







WATER SUPPLY IMPACT ASSESSMENT

To Amend the Notes of the “Comprehensive Development to include Wetland Restoration Area” Zone for a Proposed Comprehensive Development at Wo Shang Wai, Yuen Long, Lots 77 and 50 S.A in DD101

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Issue/revision	0	1	2	3
Remarks				
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1 INTRODUCTION

1.1 BACKGROUND

- 1.1.1 WSP (Asia) Limited was commissioned by Profit Point Enterprises Ltd to conduct a Water Supply Impact Assessment (WSIA) for a Comprehensive Development to include Wetland Restoration Area at Wo Shang Wai, Yuen Long, Lots 77 and 50 S.A in DD101 (thereafter referred to as “the Application Site”) by assessing the impact of the water demand due to the proposed comprehensive residential development.
- 1.1.2 This application is made under Section 12A of the Town Planning Ordinance, to rezone the Application Site on the approved Mai Po and Fairview Park Outline Zoning Plan (“OZP”) No. S/YL-MP/8. The rezoning application aims to increase the plot ratio (“PR”) from 0.4 (i.e. maximum permissible PR on the OZP) to 1.3, with a maximum building height (“BH”) adjusted to not more than 10-storeys and not exceeding +42mPD by amending the Notes of the current “Other Specified Uses (Comprehensive Development to include Wetland Restoration Area)” (“OU(CDWRA)”) zone.
- 1.1.3 The Applicant, Profit Point Enterprises Limited, proposes to increase the development intensity, and revise the layout and form of the housing developments in the Application Site, in response to the drastic changes in the development site context and planning circumstances of the area.
- 1.1.4 The Application Site is located at Wo Shang Wai, Yuen Long. It is generally bounded by Castle Peak Road – Mai Po and San Tin Highway to the east, fishponds to the north, residential developments, namely Royal Palms and Palm Springs to the south, and Wo Shang Wai Village to the southeast, as shown in Figure 1.

1.2 DESCRIPTION OF PROPOSED DEVELOPMENT

- 1.2.1 The proposed development consists of a mix of 3 stories detached and semi-detached house and 6, 8 and 10 storey residential tower. 48716 m² of land are reserved as open greenery area.
- 1.2.2 The development consists of 128 units as houses and 3434 units in residential blocks, totalling 3562 housing unit with a plot ratio of 1.28 and an average unit gross floor area of 74.7 m².
- 1.2.3 The master layout plan is attached in **Appendix A**.
- 1.2.4 The application site includes a residential care home for elderly (RCHE). The RCHE would consist of 100 beds and 15 staff.

1.3 OBJECTIVES

1.3.1 The objective for this study is set out to be as follows:

- (1) Estimating water demand arising from proposed development
- (2) Estimating water intakes to the existing/planned development
- (3) Evaluating water supply impacts to other existing development
- (4) Proposing water supply main layout to mitigate negative impacts to existing developments

1.4 DESIGN GUIDELINE

1.4.1 To conduct this study, we have obtained and adopted the following information:

- Existing water main records provided by WSD
- Capacity, Top water level, and Invert water level of Ngau Tam Mei Fresh Water Preliminary Service Reservoir
- Master Layout Plan of the proposed development
- WSD's Departmental Instruction 1309 (D.I. 1309)
- Manual of Mainlaying Practice
- 2021 Population Census

1.4.2 The following approach were adopted in carrying out this WSIA

- (1) Evaluate existing and planned works within the study area
- (2) Assess water demand from proposed development
- (3) Assess water demand from existing and planned development
- (4) Evaluate impact on existing water main
- (5) Recommend and propose water supply scheme with a hydraulic analysis
- (6) Examine the short- and long-term impacts on existing water mains and interfacing projects

1.5 INTERFACING PROJECTS

1.5.1 Notable interfacing project includes:

- CE 15/2023 (CE) First Phase Development of the New Territories North – San Tin/Lok Ma Chau Development Node – Package 1 – Design and Construction

2 EXISTING AND PLANNED WORK

2.1 EXISTING WATER WORKS AND SERVICE RESERVOIRS

- 2.1.1 Ngau Tam Mei area surrounding the application site is served by Ngau Tam Mei Water Treatment Works. The treated water from Ngau Tam Mei is stored in Ngau Tam Mei Primary Service Reservoir.
- 2.1.2 **Table 2-1** summarise the capacity, top water level and invert level of the Ngau Tam Mei Primary Service Reservoir.

Table 2-1 Parameter of Ngau Tam Mei Primary Service Reservoir

Reservoir	Capacity (m ³)	Top Water Level (APD)	Invert Level (APD)
Ngau Tam Mei Primary Service Reservoir	40750	104.1	94.15

- 2.1.3 There is no saltwater supply nor reclaimed water supply to the area, therefore, fresh water is used for flushing.

2.2 EXISTING WATER MAINS

- 2.2.1 With reference to Main Record Plans (MRPs) from WSD, the application site is served by a DN150 and a DN200 pipe. Both pipes are a tee-off from a DN200 ductile iron pipe running along Castle Peak Road-Mai Po section.
- 2.2.2 A DN600 pipe runs along San Tam Road on the other side of San Tin Highway opposite to the application site. The DN600 pipe gets fresh water from a DN700 pipe along Castle Peak Road – Tam Mi section.
- 2.2.3 The DN700 pipe gets water from DN1400 which runs from east to west along Ching Yau Road, starting from Ngau Tam Mei Primary Service Reservoir and ending at San Tin Highway.

2.3 EXISTING DEVELOPMENT

- 2.3.1 After evaluating aerial photo and water main records of the application site, the list of developments identified is shown in **Table 2-2**.

Table 2-2 List of Building Group Identified and Parameters

Building Group	Number of units	Population (person)
Wah On Villa	119	334
Ian Court	105	294
San Wai Tsuen	30	84
Kadoorie Villas	75	210
Faye Villa	39	110
Chuk Yuen Tsuen	438	1227
Tai Yuen Villa	159	446
Yau Tam Mei Tsuen	31	87
Yau Mei San Tsuen	18	51
Green Crest	81	227
Wai Tsai Tsuen	127	356
The Vineyard	214	600
The Vineyard Phase 2	30	84
YL 0172 (Palm Springs)	980	4677
YL 0162 (Casa Paradizo + The Vineyard + Rolling Hills + The Step)	1370	3836
Maple Gardens	160	448
Crescendo	67	188
Scenic Heights	33	93
Mai Po San Tsuen	338	947
Tsing Lung Tsuen	155	434
Fan Tin Tsuen	403	1129
San Lung Tsuen	79	222
On Lung Tsuen	63	177
Tai Fu Tai Garden	34	96
Sunny Hills	18	51
Wing Ping Tsuen	757	2120
Tung Chan Wai	152	426
Yan Shau Wai	356	997
Hang Fook Gardens	87	244

2.3.2 Number of units were obtained by counting houses on aerial photo and data from real estate database. Populations were found from population census 2021.

2.3.3 The population of building group YL 0172 and YL 0162 is extracted from the population census in 2021. Building group YL 0173 is not included as it covered settlements that are not served by the same existing water mains as application site.

2.4 PLANNED DEVELOPMENT

- 2.4.1 After reviewing the gazettes from Planning Department, 4 planned and approved developments were identified, the name, application number and parameters are listed in **Table 2-3**.
- 2.4.2 Application Y/YL-MP/10 covers various lots between Kam Pok Road and Ha Chuk Yuen Road and east of Ha Chuk Yuen Road. The latest Broad Development Parameters from Town Planning Board shows that the development consisted of 2322 units.
- 2.4.3 Application A/YL-MP/341 covers various lots in Yau Pok Road. The latest Broad Development Parameters from Town Planning Board shows that the development consisted of 2150 units.
- 2.4.4 Application A/YL-MP/287 covers various lots on Kam Pok Road and Ha San Wai Road. The most recent Board Development Parameter show that application A/YL-MP/287 will be a Residential (Group D) development consisting of 65 houses.
- 2.4.5 Application Y/YL-NTM/9 covers lot 4823 in D.D. 104, located north of Casa Paradizo. The most recent Board Development Parameter show that the zoning has been changed from Residential (Group C) to Government, Institution or Community. The lot will consist of a RCHE with 142 beds.

Table 2-3 List of planned development identified and parameters

Landuse	Application Number	Number of units	Population (person)
Residential Development (Group C)	Y/YL-MP/10	2322	6270
Residential Development (Group C)	A/YL-MP/341	2150	5500
Residential Development (Group D)	A/YL-MP/287	65	182
RCHE	Y/YL-NTM/9	142	142

- 2.4.6 The location of the existing and planned developments is shown in **Appendix B**.

2.5 PLANNED WATER WORK AND WATER MAIN

- 2.5.1 North to application site, CEDD have commissioned CE 15/2023 (CE) First Phase Development of the New Territories North – San Tin/Lok Ma Chau Development Node – Package 1 – Design and Construction. The project will involve re-routing water main in the area and constructing a new water treatment work and service reservoir.
- 2.5.2 The drafted preliminary diversion plan of CE 15/2023 was obtained from the project consultant. It shows that the application site itself does not fall into the project scope,

but there would be potential interface if proposed water main extends to the section of San Tam Road under San Tin Highway. The DN600 pipe on San Tam Road, north of application site will be proposed for rerouting as part of the development plan in CE 15/2023.

3 WATER SUPPLY IMPACT ASSESSMENT

3.1 WATER DEMAND FROM PROPOSED DEVELOPMENT

- 3.1.1 As quoted in Section 1, the proposed development would be R3 type residential development with 3562 units, consisting of 3434 residential blocks and 128 houses. The development is estimated to house 9615 people in residential blocks and 359 people in houses, totalling 9974 people, by assuming an average of 2.8 people occupying each unit. The total landscaping area is 48716 m².
- 3.1.2 With reference to D.I. 1309 and comments from WSD, the fresh water demand for the proposed 6-10 storey residential blocks and the proposed new private houses are assumed to be 0.300 m³ and 0.390 m³ per person per day respectively, with a service trade allowance of 0.040 m³ per person per day. The flushing water demand is 0.104 m³ per person per day. Irrigation water demand is assumed to be 0.007 m³ per m² per day.
- 3.1.3 The development will also include a 100-bed RCHE. The 100-bed RCHE is considered as private houses where each unit houses 1 person. Freshwater demand is assumed to be 0.230 m³ per person per day, with a service trade allowance of 0.040 m³ per person per day. The flushing water demand is 0.104 m³ per person per day.
- 3.1.4 Overall, the freshwater demand from the application site is estimated to be 3791.8 m³ per day and the mean flushing demand is 1047.8 m³ per day.

3.2 WATER DEMAND FROM EXISTING DEVELOPMENTS

- 3.2.1 As presented in Section 2.3, the existing developments can be divided into 29 building groups. Based on **Table 2-2**, the population can be estimated from number of units using the average occupier per unit from population census 2021. For Yuen Long district the factor is 2.8 person per household.
- 3.2.2 Most developments in the area are 3 storey houses with low plot ratio, hence they are considered R3 residential development with fresh water demand of 0.300 m³ per person per day, with a service trade allowance of 0.040 m³ per person per day. The flushing water demand is 0.104 m³ per person per day.
- 3.2.3 Some settlements, such as Mai Po San Tsuen and San Wai Tsuen, around application site are recognised as modern villages. For such site, the freshwater demand is assumed to be 0.230 m³ per person per day, with a service trade allowance of 0.040 m³ per person per day. The flushing water demand is 0.104 m³ per person per day.
- 3.2.4 Based on the information above, the freshwater and flushing water demand can be calculated for each building by multiplying the building population by the unit demand factor. Overall, the freshwater demand from the existing developments of 29 buildings

are summed up to be 6257.09 m³ per day and the mean flushing demand is 2100.28 m³ per day.

- 3.2.5 The calculations and table summarising the demand arising from different demand type can be found in **Table 3-1**.

Table 3-1 Table of Water Demands Adopted for the Assessment

Demand Type	Water Type	Unit Demand	Unit
Residential (R3)	Fresh	0.300	m ³ per person per day
	Flushing	0.104	m ³ per person per day
New Private Houses	Fresh	0.390	m ³ per person per day
	Flushing	0.104	m ³ per person per day
RCHE	Fresh	0.230	m ³ per person per day
	Flushing	0.104	m ³ per person per day
Villages (Modern)	Fresh	0.230	m ³ per person per day
	Flushing	0.104	m ³ per person per day
Service Trade	Fresh	0.040	m ³ per person per day
Irrigation	Fresh	0.007	m ³ per m ² per day

3.3 IMPACT ON EXISTING WATER WORK

- 3.3.1 The freshwater peak demand factor is assumed to be 3 and the flushing water peak demand factor were assumed to be 2. According to the Manual of Mainlaying Practice, the maximum flow velocity in water mains is 3 m/s. While the recommended flow velocity limit for different pipe size ranges is given in the table below, which is followed to determine the suitable pipe sizes for the fresh water network.

Table 3-2 Recommended Flow Velocity Limit

Pipe size range (mm)	Recommended flow velocity limit under peak flow condition
>DN700	≤ 3 m/s
DN700-DN525	≤ 2.5 m/s
DN450-DN375	≤ 2 m/s
DN300-DN200	≤ 1.5 m/s

3.3.2 Based on the calculation shown in **Appendix C**, the proposed development has a mean daily freshwater demand of **4118.4** m³/day and flushing water demand of **1257.8** m³/day. The total peak water demand is **14167.3** m³/day after applying the peak demand factor. The maximum allowable flowrate for the DN150 and DN200 pipe leading to the site is 6059.9 m³/day and 3230.7 m³/day respectively. The existing pipes are not sufficient to meet the peak water demand of the application site.

4 PROPOSED WATER MAIN SCHEME

4.1 OVERVIEW

- 4.1.1 As mentioned in **Section 2.2**, there is a DN600 pipe running along San Tam Road on the other side of San Tin Highway. The DN600 pipe would have the flow velocity 1.28 m/s and flowrate of 0.35 m³/s supplying to only existing and planned development. According to Appendix B, the flow velocity in the DN600 pipe will be increased to 1.86 m/s with a flowrate of 0.50 m³/s when the proposed development is considered.
- 4.1.2 It is therefore proposed to construct a new tee-off from the DN600 pipe, named 600DI89 on MRP. Two options are presented and evaluated in this WSIA. The drawings of the proposed pipe layout can be found in **Appendix D**.
- 4.1.3 Only elevation heads and frictional head are considered in the hydraulic calculations. Elevation head is considered as the sole driving force from primary reservoir and the main head loss is due to friction. Velocity and angled head loss are considered minor compared to frictional head loss. Minor losses are estimated as 10% of the frictional head loss.
- 4.1.4 Hazen-William's equation is used to calculate frictional head loss, and Hazen-Williams Coefficient is taken as 120 for **fresh water main** with diameter **equal to or** larger than 600mm, and 110 for **fresh water main** with diameter smaller than 600mm. Pipes where water demand cannot be estimated are assumed to have a flow velocity of 2.5 m/s for a conservative approach.

4.2 PREFERRED OPTION – CONSTRUCTION AT EXISTING SUBWAY AT SAN TAM ROAD

- 4.2.1 The preferred option would be to tee-off from the DN600 pipe further north at existing San Tam Road Subway under San Tin Highway. This option would avoid construction work under San Tin Highway and mitigate all potential structural and safety issues associate with the works at San Tin Highway.
- 4.2.2 Proposed tee-off pipe will be 400 mm in nominal diameter based on the calculation in **Appendix C**, and the length were estimated to be 573 meters. For conservative estimation, it is assumed to have the elevation of 6.2 mPD, which is the elevation of ground level recorded near the application site. It is expected that the pipe will be underground and therefore have an even lower elevation.
- 4.2.3 Calculation have shown that with a head loss of **41.3** meter from existing water mains and **5.3** meter head loss from proposed water main, the residual head in the pipe will be **51.6** meter at the boundary of the application site.

- 4.2.4 Based on WSD's circular letter No. 1/2007, the minimum acceptable residual pressure in water mains is 20 m . This option meets the minimum requirements and are therefore hydraulically feasible.
- 4.2.5 However, the proposed connection point is located on a proposed pipe under CE15/2023 managed by AECOM-Halcrow Joint Venture. The joint venture should be consulted on construction schedule and feasibility of the connection may varies with time. In the case that the proposed tee-off is not feasible, the backup option should be considered.

4.3 BACKUP OPTION – CONSTRUCTION UNDER SAN TIN HIGHWAY

- 4.3.1 The backup option would be to directly tee-off from the DN600 pipe across San Tin Highway. Construction would preferably be through micro-tunnelling to avoid interrupting traffic on San Tin Highway.
- 4.3.2 Proposed tee-off pipe will be 300 mm at minimum in nominal diameter, and the length were estimated to be 166 meters. For conservative estimation, it is assumed to have the elevation of 6.2 mPD, which is the elevation of ground level recorded near the application site. It is expected that the pipe will be underground and therefore have a lower elevation.
- 4.3.3 Calculation have shown that with a head loss of 40.7 meter from existing water mains and 4.7 meter head loss from proposed water main, the residual head in the pipe will be 52.3 meter at the boundary of the application site.
- 4.3.4 Digging underneath the San Tin Highway will requires an excavation permit from Highway department. If the option is to be adapted, the applicant shall register on XPMS as soon as possible and liaison with Highway department for permission.

5 CONCLUSION AND WAY FORWARD

- 5.1.1 It could be concluded that the existing water supply mains around the proposed development is not sufficient for the water demand, and hence a new water main scheme is needed.
- 5.1.2 It would be feasible to tee-off from the existing DN600 pipe (600DI89) which runs along San Tam Road on the other side of San Tin Highway opposite to the application site. The preferred scheme would be to tee-off further north on San Tam Road to prevent construction work under the highway. The residual head would be 51.6 meter, which meets the minimum residual pressure requirement from WSD.
- 5.1.3 Another feasible scheme is to tee-off directly across San Tin Highway, this is not preferred as construction work on San Tin highway may be uncertain. The residual head is estimated to be 52.3 meter, which would also meet the minimum residual pressure requirement from WSD.
- 5.1.4 The applicant will discuss the preferred option with AECOM for interface with CE 15/2023 and adopt the backup option if the preferred option becomes unavailable.

Appendices

Appendix A

MLP of Proposed Development

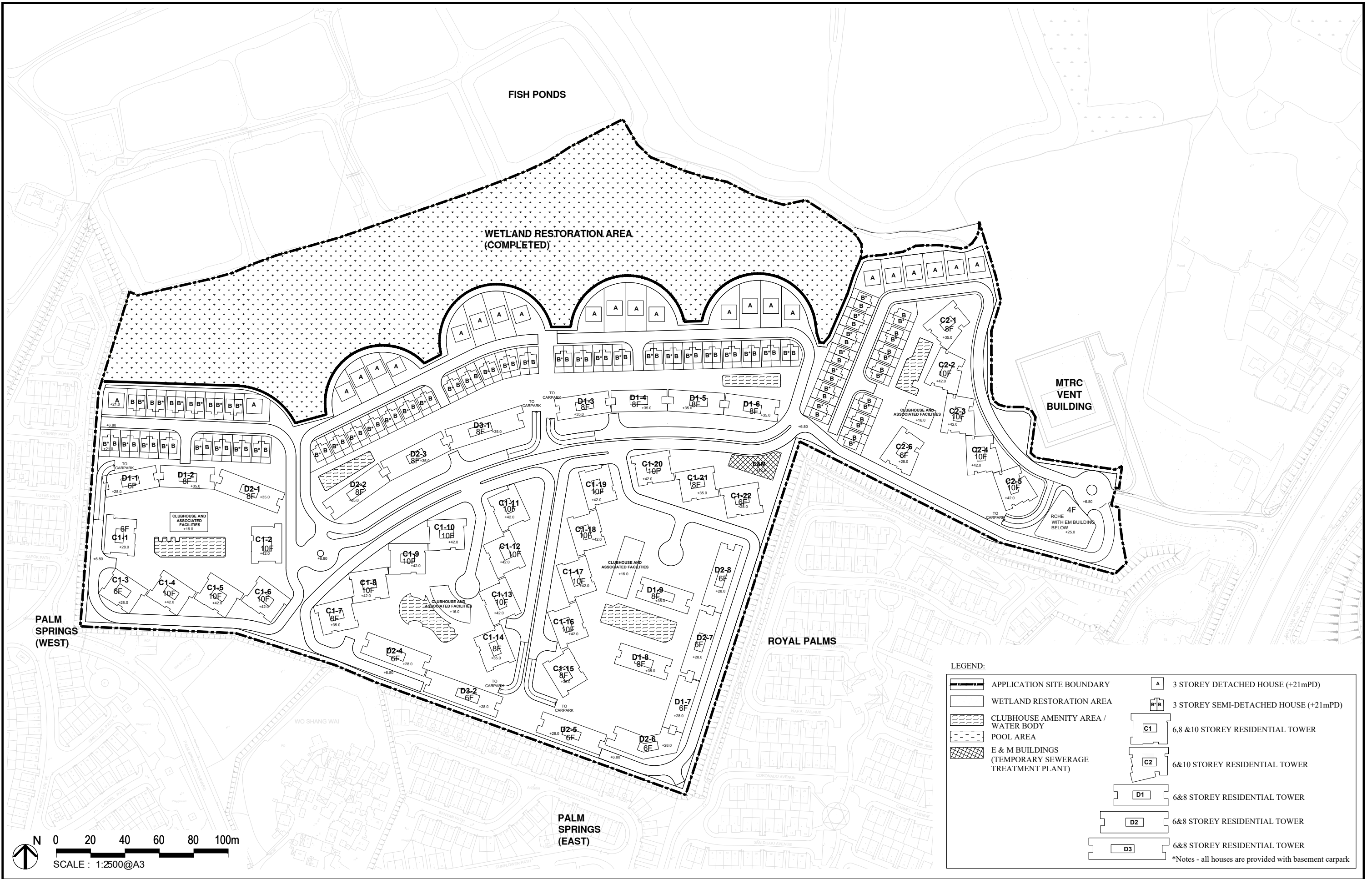
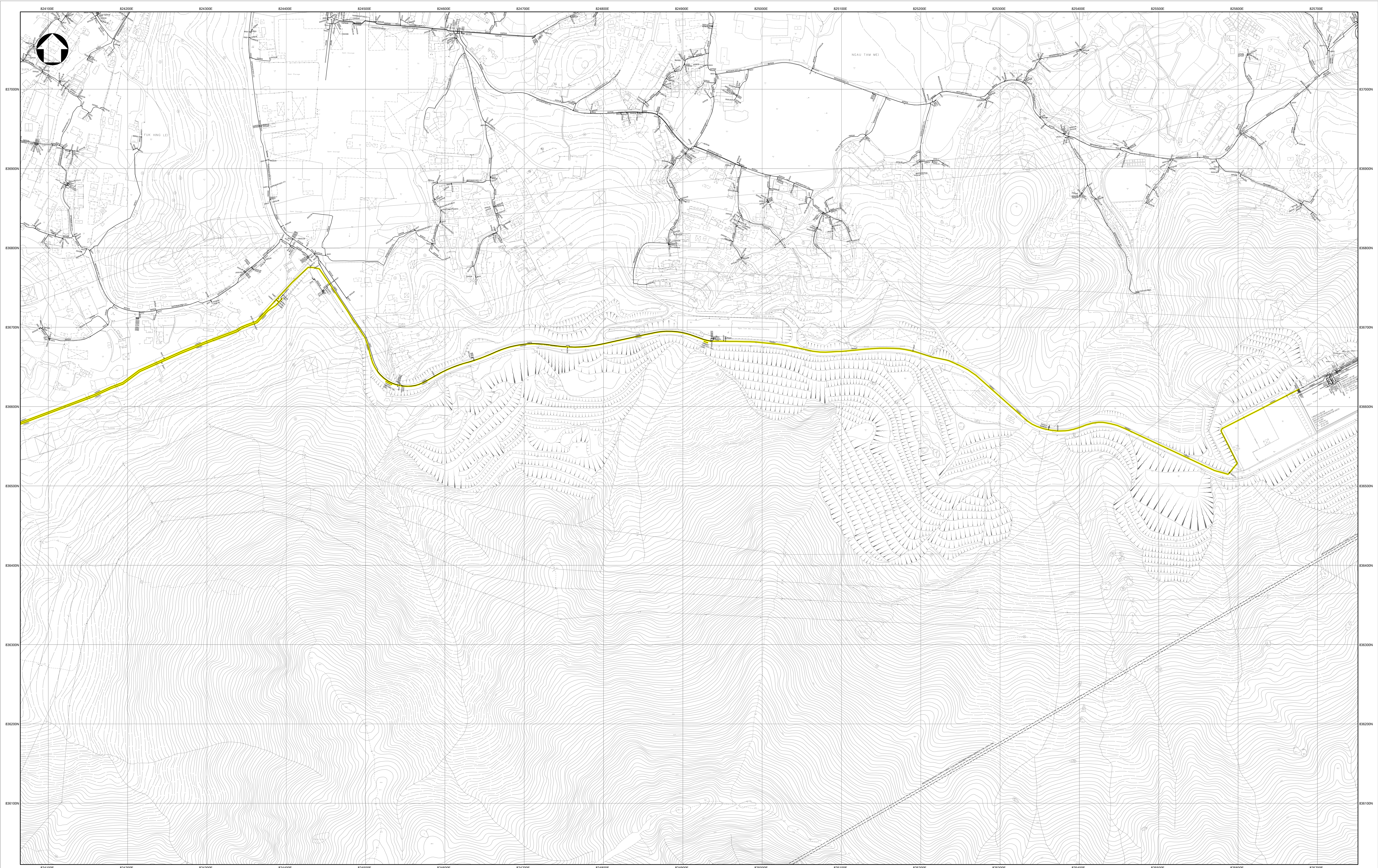


Figure 3: Revised Master Layout Plan in this Amendment Application

Appendix B

MRP with development site labelled



- NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
 2. ALL LEVELS ARE IN METRES ABOVE MEAN SEA LEVEL UNLESS OTHERWISE SPECIFIED.
 3. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
 4. FOR LAND RECORDS SHOW CONVENTIONS AND DESIGNATIONS.
 5. SEE SECTION 10.1.1.1.
 6. NO EXISTING WIRE CABLE IN THE VICINITY OF THE SITE.
 7. NO PROPOSED WIRE CABLE IN THE VICINITY OF THE SITE.
 8. THE SITE IS NOT WITHIN WIRE GATHERING GROUNDS.
 9. ASSESS FOR CATHODIC PROTECTION MATERIALS WAS FOUND IN THE VICINITY OF THE SITE.
 10. NO CATHODIC PROTECTION MATERIALS ON THE VICINITY OF THE SITE.

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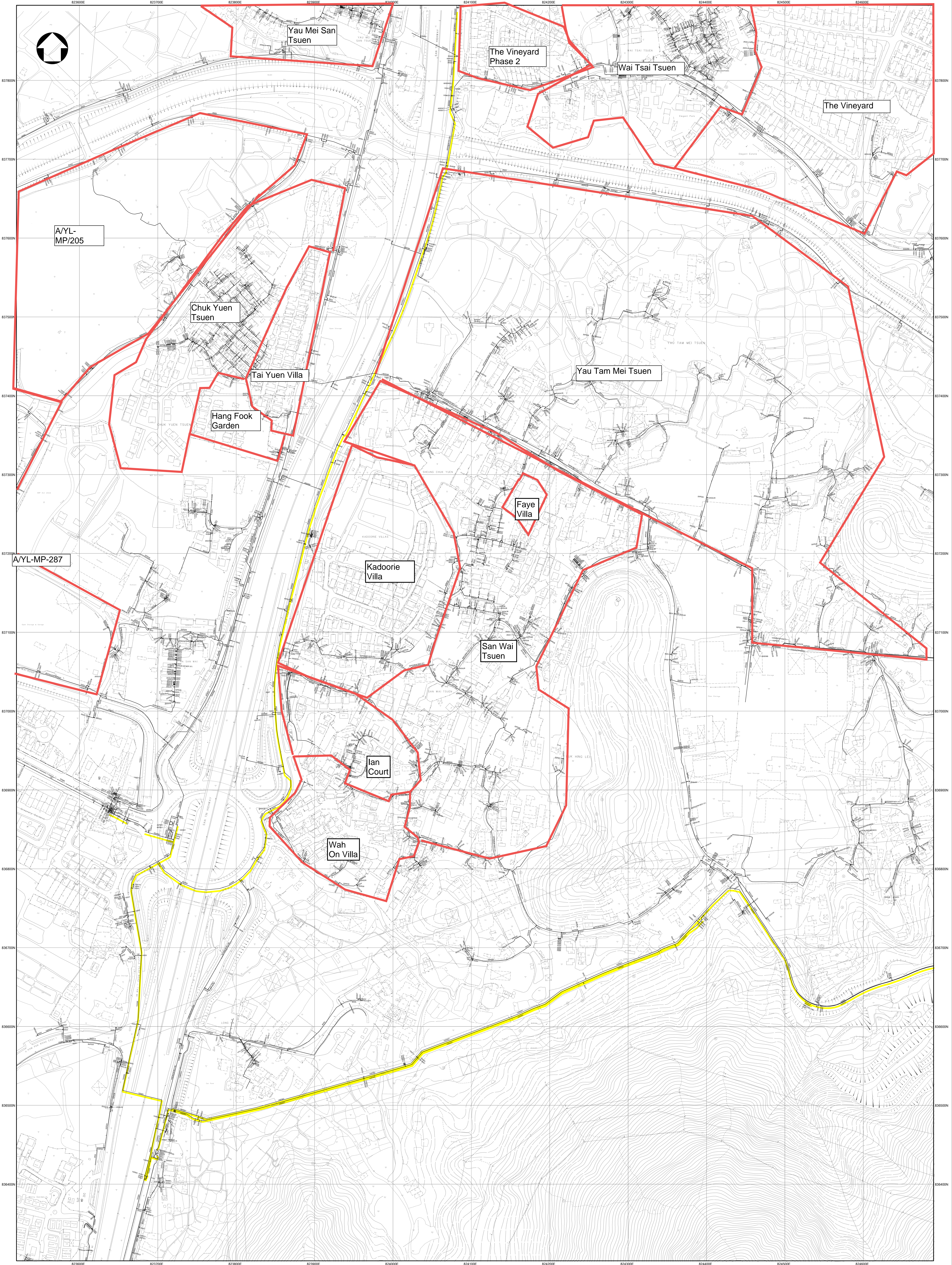
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SHEET 1 OF 1

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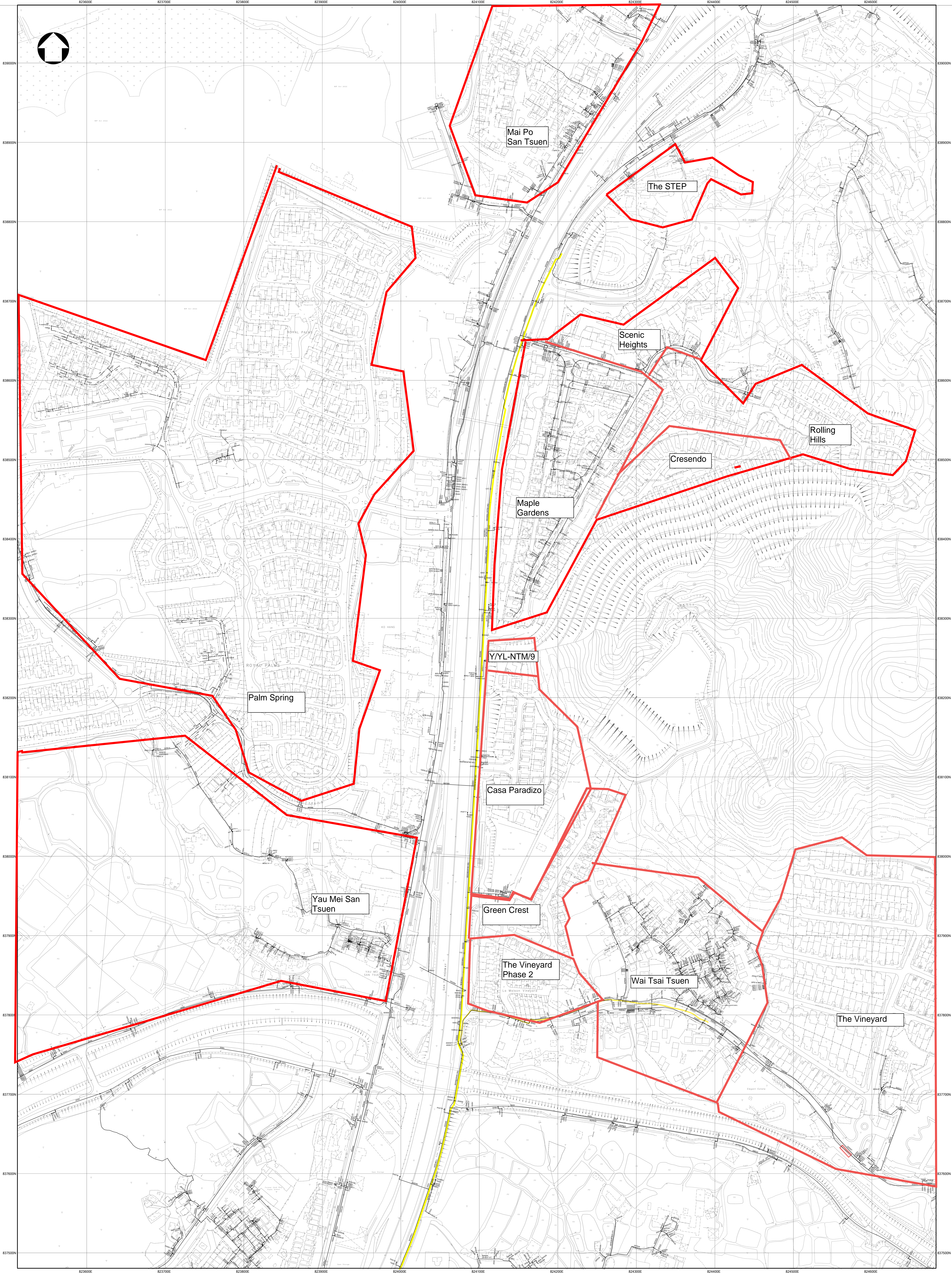
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 4. FOR MAIN RECORDS, SIGN CONVENTIONS AND DESIGNATIONS ARE IN ACCORDANCE WITH THE STANDARD PRACTICE.
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 7. NO PROPOSED WED CABLES IN THE VICINITY OF THE SITE.
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 4. FOR MAIN RECORD, SON CONVENTIONS AND DESIGNATIONS, SEE BRITISH STANDARD.
 5. NO PROPOSED WATER MAINS IN THE VICINITY OF THE SITE.
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 7. NO PROPOSED WDG CABLE IN THE VICINITY OF THE SITE.
 8. THE SITE IS NOT WITHIN ANY GATHERING GROUNDS.
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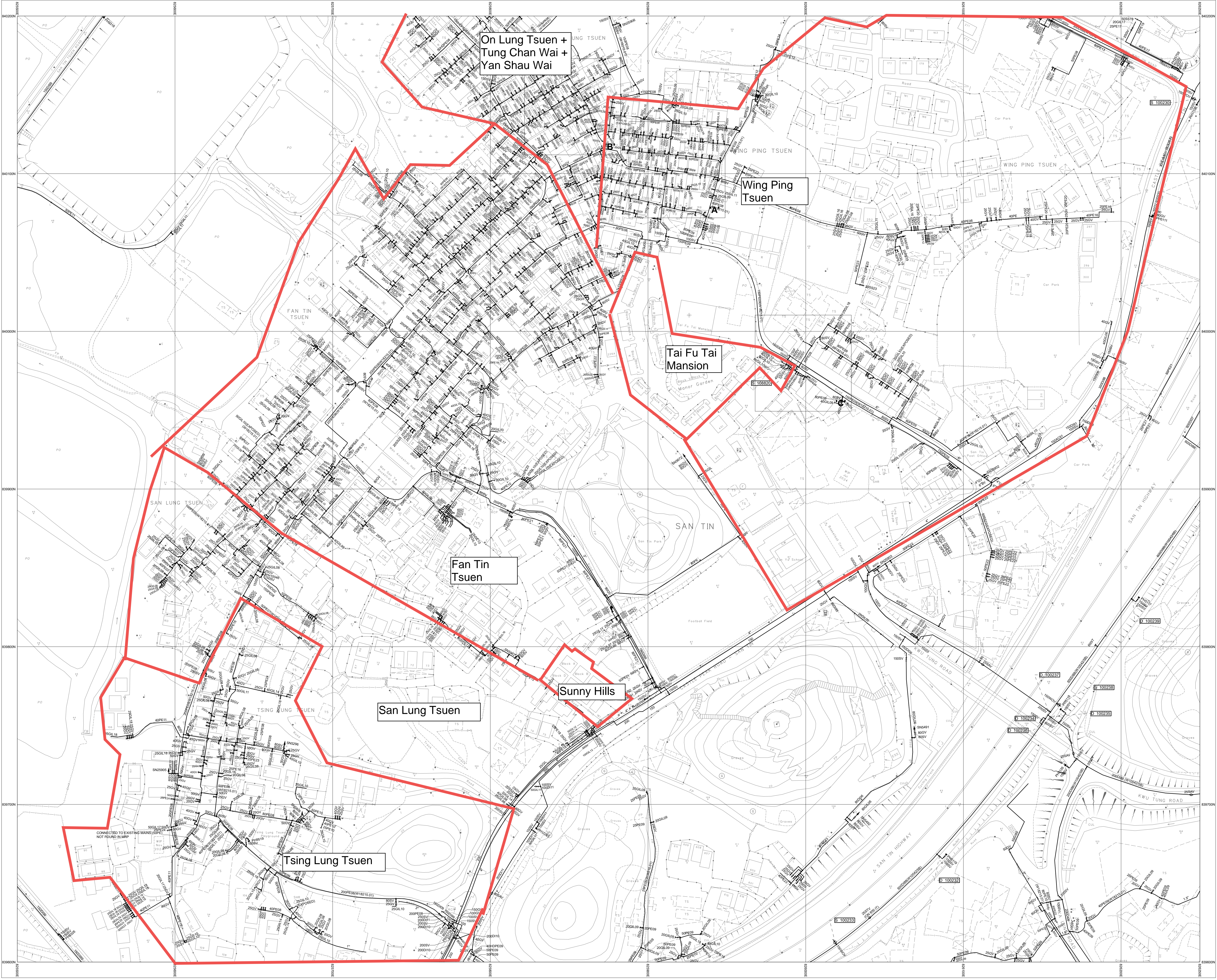
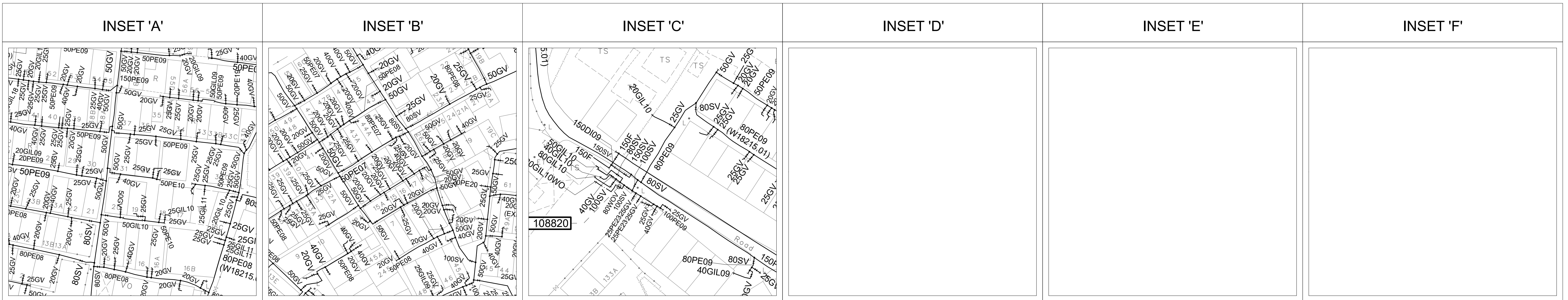
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CE/MNW
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 Water Supplies Department
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METRES 20 10 0 20 40 60 80 100 METRES

FRESH WATER MAINS RECORD PLAN

CASTLE PEAK ROAD, SAN TIN

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Appendix C

Table of Calculation

						Fresh		Flushing		
	Building Group	Landuse	Area (m2)	Number of units	Population (person)	Unit Demand Factor (m3/head/day)	Unit Demand Factor (m3/m2/day)	Mean Water Demand (m3/day)	Unit Demand Factor (m3/head/day)	Mean Flushing demand (m3/day)
Existing Developments	Wah On Villa	Residential (R3)		119	334	0.34		113.56	0.104	34.736
	Ian Court	Residential (R3)		105	294	0.34		99.96	0.104	30.576
	San Wai Tsuen	Villages (Modern)		30	84	0.27		22.68	0.104	8.736
	Kadoorie Villas	Residential (R3)		75	210	0.34		71.4	0.104	21.84
	Faye Villa	Residential (R3)		39	110	0.34		37.4	0.104	11.44
	Chuk Yuen Tsuen	Villages (Modern)		438	1227	0.27		331.29	0.104	127.608
	Tai Yuen Villa	Villages (Modern)		159	446	0.27		120.42	0.104	46.384
	Yau Tam Mei Tsuen	Villages (Modern)		31	87	0.27		23.49	0.104	9.048
	Yau Mei San Tsuen	Villages (Modern)		18	51	0.27		13.77	0.104	5.304
	Green Crest	Residential (R3)		81	227	0.34		77.18	0.104	23.608
	Wai Tsai Tsuen	Villages (Modern)		127	356	0.27		96.12	0.104	37.024
	The Vineyard	Residential (R3)		214	600	0.34		204	0.104	62.4
	The Vineyard Phase 2	Residential (R3)		30	84	0.34		28.56	0.104	8.736
	YL 0172 (Palm Springs)	Residential (R3)		980	4677	0.34		1590.18	0.104	486.408
	YL 0162 (Casa Paradizo + The Vineyard + Rolling Hills + The Step)	Residential (R3)		1370	3836	0.34		1304.24	0.104	398.944
	Maple Gardens	Residential (R3)		160	448	0.34		152.32	0.104	46.592
	Crescendo	Residential (R3)		67	188	0.34		63.92	0.104	19.552
	Scenic Heights	Residential (R3)		33	93	0.34		31.62	0.104	9.672
	Mai Po San Tsuen	Villages (Modern)		338	947	0.27		255.69	0.104	98.488
	Tsing Lung Tsuen	Villages (Modern)		155	434	0.27		117.18	0.104	45.136
	Fan Tin Tsuen	Villages (Modern)		403	1129	0.27		304.83	0.104	117.416
	San Lung Tsuen	Villages (Modern)		79	222	0.27		59.94	0.104	23.088
	On Lung Tsuen	Villages (Modern)		63	177	0.27		47.79	0.104	18.408
	Tai Fu Tai Garden	Residential (R3)		34	96	0.34		32.64	0.104	9.984
	Sunny Hills	Residential (R3)		18	51	0.34		17.34	0.104	5.304
	Wing Ping Tsuen	Villages (Modern)		757	2120	0.27		572.4	0.104	220.48
	Tung Chan Wai	Villages (Modern)		152	426	0.27		115.02	0.104	44.304
	Yan Shau Wai	Villages (Modern)		356	997	0.27		269.19	0.104	103.688
	Hang Fook Gardens	Residential (R3)		87	244	0.34		82.96	0.104	25.376
Total					20195			6257.09		2100.28
Planned Developments	Lots 3152, 3153 RP, 3156 S.B and 4805 in D.D. 104 and Adjoining Government Land, Kam Pok Road, Yuen Long (Y/YL-MP/10)	Residential (R3)		2322	6270	0.34		2131.8	0.104	652.08
	Various Lots in D.D. 104 and Adjoining Government Land, Yau Pok Road, Mai Po, Yuen Long (A/YL-MP/341)	Residential (R3)		2150	5500	0.34		1870	0.104	572
	Proposed House development in various lots in D.D. 104 and adjoining government land, Mai Po, Yuen Long (A/YL-MP/287)	Houses		65	182	0.43		78.26	0.104	18.928
	Lot 4823 in D.D. 104, Ngau Tam Mei, Yuen Long (Y/YL-NTM/9)	RCHE		142	142	0.27		38.34	0.104	14.768
Total					12094			4118.4		1257.776
Proposed Development		Residential Tower		3434	9616	0.34		3269.44	0.104	1000.064
		Houses		128	359	0.43		154.37	0.104	37.336
		RCHE		100	100	0.27		27	0.104	10.4
		Landscaping	48716				0.007	341.012		
Total					10075			3791.822		1047.8
Grand Total					42364			14167.312		4405.856

Remark:

Unit demand factor from DI 1309 or agreed with WSD

Unit demand factor for Fresh Water = Fresh water demand factor + Service trades

Records for populations taken from 2021 population census

Census found from: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.census2021.gov.hk%2Fdoc%2FHMA_BG_21C.xlsx&wdOrigin=BROWSELINK

Population data for village type settlement are estimated by counting house seems in aerial photo and assuming 2.7 person per house

2.8 person per house is assumed based on the data for Yuen Long District in the 2021 population census

Portion	Nominal Diameter (mm)	Internal Diameter (mm)	Length (m)	Material	Hazen-Williams Coefficient	Total Fresh water demand	Total Flushing water demand	Fresh water peak factor	Flushing water peak factor	Peak Demand Flow(m3/day)	Peak flowrate(m3/s)	Area (m2)	Velocity (m/s)	Head loss per length	Head Loss (m)	Minor Head Loss (m)	Total Head Loss (m)	Note
1400S01	1400	1379	2255.3	S	120							1.5	3.00	0.005	11.4	1.1	12.5	Assumed velocity of 2.5 m/s for conservative estimation
1400S98	1400	1379	53.8	S	120							1.5	3.00	0.005	0.3	0.0	0.3	Assumed velocity of 2.5 m/s for conservative estimation
1200S98	1200	1182	11.3	S	120							1.1	3.00	0.006	0.1	0.0	0.1	Assumed velocity of 2.5 m/s for conservative estimation
700S00	700	682	29.4	S	120							0.4	2.50	0.008	0.2	0.0	0.3	Assumed velocity of 2.5 m/s for conservative estimation
700S91	700	682	155.3	S	120							0.4	2.50	0.008	1.3	0.1	1.4	Assumed velocity of 2.5 m/s for conservative estimation
700S88	700	682	311.4	S	120							0.4	2.50	0.008	2.6	0.3	2.8	Assumed velocity of 2.5 m/s for conservative estimation
600S90	600	586	207.8	S	120							0.3	2.50	0.010	2.0	0.2	2.2	Assumed velocity of 2.5 m/s for conservative estimation
600S89	600	586	341.7	S	120							0.3	2.50	0.010	3.3	0.3	3.7	Assumed velocity of 2.5 m/s for conservative estimation
600DI90	600	586	1493.0	DI	120	14167.3	4405.9	3	2	51313.6	0.59	0.3	2.20	0.008	11.5	1.2	12.7	Considering all existing and planned development
									Backup Option			0						
DN300	300	285	166.0	DI	110	3791.8	1047.8	3	2	13471.1	0.2	0.1	2.44	0.026	4.2	0.4	4.7	Supply to only proposed development
									Preferred Option									
600DI90	600	586	173.6	DI	120	14167.3	4405.9	3	2	51313.6	0.6	0.27	2.20	0.01	1.34	0.1	1.5	
DN400	400	382	573.0	DI	110	3791.8	1047.8	3	2	13471.1	0.2	0.1	1.36	0.006	3.5	0.4	3.9	Supply to only proposed development

Notes:

Hazen-Williams Coefficient taken as 110 when diameter < 600, 120 when diameter > 600
According to main laying practice, the maximim velocity allowed is 3 m/s
Velocity head loss, angled headloss and headloss at connections are considered minor
Minor headloss accounted by a 1.1 factor on frictional headloss

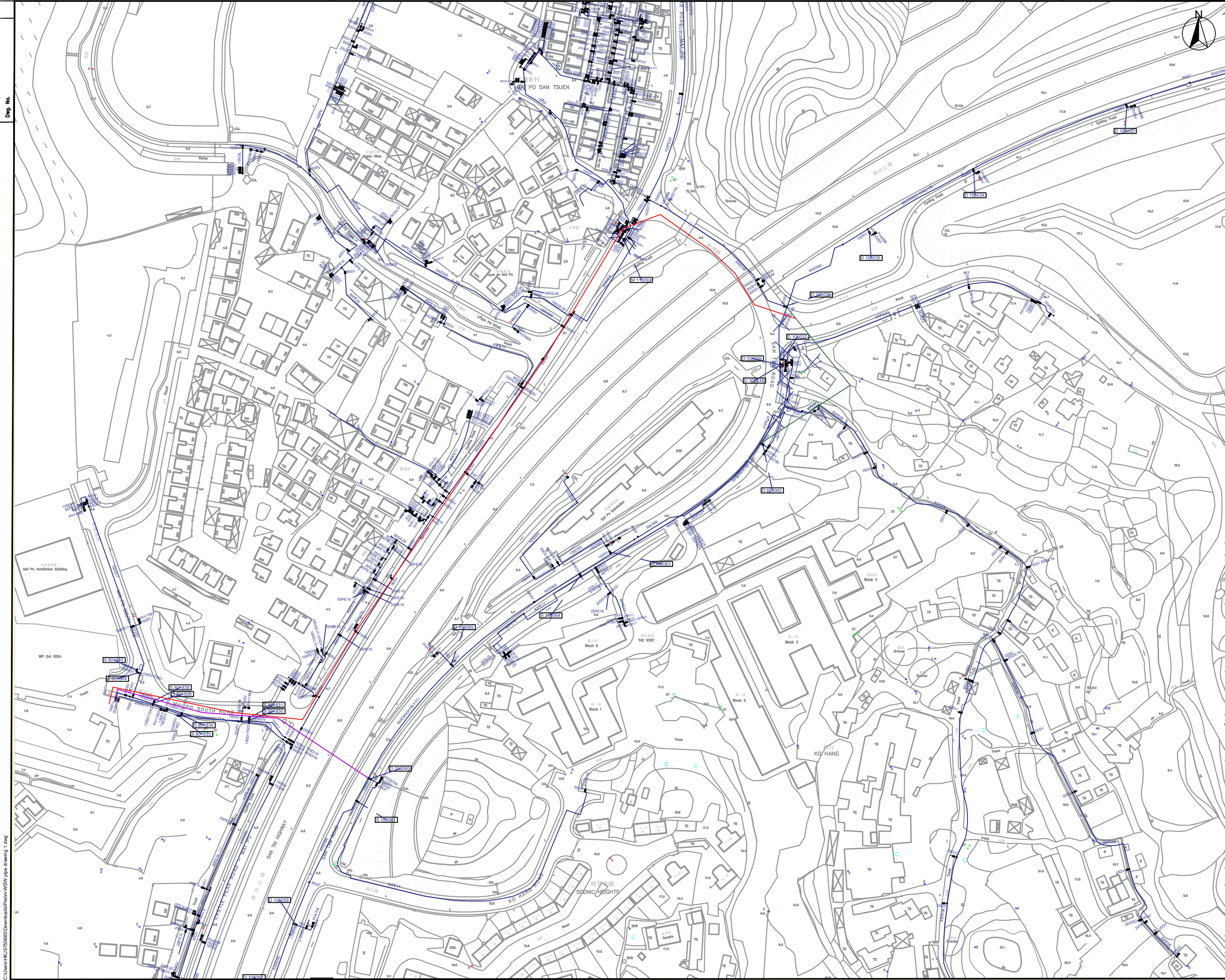
Estimate Residual Head			
Head to Ngau Tam Mei Fresh Water Preliminary Service Reservoir	=	99.1	mPD
Ground Level at extremity of proposed system	=	6.2	mPD
Friction Head Loss from Existing and Proposed Main Option 1	=	40.7	m
Residual Head at Extremity	=	52.3	m
Friction Head Loss from Existing and Proposed Main Option 2	=	41.3	m
Residual Head at Extremity	=	51.6	m

Appendix D

Proposed Water Supply Scheme

Dep. No.

C:\Users\HKUST50685\Downloads\Prelim-WSW pipe drawing 1.dwg



LEGEND

- Option 1
- Option 2
- Water Main to be diverted in CE15
- Water Main to be abolished in CE15

- NOTES:
1. Use written dimensions or grid lines. Measurements to existing work to be checked on site.
 2. This drawing is to be read in conjunction with the Specification & Conditions of Contract.
 3. This drawing & design are copyright and no portion may be reproduced without the written permission of WSP(Asia)Ltd. Consulting Engineers.
 4. All Pipe Sizes refers to inner diameter in millimeters.

CLIENT

Profit Point Enterprise Ltd

DESIGN CONSULTANT

wsp

PROJECT

PROPOSED DEVELOPMENT AT
WO SHANG WAI
HONG KONG
LOTS 77 AND 50 S.A in DD101

DESIGNED BY	DATE	CHECKED BY	DATE
—	JAN 2025	CC	JAN 2025
DRAWN BY	DATE	APPROVED BY	DATE
JS	JAN 2025	—	—

DRAWING TITLE

PROPOSED WATER SUPPLY SCHEME
(Sheet 1)

SCALE	1:2000	STATUS	FILE NAME
DRAWING NO.	—		REV.