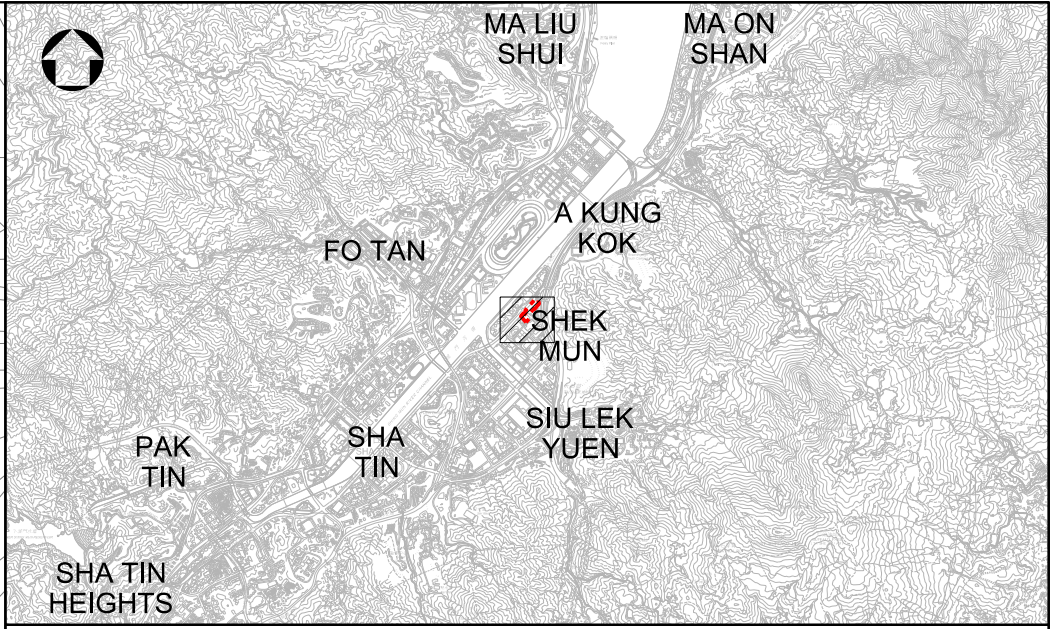
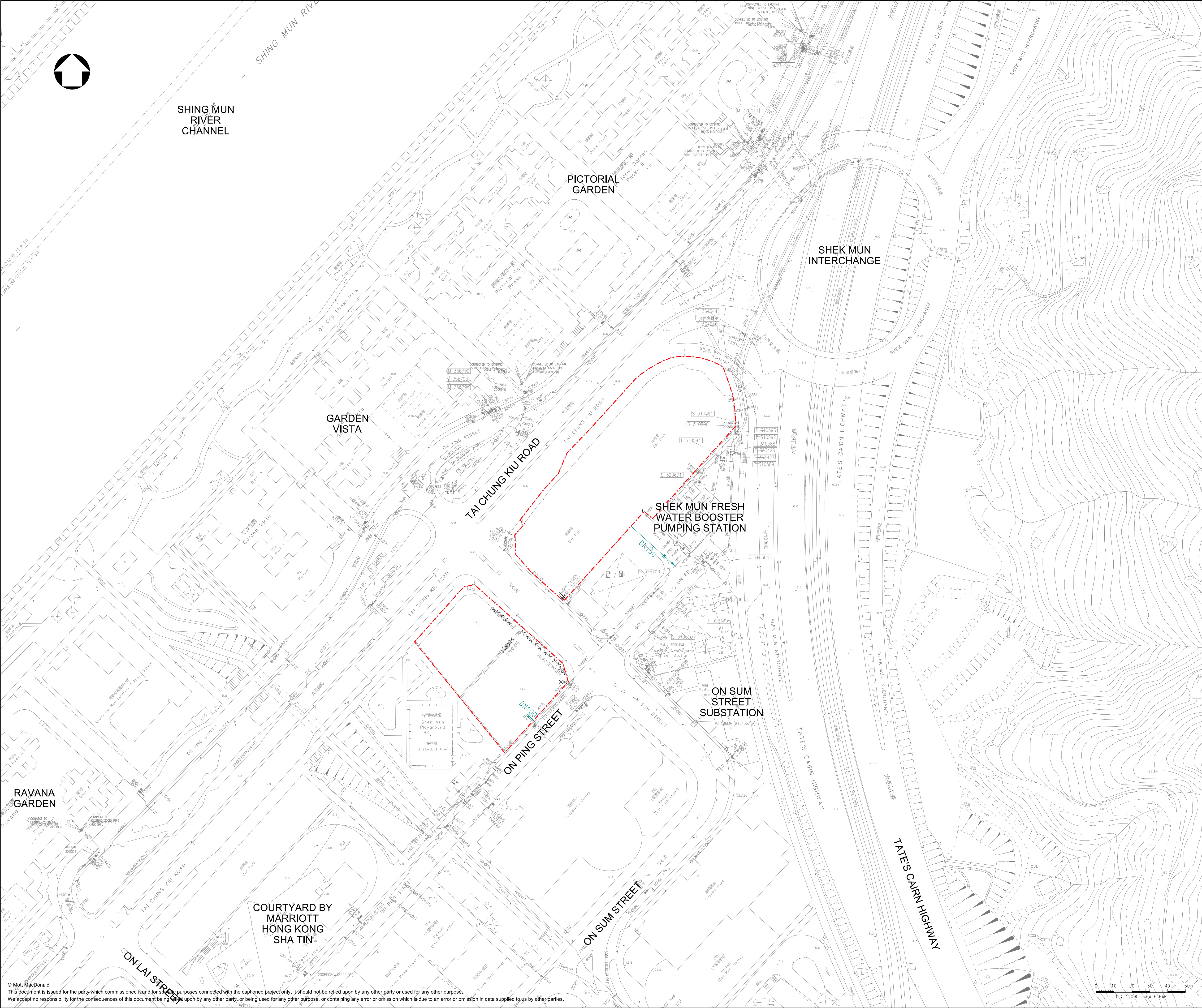
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PROPOSED HOUSING AND
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TASK ORDER NO.4

Title

EXISTING SALT WATER MAINS

Designed	TC	Eng check	VF
Drawn	TL	Coordination	VF
Dwg check	AT	Approved	DN
Scale at A1	Status	Rev	
1:5000	PRE	P1	
Drawing Number			
MMH/CE19/TO4/WSIA/FIG/2.2			



LEGEND:	
	APPLICATION SITE BOUNDARY
	EXISTING FRESH WATER MAIN
	PROPOSED FRESH WATER MAIN
	EXISTING FRESH WATER MAIN TO BE ABANDONED

P1	JAN 2026	TL	FIRST ISSUE	VF	DN
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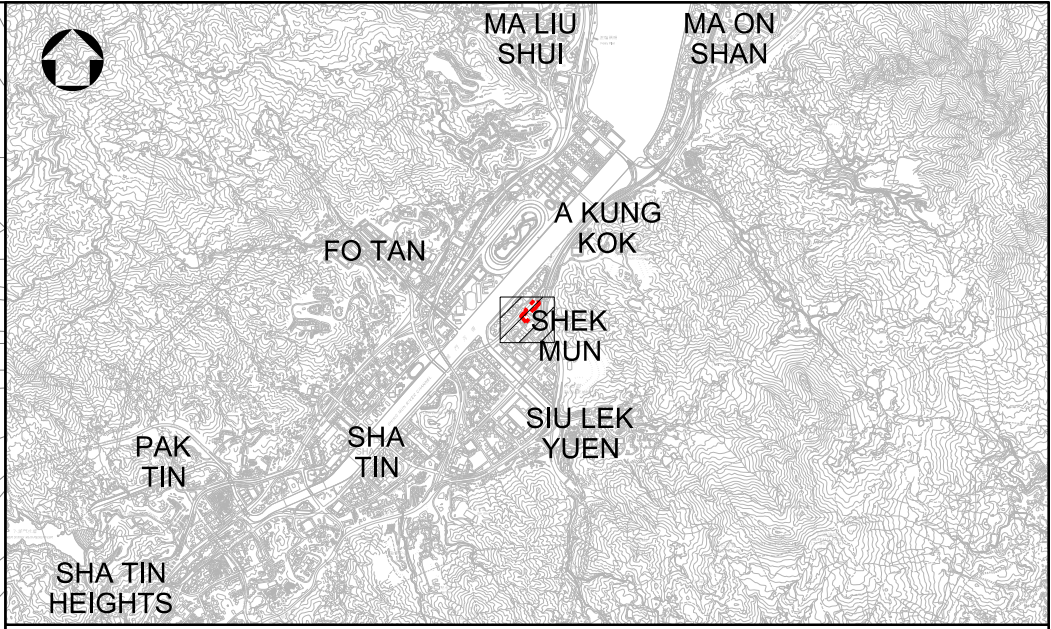
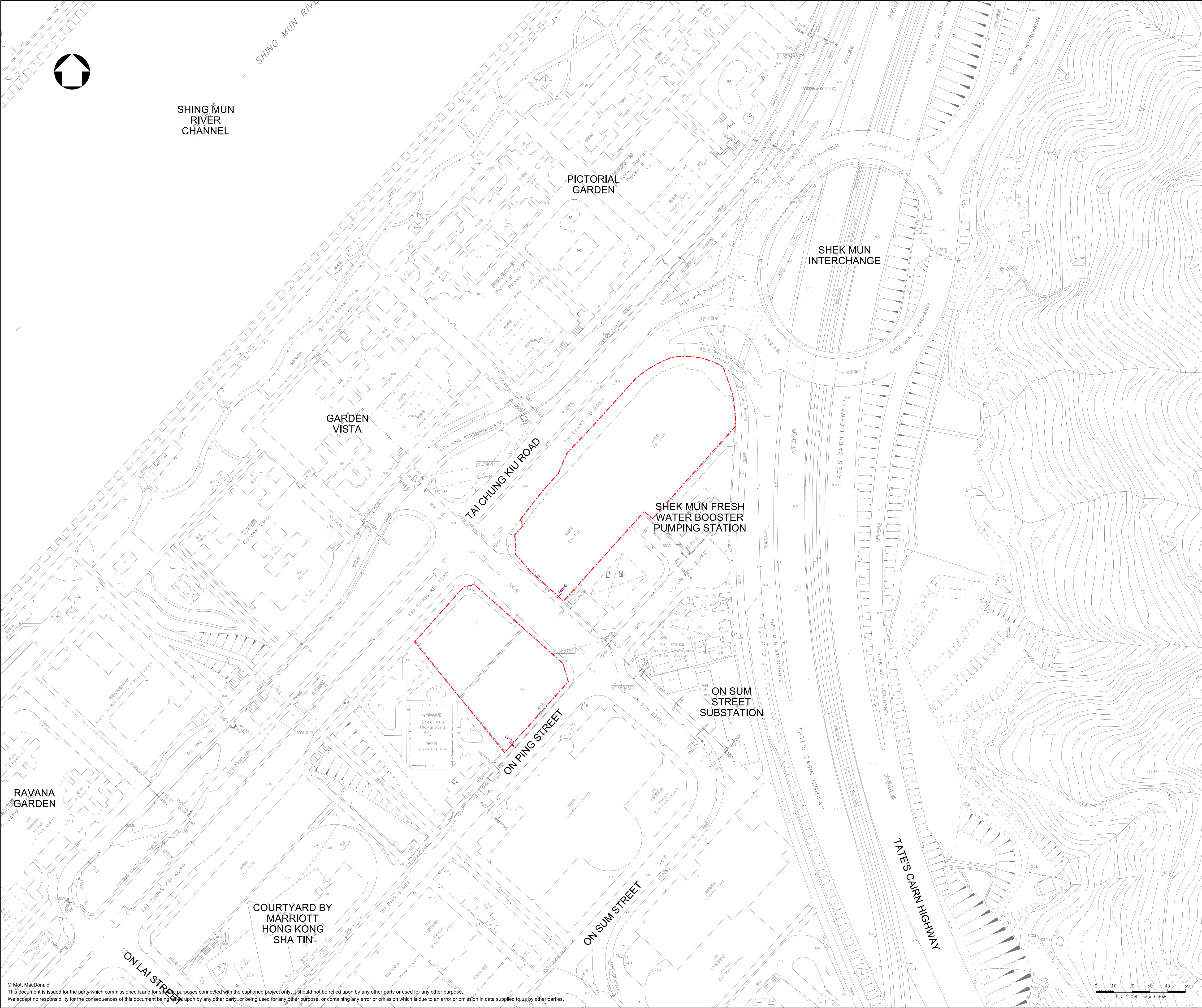
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Title
PROPOSED FRESH WATER MAINS

Designed	TC	Eng check	VF
Drawn	TL	Coordination	VF
Dwg check	AT	Approved	DN
Scale at A1	Status	Rev	
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Drawing Number MMH/CE19/TO4/WSIA/FIG/3.1			



KEY PLAN

LEGEND:

APPLICATION SITE BOUNDARY

EXISTING SALT WATER MAIN

PROPOSED SALT WATER MAIN

P1JAN 2026TLFIRST ISSUEVF DN

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Title

PROPOSED SALT WATER MAINS

DesignedTCEng checkVF

DrawnTLCoordinationVF

Dwg checkATApprovedDN

Scale at A11:1000PREP1

Drawing NumberMMH/CE19/TO4/WSIA/FIG/3.2

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DATE: 18/03/2026 TIME: 16:01:27 USER: LAM102274

Appendices

A. Fresh Water Supply Zones

Part print of drawing
no. 10156.3.7

3.66 & 4.30

3.36

渡輪碼頭
Ferry Pier

4.22

3.17

配水庫 (SR132)
FW SR

馬鞍山村食水缸 (WT1)
Ma On Shan Tsuen F

3.36

3.36
亞公角食水配水庫 (SR)
A Kung Kok FW SR

3.18

3.36

3.58

4.12

3.19

4.12
花心坑食水缸 (WT128)
Fa Sam Hang FW Tank

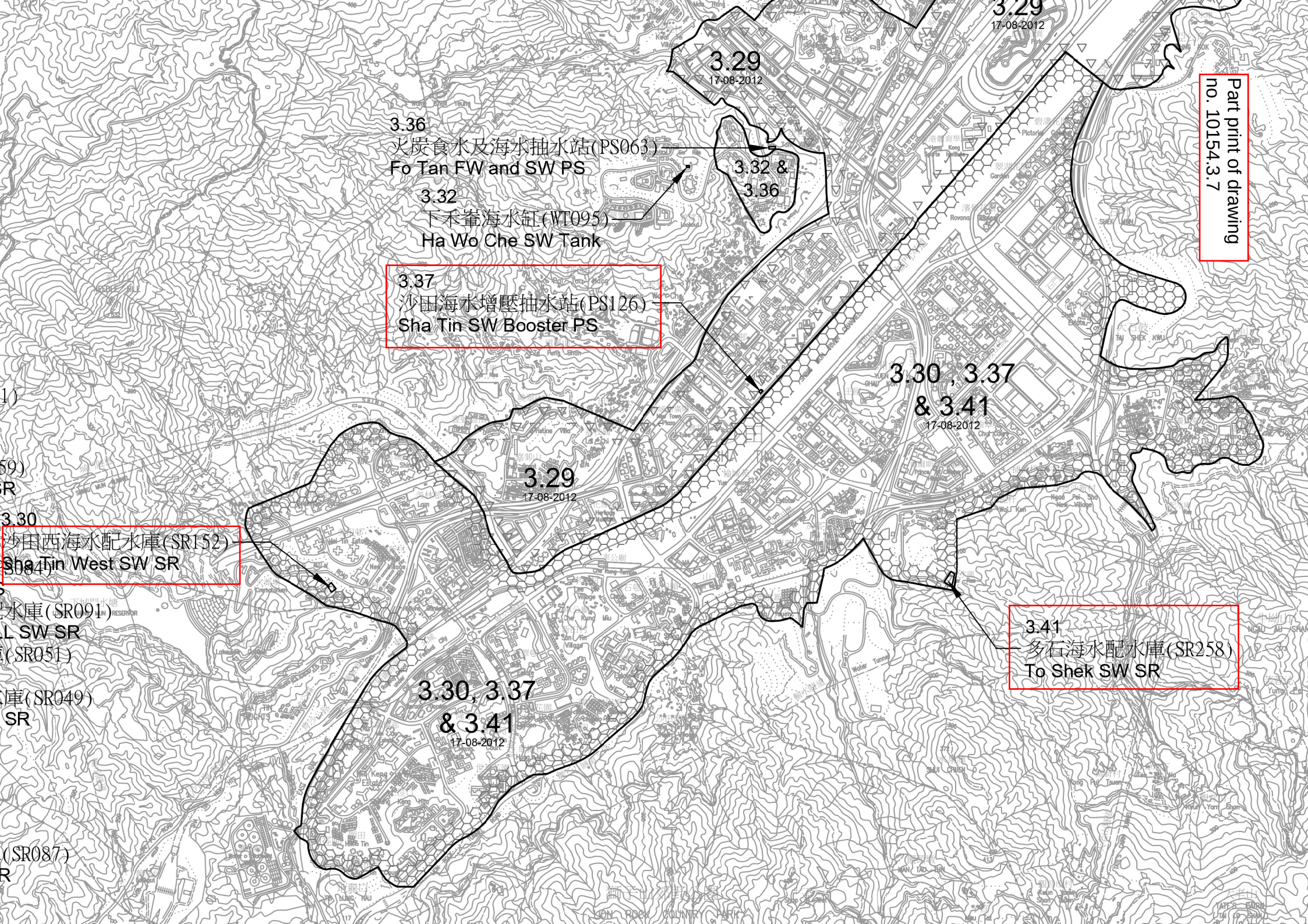
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多石食水配水庫 (SR114)
To Shek FW SR

3.58
小瀝源食水配水庫 (SR174)
Siu Lek Yuen FW SR

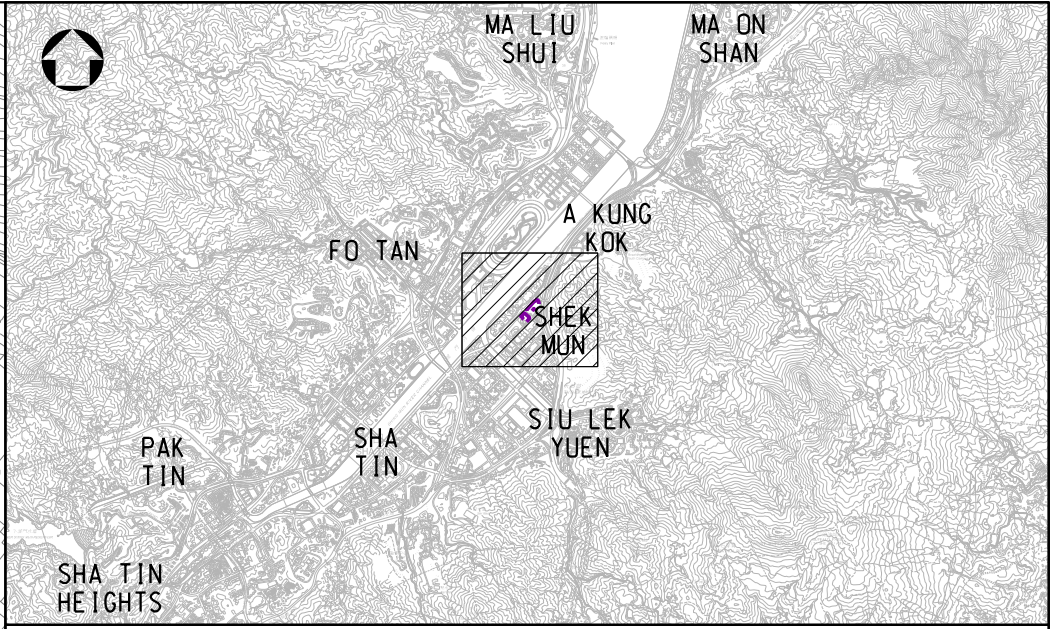
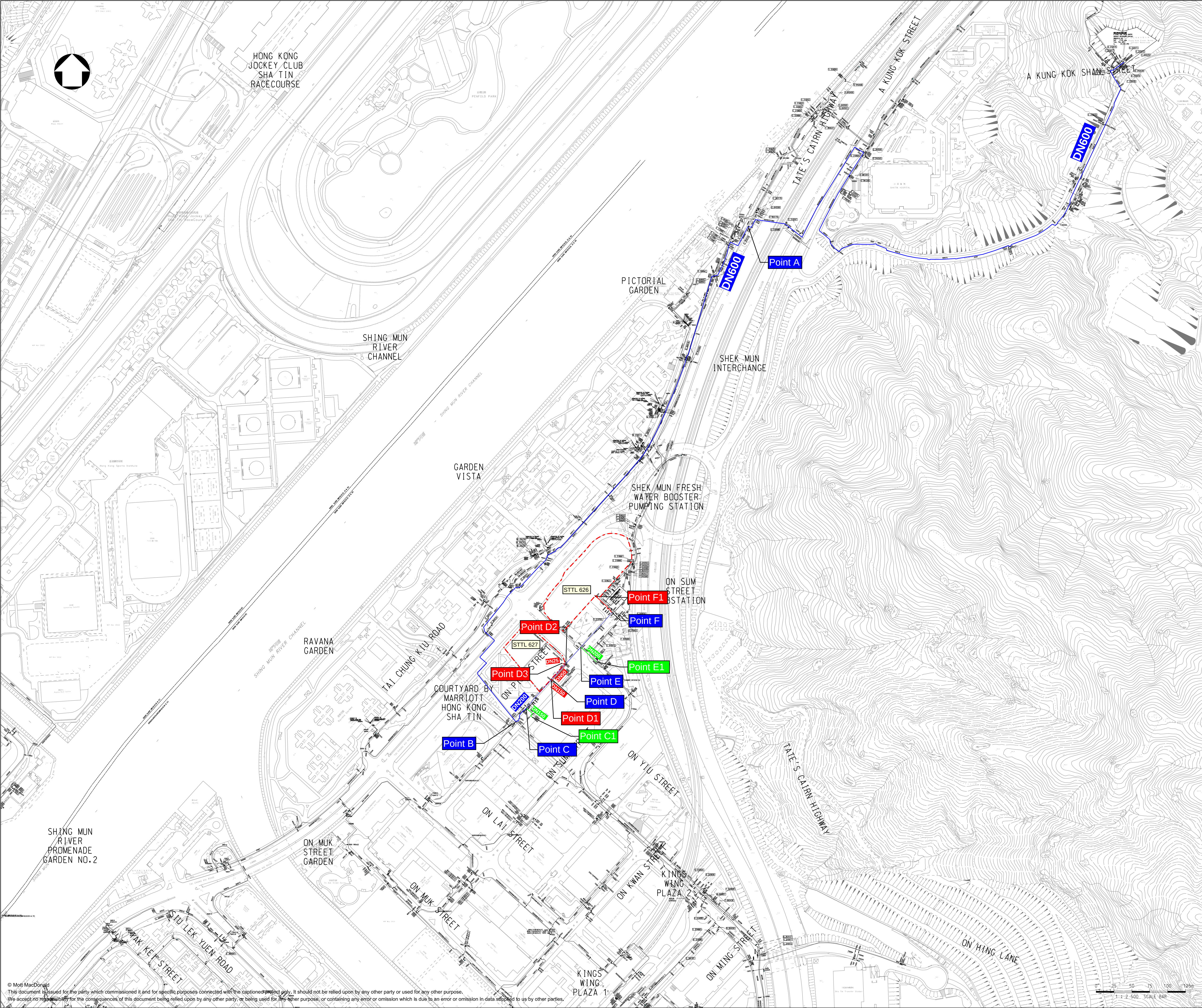
4.33

WEST BUFFALO HILL

B. Salt Water Supply Zones

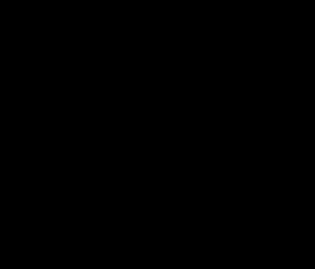


C. Layout Plan of Existing Fresh Water System



LEGEND:	
	APPLICATION SITE BOUNDARY
	EXISTING FRESH WATER MAIN
	EXISTING FRESH WATER MAINS (TO THE SITE)
	EXISTING FRESH WATER MAIN CURRENTLY SUPPLYING FRESH WATER TO THE SITE
	EXISTING FRESH WATER MAINS (HYDRAULIC CHECK)

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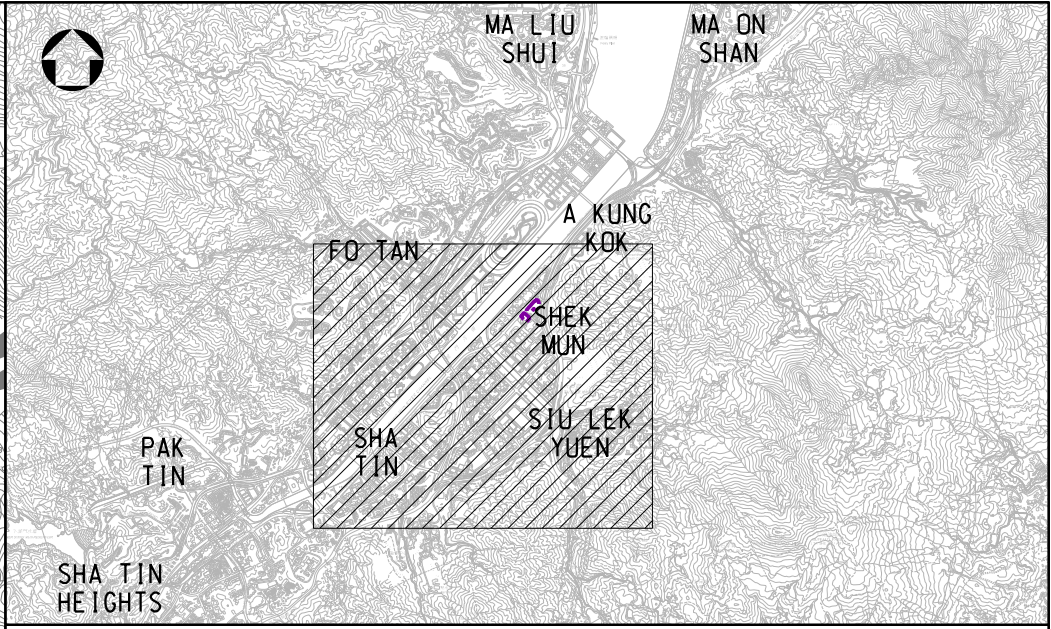
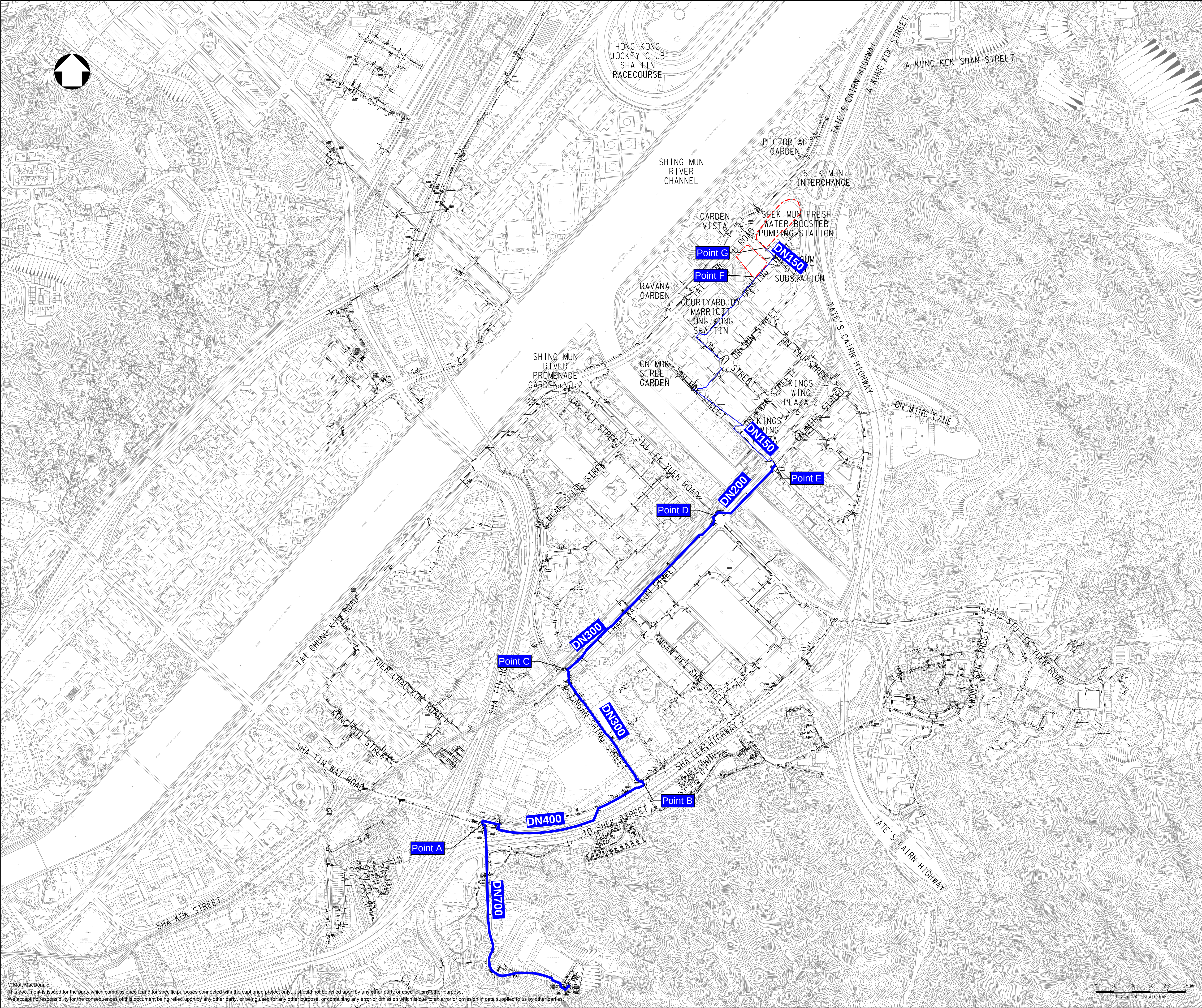
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TASK ORSR NO.4
TERM CONSULTANCY FOR SITE FORMATION
AND INFRASTRUCTURE WORKS FOR
PROPOSED HOUSING AND
OTHER DEVELOPMENTS IN ZONE 1 (2023-2027)

Title
LAYOUT PLAN OF EXISTING FRESH
WATER SYSTEM

Designed	GL		Eng check	VF	
Drawn	HL		Coordination	VF	
Dwg check	GL		Approved	EC	
Scale at A1	Status		Rev		
1:2500	PRE		P1		
Drawing Number					
MMH/CE19/TO4/WSIA/FIG/2.1					

D. Layout Plan of Existing Salt Water System



KEY PLAN

LEGEND:

- APPLICATION SITE BOUNDARY
- EXISTING SALT WATER MAIN
- DN600 EXISTING SALT WATER MAINS (TO THE SITE)

P1	JAN 2024	HL	FIRST ISSUE	VF	EC
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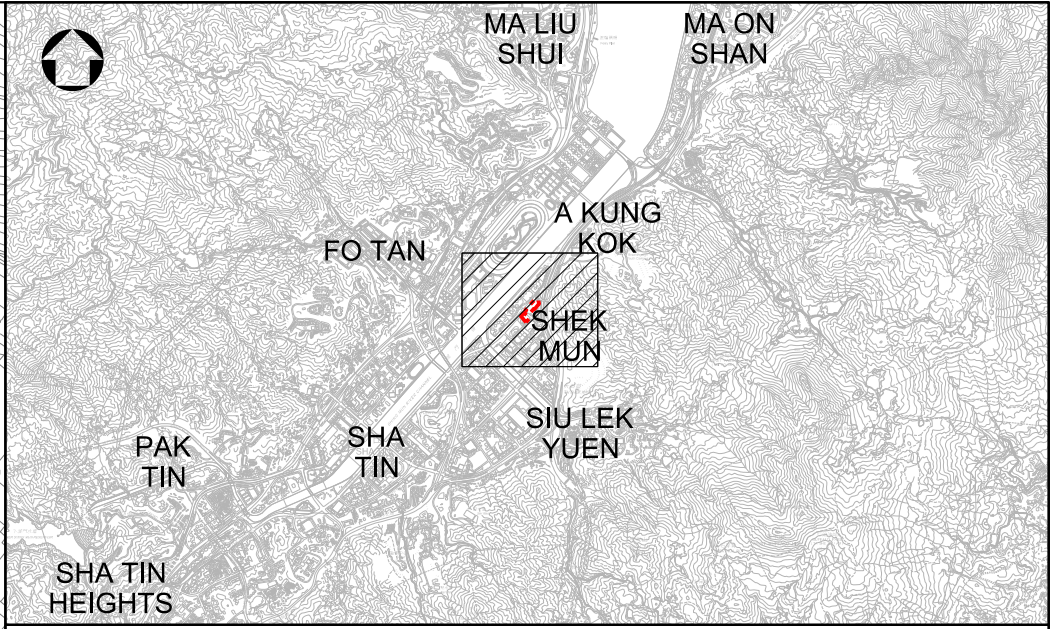
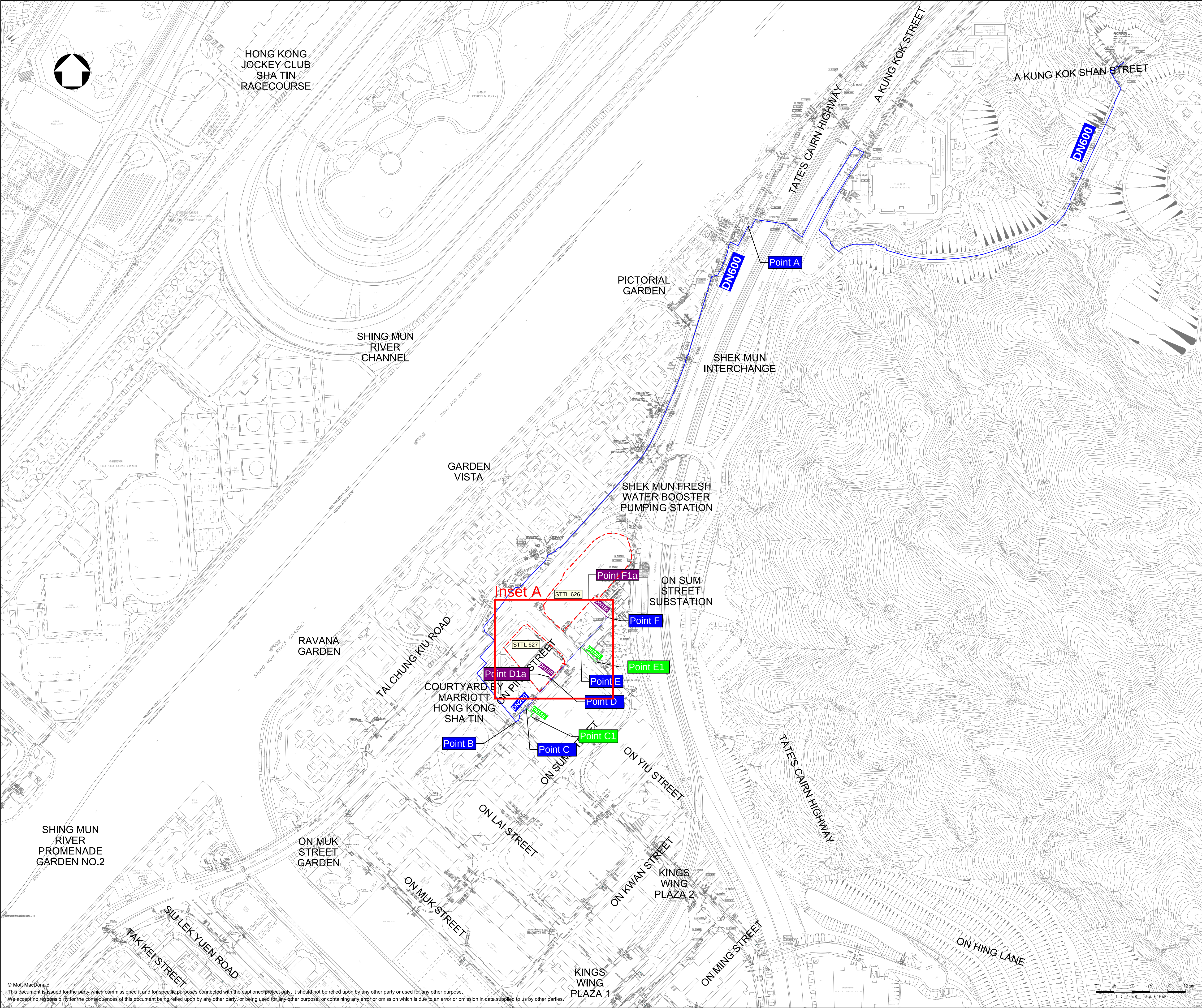
AGREEMENT NO. CE 19/2023 (CE) -
TASK ORSR NO.4
TERM CONSULTANCY FOR SITE FORMATION
AND INFRASTRUCTURE WORKS FOR
PROPOSED HOUSING AND
OTHER DEVELOPMENTS IN ZONE 1 (2023-2027)

Title

LAYOUT PLAN OF EXISTING SALT
WATER SYSTEM

Designed	GL	Eng check	VF
Drawn	HL	Coordination	VF
Dwg check	GL	Approved	EC
Scale at A1	Status	Rev	
1:5000	PRE	P1	
Drawing Number			
MMH/CE19/TO4/WSIA/FIG/2.2			

E. Layout Plan of Proposed Fresh Water System



KEY PLAN	
LEGEND:	
	APPLICATION SITE BOUNDARY
	EXISTING FRESH WATER MAIN
	EXISTING FRESH WATER MAINS (TO THE SITE)
	PROPOSED FRESH WATER MAIN TO SUPPLY FRESH WATER TO THE SITE
	EXISTING FRESH WATER MAINS (HYDRAULIC CHECK)
	EXISTING FRESH WATER MAIN TO BE ABANDONED

P1	JAN 2026	TL	FIRST ISSUE	VF	DN
Rev	Date	Drawn	Description	Ch'k'd	App'd

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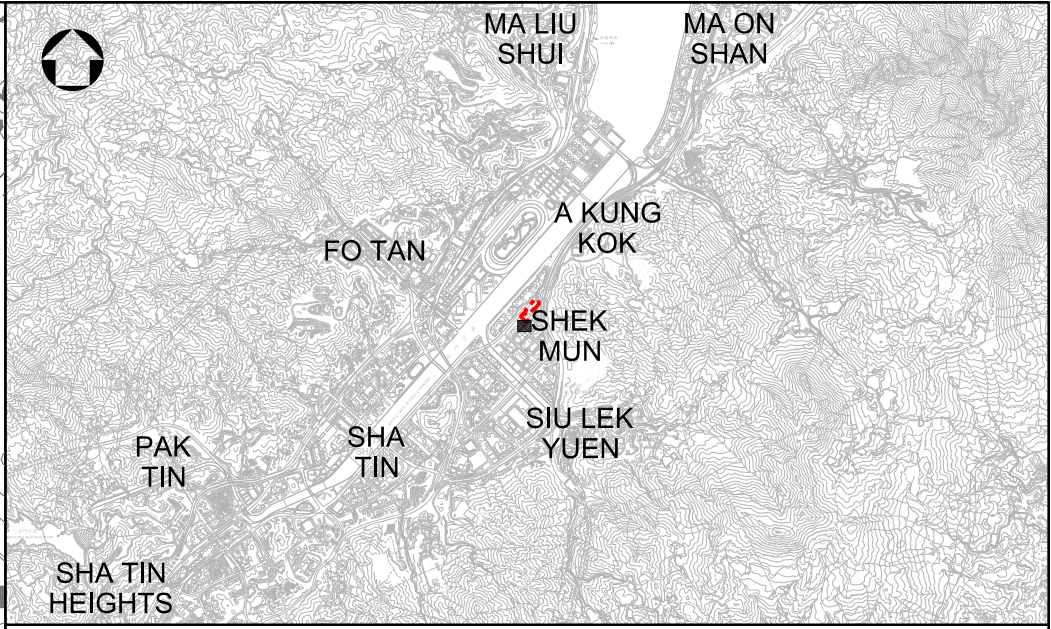
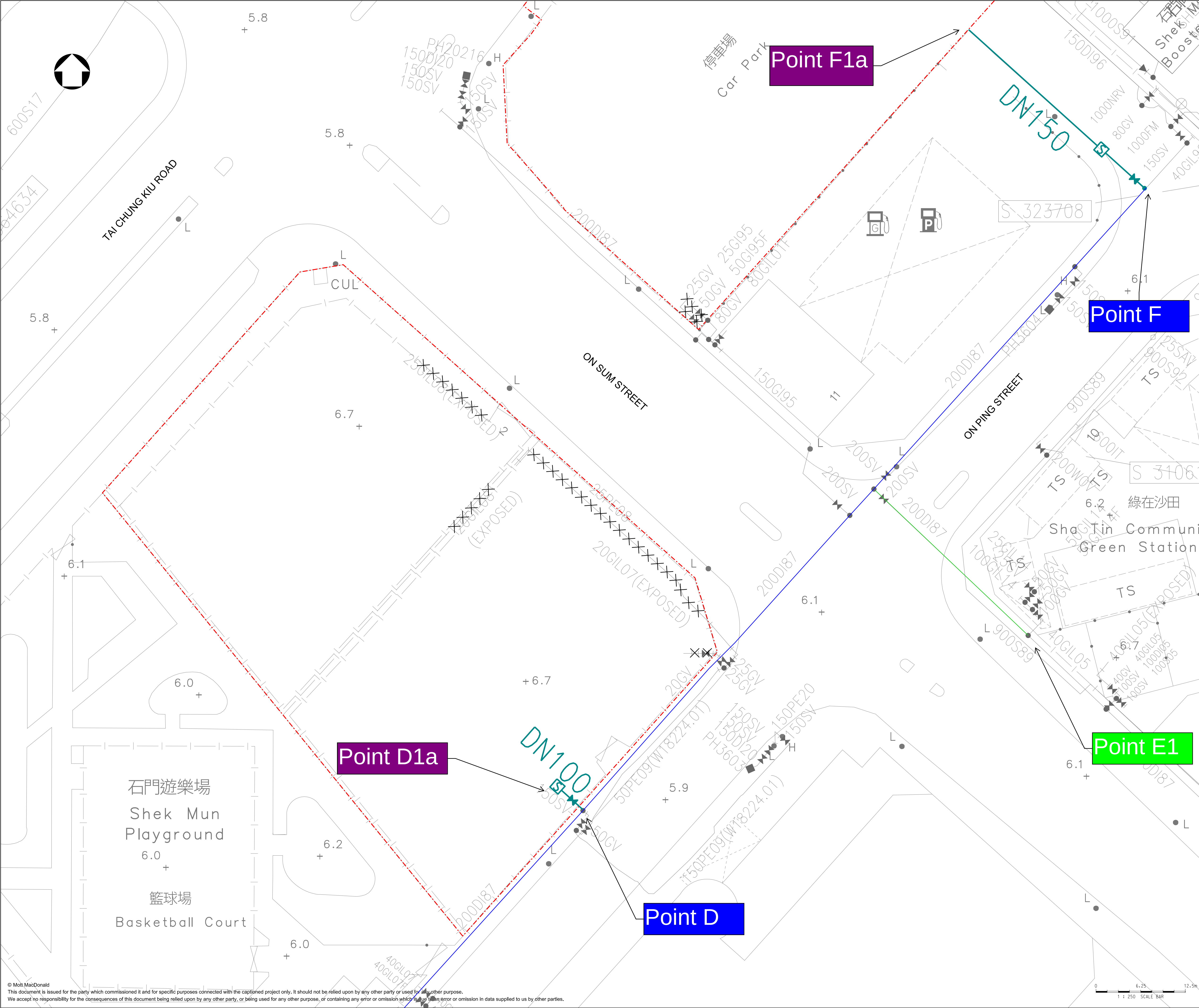
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Title
LAYOUT PLAN OF PROPOSED FRESH WATER SYSTEM

Designed	TC	Eng check	VF
Drawn	TL	Coordination	VF
Dwg check	AT	Approved	DN
Scale at A1	Status	Rev	
1:2500	PRE	P1	
Drawing Number MMH/CE19/TO4/WSIA/FIG/2.1			



KEY PLAN

LEGEND:

- APPLICATION SITE BOUNDARY
- EXISTING FRESH WATER MAIN
- PROPOSED FRESH WATER MAIN
- EXISTING FRESH WATER MAIN TO BE ABANDONED

P1	JAN 2026	TL	FIRST ISSUE	VF	DN
Rev	Date	Drawn	Description	Ch'k'd	App'd

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AND INFRASTRUCTURE WORKS FOR
PROPOSED HOUSING AND
OTHER DEVELOPMENTS IN ZONE 1 (2023-2027)
TASK ORDER NO.4

Title

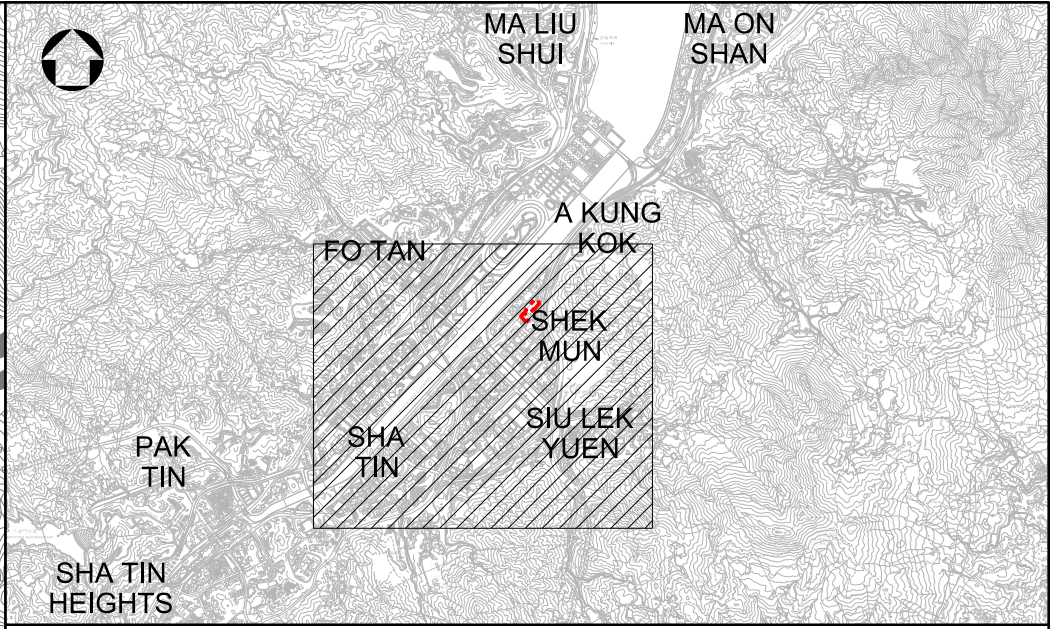
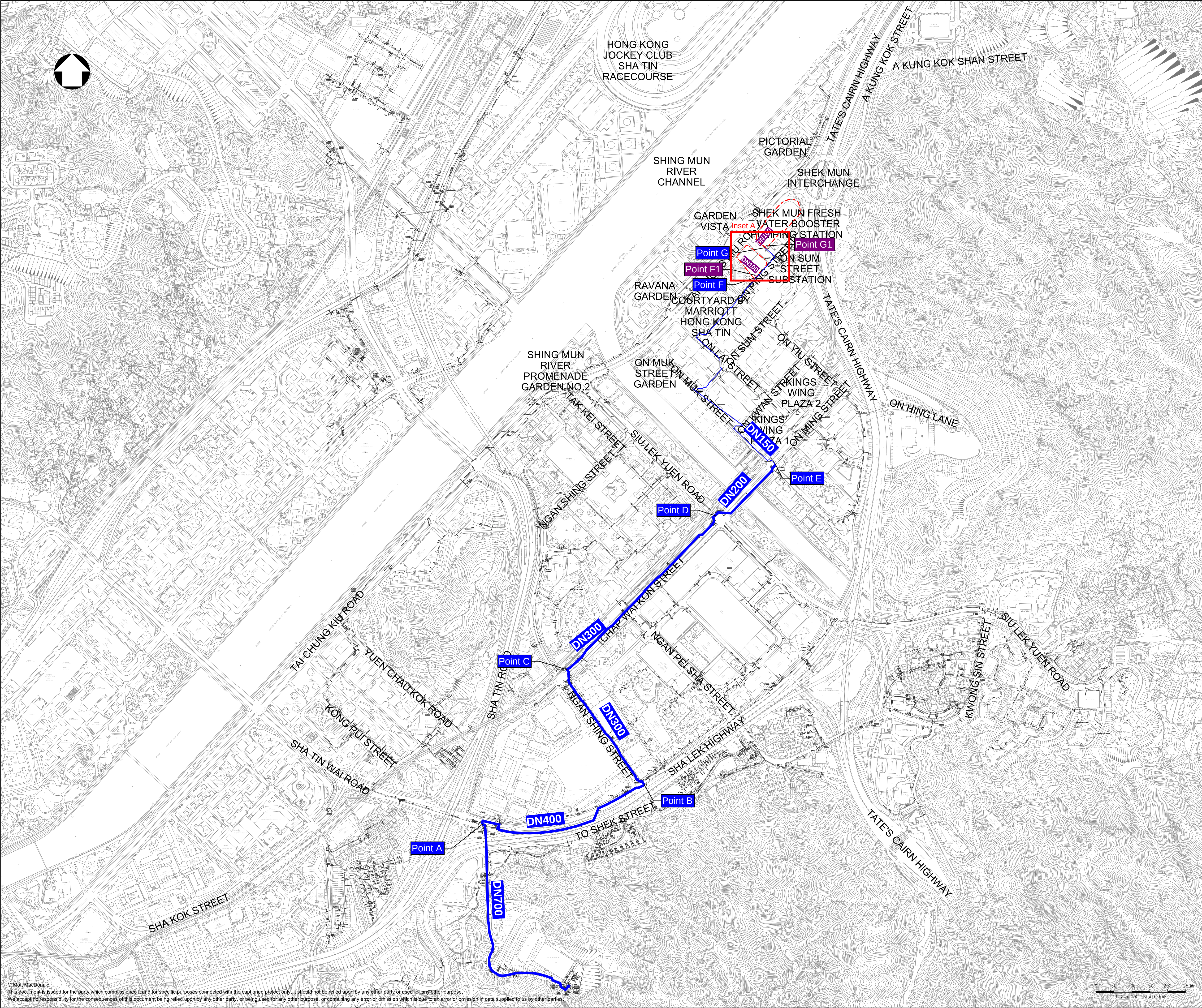
LAYOUT PLAN OF PROPOSED
FRESH WATER SYSTEM (INSET A)

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Drawn	TL	Coordination	VF
Dwg check	AT	Approved	DN
Scale at A1	Status	Rev	
1:250	PRE	P1	

Drawing Number

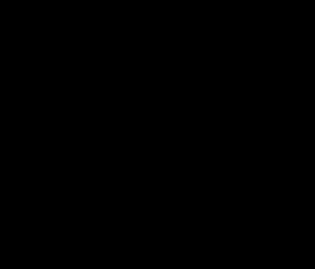
MMH/CE19/TO4/WSIA/FIG/2.1A

F. Layout Plan of Proposed Salt Water System



KEY PLAN	
LEGEND:	
	APPLICATION SITE BOUNDARY
	EXISTING SALT WATER MAIN
	EXISTING SALT WATER MAINS (TO THE SITE)
	PROPOSED SALT WATER MAIN TO SUPPLYING SALT WATER TO THE SITE

P1	JAN 2026	TL	FIRST ISSUE	VF	DN
Rev	Date	Drawn	Description	Ch'k'd	App'd



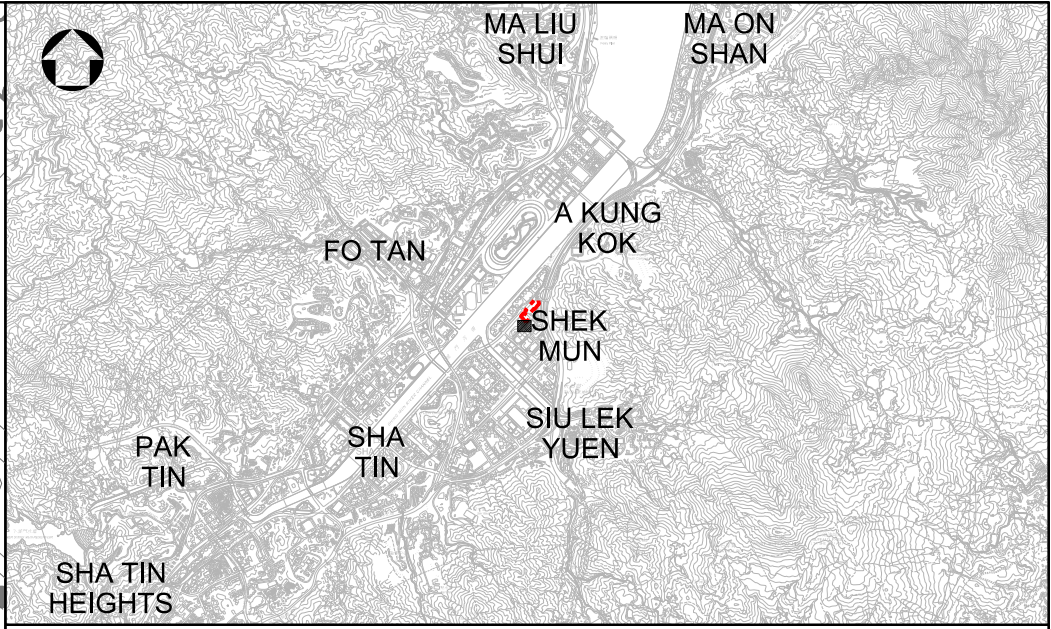
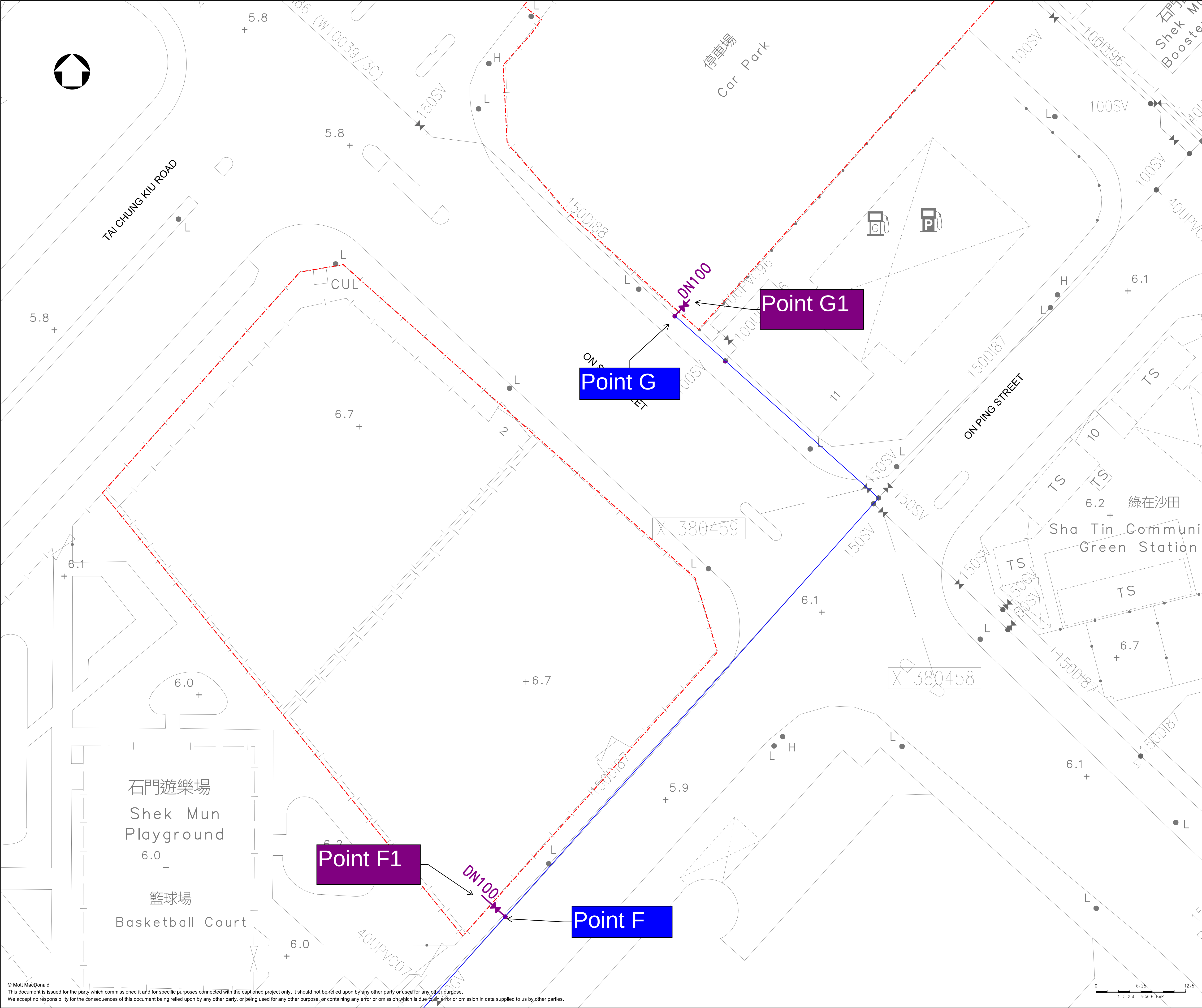


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TERM CONSULTANCY FOR SITE FORMATION
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PROPOSED HOUSING AND
OTHER DEVELOPMENTS IN ZONE 1 (2023-2027)
TASK ORDER NO.4

Title
LAYOUT PLAN OF PROPOSED SALT
WATER SYSTEM

Designed	TC	Eng check	VF
Drawn	TL	Coordination	VF
Dwg check	AT	Approved	DN
Scale at A1 1:5000	Status PRE	Rev P1	
Drawing Number MMH/CE19/TO4/WSIA/FIG/2.2			



KEY PLAN

LEGEND:

APPLICATION SITE BOUNDARY

EXISTING SALT WATER MAIN

PROPOSED SALT WATER MAIN

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Title

LAYOUT PLAN OF PROPOSED SALT WATER SYSTEM (INSET A)

Designed	TC	Eng check	VF
Drawn	TL	Coordination	VF
Dwg check	AT	Approved	DN
Scale at A1	Status	Rev	
1:250	PRE	P1	

Drawing Number

MMH/CE19/TO4/WSIA/FIG/2.2A

G. Catchment Summary and Calculation for Fresh Water and Salt Water Supply System

G1 Water Demand Estimation for Fresh Water and Flushing Water									
Domestic Demand (Implemented in Hydraulic Calculation in Appendix G2 - G6)									
Site	Development Type	Flat no.	Estimated Population	Adopted Population (with 10% allowance)	Fresh Water		Mean Fresh Water Demand	Flushing Water Flushing Water Unit Demand ⁽⁴⁾	Mean Flushing Water Demand
			head	head	Fresh Water Unit Demand ⁽²⁾	Service Trade ⁽³⁾		(l/h/d)	(MLD)
STTL626	Private Housing	1000	2800	3080	230	45	0.847	110	0.339
STTL627	Private Housing	410	1148	1263			0.347		0.139
Total			3948	4343	/	/	1.194	/	0.478
Non-Domestic Demand (Implemented in Hydraulic Calculation in Appendix G2 - G6)									
Site	Development Type	Flat no.	Estimated Population	Adopted Population	Fresh Water		Mean Fresh Water Demand	Flushing Water Flushing Water Unit Demand ⁽⁶⁾	Mean Flushing Water Demand
			head	head	Fresh Water Unit Demand ⁽²⁾⁽⁵⁾⁽⁷⁾	Service Trade		(l/h/d)	(MLD)
Integrated Children and Youth Services Centres (ICYSC)	Social welfare (proposed within STTL627)	/	11	11	100	/	0.0011	50	0.00055
Total			11	11	/	/	0.0011	/	0.00055
Local surrounding Demand (Implemented in Hydraulic Calculation in Appendix G2 - G4)									
Area	Development Type	Flat no.	Estimated Population	Adopted Population	Fresh Water		Mean Fresh Water Demand	Flushing Water Flushing Water Unit Demand ⁽⁶⁾	Mean Flushing Water Demand
			head	head	Fresh Water Unit Demand ⁽²⁾⁽⁵⁾⁽⁷⁾	Service Trade		(l/h/d)	(MLD)
Green @ Sha Tin	Social welfare	/	100	100	100	0	0.010	50	0.005
GrandTech Centre	Business	/	560	560	100	0	0.056	25	0.014
Total							0.066	-	0.019
Fresh Water Demand Estimation for A Kung Kok FWSR Supply Zone									
Area ⁽¹³⁾	Population Type	Flat no.	Extracted Population from 2021-based TPEDM ⁽¹⁴⁾⁽¹⁵⁾	Adopted Population	Fresh Water		Mean Fresh Water Demand	Flushing Water Flushing Water Unit Demand	Mean Flushing Water Demand
			head	head	Fresh Water Unit Demand ⁽²⁾	Service Trade ⁽³⁾		(l/h/d)	(MLD)
25% of TPU Zone 755	Resident	/	79250	19812.5	230	45	5.448	/	/
25% of TPU Zone 755	Residential setting	/	1850	462.5	100	0	0.046	/	/
25% of TPU Zone 755	Industrial	/	100	25	300	0	0.008	/	/
25% of TPU Zone 755	Office, commercial, hotel, GIC related and others	/	5200	1300	100	0	0.130	/	/
40% of TPU Zone 756	Resident	/	95300	38120	230	45	10.483	/	/
40% of TPU Zone 756	Residential setting	/	5200	2080	100	0	0.208	/	/
40% of TPU Zone 756	Industrial	/	3050	1220	300	0	0.366	/	/
40% of TPU Zone 756	Office, commercial, hotel, GIC related and others	/	52550	21020	100	0	2.102	/	/
Total							18.791		
Salt Water Demand Estimation for To Shek SWSR and Sha Tin West SWSR Supply Zone									
Area ⁽¹³⁾	Population Type	Flat no.	Extracted Population from 2021-based TPEDM ⁽¹⁴⁾⁽¹⁵⁾	Adopted Population	Fresh Water		Mean Fresh Water Demand	Flushing Water Flushing Water Unit Demand ⁽⁴⁾⁽⁸⁾⁽¹⁰⁾⁽¹²⁾	Mean Flushing Water Demand
			head	head	Fresh Water Unit Demand	Service Trade		(l/h/d)	(MLD)
75% of TPU 754	Resident	/	58900	44175	/	/	/	110	4.859
75% of TPU 754	Residential-setting	/	2500	1875	/	/	/	25	0.047
75% of TPU 754	Industrial	/	400	300	/	/	/	50	0.015
75% of TPU 754	Office, commercial, hotel, GIC related and others	/	11000	8250	/	/	/	25	0.206
TPU 755	Resident	/	79250	79250	/	/	/	110	8.718
TPU 755	Residential setting	/	1850	1850	/	/	/	25	0.046
TPU 755	Industrial	/	100	100	/	/	/	50	0.005
TPU 755	Office, commercial, hotel, GIC related and others	/	5200	5200	/	/	/	25	0.130
75% of TPU 756	Resident	/	95300	71475	/	/	/	110	7.862
75% of TPU 756	Residential setting	/	5200	3900	/	/	/	25	0.098
75% of TPU 756	Industrial	/	3050	2287.5	/	/	/	50	0.114
75% of TPU 756	Office, commercial, hotel, GIC related and others	/	52550	39412.5	/	/	/	25	0.985
TPU759	Resident	/	113000	113000	/	/	/	110	12.430
TPU759	Residential setting	/	6150	6150	/	/	/	25	0.154
TPU759	Industrial	/	900	900	/	/	/	50	0.045
TPU759	Office, commercial, hotel, GIC related and others	/	16950	16950	/	/	/	25	0.424
Total									36.138

Notes:

- (1) Details of the G/IC complex / commercial facility within site area is not available in current stage.
- (2) Fresh water unit demand 230 l/h/d is adopted for the R1 type housing in DI No. 1309 for conservative design.
- (3) Service Trade 45 l/h/d is adopted for the Sha Tin area in DI No. 1309 for conservative design.
- (4) Flushing water unit demand 110 l/h/d is adopted for the Sha Tin area as advised by WSD for conservative design.
- (5) Fresh water unit demand 100 l/h/d is adopted for social welfare uses.
- (6) Salt water unit demand 50 l/h/d is adopted for social welfare uses.
- (7) Fresh water unit demand 100 l/h/d is adopted for commercial/business, office, hotel, GIC related employment uses.
- (8) Salt water unit demand 25 l/h/d is adopted for commercial/business, office, hotel, GIC related employment uses.
- (9) Fresh water unit demand 100 l/h/d is adopted for residential setting employment use.
- (10) Salt water unit demand 25 l/h/d is adopted for residential setting employment use.
- (11) Fresh water unit demand 300 l/h/d is adopted for industrial employment use.
- (12) Salt water unit demand 50 l/h/d is adopted for industrial employment use.
- (13) For TPU's which partly encroach the fresh water/ salt water supply zones, a reduced portion of the TPUs' population has been applied to each of those TPUs in the calculation of water demand.
- (14) Population figures of resident are extracted from 2021-based TPEDM Table Ia : 2031 Land Usual Residents
- (15) Employment population figures of residential-setting, industrial, office, commercial, hotel, GIC related and others are extracted from 2021-based TPEDM Table V : 2031 Employment by Employment Type (7 Major Types)

Appendix G2 - Hydraulic Calculation and Residual Head Calculation of Fresh Water Main under Existing Fresh Water Supply System

(by using Hazen-Williams Equation)

1. Head Loss Equation (Hazen-William Equation)

$$V = 0.3564 \times C \times D^{0.63} \times i^{0.54}$$

where

V = Velocity along the pipeline in m/s

C = Hazen-Williams Constant, 110 for D < 600mm, 120 for D >= 600mm

D = Diameter of the pipeline in meter

i = Hydraulic Gradient

2. Hydraulic Gradient Equation

$$\text{Hydraulic Gradient} = \frac{\text{Headloss}}{\text{Pipe Length}}$$

Pipe Information							Peak Flow Velocity										Residual Head Estimation				
Remark	From Start Control Point	To End Control Point	Main Type (Distribution/Trunk)	Pipe Section Length/ Travel Distance (m)	Pipe Diameter (mm)	Equivalent Pipe Area (m²)	Included Catchment	Mean Flow Demand		Fire Fighting Flow (m³/s)	Peak Flow Multiplier (Distribution:3, Trunk:1.8)	Peak Flow (m³/s)	Pipe Velocity under Peak Flow Condition (m/s)	Hazen-William Constant	Hydraulic Gradient, i	Estimated Major Headloss	Total Water Head Level at Start Control Point (mPD)	Total Water Head Level at End Control Point (mPD)	Approx. Ground Level at End Control Point (mPD)	Residual Head at End Control Point (m)	
								MLD	m³/s												
Refer to Notes 1	A Kung Kok Fresh Water Service reservoir	A	Trunk	1007	586	0.270	Estimated existing water demand	38.837	0.450	0.70	1.5	0.67	2.50	120	0.009707814	9.7758	1.9552	71.185	59.454		
		B	Trunk	877	586	0.270		38.837	0.450	0.70	1.5	0.67	2.50	120	0.009707814	8.5138	1.7028	59.454	49.238		
		B	Distribution	27	189	0.028	Green@Sha Tin + GrandTech Centre	0.066	0.001	0.07	3.0	0.00229	0.0817	110	7.56768E-05	0.0020	0.0004	49.238	49.235		
		C	Distribution	54	189	0.028	Green@Sha Tin	0.010	0.00012	0.07	3.0	0.00035	0.0124	110	2.29764E-06	0.0001	0.0000	49.235	49.235		
		D	Distribution	61	189	0.028	Green@Sha Tin	0.010	0.00012	0.07	3.0	0.00035	0.0124	110	2.29764E-06	0.0001	0.0000	49.235	49.235		
Existing pipe connected to Green@Sha Tin	E	E1 (Green@Sha Tin)	Distribution	30	189	0.028	Green@Sha Tin	0.010	0.00012	0.07	3.0	0.00035	0.0124	110	2.29764E-06	0.0001	0.0000	49.235	49.235	6.000	43.23
Existing pipe connected to GrandTech Centre	C	C1 (GrandTech Centre)	Distribution	19	138	0.015	GrandTech Centre	0.06	0.00065	0.07	3.0	0.00194	0.1300	110	0.000268241	0.0049	0.0010	49.235	49.229	6.000	43.23

1. Existing mean flow demands of fresh water trunk mains are estimated based on the flow velocity limit stipulated in DI 1309 by the WSD.

Appendix G3 - Hydraulic Calculation and Residual Head Calculation of Fresh Water Main under Existing Fresh Water Supply System with Proposed Development

(by using Hazen-Williams Equation)

1. Head Loss Equation (Hazen-William Equation)

V = 0.3564 × C × D^0.63 × i^0.54

where

V = Velocity along the pipeline in m/s

C = Hazen-Williams Constant, 110 for D < 600mm, 120 for D >= 600mm

D = Diameter of the pipeline in meter

i = Hydraulic Gradient

2. Hydraulic Gradient Equation

Hydraulic Gradient = Headloss / Pipe Length

Pipe Information							Peak Flow Velocity							Residual Head Estimation							
Remark	From Start Control Point	To End Control Point	Main Type (Distribution/Trunk)	Pipe Section Length/ Travel Distance (m)	Pipe Diameter (mm)	Equivalent Pipe Area (m2)	Included Catchment	Mean Flow Demand		Fire Fighting Flow (m3/s)	Peak Flow Multiplier (Distribution:3, Trunk:1.5)	Peak Flow (m3/s)	Pipe Velocity under Peak Flow Condition (m/s)	Hazen-William Constant	Hydraulic Gradient, i	Estimated Major Headloss	Minor Headloss	Total Water Head Level at Start Control Point (mPD)	Total Water Head Level at End Control Point (mPD)	Approx. Ground Level at End Control Point (mPD)	Residual Head at End Control Point (m)
								MLD	m3/s								Extra 20% of Estimated Major				
Refer to Notes 1	A Kung Kok Fresh Water Service reservoir	A	Trunk	1007	586	0.270	Estimated existing water demand	40.033	0.463	0.72	1.5	0.70	2.58	120	0.01026841	10.3403	2.0681	71.185	58.777		
	A	B	Trunk	877	586	0.270	Estimated existing water demand	40.033	0.463	0.72	1.5	0.70	2.58	120	0.01026841	9.0054	1.8011	58.777	47.970		
	B	C	Distribution	27	189	0.028	Green @ Sha Tin + GrandTech Centre + STTL626 + STTL627 (include ICVSC)	1.261	0.015	0.08	3.0	0.04	1.56	110	0.017855291	0.4821	0.0964	47.970	47.392		
	C	D	Distribution	54	189	0.028	Green @ Sha Tin + STTL626 + STTL627(include ICVSC)	1.205	0.014	0.08	3.0	0.04	1.49	110	0.016415197	0.8864	0.1773	47.392	46.328		
	D	E	Distribution	61	189	0.028	Green @ Sha Tin + GrandTech Centre + STTL626	0.857	0.010	0.08	3.0	0.03	1.06	110	0.00872724	0.5324	0.1065	46.328	45.689		
Existing Pipe connected to Site STTL626	E	F	Distribution	65	189	0.028	STTL626	0.847	0.010	0.08	3.0	0.03	1.06	110	0.008539595	0.5551	0.1110	45.689	45.023	6.00	39.02
	F	F1	Distribution	36	138	0.015	STTL626	0.847	0.010	0.08	3.0	0.03	1.97	110	0.039504418	1.4222	0.2844	45.023	43.316	6.000	37.32
Existing pipe connected to Site STTL627	D	D1	Distribution	4	138	0.015	STTL627(include ICVSC)	0.348	0.004	0.07	3.0	0.01	0.81	110	0.007625164	0.0305	0.0061	46.328	46.291		
	D1	D2	Distribution	32	50	0.002	STTL627(include ICVSC)	0.348	0.004	0.07	3.0	0.01	6.16	110	1.07630763	34.2602	6.8520	46.291	5.179		
	D2	D3	Distribution	6	25	0.000	STTL627(include ICVSC)	0.348	0.004	0.07	3.0	0.01	24.05	110	31.31607247	256.5286	50.1057	5.179	-9	6.000	-16
Existing pipe connected to Green@ShaTin	E	E1 (Green@Sha Tin)	Distribution	30	189	0.028	Green@Sha Tin	0.010	0.000	0.07	3.0	0.00	0.01	110	2.29764E-06	0.0001	0.0000	45.689	45.689	6.000	39.69
Existing pipe connected to GrandTech Centre	C	C1 (GrandTech Centre)	Distribution	19	138	0.015	GrandTech Centre	0.056	0.001	0.07	3.0	0.00	0.13	110	0.000258241	0.0049	0.0010	47.392	47.386	6.000	41.39

Notes:
1. Existing mean flow demands of fresh water trunk mains are estimated based on the flow velocity limit stipulated in DI 1309 by the WSD.

Appendix G4 - Hydraulic Calculation and Residual Head Calculation of Fresh Water Main under Proposed Fresh Water Supply System with Proposed Development

(by using Hazen-Williams Equation)

1. Head Loss Equation (Hazen William Equation)

V=0.3564×C×D^0.63 ×i^0.54

where

V = Velocity along the pipeline in m/s

C = Hazen-Williams Constant, 110 for D < 600mm, 120 for D >= 600mm

D = Diameter of the pipeline in meter

i = Hydraulic Gradient

2. Hydraulic Gradient Equation

Hydraulic Gradient = Headloss / Pipe Length

Pipe Information							Peak Flow Velocity							Residual Head Estimation							
Remark	From Start Control Point	To End Control Point	Main Type (Distribution/Trunk)	Pipe Section Length/ Travel Distance (m)	Pipe Diameter (mm)	Equivalent Pipe Area (m2)	Included Catchment	Mean Flow Demand		Fire Fighting Flow (m3/s)	Peak Flow Multiplier (Distribution:3, Trunk:1.5)	Peak Flow (m3/s)	Pipe Velocity under Peak Flow Condition (m/s)	Hazen-William Constant	Hydraulic Gradient, i	Estimated Major Headloss	Minor Headloss (Extra 20% of Estimated Major)	Total Water Head Level at Start Control Point (mPD)	Total Water Head Level at End Control Point (mPD)	Approx. Ground Level at End Control Point (mPD)	Residual Head at End Control Point (m)
								MLD	m3/s												
Refer to Notes 1	A Kung Kok Fresh Water Service reservoir	A	Trunk	1007	586	0.270	Estimated existing water demand	40.033	0.463	0.72	1.5	0.70	2.58	120	0.01026841	10.3403	2.0681	71.185	58.777		
	A	B	Trunk	877	586	0.270	Estimated existing water demand	40.033	0.463	0.72	1.5	0.70	2.58	120	0.01026841	9.0054	1.8011	58.777	47.970		
	B	C	Distribution	27	189	0.028	Green @ Sha Tin + GrandTech Centre + STTL626 + STTL627 (include ICVSC)	1.261	0.015	0.08	3.0	0.04	1.56	110	0.017855291	0.4821	0.0964	47.970	47.392		
	C	D	Distribution	54	189	0.028	Green @ Sha Tin + STTL626 + STTL627(include ICVSC)	1.205	0.014	0.08	3.0	0.04	1.49	110	0.016415197	0.8864	0.1773	47.392	46.328		
	D	E	Distribution	61	189	0.028	Green @ Sha Tin + GrandTech Centre + STTL626	0.857	0.010	0.08	3.0	0.03	1.06	110	0.00872724	0.5324	0.1065	46.328	45.689		
	E	F	Distribution	56	189	0.028	STTL626	0.847	0.010	0.08	3.0	0.03	1.05	110	0.008539595	0.4782	0.0956	45.689	45.115	6.000	39.12
Proposed DN200 main connection to Site STTL626	F	F1a	Distribution	36	138	0.015	STTL626	0.847	0.010	0.08	3.0	0.03	1.97	110	0.039504418	1.4222	0.2844	45.115	43.409	6.000	37.41
Proposed DN150 main connection to Site STTL627	D	D1a	Distribution	4	95	0.007	STTL627(include ICVSC)	0.348	0.004	0.07	3.0	0.01	1.71	110	0.046990108	0.1880	0.0376	47.392	47.166	6.000	41.17
Existing pipe connected to Green@ShaTin	E	E1 (Green@Sha Tin)	Distribution	30	189	0.028	Green@Sha Tin	0.010	0.000	0.07	3.0	0.00	0.01	110	2.29784E-06	0.0001	0.0000	45.689	45.689	6.000	39.69
Existing pipe connected to GrandTech Centre	C	C1 (GrandTech Centre)	Distribution	19	138	0.015	GrandTech Centre	0.056	0.001	0.07	3.0	0.00	0.13	110	0.000258241	0.0049	0.0010	47.392	47.386	6.000	41.39

Notes:
1. Existing mean flow demands of fresh water trunk mains are estimated based on the flow velocity limit stipulated in DI 1309 by the WSD.

Appendix G5 - Hydraulic Calculation and Residual Head Calculation of Salt Water Main under Existing Salt Water Supply System

(by using Hazen-Williams Equation)

1. Head Loss Equation (Hazen William Equation)

V = 0.3564 × C × D^0.63 × i^0.54

where
V = Velocity along the pipeline in m/s
C = Hazen-Williams Constant, 110 for D < 600mm, 120 for D >= 600mm
D = Diameter of the pipeline in meter
i = Hydraulic Gradient

2. Hydraulic Gradient Equation

Hydraulic Gradient = Headloss / Pipe Length

Pipe Information							Peak Flow Velocity					Residual Head Estimation								
Remark	From Start Control Point	To End Control Point	Pipe Section Length/Travel Distance (m)	Pipe Diameter (mm)	Equivalent Pipe Area (m2)	Included Catchment	Mean Flow Demand		Peak Flow Multiplier (Z)	Peak Flow (m3/s)	Pipe Velocity under Peak Flow Condition (m/s)	Hazen-William Constant	Hydraulic Gradient, I	Estimated Major Headloss	Minor Headloss (Extra 20% of Estimated Major)	Total Water Head Level at Start Control Point (mPD)	Total Water Head Level at End Control Point (mPD)	Approx. Ground Level at End Control Point (mPD)	Residual Head at End Control Point (m)	
							MLD	m3/s												
Refer to Notes 1	To Shek Salt Water Service Reservoir	A	668	682	0.365	Estimated Existing water demand	31.563	0.365	2	0.73	2.00	120	5.38E-03	3.5939	0.7188	83.050	78.737			
		A	530	382	0.115	Estimated Existing water demand	7.427	0.086	2	0.17	1.50	110	0.007295849	3.8668	0.7734	78.737	74.097			
		B	C	404	282	0.062	Estimated Existing water demand	4.047	0.047	2	0.09	1.50	110	0.010395683	4.1999	0.8400	74.097	69.057		
		C	D	608	282	0.062	Estimated Existing water demand	4.047	0.047	2	0.09	1.50	110	0.010395683	6.3207	1.2641	69.057	61.472		
		D	E	236	189	0.028	Estimated Existing water demand	1.818	0.021	2	0.04	1.50	110	0.016581011	3.9131	0.7626	61.472	56.777		
		E	F	845	138	0.015	Estimated Existing water demand	0.969	0.011	2	0.02	1.50	110	0.023930816	20.2215	4.0443	56.777	32.511		
		F	G	114	138	0.015	Estimated Existing water demand	0.969	0.011	2	0.02	1.50	110	0.023930816	2.7281	0.5456	32.511	29.237		

Notes:
1. Existing mean flow demands of salt water mains are estimated based on the flow velocity limit stipulated in DI 1309 by the WSD.

Appendix G6 - Hydraulic Calculation and Residual Head Calculation of Salt Water Main under Existing Salt Water Supply System with Proposed Development

(by using Hazen-Williams Equation)

1. Head Loss Equation (Hazen William Equation)

V = 0.3564 × C × D^0.63 × i^0.54

where

V = Velocity along the pipeline in m/s

C = Hazen-Williams Constant, 110 for D < 600mm, 120 for D >= 600mm

D = Diameter of the pipeline in meter

i = Hydraulic Gradient

2. Hydraulic Gradient Equation

Hydraulic Gradient = Headloss / Pipe Length

Pipe Information						Peak Flow Velocity						Residual Head Estimation							
Remark	From Start Control Point	To End Control Point	Pipe Section Length/Travel Distance (m)	Pipe Diameter (mm)	Equivalent Pipe Area (m ²)	Included Catchment	Mean Flow Demand		Peak Flow Multiplier (Z)	Peak Flow (m ³ /s)	Pipe Velocity under Peak Flow Condition (m/s)	Hazen-William Constant	Hydraulic Gradient, i	Estimated Major Headloss	Minor Headloss (Extra 20% of Estimated Major)	Total Water Head Level at Start Control Point (mPD)	Total Water Head Level at End Control Point (mPD)	Approx. Ground Level at End Control Point (mPD)	Residual Head at End Control Point (m)
							MLD	m ³ /s											
Refer to Notes 1	To Shek Salt Water Service Reservoir	A	668	682	0.365	Estimated Existing water demand + STTL626 + STTL627	32.041	0.371	2	0.74	2.03	120	5.53E-03	3.6954	0.7391	83.050	78.616		
	A	B	530	382	0.115	Estimated Existing water demand + STTL626 + STTL627	7.905	0.091	2	0.18	1.60	110	0.008189749	4.3406	0.8681	78.616	73.407		
	B	C	404	282	0.062	Estimated Existing water demand + STTL626 + STTL627	4.526	0.052	2	0.10	1.68	110	0.012784708	5.1650	1.0330	73.407	67.209		
	C	D	608	282	0.062	Estimated Existing water demand + STTL626 + STTL627	4.526	0.052	2	0.10	1.68	110	0.012784708	7.7731	1.5546	67.209	57.881		
	D	E	236	189	0.028	Estimated Existing water demand + STTL626 + STTL627	2.296	0.027	2	0.05	1.89	110	0.025553371	6.0306	1.2061	57.881	50.644		
	E	F	845	138	0.015	Estimated Existing water demand	0.969	0.011	2	0.02	1.50	110	0.023930816	20.2215	4.0443	50.644	26.379		
	F	G	114	138	0.015	Estimated Existing water demand	0.969	0.011	2	0.02	1.50	110	0.023930816	2.7281	0.5456	26.379	23.105		
Proposed DN150 main connection to Site STTL627	F	F1	2	95	0.007	STTL627(include ICYSC)	0.139	0.002	2.0	0.00	0.45	110	0.004040569	0.0081	0.0016	26.379	26.369	6.000	20.37
Proposed DN150 main connection to Site STTL626	G	G1	1	95	0.007	STTL626	0.339	0.004	2.0	0.01	1.11	110	0.0210563	0.0211	0.0042	23.105	23.080	6.000	17.08

Notes:
1. Existing mean flow demands of salt water mains are estimated based on the flow velocity limit stipulated in DI 1309 by the WSD.

