

Appendix B

Revised Sewerage Impact Assessment

Civil Engineering and Development Department

Agreement No. CE 1/2020 (CE) Hung Shui Kiu/Ha Tsuen New Development Area Package A Works for Second Phase Development – Design and Construction

S16 Planning Application for Proposed Flat and Shop and Services and Eating Place at Non-Domestic Podium within “G/IC(1)” Zone of Planning Area 34E of Hung Shui Kiu/ Ha Tsuen New Development Area Sewerage Impact Assessment

Draft | November 2025

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

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

Job number 278463

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ARUP

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1. Introduction

1.1 General

1.1.1 Ove Arup and Partners Hong Kong Limited (Arup) was commissioned by the West Development Office (WDO) of the Civil Engineering and Development Department (CEDD) of the Government of Hong Kong Special Administrative Region (HKSAR) on 30 September 2020 to provide Consultancy Services for the Design and Construction Supervision of Hung Shui Kiu / Ha Tsuen New Development Area (HSK/HT NDA) Package A Works for Second Phase Development (the Consultancy). Under the Review Phase of the Consultancy, technical assessments including reports on Traffic and Transport Impact Assessments Review (TTIA), report on Drainage and Sewerage Impact Assessments Review (DSIA), Report on Water Supply and Utilities Impact Assessments Review (WSUIA) had been completed, which was based on the planning parameters adopted in the Approved S16 Planning Application (No. A/HSK/452) for proposed minor relaxation of plot ratio and/or building height restrictions for the proposed/permitted public and private housing developments, proposed social welfare facilities, proposed shop and services, eating place, school, office, educational institution, institutional use, off-course betting centre, place of entertainment, private club, public convenience, recycle collection centre and training centre at non-domestic podium within public housing developments in HSK/HT NDA in April 2023.

1.1.2 This Planning Application is submitted in accordance with Section 16 of the Town Planning Ordinance to seek approval of the Town Planning Board for the proposed flat and shop and services and eating place at non-domestic podium within "Government, Institution or Community (1)" ("G/IC(1)") of Planning Area 34E of Hung Shui Kiu/ Ha Tsuen New Development Area ("the Application Site"). The Proposed Development has a total Plot Ratio of 6.5, comprising residential developments on top of non-domestic podium.

1.1.3 This updated SIA report will be based on the accepted DSIA Report No. REP-031-07 (F3D) for the HSK/HT NDA development under Review Phase of the Consultancy.

1.2 Scope of Updated Technical Assessments

1.2.1 The scope of updated technical assessment for sewerage comprises the following:

- Update the previous SIA conducted using the new development parameters (site area, population, type, mix, etc.) given by CEDD;

- Undertake a review of the proposed sewerage network and identify if there would be any deficiency / inadequate capacity based on the new development parameters;
- Propose the preliminary modification measures for the purpose of the SIA; and
- Submit the SIA to support S16 application.

1.2.2

This section outlines the assessment of the sewerage impact potentially induced by the proposed development parameters at Site No. 4-1 (i.e. the Application Site) in HSK/HT NDA and includes:

- Estimation of sewage flows arising from the Application Site;
- Assessment of potential impact on the existing and planned sewerage system imposed by the Application Site; and
- Proposed preliminary sewerage system modification works, if considered necessary.

2. Planning Data and Sewage Flow Estimation

2.1 Baseline Population and Employment Data

2.1.1 The baseline sewerage catchments and population within the proposed HSK/HT NDA is based on the following planned and committed developments:

- S16 Planning Application No. A/HSK/452 (approved on 23 Jun 2023);
- Updated planned population and employment figures at nine housing sites advised by the Housing Department (i.e. Site No. 4-3, 4-4, 4-5, 4-6, 4-22, 4-24, 4-28, 5-16 and 5-17); and
- Planning Application No. A/HSK/573 – Proposed Minor Relaxation of Domestic Plot Ratio Restriction (From 4.5 to 5) for Mixed Use Development (in Planning Areas 28A and 28B of HSK/HA NDA) (i.e. Site No. 4-25a, 4-25b, 4-25c, and 4-29) (approved on 15 Aug 2025).

2.2 Proposed Development

2.2.1 The proposed development information for the Application Site (i.e. Site No. 4-1) is summarized in **Table 2.1**. The Indicative Scheme is shown in **Appendix A**.

Table 2.1 Proposed Development Parameters for the Application Site

Development Parameters	Proposed Development
Application Site	About 7,760m ²
Total Plot Ratio (PR)	6.5
- Domestic PR	6
- Non-domestic PR	0.5
Total Gross Floor Area (GFA)	50,440m ²
- Domestic GFA	46,560m ²
- Non-domestic GFA	3,880m ²
No. of Blocks	4 nos. of residential towers on top of 5-storey retail, carpark cum clubhouse podium
Population	About 2,420
Clubhouse GFA	About 2,095.2m ²
Anticipated Intake Year	No later than 2033

2.3 Sewerage Parameters and Assumptions

2.3.1 The assumptions for sewage flow estimation have been adopted with reference to those stated in the accepted DSIA (Report No. REP-031-07) (F3D) for the HSK/HT NDA. The relevant sewerage parameters and assumptions are presented in the following paragraphs.

2.3.2 The following unit flow factors for domestic and commercial activities in accordance with EPD's Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (GESF) are adopted:

Table 2.2 Unit flow Factors for Different Land Uses

Land Use specified in GESF	Unit Flow Factor (m ³ /person/day)	Remark
<i>Domestic</i>		
Residential – Private	0.27 ⁽¹⁾	Adopted for private residential development
<i>Commercial</i>		
General	0.28 ⁽¹⁾	Sum of flows due to employee (0.08m ³ /person/day) & General territorial average (0.20m ³ /person/day)
J10 – Restaurants & Hotels	1.58 ⁽¹⁾	Sum of flows due to employee (0.08m ³ /person/day) & General territorial average (1.50m ³ /person/day)

Notes:

(1) Referenced from EPD's Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Table T-1 and T-2.

2.3.3 As human activities fluctuates throughout the day, sewage flow is likewise not uniform with peaks in certain periods. As such, peaking factor is proposed to accommodate for potential spike in sewage flow. Peaking factor serves to cater for seasonal/diurnal fluctuation and normal amount of infiltration and inflow. Peaking factors (including stormwater allowance) have been adopted in accordance with EPD's GESF as shown in **Table 2.3**.

Table 2.3 Peaking Factors for Various Population Ranges

Population Range	Peaking Factor (including stormwater allowance) for facility with existing upstream sewerage	Peaking Factor (excluding stormwater allowance) for facility with new upstream sewerage
<i>Sewers</i>		
< 1,000	8	6
1,000 – 5,000	6	5
5,000 – 10,000	5	4
10,000 – 50,000	4	3
> 50,000	Max ($7.3/N^{0.15}$, 2.4)	Max ($6/N^{0.175}$, 1.6)
<i>Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations</i>		
< 10,000	4	3
10,000 – 25,000	3.5	2.5
25,000 – 50,000	3	2
> 50,000	Max ($3.9/N^{0.065}$, 2.4)	Max ($2.6/N^{0.065}$, 1.6)

Notes:

- (1) Referenced from EPD's GESF Table T-5; N = Contributing population in thousands.

2.3.4

Average dry weather flows (ADWF) were estimated by applying appropriate unit sewage flow factors according to their development type, and peak flows were calculated by multiplying the ADWF by the peaking factor, which account for the peak flows and provide adequate safety margin in planning sewage facilities. A return liquid allowance of 2.5% is also applied to all estimated ADWFs to follow the same assumption in the accepted DSIA for the HSK/HT NDA.

3. Assessment of Sewerage Impact

3.1 Existing and Planned Sewerage Infrastructure

- 3.1.1** The sewerage system in North-west New Territories (NWNT) serves the major urban developments in Tin Shui Wai and Tuen Mun - Yuen Long Corridor and small developments on the periphery of Yuen Long. Two sewerage catchments, Yuen Long Sewerage Catchment and San Wai Sewerage Catchment, correspond to two sewage treatment works, Yuen Long Sewage Treatment Works (YLSTW) and San Wai Sewage Treatment Works (SWSTW) respectively.
- 3.1.2** SWSTW is planned to serve major developments in Yuen Long Town, Au Tau, Tin Shui Wai, Ping Shan, Lau Fau Shan, Shap Pat Heung and covered part of the area within HSK/HT NDA including Hung Shui Kiu and Ha Tsuen. The remaining areas within HSK/HT NDA are unsewered areas. YLSTW serves the eastern part of the NWNT.
- 3.1.3** To cater for the forecast sewage flow due to population growth in the NWNT, DSD commenced the works contract no. DC/2013/10 in May 2016 - "Upgrading of San Wai Sewage Treatment Works – Phase 1" to upgrade the SWSTW from preliminary treatment to chemically enhanced primary treatment plus disinfection facilities and increase the ADWF treatment capacity to 200,000 m³/day. Phase 1 upgrading works of SWSTW at a site adjacent to the existing SWSTW had been completed in the end of 2020.
- 3.1.4** Under DSD Agreement No. CE30/2006 (DS), Ha Tsuen Sewage Pumping Station (HTSPS) was expanded with an additional 1200mm diameter rising main constructed in parallel with the existing twin 1200mm diameter rising mains. Upon completion of the expansion works in 2014, the design capacity of HTSPS has been increased to 193,100 m³/day.
- 3.1.5** Four new sewage pumping stations (SPS) (i.e. SPS1 to SPS4) are proposed to convey sewage flow from the HSK/HT NDA to the upgraded SWSTW – Phase 1 and the planned Hung Shui Kiu Effluent Polishing Plant (HSKEPP) (ADWF treatment capacity of 90,000 m³/day).
- 3.1.6** The effluent of the upgraded SWSTW and the HSKEPP will be discharged to the existing NWNT Effluent Tunnel which has a total hydraulic capacity of 440,000 m³/day and subsequently discharged via the existing Urmston Road Submarine Outfall.

3.2 Sewerage Impact

3.2.1 The ADWF generated from the proposed development at the Application Site is estimated in accordance with EPD's GESF and are summarised in **Table 3.1**.

Table 3.1 Estimation of ADWF from the Proposed Development

Development and Type	GFA (m ²)	Population /Employee	Unit Flow Factor (m ³ /day/head)	Design ADWF (m ³ /day) ⁽¹⁾
Domestic (Private)	46,560	2,420	0.27	670
Non-domestic (Commercial – Non-catering)	2,716 ⁽³⁾	96 ⁽²⁾	0.28	28
Non-domestic (Commercial – Catering/Restaurants)	1,164 ⁽³⁾	60 ⁽²⁾	1.58	97
Clubhouse (Commercial – General)	2095.2	70 ⁽²⁾	0.28	20
Total				815

Notes:

- (1) Design ADWF includes a return liquid allowance of 2.5%.
- (2) Reference from Table 8 of PlanD's Commercial and Industrial Floor Space Utilization Survey.
- (3) Assume total non-domestic GFA (i.e. 3,880 m²) comprises 70% non-catering and 30% catering GFA.

3.2.2 In the Indicative Scheme formulated for the purpose of technical assessment, a swimming pool is proposed (subject to change at the detailed design stage). Since the discharge of the swimming pool will be only undertaken occasionally, the sewage from the swimming pool is planned to be discharged during non-peak hours to reduce the loading on public sewer. Thus, the swimming pool's backwashing flow will be excluded from the peak sewage flow of the proposed development.

3.2.3 The flow increment compared to the baseline scenario is summarised in **Table 3.2**.

Table 3.2 Sewage Flow Comparison for Site No. 4-1

Scenario	Design ADWF (m ³ /day) ⁽¹⁾
Baseline (Refer to Section 2.1)	447
Proposed	815
Difference	+368

Notes:

- (1) Design ADWF includes a return liquid allowance of 2.5%.

3.2.4 With the proposed residential development in this S16 Planning Application, the additional sewage flow generated from Site No. 4-1 would be conveyed to SPS3, then SPS2, and eventually to the planned HSKIPP.

3.2.5

For the avoidance of doubt, there is no additional sewage flow to SPS1 and SPS4 due to the proposed development. **Table 3.3** summarises the design pumping capacities of the proposed SPS2 and SPS3, and a comparison of design sewage flow under base case and proposed condition.

Table 3.3 Sewage Pumping Capacities and Sewage Flow Comparison

SPS	ADWF (m ³ /day) ⁽¹⁾				Capacity Shortfall (m ³ /day) (Proposed ADWF – Pumping Capacity)	Remarks
	Pumping Capacity	Base Case	Increment under Proposed Condition	Proposed Condition (Base Case + Increment)		
SPS2	47,229 ⁽²⁾	47,229	+368 (0.8%)	47,597	368 (0.8%)	Pumping Capacity < Proposed ADWF
SPS3	12,341 ⁽²⁾	12,341	+368 (3.0%)	12,709	368 (3.0%)	

Notes:

- (1) Design ADWF includes a return liquid allowance of 2.5%.
- (2) Refer to latest updated SIA for 9 nos. Housing Sites (i.e. 4-3, 4-4, 4-5, 4-6, 4-22, 4-24, 4-28, 5-16 and 5-17), the pumping capacity of SPS2 and SPS3 under original base case scenario are 46,121 m³/day and 12,341 m³/day respectively. Due to the concurrent planned and committed developments in the vicinity, SPS2's pumping capacity under base case is required to be further increased from 46,121 m³/day to 47,229 m³/day.

3.2.6

Both SPS2 and SPS3 have a capacity shortfall of 368 m³/day. Upgrading works are required to handle a respective total ADWF of 47,597 m³/day and 12,709 m³/day.

3.2.7

Table 3.5 summarises the comparison of sewage flow to planned HSKEPP under base case and proposed condition.

Table 3.5 Treatment Works Capacities and Sewage Flow Comparison

Sewage Treatment Works	Treatment Capacity (m ³ /day)	ADWF (m ³ /day) ⁽¹⁾			Capacity Shortfall (m ³ /day)
		Base Case	Increment under Proposed Condition	Proposed Condition	
HSKEPP	90,000	87,421 ⁽²⁾	+368 (0.4%)	87,789	-

Notes:

- (1) Design ADWF includes a return liquid allowance of 2.5%.
- (2) Including sewage flow from SPS2 and two-third of SPS4.

3.2.8

It is noted that the 0.4% increment of sewage flow could be absorbed by the planned HSKEPP without any adverse sewerage impact.

3.2.9

Based on the hydraulic checking in **Appendix C**, the proposed gravity sewer within HSK/HT NDA Second Phase Development have sufficient capacity to cater for the additional sewage flow imposed by the proposed development.

4. Proposed Sewerage Modification Works

4.1.1 The design guidelines, standards and criteria used for the preliminary design of the proposed sewerage system and the proposed sewerage improvement schemes are as follows:

- EPD's Technical Paper Guidelines for Estimating Sewage Flows (GESF) for Sewerage Infrastructure Planning Version 1.0; and
- DSD's Sewerage Manual Part 1 (Key Planning Issues and Gravity Collection System) and Part 2 (Pumping Stations and Rising Mains), Third Edition, May 2013.

4.1.2 Refer to **Section 3.2.6**, pump and pump motor upgrading works are required and proposed at SPS2 and SPS3 to achieve a net positive pump outflow during peak flow condition. Due to the relatively small increase in pumping capacity, it is anticipated that the current pump model / physical size can be retained. The increase in pumping capacity should be achievable by enlarging the respective pump impeller diameter and upgrading the corresponding pump motor. As the pump physical size does not increase, the pumping station's physical dimensions would not have to be modified to accommodate the increase in pumping capacity.

4.1.3 The design capacity and utilization ratio after proposed modification is tabulated in **Table 4.1**.

Table 4.1 SPS Arrangement after Proposed Pump Modification Works

SPS	Design Accumulated ADWF under Proposed Condition (m ³ /day)	Design Pumping Capacity (in ADWF) after Modification (m ³ /day)	Utilization Ratio	Design Total Pump Rate (in peak flow) after Modification (l/s)	No. of Pumps	Proposed Flow Rate of each Pump (l/s)
SPS2	47,597	47,597 (Upgraded)	100%	1,665 (Upgraded)	4	555
SPS3	12,709	12,709 (Upgraded)	100%	450 (Upgraded)	4	150

4.1.4 **Table 4.2** summarizes the flow velocity of rising mains upon proposed pump modification in SPS2 and SPS3. The flow velocities under all conditions are well within the design limit of 1 m/s to 3 m/s. As such, no adverse impact on rising mains is envisaged.

Table 4.2 SPS Rising Main Size and Flow Velocity

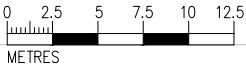
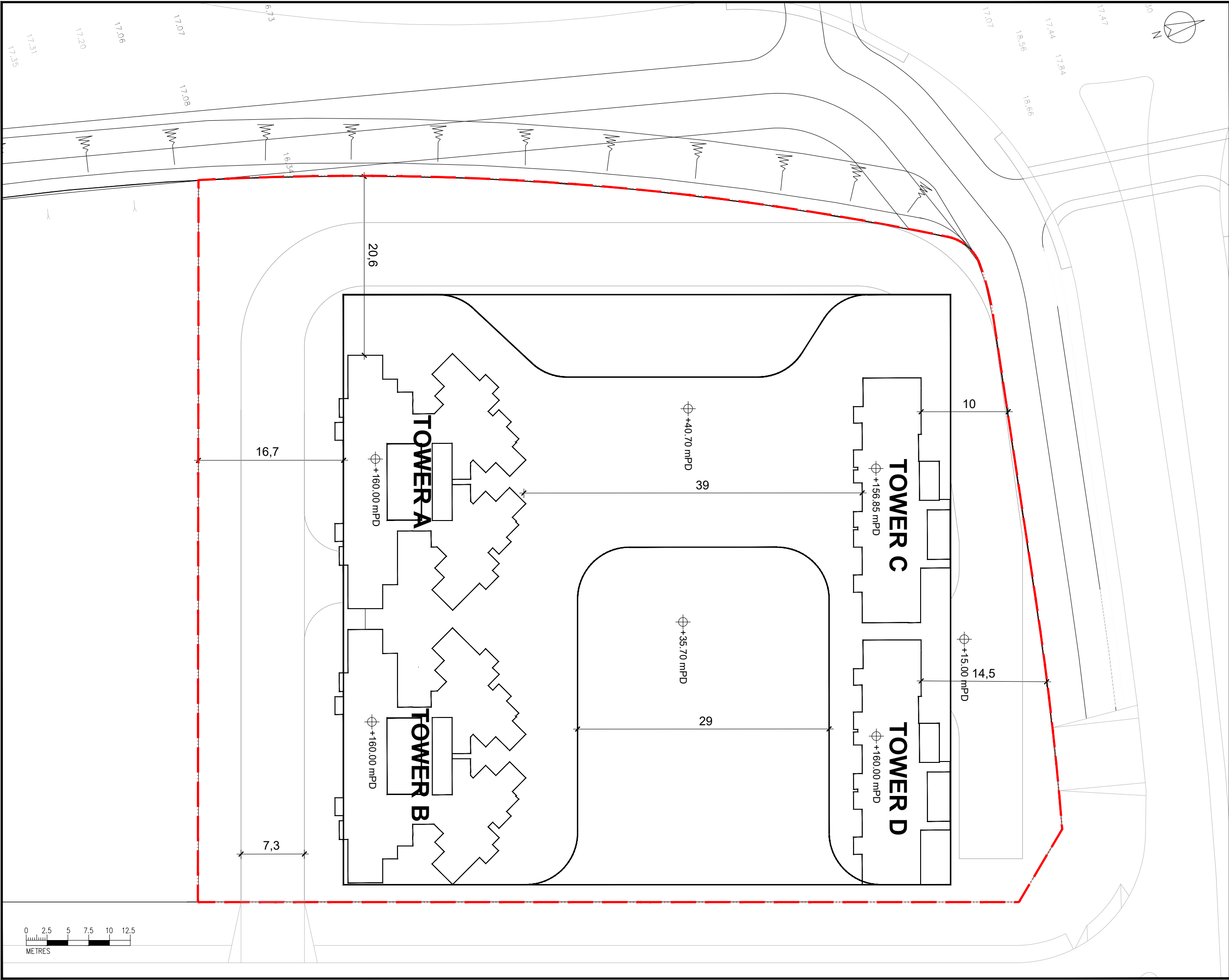
SPS	Rising Main Diameter (mm)	Flow Velocity under Proposed Condition (m/s)	
		Using 1 Pipe (During Maintenance)	Using 2 Pipes (Normal Condition)
SPS2	2 x DN900 DI pipes	2.35	1.18
SPS3	2 x NS560 HDPE pipes	2.65	1.32

5. Summary

- 5.1.1** This report estimated the sewage flows generated from the proposed development at Site No. 4-1 in comparison with that from the base case scenario, assessed the potential impact and recommended sewerage modification works to mitigate the potential impact.
- 5.1.2** According to the assessment, the proposed development would induce an additional ADWF of 368 m³/day, imposing extra sewage flow to proposed SPS2 and SPS3 (within HSK/HT NDA Second Phase Development), and planned HSKEPP.
- 5.1.3** The pumping capacity of proposed SPS2 and SPS3 are found to be marginally insufficient. The pumps and ancillary equipment are required to be upgraded, such that the total pump rates will be increased to cater for the additional sewage flow from the proposed development.
- 5.1.4** Other than the proposed pump modification works in SPS2 and SPS3, the hydraulic assessment suggested that the proposed development would incur no adverse sewerage impacts to other existing and proposed sewerage infrastructure, including the planned HSKEPP, proposed gravity sewers and rising mains.
- 5.1.5** Upon implementing the proposed modification / upgrading works at SPS2 and SPS3, no adverse impact to the existing and planned sewerage system is envisaged due to the proposed development.

Appendix A

Indicative Scheme for Site No. 4-1



Rev.	Date	Description	Drawn

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 - 2.ALL DIMENSIONS ARE TO BE CHECKED AT SITE BY THE MAIN CONTRACTOR/FABRICATOR.
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 Application Site

CLIENT:

DESIGN CONSULTANT:

ARUP

CONTACT NO.:

PROJECT:
S16 Planning Application for Proposed Flat and Shop and Services and Eating Place at Non-Domestic Podium within "G/IC(1)" Zone of Planning Area 34E of HSK/HT NDA

DRAWING TITTLE:
MASTER LAYOUT PLAN

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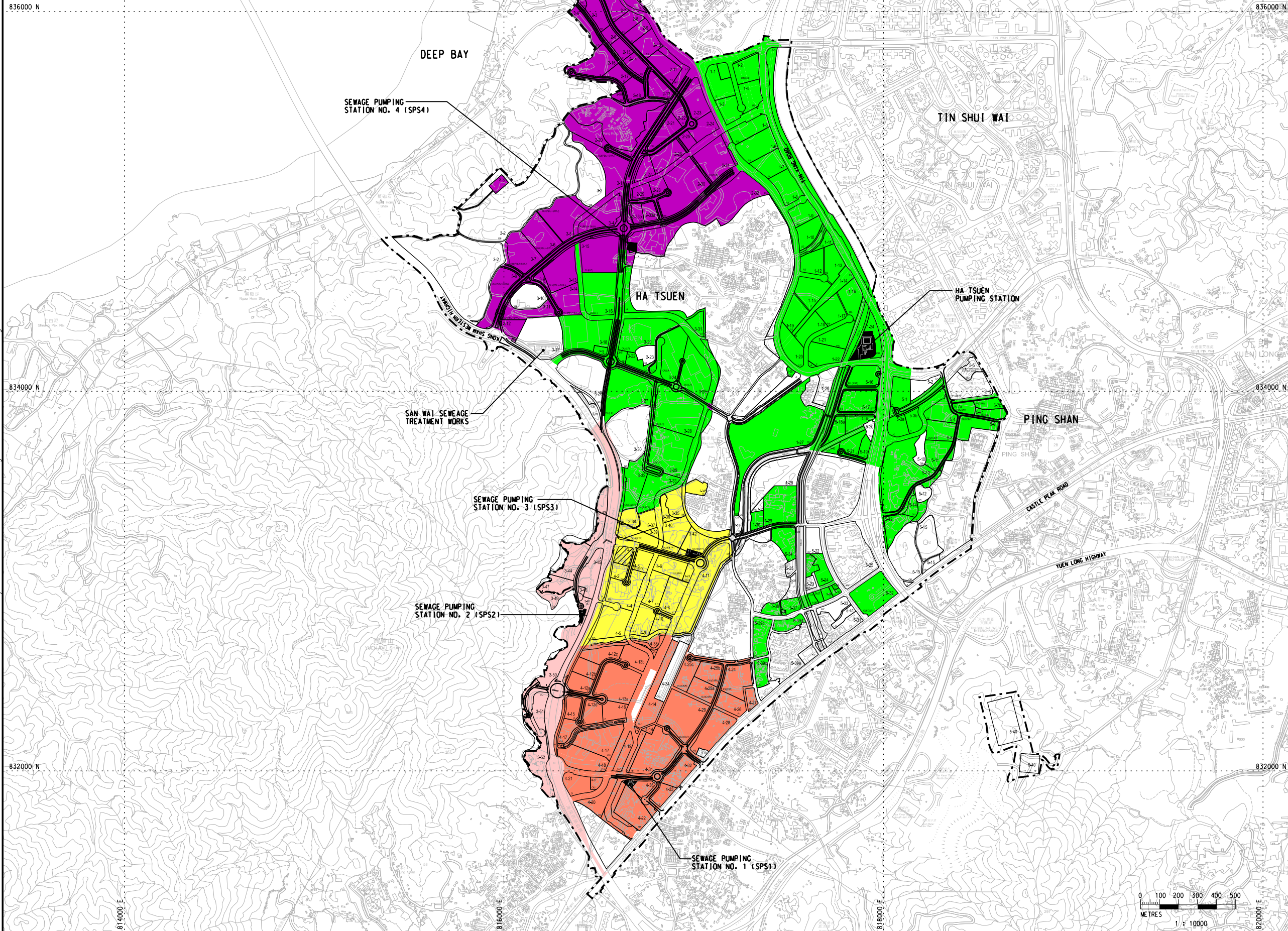
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Appendix B

Proposed Sewerage Upgrading/Modification Works

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LEGEND:

- HSK/HT NDA SITE BOUNDARY
- PROPOSED SEWERAGE CATCHMENT AREA OF SPS 1
- PROPOSED SEWERAGE CATCHMENT AREA OF SPS 2
- PROPOSED SEWERAGE CATCHMENT AREA OF SPS 3
- PROPOSED SEWERAGE CATCHMENT AREA OF SPS 4
- PROPOSED SEWERAGE CATCHMENT AREA OF HA TSUEN PS FROM HSK/HT NDA
- EXISTING SPS
- PROPOSED SPS UNDER HSK/HT NDA SECOND PHASE DEVELOPMENT
- THE APPLICATION SITE

A	FIRST ISSUE	BT	09/25
Rev	Description	By	Date
Consultant		ARUP	
Project Title			
Agreement No. CE 1/2020 (CE)			
Hung Shui Kiu / Ha Tsuen			
New Development Area Package A			
Works for Second Phase Development			
– Design and Construction			
Drawing title			
PROPOSED SEWERAGE			
CATCHMENT AREA OF			
EXISTING AND PROPOSED			
SEWAGE PUMPING STATIONS			
Drawing no.		Rev.	
278463/SIA/201		A	
Drawn MAN	Date 07/25	Checked CF	Approved DL
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KONG SHAM WESTERN HIGHWAY

NGAU HOM SHEK

SEWAGE PUMPING STATION
NO. 4 (SPS4)

LAU FAU SHAN

SAN WAI

TIN SHUI WAI

PING SHAN

CASTLE PEAK ROAD - PING SHAN

YUEN TAU SHAN

C4/SEW/1102

C4/SEW/1103

YUEN LONG HIGHWAY

SEWAGE PUMPING STATION
NO. 11 (SPS11)



LEGEND

- HSK/HT NDA SITE BOUNDARY
- THE APPLICATION SITE
- PLANNED HUNG SHUI KIU EFFLUENT POLISHING PLANT (BY OTHERS)
- EXISTING SAN WAI SEWAGE TREATMENT WORKS
- EXISTING HA TSUEN SEWAGE PUMPING STATION
- PROPOSED SEWAGE PUMPING STATION
- PROPOSED HSK/HT NDA SECOND PHASE DEVELOPMENT GRAVITY SEWERAGE NETWORK
- PROPOSED HSK/HT NDA SECOND PHASE DEVELOPMENT SEWAGE RISING MAIN NETWORK
- EXISTING GRAVITY SEWERAGE NETWORK
- EXISTING SEWAGE RISING MAIN NETWORK

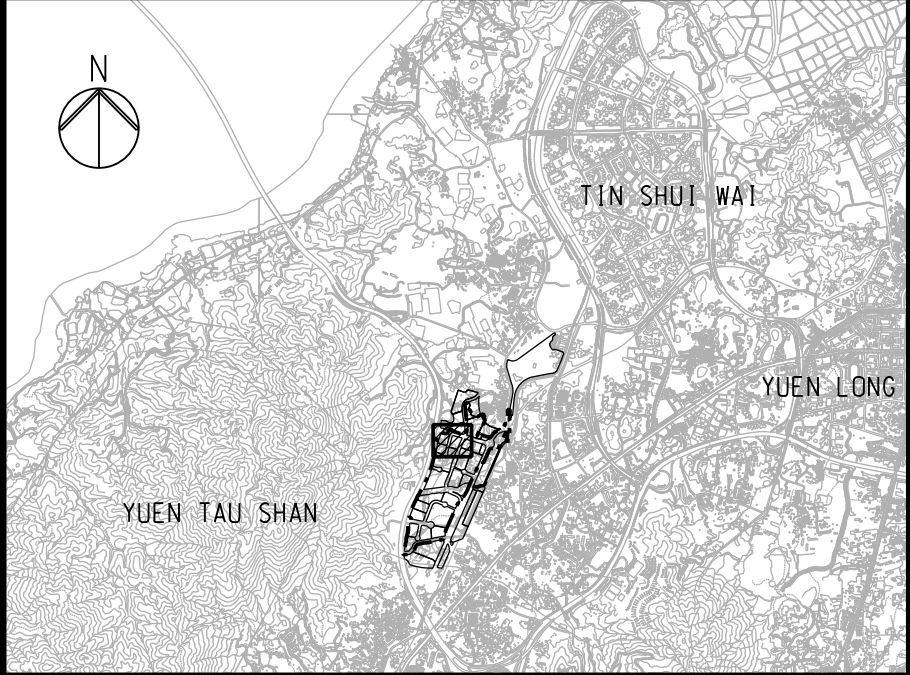
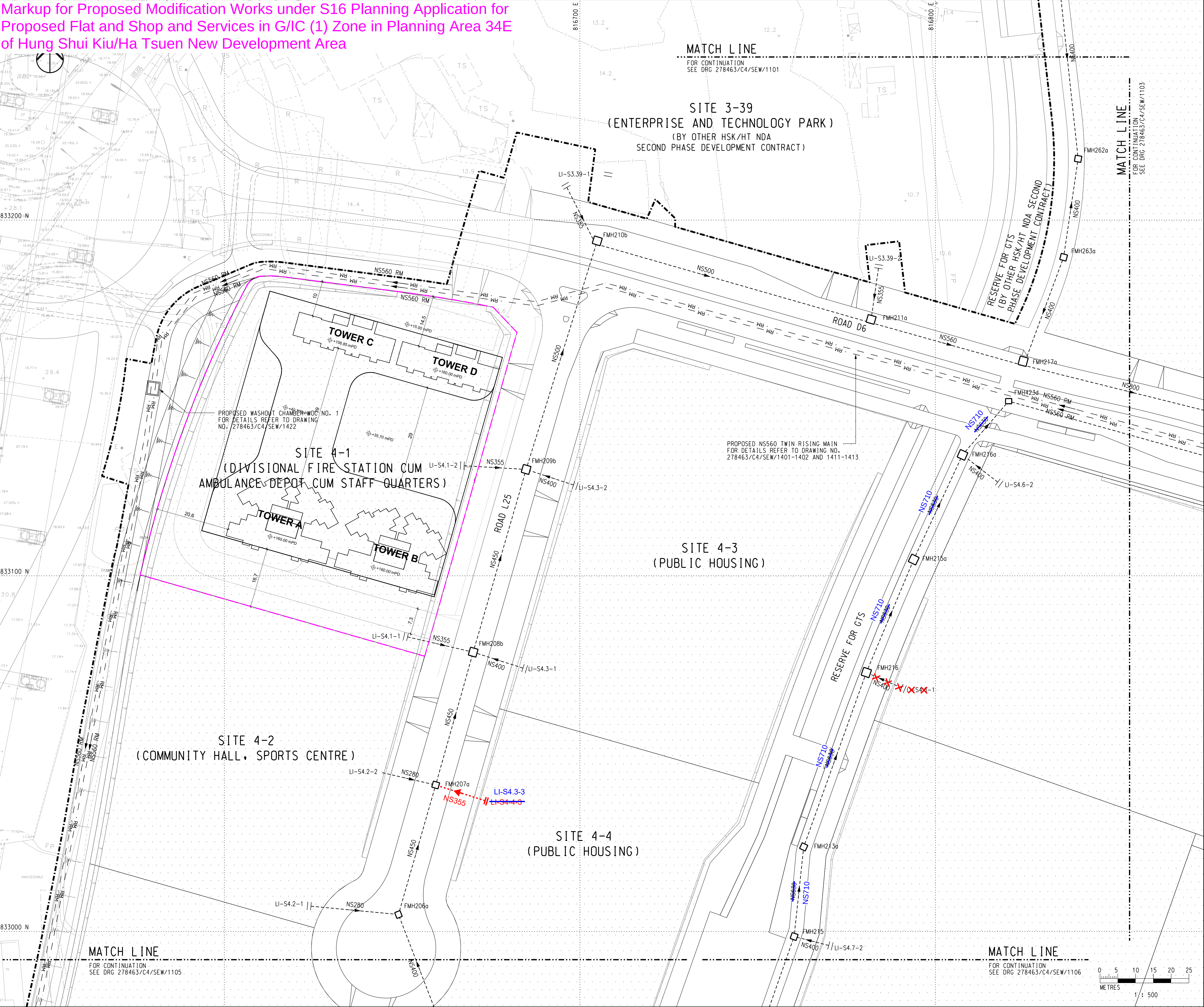
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Rev	Description	By	Date
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Project Title			
Agreement No. CE 1/2020 (CE)			
Hung Shui Kiu / Ha Tsuen			
New Development Area Package A			
Works for Second Phase Development			
– Design and Construction			
Drawing title			
SEWERAGE WORKS			
OVERALL LAYOUT PLAN			
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Markup for Proposed Modification Works under S16 Planning Application for Proposed Flat and Shop and Services in G/IC (1) Zone in Planning Area 34E of Hung Shui Kiu/Ha Tsuen New Development Area



KEY PLAN

NOTES

1. FOR GENERAL NOTES AND LEGEND, REFER TO DRAWING NO. 278463/C4/SEW/1101.

Remark:
NS355 Other Post-tender Markup
NS355 Markup for Proposed Modification Works under HD's Technical Assessments
NS355 Markup for Proposed Modification Works under S16 Planning Application for Proposed Flat and Shop and Services in G/IC (1) Zone in Planning Area 34E of Hung Shui Kiu/Ha Tsuen New Development Area

01	RtoC SUBMISSION	JT	09/24
00	TENDER ISSUE	EF	02/24
Rev	Description	By	Date

Consultant
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Project Title
Contract No. YL/2023/04
Hung Shui Kiu/Ha Tsuen
New Development Area
Second Phase Development - Contract 4 -
Site Formation and Engineering
Infrastructure Works

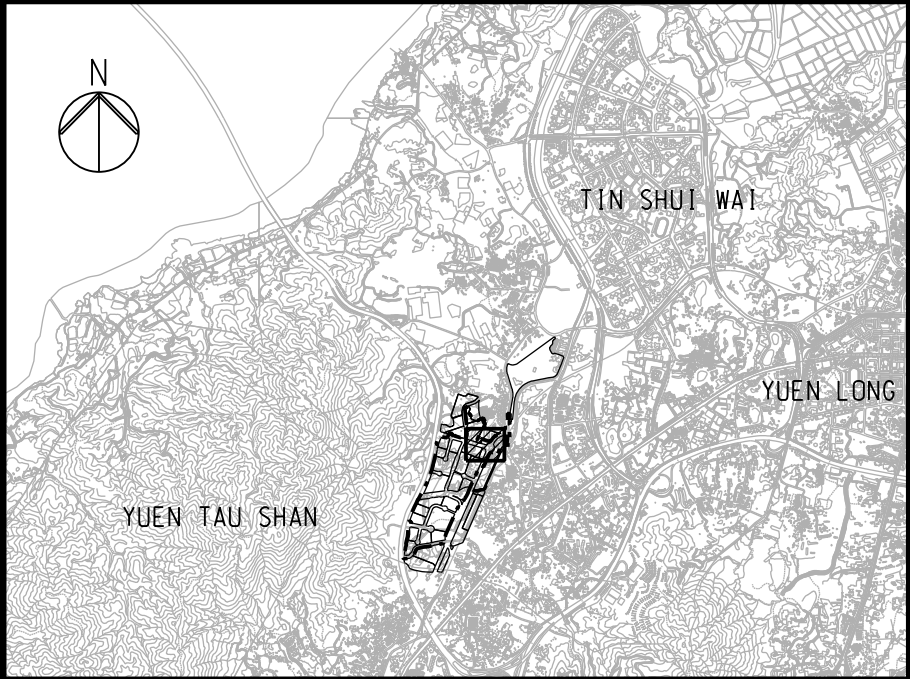
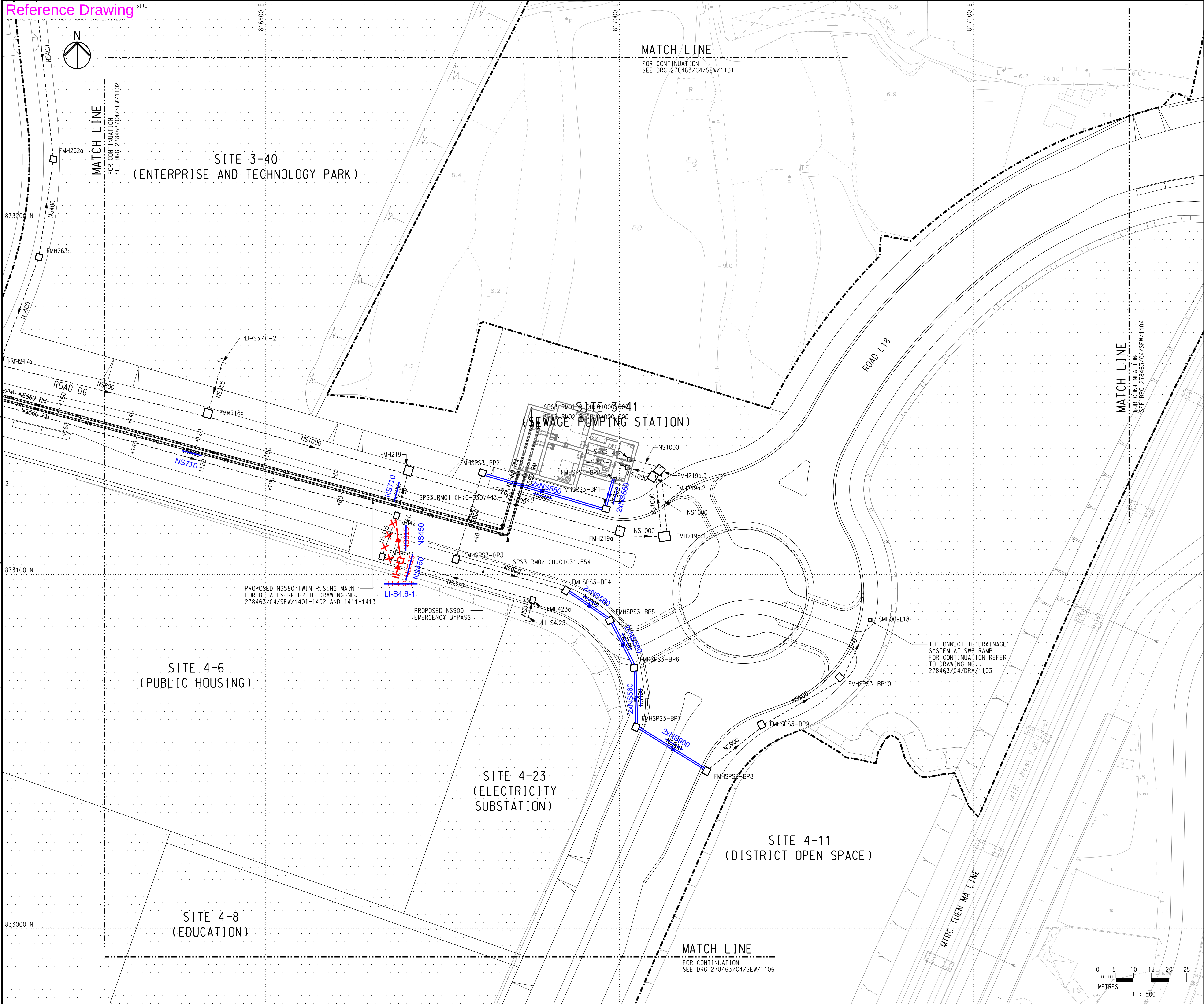
Drawing title
**SEWERAGE LAYOUT PLAN
(SHEET 2)**

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KEY PLAN

NOTES

1. FOR GENERAL NOTES AND LEGEND, REFER TO DRAWING NO. 278463/C4/SEW/1101.

Remark:
NS355 Other Post-tender Markup
NS355 Markup for Proposed Modification Works under HD's Technical Assessments

01	RtoC SUBMISSION	JT	09/24
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Rev	Description	By	Date

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Project Title
Contract No. YL/2023/04
Hung Shui Kiu/Ha Tsuen
New Development Area
Second Phase Development - Contract 4 -
Site Formation and Engineering
Infrastructure Works

Drawing title
**SEWERAGE LAYOUT PLAN
(SHEET 3)**

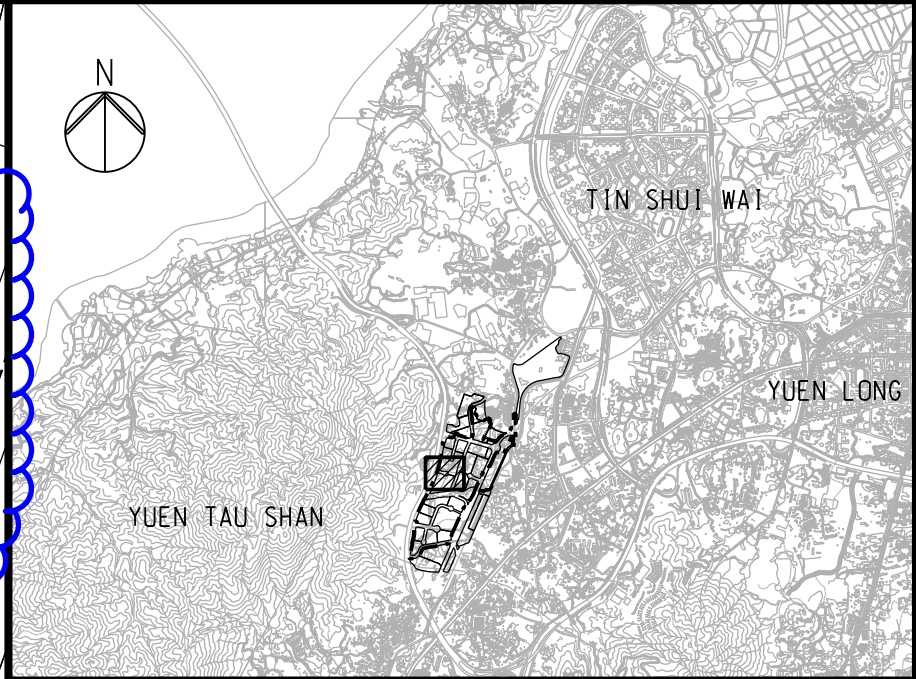
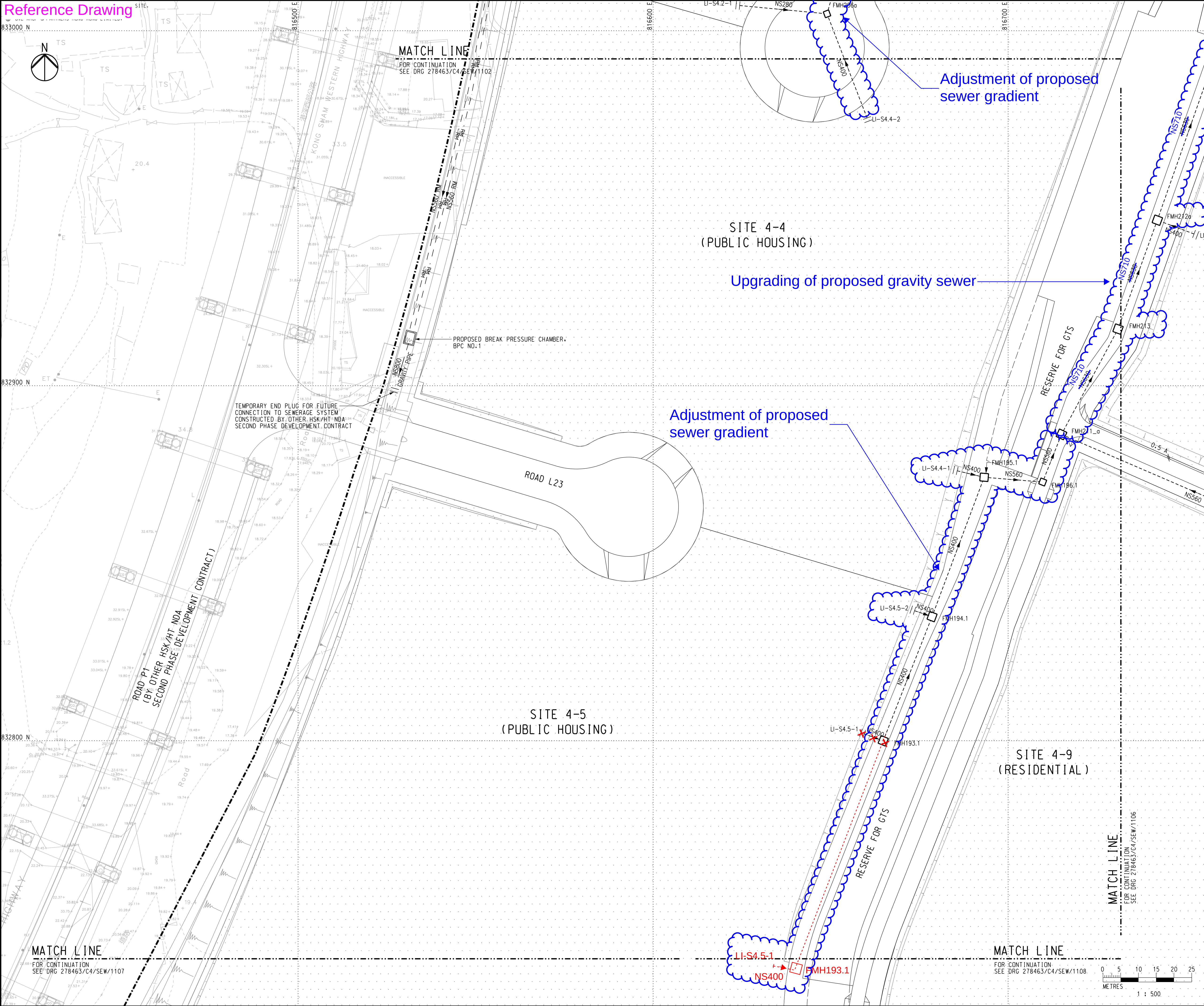
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SITE



KEY PLAN

NOTES

1. FOR GENERAL NOTES AND LEGEND, REFER TO DRAWING NO. 278463/C4/SEW/1101.

Remarks:

- NS355 Other Post-tender Markup
- NS356 Markup for Proposed Modification Works under HD's Technical Assessments
- NS357 Adjustment for Hydraulic Performance

00	TENDER ISSUE	EF	02/24
Rev	Description	By	Date
Consultant			
ARUP			
Project Title			
Contract No. YL/2023/04			
Hung Shui Kiu/Ha Tsuen			
New Development Area			
Second Phase Development - Contract 4 -			
Site Formation and Engineering			
Infrastructure Works			
Drawing title			
SEWERAGE LAYOUT PLAN			
(SHEET 5)			
Drawing no.		Rev.	
278463/C4/SEW/1105		00	
Drawn	Date	Checked	Approved
DT	02/24	EF	DL
Scale	Status		TENDER
1:500 @ A1			
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土木工程拓展署			
Civil Engineering and			
Development Department			

SEWERAGE D6 MANHOLE SCHEDULE

UPSTREAM STRUCTURE	DOWNSTREA M STRUCTURE	PIPE LENGTH (m)	UPSTREAM MH/CP TYPE	DOWNSTREAM MH/CP TYPE	PIPE OUTSIDE DIAMETER (mm)	UPSTREAM FINISHED GROUND LEVEL (mPD)	DOWNSTREAM FINISHED GROUND LEVEL (mPD)	UPSTREAM INVERT LEVEL (mPD)	DOWNSTREA M INVERT LEVEL (mPD)	PIPE GRADIENT (1 in X)	PIPE MATERIAL	STANDARD DIMENSIONAL RATIO
FMHSPS3-BP0	FMHSPS3-BP1	7.85	TP	H	2x560	11.25	8.70	7.70	7.68	175	HDPE	SDR17
FMHSPS3-BP1	FMHSPS3-BP2	34.73	H	H	2x560	8.70	10.98	7.65	7.37	182	HDPE	SDR17
FMHSPS3-BP2	FMHSPS3-BP3	24.71	H	H	900	10.98	9.83	7.45	7.29	511	HDPE	SDR17
FMHSPS3-BP3	FMHSPS3-BP4	31.07	H	G1	900	9.83	8.67	7.40	7.21	539	HDPE	SDR17
FMHSPS3-BP4	FMHSPS3-BP5	13.55	G1	G1	2x560	8.67	8.13	7.17	7.17	150	HDPE	SDR17
FMHSPS3-BP5	FMHSPS3-BP6	13.66	G1	G1	2x560	8.13	7.93	7.24	7.14	89	HDPE	SDR17
FMHSPS3-BP6	FMHSPS3-BP7	15.27	G1	G1	2x560	7.93	9.09	7.65	7.10	185	HDPE	SDR17
FMHSPS3-BP7	FMHSPS3-BP8	22.02	G1	H	2x900	9.09	9.72	6.98	7.05	870	HDPE	SDR17
FMHSPS3-BP8	FMHSPS3-BP9	19.30	H	H	900	9.72	9.03	6.95	6.40	37	HDPE	SDR17
FMHSPS3-BP9	FMHSPS3-BP10	24.71	H	H	900	9.03	8.03	6.40	5.58	31	HDPE	SDR17
FMHSPS3-BP10	SMH009L18	17.72	H	H	900	8.03	5.89	5.58	5.00	31	HDPE	SDR17
FMH210b	FMH211a	60.01	SP-F/D	F1	500	13.88	12.92	9.47	9.24	263	HDPE	SDR17
FMH211a	FMH217a	60.92	F1	F1	560	12.92	11.97	9.24	9.02	268	HDPE	SDR17
FMH217a	FMH218a	59.07	L	L	800	11.97	11.06	6.37	6.16	293	HDPE	SDR17
FMH218a	FMH219	57.10	L	L	1000	11.06	10.51	6.09	5.91	327	HDPE	SDR17
FMH219	FMH219a	60.40	L	L	1000	10.51	12.08	5.91	5.75	391	HDPE	SDR11
FMH219a	FMH219a.1	10.21	L	SP-1	1000	12.08	12.51	5.74	5.72	510	HDPE	SDR11
FMH219a.1	FMH219a.2	16.04	SP-1	L	1000	12.51	11.25	5.71	5.68	535	HDPE	SDR11
FMH219a.2	D-SPS3-1	6.35	L	TP	1000	11.25	6.68	5.68	5.67	500	HDPE	SDR17
FMH219a.1	FMH219a.3	17.50	SP-1	L	1000	12.51	11.25	5.71	5.68	583	HDPE	SDR11
FMH219a.3	D-SPS3-2	7.79	L	TP	1000	11.25	6.68	5.68	5.67	779	HDPE	SDR17
LI-S3.39-1	FMH210b	17.96	TP	L	355	14.19	13.88	11.40	11.28	153	HDPE	SDR17
LI-S3.39-2	FMH211a	14.08	TP	L	355	13.87	12.92	11.14	11.05	158	HDPE	SDR17
LI-S3.40-2	FMH218a	14.73	TP	L	355	13.00	11.06	6.19	6.09	150	HDPE	SDR17
LI-S4.23	FMH423a	4.74	TP	E1	315	11.10	9.30	8.20	8.18	339	HDPE	SDR17
FMH423a	FMH423b	43.21	E1	E1	315	9.30	10.88	8.18	8.00	240	HDPE	SDR17
LI-S4.6-1	FMH423b	5.00	TP	E1	315	11.00	10.88	8.10	8.05	100	HDPE	SDR17
FMH423b	FMH423c	21.00	E1	F1	450	10.88	10.53	8.05	7.84	47	HDPE	SDR17
FMH423c	FMH219	10.43	F1	L	630	10.53	10.51	6.65	6.51	74	HDPE	SDR17
FMH224a	FMH223a	29.42	E1	E1	450	10.14	10.45	8.70	8.64	487	HDPE	SDR17
FMH223a	FMH209_a	29.14	E1	F1	500	10.45	10.81	8.64	8.58	501	HDPE	SDR17
FMH209_a	FMH210_a	14.21	F1	F1	560	10.81	10.92	8.58	8.55	495	HDPE	SDR17
FMH210_a	FMH211_a	80.24	F1	L	560	10.92	12.57	8.55	8.39	504	HDPE	SDR17
LI-S4.8-1	FMH224a	16.70	TP	E1	355	11.50	10.14	8.64	8.50	118	HDPE	SDR17
LI-S4.10-2	FMH224a	15.66	TP	E1	355	11.50	10.14	8.64	8.50	114	HDPE	SDR17
LI-S4.8-2	FMH223a	15.24	TP	E1	355	11.70	10.45	8.64	8.50	107	HDPE	SDR17
LI-S4.10-1	FMH223a	16.54	TP	E1	355	11.70	10.45	8.64	8.50	121	HDPE	SDR17
LI-S4.9-2	FMH209_a	18.13	TP	F1	450	11.40	10.81	8.55	8.43	155	HDPE	SDR17
LI-S4.9-1	FMH210_a	5.15	TP	F1	450	11.40	10.92	8.55	8.50	125	HDPE	SDR17
FMH206a	FMH207a	37.56	E1	F1	450	14.85	14.53	11.64	11.31	114	HDPE	SDR17
FMH207a	FMH208b	37.04	F1	L	450	14.53	13.85	10.71	10.50	176	HDPE	SDR17
FMH208b	FMH209b	51.70	L	L	450	13.85	13.18	10.77	10.50	100	HDPE	SDR17
FMH209b	FMH210b	65.74	L	SP-F/D	500	13.18	13.88	10.77	10.50	100	HDPE	SDR17
LI-S4.1-1	FMH208b	17.77	TP	L	355	14.50	13.85	12.14	12.05	223	HDPE	SDR17
LI-S4.1-2	FMH209b	16.25	TP	L	355	14.50	13.18	12.14	12.05	206	HDPE	SDR17
LI-S4.2-1	FMH206a	23.74	TP	E1	280	15.00	14.85	12.14	12.07	380	HDPE	SDR17
LI-S4.2-2	FMH207a	14.98	TP	F1	280	15.00	14.53	12.14	12.05	181	HDPE	SDR17
LI-S4.4-2	FMH206a	31.42	TP	E1	400	15.00	14.85	12.00	11.69	101	HDPE	SDR17
LI-S4.3-3	FMH207a	13.53	TP	F1	355	13.48	14.53	10.85	10.71	51	HDPE	SDR17
FMH260a	FMH261B	9.59	L	F1	400	14.11	13.67	10.21	10.17	292	HDPE	SDR17
FMH261B	FMH261a	18.13	F1	F1	400	13.67	12.88	10.17	10.11	305	HDPE	SDR17
FMH261a	FMH262a	58.21	F1	F1	400	12.88	12.40	10.11	8.90	49	HDPE	SDR17
FMH262a	FMH263a	26.62	F1	F1	400	12.40	12.45	8.90	8.86	699	HDPE	SDR17
FMH263a	FMH217a	29.86	F1	L	400	12.45	11.97	8.86	8.49	84	HDPE	SDR17
LI-S3.36-1	FMH260a	6.05	TP	L	400	14.00	14.11	10.25	10.22	217	HDPE	SDR17
LI-S3.40-1	FMH261a	5.62	TP	F1	400	13.00	12.88	10.50	10.48	331	HDPE	SDR17
LI-S4.4-1	FMH195.1	7.44	TP	L	400	13.13	12.52	11.23	11.13	74	HDPE	SDR17
FMH195.1	FMH196.1	14.77	L	E1	560	12.52	12.45	8.70	8.60	100	HDPE	SDR17
FMH196.1	FMH211_a	12.06	E1	L	560	12.45	12.57	8.60	8.54	100	HDPE	SDR17
FMH211_a	FMH213	32.85	L	L	710	12.57	12.87	8.39	8.32	601	HDPE	SDR17
FMH213	FMH212a	29.84	L	L	710	12.87	13.09	8.32	8.25	615	HDPE	SDR17
FMH212a	FMH215	53.60	L	E1	710	13.09	12.87	8.25	8.14	605	HDPE	SDR17
FMH215	FMH213a	24.63	E1	E1	710	12.87	12.60	8.14	8.06	298	HDPE	SDR17
FMH213a	FMH216	24.80	E1	L	710	12.60	12.43	8.06	8.00	453	HDPE	SDR17
FMH216	FMH215a	60.25	L	L	710	12.43	12.28	8.00	7.85	500	HDPE	SDR17
FMH215a	FMH216a	31.12	L	L	710	12.28	12.50	7.85	7.77	706	HDPE	SDR17
FMH216a	FMH423d	19.20	L	L	710	12.50	12.03	7.77	7.69	146	HDPE	SDR17
FMH423d	FMH423c	119.12	L	F1	710	12.03	10.53	7.69	7.24	500	HDPE	SDR17
LI-S4.3-1	FMH208b	22.56	TP	L	315	13.60	12.43	11.00	10.77	100	HDPE	SDR17
LI-S4.3-2	FMH209b	22.04	TP	L	315	13.60	12.50	10.70	10.48	100	HDPE	SDR17
LI-S4.6-2	FMH216a	11.05	TP	L	400	12.20	12.50	8.50	8.43	179	HDPE	SDR17
LI-S4.7-1	FMH212a	9.63	TP	L	400	14.00	13.09	7.44	7.40	299	HDPE	SDR17
LI-S4.7-2	FMH215	9.71	TP	E1	400	14.00	12.87	11.68	11.64	296	HDPE	SDR17
FMH193.1	FMH194.1	106.61	L	L	400	12.94	12.72	10.52	9.68	76	HDPE	SDR17
FMH194.1	FMH195.1	39.23	L	L	400	12.72	12.52	9.68	8.90	100	HDPE	SDR17
LI-S4.5-1	FMH193.1	103.00	TP	L	400	12.94	10.60	8.67	10.52	77	HDPE	SDR17
LI-S4.5-2	FMH194.1	4.74	TP	L	400	13.50	12.72	9.73	9.68	95	HDPE	SDR17

SEWERAGE D7 MANHOLE SCHEDULE

UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	PIPE LENGTH (m)	UPSTREAM MH TYPE	DOWNSTREAM MH TYPE	PIPE OUTSIDE DIAMETER (mm)	UPSTREAM FINISHED GROUND LEVEL (mPD)	DOWNSTREAM FINISHED GROUND LEVEL (mPD)	UPSTREAM INVERT LEVEL (mPD)	DOWNSTREAM INVERT LEVEL (mPD)	PIPE GRADIENT (1 in X)	PIPE MATERIAL	STANDARD DIMENSIONAL RATIO
LI-S4.13b-2	FMH105a	18.90	TP	E1	500	13.50	12.71	11.05	10.95	196	HDPE	SDR17
FMH115	FMH116a	27.07	SP-L	SP-L	710	18.25	18.86	9.52	9.38	206	HDPE	SDR11
FMH116a	FMH122a	29.11	SP-L	SP-L	710	18.86	19.00	9.38	9.23	197	HDPE	SDR11
FMH122a	TEP-D7	81.94	SP-L	TP	900	19.00	9.59	9.23	8.81	201	HDPE	SDR11
LI-S4.13b-1	FMH106a	14.66	TP	E1	500	14.00	12.78	11.50	11.45	315	HDPE	SDR17
LI-S4.13a-2	FMH106a	23.11	TP	E1	500	14.00	12.78	11.62	11.58	586	HDPE	SDR17
LI-S4.12c-2	FMH107a	12.64	TP	L	500	15.20	14.54	12.14	12.08	211	HDPE	SDR17
LI-S4.12c-1	FMH108a	12.69	TP	L	500	16.00	15.42	14.40	13.72	20	HDPE	SDR17
LI-S4.12b-2	FMH109a	14.07	TP	L	450	16.40	15.68	12.18	12.13	250	HDPE	SDR17
LI-S4.12b-1	FMH109b	12.74	TP	L	450	17.00	16.30	14.55	14.45	132	HDPE	SDR17
LI-S4.12a-2	FMH110a	13.88	TP	L	450	18.10	17.21	12.18	12.13	251	HDPE	SDR17
FMH105a	FMH106a	13.95	E1	E1	500	12.71	12.78	10.95	10.88	203	HDPE	SDR17
LI-S4.12a-1	FMH115	20.37	TP	SP-L	450	19.00	18.25	12.18	12.10	244	HDPE	SDR11
LI-S4.13a-1	FMH114a	22.09	TP	L	500	18.00	17.71	12.18	12.03	145	HDPE	SDR17
FMH114a	FMH115a	26.57	L	L	450	17.71	17.88	11.82	11.63	147	HDPE	SDR17
FMH115a	FMH116a	38.63	L	L	450	17.88	18.86	11.63	11.36	152	HDPE	SDR11
LI-S4.16-2	FMH112a	22.71	TP	L	400	18.00	17.82	12.18	12.03	149	HDPE	SDR11
FMH112a	FMH114a	16.63	L	L	400	17.82	17.71	11.95	11.82	151	HDPE	SDR17
LI-S4.16-1	FMH111a	12.02	TP	L	400	18.00	12.93	12.18	12.10	149	HDPE	SDR17
FMH111a	FMH112a	20.61	L	L	400	12.93	17.82	12.10	11.95	149	HDPE	SDR17
LI-S4.17	FMH117a	14.89	TP	SP-L	355	18.60	17.69	10.18	10.13	274	HDPE	SDR11
FMH117a	FMH118a	10.78	SP-L	SP-L	355	17.69	17.87	10.13	10.08	268	HDPE	SDR11
FMH106a	FMH106b	46.34	E1	E1	560	12.78	13.39	10.88	10.64	199	HDPE	SDR17
FMH118a	FMH120a	11.34	SP-L	SP-L	355	17.87	17.76	10.08	10.03	274	HDPE	SDR11
FMH120a	FMH121a	48.35	SP-L	SP-L	450	17.76	18.15	10.03	9.85	270	HDPE	SDR11
FMH121a	FMH122a	63.04	SP-L	SP-L	450	18.15	19.00	9.85	9.61	272	HDPE	SDR11
LI-S4.2d-1	FMH119a	17.44	TP	F1	450	18.00	17.86	14.53	14.41	149	HDPE	SDR17
FMH119a	FMH120a	17.48	F1	L	450	17.86	17.76	14.41	14.28	146	HDPE	SDR17
LI-S4.15-1	FMH120a	13.56	TP	L	355	18.00	17.76	14.83	14.75	184	HDPE	SDR17
LI-S4.15-2	FMH121a	12.98	TP	L	355	20.00	18.15	13.52	13.43	149	HDPE	SDR17
LI-S4.12d-2	FMH121a	16.74	TP	L	450	19.00	18.15	13.52	13.40	149	HDPE	SDR17
FMH106b	FMH107a	26.99	E1	L	560	13.39	14.54	10.64	10.49	206	HDPE	SDR17
FMH107a	FMH108a	30.35	L	L	560	14.54	15.42	10.49	10.33	200	HDPE	SDR17
FMH108a	FMH109a	23.86	L	L	710	15.42	15.68	10.33	10.20	201	HDPE	SDR17
FMH109a	FMH109b	43.30	L	SP-L	710	15.68	16.30	10.20	9.98	200	HDPE	SDR17
FMH109b	FMH110a	51.73	SP-L	SP-L	710	16.30	17.21	9.98	9.71	200	HDPE	SDR17
FMH110a	FMH115	35.57	SP-L	SP-L	710	17.21	18.25	9.71	9.52	196	HDPE	SDR17

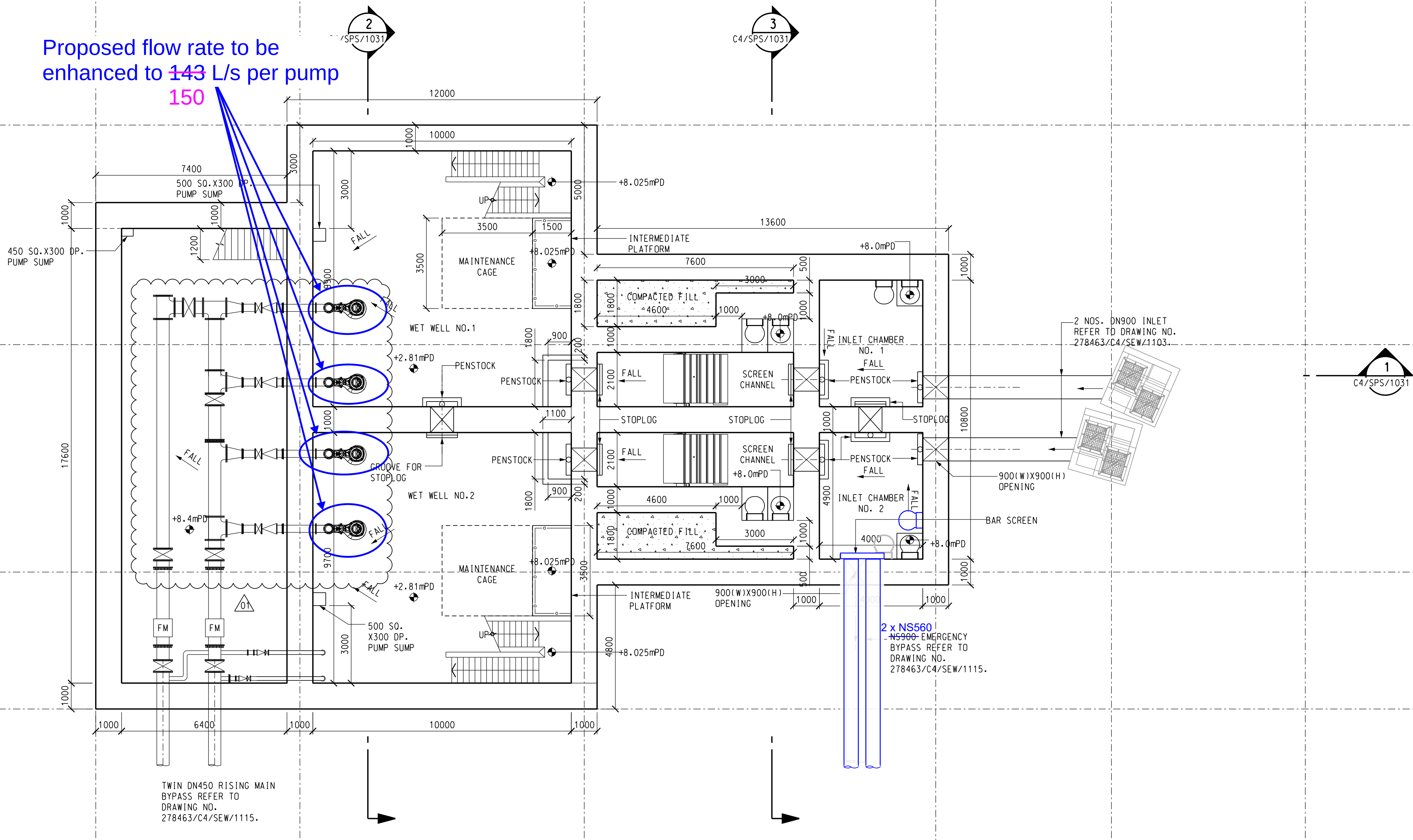
Markup for Proposed Modification Works under S16 Planning Application for Proposed Flat and Shop and Services in G/IC (1) Zone in Planning Area 34E of Hung Shui Kiu/Ha Tsuen New Development Area

NOTES

1. MINIMUM CIVIL & STRUCTURAL DESIGN IS INDICATED IN THE DRAWING AS RESERVATION FOR O&M APPLICATION.

Remark:

- NS355 Markup for Proposed Modification Works under HD's Technical Assessments
- NS355 Markup for Proposed Modification Works under S16 Planning Application for Proposed Flat and Shop and Services in G/IC (1) Zone in Planning Area 34E of Hung Shui Kiu/Ha Tsuen New Development Area



UNDERGROUND FLOOR PLAN AT +8.40mPD
SCALE 1:100

Rev	Description	By	Date
01	TENDER ADDENDUM NO. 1	EF	03/24
00	TENDER ISSUE	EF	02/24

Consultant
ARUP

Project Title
Contract No. YL/2023/04
Hung Shui Kiu/Ha Tsuen
New Development Area
Second Phase Development - Contract 4 -
Site Formation and Engineering
Infrastructure Works

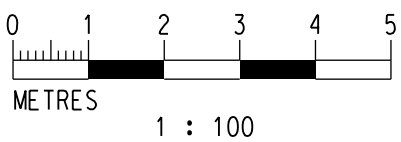
Drawing title
SEWAGE PUMPING STATION NO.3
- LAYOUT PLANS
(SHEET 3)

Drawing no. 278463/C4/SPS/1023		Rev. 01	
Drawn CSK	Date 02/24	Checked EF	Approved DL
Scale 1:100 @ A1		Status TENDER	

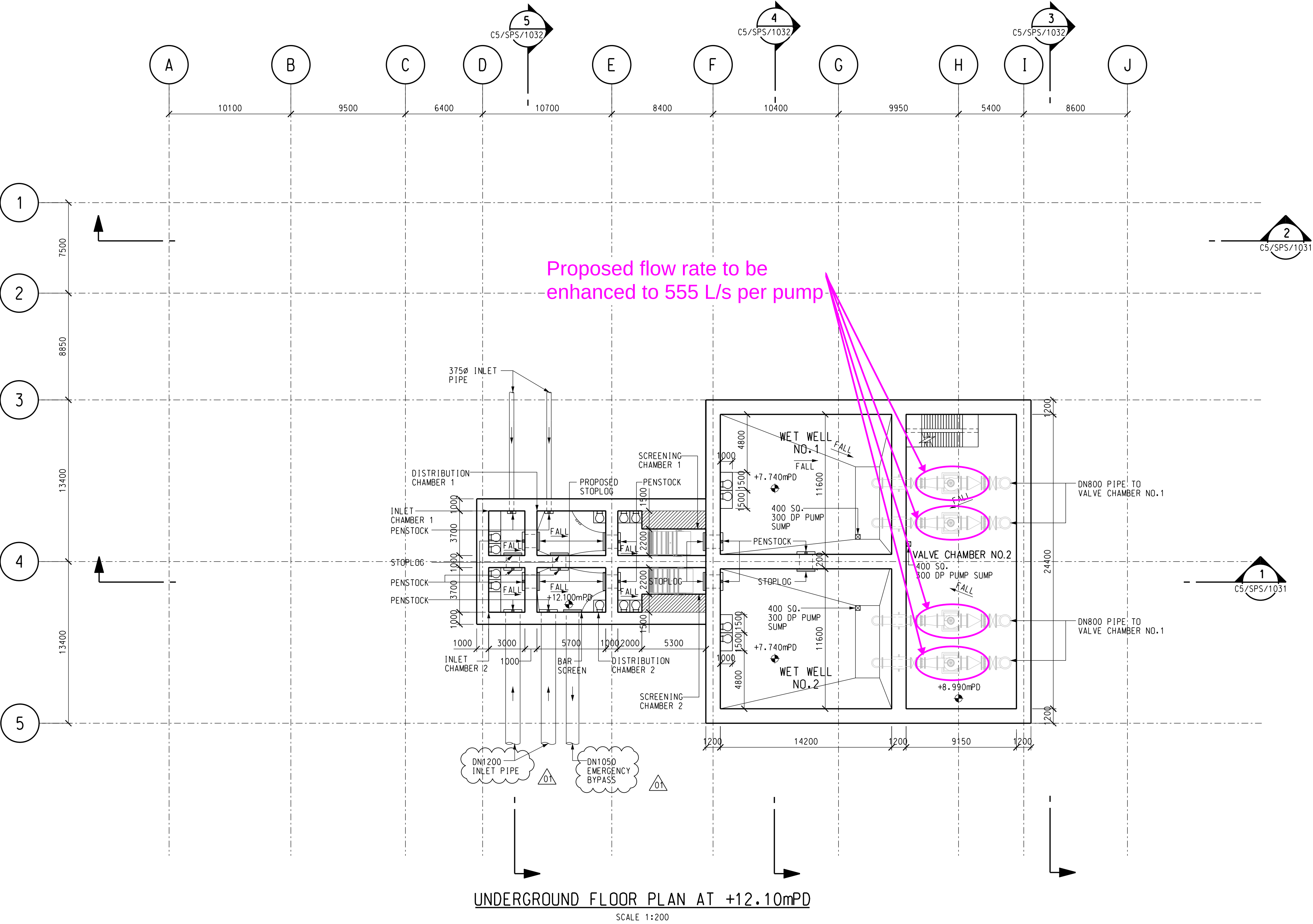
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Markup for Proposed Modification Works under S16 Planning Application for Proposed Flat and Shop and Services in G/IC (1) Zone in Planning Area 34E of Hung Shui Kiu/Ha Tsuen New Development Area



NOTES

1. MINIMUM CIVIL & STRUCTURAL DESIGN IS INDICATED
IN THE DRAWING AS RESERVATION FOR O&M APPLICATION.

LEGEND:

—○— HADNRAIL
— HANDRAIL GATE

Remark:

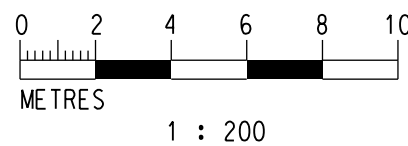
NS355 Markup for Proposed Modification Works under S16 Planning Application for Proposed Flat and Shop and Services in G/IC (1) Zone in Planning Area 34E of Hung Shui Kiu/Ha Tsuen New Development Area

01	TENDER ADDENDUM NO. 3	EF	10/24
00	TENDER ISSUE	EF	08/24
Rev	Description	By	Date
Consultant			
ARUP			
Project Title			
Contract No. YL/2023/05 Hung Shui Kiu/Ha Tsuen New Development Area Second Phase Development - Contract 5 - Site Formation and Engineering Infrastructure Works			
Drawing title			
SEWAGE PUMPING STATION NO.2 UNDERGROUND FLOOR PLAN (SHEET 2)			
Drawing no.			Rev.
278463/C5/SPS/1023			01
Drawn	Date	Checked	Approved
RY	08/24	EF	DL
Scale	Status		
1:200 @ A1	TENDER		

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Appendix C

Sewerage Catchment Plans and Calculations

Base Case Scenario

1. Sewage flow build-up:
 - a. S16 Planning Application No. A/HSK/452 (approved on 23 Jun 2023)
 - b. Updated planned population and employment figures at nine housing sites advised by the Housing Department (i.e. Site No. 4-3, 4-4, 4-5, 4-6, 4-22, 4-24, 4-28, 5-16 and 5-17)
 - c. No. A/HSK/573 – Proposed Minor Relaxation of Domestic Plot Ratio Restriction (From 4.5 to 5) for Mixed Use Development (in Planning Areas 28A and 28B of HSK/HA NDA) (i.e. Site No. 4-25a, 4-25b, 4-25c, and 4-29) (approved on 15 Aug 2025)
2. Estimation of sewage flow by SPS and phasing

[illegible]

[illegible]

[illegible]

Updated planned population and employment figures at nine housing sites advised by the Housing Department (i.e. Site No. 4-3, 4-4, 4-5, 4-6, 4-22, 4-24, 4-28, 5-16 and 5-17)

Sewage Flow Estimation for 9 Nos. Public Housing Sites under Revised Scheme (Apr 2025)

Site	Domestic Zoning	Population	Residential UFF (m ³ /day)	Non-caterng Retail (J4) GFA (m ²)	Employee	Non-caterng Retail (J4) UFF (m ³ /day)	Catering (J10) GFA (m ²)	Employee	Catering (J10) UFF (m ³ /day)	Social Services (J11) GFA (m ²)	Employee	Social Services (J11) UFF (m ³ /day)	DTMO/DMO/ EMO (J12) GFA (m ²)	Employee	DTMO/DMO/ EMO (J12) UFF (m ³ /day)	Kindergarten Teacher	Kindergarten Teacher (General) UFF (m ³ /day)	Kindergarten Student	Kindergarten Student UFF (m ³ /day)	Total ADWF (m ³ /day)	Deisgn ADWF ¹ (m ³ /day)
4-3	SSF	4420	0.27	434	15	0.28	651	33	1.58	788	26	0.28	200	48	0.08	0	0.28	0	0.04	1261	1292
4-4	PRH	7800	0.19	1479	52	0.28	986	50	1.58	7124	235	0.28	1657	144	0.08	29	0.28	180	0.04	1668	1710
4-5	SSF	8450	0.27	490	17	0.28	1550	79	1.58	4275	141	0.28	300	92	0.08	44	0.28	270	0.04	2481	2543
4-6	SSF	4680	0.27	632	22	0.28	538	27	1.58	3766	124	0.28	200	51	0.08	0	0.28	0	0.04	1351	1385
4-22	PRH	11310	0.19	1103	38	0.28	832	42	1.58	8000	264	0.28	1850	182	0.08	29	0.28	180	0.04	2330	2388
4-24	SSF	7150	0.27	654	23	0.28	418	21	1.58	6042	199	0.28	250	78	0.08	44	0.28	270	0.04	2055	2107
4-28	SSF	9048	0.27	1761	61	0.28	1224	62	1.58	7471	247	0.28	572	99	0.08	0	0.28	0	0.04	2635	2701
5-16	SSF	5460	0.27	0	0	0.28	0	0	1.58	3023	100	0.28	250	60	0.08	34	0.28	210	0.04	1525	1563
5-17	SSF	6838	0.27	1650	58	0.28	2480	127	1.58	5850	193	0.28	300	75	0.08	0	0.28	0	0.04	2123	2176

(1) Design ADWF includes a return liquid allowance of 2.5%

No. A/HSK/573 – Proposed Minor Relaxation of Domestic Plot Ratio Restriction (From 4.5 to 5) for Mixed Use Development (in Planning Areas 28A and 28B of HSK/HA NDA) (i.e. Site No. 4-25a, 4-25b, 4-25c, and 4-29) (approved on 15 Aug 2025)

ADWF before MTRC Sites S16

Site	Zoning	Domestic Population	Domestic UFF (m ³ /head/day)	Employee Population			Commercial UFF (m ³ /day)			Total ADWF (m ³ /day)	Design ADWF ¹ (m ³ /day)
				J3	J4	J11	J3	J4	J11		
4-25a	OU(C&R)	2,408	0.27	0	1,288	25	0.18	0.28	0.28	1,018	1,043
4-25b	OU(C&R)	2,408	0.27	0	1,288	25	0.18	0.28	0.28	1,018	1,043
4-25c	OU(C&R)	2,479	0.27	0	1,326	26	0.18	0.28	0.28	1,048	1,074
4-29	OU(C&R)	8,097	0.27	10	3,852	85	0.18	0.28	0.28	3,290	3,372

(1) Design ADWF includes a return liquid allowance of 2.5%

Total **6,533**

ADWF after MTRC Sites S16

Site	Zoning	Domestic Population	Domestic UFF (m ³ /head/day)	Contributing population	Total ADWF (m ³ /day)	Design ADWF ¹ (m ³ /day)	Remarks
4-25a	OU(C&R)	1,400	0.27	1,925	520	533	- ADWF assumed for club house, swimmig pool, commercial and office uses
4-25b	OU(C&R)	5,364	0.27	5,446	1,471	1,507	- ADWF assumed for club house and swimmig pool uses
4-25c	OU(C&R)	4,161	0.27	9,739	2,630	2,695	- ADWF assumed for club house, swimmig pool and commercial uses
4-29	OU(C&R)	12,040	0.27	20,253	5,468	5,605	- ADWF assumed for club house, swimmig pool, commercial and PTI uses

(1) Design ADWF includes a return liquid allowance of 2.5%

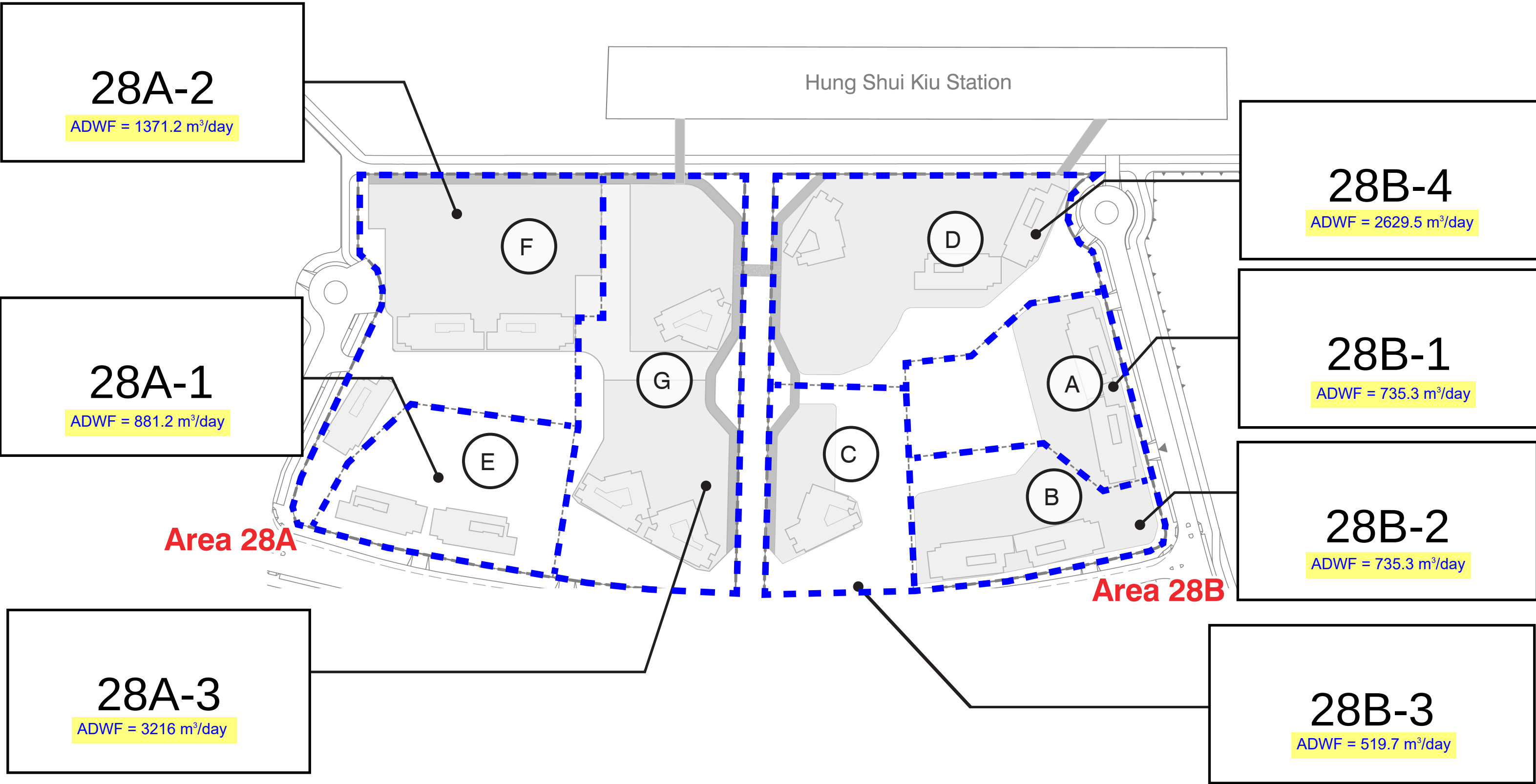
Total **10,340**

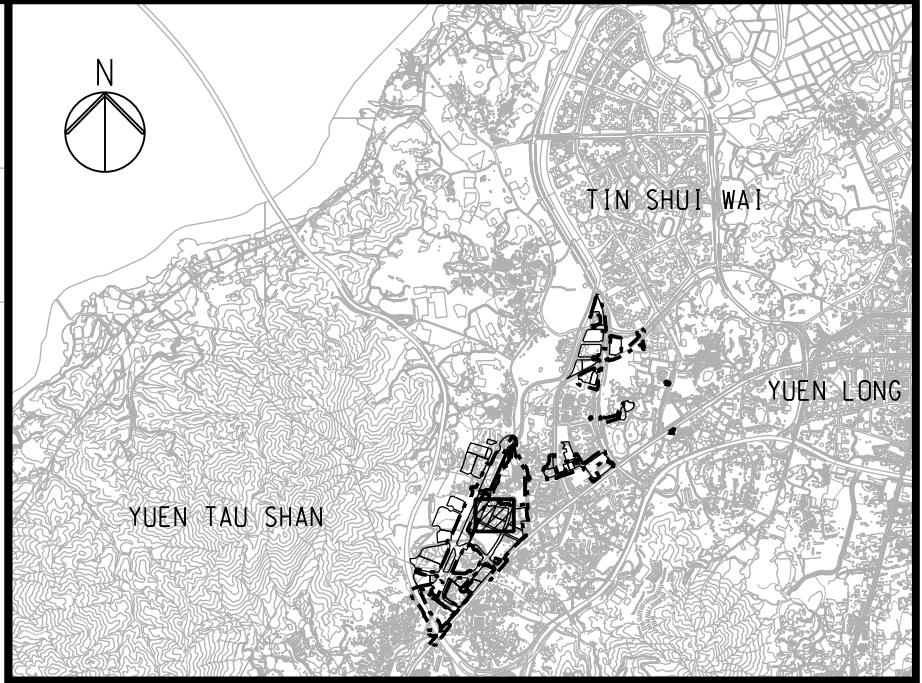
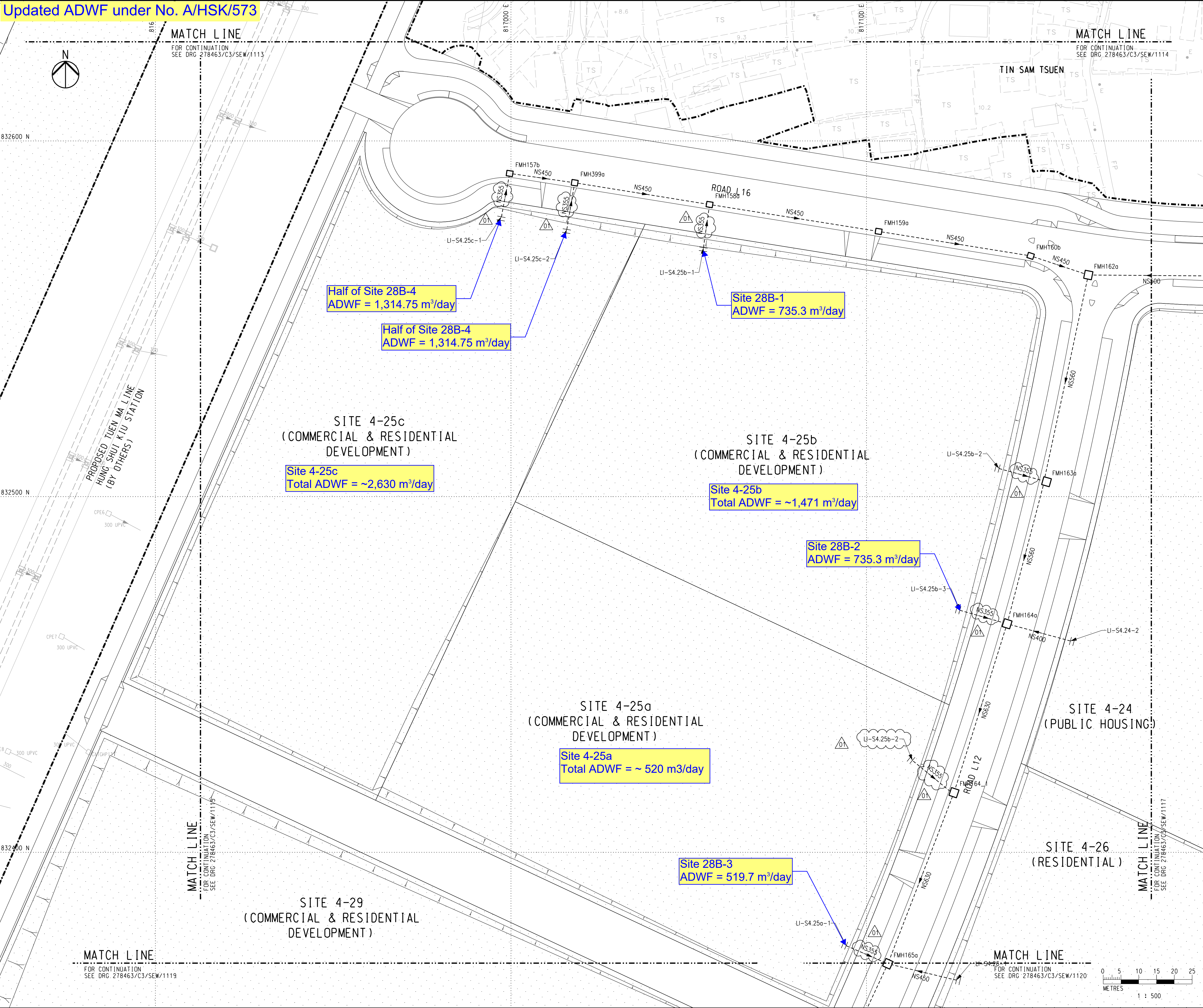
Difference **3,807**

DLN

Master Scheme Design
for Hung Shui Kiu Property Development
N3306-H

Phasing Strategy (Proposed Scheme)





KEY PLAN

NOTES

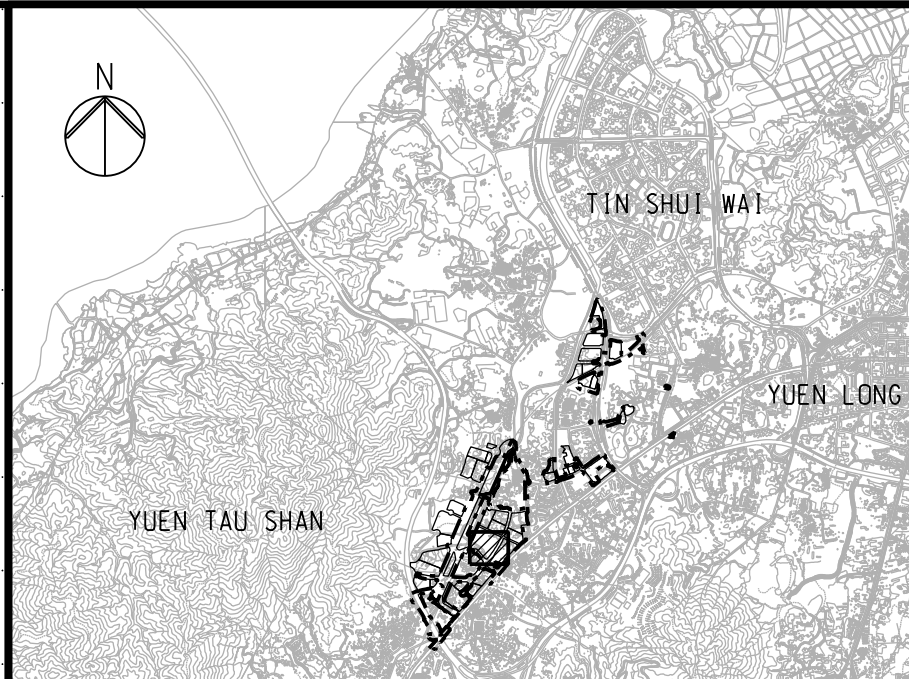
1. FOR GENERAL NOTES AND LEGEND, REFER TO DRAWING NO. 278463/C3/SEW/1001.

01	TENDER ADDENDUM NO. 1	EF	04/24
00	TENDER ISSUE	EF	03/24
Rev	Description	By	Date
Consultant			
ARUP			
Project Title			
Contract No. YL/2023/03			
Hung Shui Kiu/Ha Tsuen			
New Development Area			
Second Phase Development - Contract 3 -			
Site Formation and Engineering			
Infrastructure Works			
Drawing title			
SEWERAGE LAYOUT PLAN			
(SHEET 16)			
Drawing no.			Rev.
278463/C3/SEW/1116			01
Drawn	Date	Checked	Approved
DT	03/24	EF	DL
Scale	1:500 @ A1	Status	TENDER

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土木工程拓展署
Civil Engineering and
Development Department



NOTES

1. FOR GENERAL NOTES AND LEGEND, REFER TO
DRAWING NO. 278463/C3/SEW/1001.

ARUP

Drawing title

SEWERAGE LAYOUT PLAN
(SHEET 19)

Drawing no. 278463/C3/SEW/1119			Rev. 01
Drawn DT	Date 01/8	Checked EF	Approved DL
Scale 1:500 @ A1		Status TENDER	

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Extracted from Appendix 5 - Sewerage Appraisal under No. A/HSK/573

Table 3 Calculation for Sewage Generation Rate of the Proposed Development (By Site)

Subject Site 28A		
Site 28A-1		
1. Residential		
Total number of residential units	=	1148 units
Total number of residents	=	3214 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Hung Shui Kiu)
Design flow	=	270 litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage generation rate	=	867.9 m ³ /day
2. Club House		
Assumed area	=	1435.3 m ² (Assume 2.5% of residential GFA)
Assumed floor area per employee	=	30.3 m ² per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees	=	47 employees
Design flow	=	280 litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social, Personal Services)
Sewage generation rate	=	13.3 m ³ /day
3. Proposed Swimming Pool (Indoor)		
Area of Swimming Pool	=	50 m ² (Assume)
Depth of Swimming Pool	=	1.5 m
Volume of Swimming Pool (Ordinary Assumption)	=	75 m ³
Turnover Rate	=	4 hr
Required Surface Loading Rate of Filter	=	18.75 m ³ /m ² /hr
Filter Areas required	=	1 m ²
Adopted Surface Loading Rate of Filter	=	50 m ³ /m ² /hr
Adopted Filter Area	=	0.38 m ²
Backwash Duration	=	3 min/d
Backwash flow rate	=	30 m ³ /m ² /hr
Design flow for Swimming Pool Backwashing	=	0.5625 m ³ /day
Design flow for Swimming Pool Backwashing	=	3.1 litre/sec
Total Flow from the Proposed Development (Site 28A-1)		
Flow rate	=	881.2 m ³ /day
Flow rate with P _{CF} (Yuen Long - 1.0)	=	881.2 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	=	3264 people (refer to Section 12 of GESF)
Peaking factor	=	6 (refer to Table T-5 of GESF for a population between 1000-5000 incl. stormwater allowance)
Peak flow (without swimming pool)	=	61.2 litre/sec
Peak flow (with swimming pool)	=	64.3 litre/sec

Part of ADWF of Site 4-29

Extracted from Appendix 5 - Sewerage Appraisal
 under No. A/HSK/573

Site 28A-2

1. Residential		
Total number of residential units	=	1535 units
Total number of residents	=	4298 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Hung Shui Kiu)
Design flow	=	270 litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage generation rate	=	1160.5 m ³ /day
2. Club House		
Assumed area	=	1918 m ² (Assume 2.5% of residential GFA)
Assumed floor area per employee	=	30.3 m ² per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees	=	63 employees
Design flow	=	280 litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social, Personal Services)
Sewage generation rate	=	17.7 m ³ /day
3. Proposed Swimming Pool (Indoor)		
Area of Swimming Pool	=	50 m ² (Assume)
Depth of Swimming Pool	=	1.5 m
Volume of Swimming Pool (Ordinary Assumption)	=	75 m ³
Turnover Rate	=	4 hr
Required Surface Loading Rate of Filter	=	18.75 m ³ /m ² /hr
Filter Areas required	=	1 m ²
Adopted Surface Loading Rate of Filter	=	50 m ³ /m ² /hr
Adopted Filter Area	=	0.38 m ²
Backwash Duration	=	3 min/d
Backwash flow rate	=	30 m ³ /m ² /hr
Design flow for Swimming Pool Backwashing	=	0.5625 m ³ /day
Design flow for Swimming Pool Backwashing	=	3.1 litre/sec
4. Commercial (Retail)		
GFA	=	1000 m ²
Assumed floor area per employee	=	28.6 m ² per employee -- (refer to Table 8 of CIFSUS - Retail Trade)
Total number of employees	=	35 employees
Design flow	=	280 litre/employee/day -- (refer to Table T-2 of GESF - J4 Wholesale & Retail)
Sewage generation rate	=	9.8 m ³ /day
5. Commercial (F&B)		
GFA	=	1000 m ²
Assumed floor area per employee	=	19.6 m ² per employee -- (refer to Table 8 of CIFSUS - Restaurants)
Total number of employees	=	51 employees
Design flow	=	1580 litre/employee/day -- (refer to Table T-2 of GESF - J10 Restaurant & Hotels)
Sewage generation rate	=	80.6 m ³ /day
6. PTI		
Assumed area	=	15000 m ²
Assumed floor area per employee	=	26.3 m ² per employee -- (refer to Table 8 of CIFSUS - Transport)
Total number of employees	=	570 employees
Design flow	=	180 litre/employee/day -- (refer to Table T-2 of GESF - J3 Transport, Storage & Communication)
Sewage generation rate	=	102.6 m ³ /day
Total Flow from the Proposed Development (Site 28A-2 - PTI)		
Flow rate	=	102.6 m ³ /day
Flow rate with P _{ClF} (Yuen Long - 1.0)	=	102.6 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	=	380 people (refer to Section 12 of GESF)
Peaking factor	=	8 (refer to Table T-5 of GESF for a population between <1,000 incl. stormwater allowance)
Peak flow	=	<u>9.5</u> litre/sec
Total Flow from the Proposed Development (Site 28A-2 - exclude PTI)		
Flow rate	=	1268.6 m ³ /day
Flow rate with P _{ClF} (Yuen Long - 1.0)	=	1268.6 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	=	4698 people (refer to Section 12 of GESF)
Peaking factor	=	6 (refer to Table T-5 of GESF for a population between <1,000 incl. stormwater allowance)
Peak flow (without swimming pool)	=	<u>88.1</u> litre/sec
Peak flow (with swimming pool)	=	<u><u>91.2</u></u> litre/sec
Total Flow from the Proposed Development (Site 28A-2)		
Flow rate	=	1371.2 m³/day
Flow rate with P _{ClF} (Yuen Long - 1.0)	=	1371.2 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	=	5078 people
Peaking factor	=	5 (refer to Table T-5 of GESF for a population 5000-10000 incl. stormwater allowance)
Peak flow (without swimming pool)	=	<u>79.3</u> litre/sec
Peak flow (with swimming pool)	=	<u><u>82.5</u></u> litre/sec

Part of ADWF of Site 4-29

Extracted from Appendix 5 - Sewerage Appraisal
 under No. A/HSK/573

Site 28A-3		
1. Residential		
Total number of residential units	=	1617 units
Total number of residents	=	4528 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Hung Shui Kiu)
Design flow	=	270 litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage generation rate	=	1222.5 m ³ /day
2. Club House		
Assumed area	=	2021 m ² (Assume 2.5% of residential GFA)
Assumed floor area per employee	=	30.3 m ² per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees	=	67 employees
Design flow	=	280 litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social, Personal Services)
Sewage generation rate	=	18.7 m ³ /day
3. Proposed Swimming Pool (Indoor)		
Area of Swimming Pool	=	50 m ² (Assume)
Depth of Swimming Pool	=	1.5 m
Volume of Swimming Pool (Ordinary Assumption)	=	75 m ³
Turnover Rate	=	4 hr
Required Surface Loading Rate of Filter	=	18.75 m ³ /m ² /hr
Filter Areas required	=	1 m ²
Adopted Surface Loading Rate of Filter	=	50 m ³ /m ² /hr
Adopted Filter Area	=	0.38 m ²
Backwash Duration	=	3 min/d
Backwash flow rate	=	30 m ³ /m ² /hr
Design flow for Swimming Pool Backwashing	=	0.5625 m ³ /day
Design flow for Swimming Pool Backwashing	=	3.1 litre/sec
4. Commercial (Retail)		
GFA	=	21851 m ²
Assumed floor area per employee	=	28.6 m ² per employee -- (refer to Table 8 of CIFSUS - Retail Trade)
Total number of employees	=	765 employees
Design flow	=	280 litre/employee/day -- (refer to Table T-2 of GESF - J4 Wholesale & Retail)
Sewage generation rate	=	214.1 m ³ /day
5. Commercial (F&B)		
GFA	=	21851 m ²
Assumed floor area per employee	=	19.6 m ² per employee -- (refer to Table 8 of CIFSUS - Restaurants)
Total number of employees	=	1114 employees
Design flow	=	1580 litre/employee/day -- (refer to Table T-2 of GESF - J10 Restaurant & Hotels)
Sewage generation rate	=	1760.8 m ³ /day
Total Flow from the Proposed Development (Site 28A-3)		
Flow rate	=	3216.0 m ³ /day
Flow rate with P _{CIF} (Yuen Long - 1.0)	=	3216.0 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	=	11911 people (refer to Section 12 of GESF)
Peaking factor	=	4 (refer to Table T-5 of GESF for a population between 10000-50000 incl. stormwater allowance)
Peak flow (without swimming pool)	=	148.9 litre/sec
Peak flow (with swimming pool)	=	152.0 litre/sec

Remark: The Proposed Development will have phasing based on indicative preliminary deisgn. This calculation is prepared base on 7 phasing (3 on Site 28A and 4 on Site 28B), serving only as an assumption for the Sewerage Appraisal.

Part of ADWF of Site 4-29

Extracted from Appendix 5 - Sewerage Appraisal under No. A/HSK/573

Subject Site 28B

Site 28B-1

1. Residential	
Total number of residential units	= 958 units
Total number of residents	= 2682 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Hung Shui Kiu)
Design flow	= 270 litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage generation rate	= 724.2 m ³ /day
2. Club House	
Assumed area	= 1198 m ² (Assume 2.5% of residential GFA)
Assumed floor area per employee	= 30.3 m ² per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees	= 40 employees
Design flow	= 280 litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social, Personal Services)
Sewage generation rate	= 11.1 m ³ /day
3. Proposed Swimming Pool (Indoor)	
Area of Swimming Pool	= 37.5 m ² (Assume)
Depth of Swimming Pool	= 1.5 m
Volume of Swimming Pool (Ordinary Assumption)	= 56.25 m ³
Turnover Rate	= 4 hr
Required Surface Loading Rate of Filter	= 14.0625 m ³ /m ² /hr
Filter Areas required	= 1 m ²
Adopted Surface Loading Rate of Filter	= 50 m ³ /m ² /hr
Adopted Filter Area	= 0.28 m ²
Backwash Duration	= 3 min/d
Backwash flow rate	= 30 m ³ /m ² /hr
Design flow for Swimming Pool Backwashing	= 0.421875 m ³ /day
Design flow for Swimming Pool Backwashing	= 2.3 litre/sec
Total Flow from the Proposed Development (Site 28B-1)	
Flow rate	= 735.3 m ³ /day
Flow rate with P _{CF} (Yuen Long - 1.0)	= 735.3 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	= 2723 people (refer to Section 12 of GESF)
Peaking factor	= 6 (refer to Table T-5 of GESF for a population between 1000-5000 incl. stormwater allowance)
Peak flow (without swimming pool)	= 51.1 litre/sec
Peak flow (with swimming pool)	= 53.4 litre/sec

Part of ADWF of Site 4-25b

Extracted from Appendix 5 - Sewerage Appraisal under No. A/HSK/573

Site 28B-2	
1. Residential	
Total number of residential units	= 958 units
Total number of residents	= 2682 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Hung Shui Kiu)
Design flow	= 270 litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage generation rate	= 724.2 m ³ /day
2. Club House	
Assumed area	= 1198 m ² (Assume 2.5% of residential GFA)
Assumed floor area per employee	= 30.3 m ² per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees	= 40 employees
Design flow	= 280 litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social, Personal Services)
Sewage generation rate	= 11.1 m ³ /day
3. Proposed Swimming Pool (Indoor)	
Area of Swimming Pool	= 37.5 m ² (Assume)
Depth of Swimming Pool	= 1.5 m
Volume of Swimming Pool (Ordinary Assumption)	= 56.25 m ³
Turnover Rate	= 4 hr
Required Surface Loading Rate of Filter	= 14.0625 m ³ /m ² /hr
Filter Areas required	= 1 m ²
Adopted Surface Loading Rate of Filter	= 50 m ³ /m ² /hr
Adopted Filter Area	= 0.28 m ²
Backwash Duration	= 3 min/d
Backwash flow rate	= 30 m ³ /m ² /hr
Design flow for Swimming Pool Backwashing	= 0.421875 m ³ /day
Design flow for Swimming Pool Backwashing	= 2.3 litre/sec
Total Flow from the Proposed Development (Site 28B-2)	
Flow rate	= 735.3 m ³ /day
Flow rate with P _{CF} (Yuen Long - 1.0)	= 735.3 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	= 2723 people (refer to Section 12 of GESF)
Peaking factor	= 6 (refer to Table T-5 of GESF for a population between 1000-5000 incl. stormwater allowance)
Peak flow (without swimming pool)	= 51.1 litre/sec
Peak flow (with swimming pool)	= 53.4 litre/sec

Part of ADWF of Site 4-25b



Extracted from Appendix 5 - Sewerage Appraisal
 under No. A/HSK/573

Site 28B-3	
1. Residential	
Total number of residential units	= 500 units
Total number of residents	= 1400 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Hung Shui Kiu)
Design flow	= 270 litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage generation rate	= 378.0 m ³ /day
2. Club House	
Assumed area	= 625 m ² (Assume 2.5% of residential GFA)
Assumed floor area per employee	= 30.3 m ² per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees	= 21 employees
Design flow	= 280 litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social, Personal Services)
Sewage generation rate	= 5.8 m ³ /day
3. Proposed Swimming Pool (Indoor)	
Area of Swimming Pool	= 37.5 m ² (Assume)
Depth of Swimming Pool	= 1.5 m
Volume of Swimming Pool (Ordinary Assumption)	= 56.25 m ³
Turnover Rate	= 4 hr
Required Surface Loading Rate of Filter	= 14.0625 m ³ /m ² /hr
Filter Areas required	= 1 m ²
Adopted Surface Loading Rate of Filter	= 50 m ³ /m ² /hr
Adopted Filter Area	= 0.28 m ²
Backwash Duration	= 3 min/d
Backwash flow rate	= 30 m ³ /m ² /hr
Design flow for Swimming Pool Backwashing	= 0.421875 m ³ /day
Design flow for Swimming Pool Backwashing	= 2.3 litre/sec
4. Commercial (Retail)	
GFA	= 700 m ²
Assumed floor area per employee	= 28.6 m ² per employee -- (refer to Table 8 of CIFSUS - Retail Trade)
Total number of employees	= 25 employees
Design flow	= 280 litre/employee/day -- (refer to Table T-2 of GESF - J4 Wholesale & Retail)
Sewage generation rate	= 6.9 m ³ /day
5. Commercial (F&B)	
GFA	= 700 m ²
Assumed floor area per employee	= 19.6 m ² per employee -- (refer to Table 8 of CIFSUS - Restaurants)
Total number of employees	= 36 employees
Design flow	= 1580 litre/employee/day -- (refer to Table T-2 of GESF - J10 Restaurant & Hotels)
Sewage generation rate	= 56.4 m ³ /day
6. Office	
GFA	= 16504 m ²
Assumed floor area per employee	= 18.2 m ² per employee -- (refer to Table 8 of CIFSUS - Financial, Insurance, Real Estate & Business Services)
Total number of employees	= 908 employees
Design flow	= 0.08 m ³ /employee/day -- (refer to Table T-2 of GESF - J6 Finance, Insurance, Real Estate & Business Services)
Sewage generation rate	= 72.6 m ³ /day
Total Flow from the Proposed Development (Site 28B-3)	
Flow rate	= 519.7 m³/day
Flow rate with P _{ClF} (Yuen Long - 1.0)	= 519.7 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	= 1925 people (refer to Section 12 of GESF)
Peaking factor	= 6 (refer to Table T-5 of GESF for a population between 1000-5000 incl. stormwater allowance)
Peak flow	= 36.1 litre/sec
Peak flow (with swimming pool)	= 38.4 litre/sec

Total ADWF of Site 4-25a

Extracted from Appendix 5 - Sewerage Appraisal
 under No. A/HSK/573

Site 28B-4	
1. Residential	
Total number of residential units	= 1486 units
Total number of residents	= 4161 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Hung Shui Kiu)
Design flow	= 270 litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage generation rate	= 1123.4 m ³ /day
2. Club House	
Assumed area	= 1857 m ² (Assume 2.5% of residential GFA)
Assumed floor area per employee	= 30.3 m ² per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees	= 61 employees
Design flow	= 280 litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social, Personal Services)
Sewage generation rate	= 17.2 m ³ /day
3. Proposed Swimming Pool (Indoor)	
Area of Swimming Pool	= 37.5 m ² (Assume)
Depth of Swimming Pool	= 1.5 m
Volume of Swimming Pool (Ordinary Assumption)	= 56.25 m ³
Turnover Rate	= 4 hr
Required Surface Loading Rate of Filter	= 14.0625 m ³ /m ² /hr
Filter Areas required	= 1 m ²
Adopted Surface Loading Rate of Filter	= 50 m ³ /m ² /hr
Adopted Filter Area	= 0.28 m ²
Backwash Duration	= 3 min/d
Backwash flow rate	= 30 m ³ /m ² /hr
Design flow for Swimming Pool Backwashing	= 0.421875 m ³ /day
Design flow for Swimming Pool Backwashing	= 2.3 litre/sec
4. Commercial (Retail)	
GFA	= 16474 m ²
Assumed floor area per employee	= 28.6 m ² per employee -- (refer to Table 8 of CIFSUS - Retail Trade)
Total number of employees	= 577 employees
Design flow	= 280 litre/employee/day -- (refer to Table T-2 of GESF - J4 Wholesale & Retail)
Sewage generation rate	= 161.4 m ³ /day
5. Commercial (F&B)	
GFA	= 16474 m ²
Assumed floor area per employee	= 19.6 m ² per employee -- (refer to Table 8 of CIFSUS - Restaurants)
Total number of employees	= 840 employees
Design flow	= 1580 litre/employee/day -- (refer to Table T-2 of GESF - J10 Restaurant & Hotels)
Sewage generation rate	= 1327.5 m ³ /day
Total Flow from the Proposed Development (Site 28B-4)	
Flow rate	= 2629.5 m³/day
Flow rate with P _{CIF} (Yuen Long - 1.0)	= 2629.5 m ³ /day (refer to Table T-4 of GESF - Yuen Long - 1.0)
Contributing population	= 9739 people (refer to Section 12 of GESF)
Peaking factor	= 5 (refer to Table T-5 of GESF for a population between 5000-10000 incl. stormwater allowance)
Peak flow (without swimming pool)	= 152.2 litre/sec
Peak flow (with swimming pool)	= 154.5 litre/sec

Remark: The Proposed Development will have phasing based on indicative preliminary deisgn. This calculation is prepared base on 7 phasing (3 on Site 28A and 4 on Site 28B), serving only as an assumption for the Sewerage Appraisal.

Total ADWF of Site 4-25c

Table 6a Comparison of the Hydraulic Capacity of the Lead-in for Each Site

Sewerage catchment to lead-ins

Hydraulic Capacity of Future Sewers

Manhole Reference	Manhole Reference	Proposed Pipe Dia. (mm)	Proposed Pipe Length (m)	Gradient	Estimated Capacity (L/s)	Peak Flow from the Proposed Development (L/s)	Contribution from the Proposed Development (%)	Status	Included Catchment
LI-S4.25b-1	FMH158a	355	11.4	0.0035	110	53.4	48.5%	OK	Site 28B-1
LI-S4.25b-3	FMH164a	355	12.8	0.0055	138	53.4	38.6%	OK	Site 28B-2
LI-S4.25a-1	FMH165a	355	11.6	0.0035	109	38.4	35.2%	OK	Site 28B-3
LI-S4.25c-1	FMH157b	355	11.6	0.0060	145	77.3	53.2%	OK	Half of Site 28B-4
LI-S4.25c-2	FMH399a	355	12.4	0.0056	140	77.3	55.1%	OK	Half of Site 28B-4
LI-S4.29-2	FMH168a	450	20.0	0.0040	220	64.3	29.2%	OK	Site 28A-1
LI-S4.29-3	FMH178A	315	17.6	0.0034	79	41.2	52.0%	OK	Half of Site 28A-2
LI-S4.29-4	FMH175a	315	14.6	0.0041	87	41.2	47.2%	OK	Half of Site 28A-2
LI-S4.29-1	FMH166b	450	13.0	0.0041	223	152.0	68.2%	OK	Site 28A-3

Table 6b Comparison of the Public Sewers for Sewerage generated from the Proposed Development and Surrounding Catchment Areas

Manhole Reference	Manhole Reference	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	Peak Flow from the Proposed Development and Surrounding Catchment (L/s)	Contribution from the S16 Proposed Development and Surrounding Catchment (%)	Status	Catchment included/ to be included
LI-S4.25c-1	FMH157b	355	11.6	0.006	145.11	77.3	53.2%	OK	Half of Site 28B-4
FMH157b	FMH399a	450	17.1	0.008	315.98	77.3	24.5%	OK	Half of Site 28B-4
LI-S4.25c-2	FMH399a	355	12.4	0.006	140.29	77.3	55.1%	OK	Half of Site 28B-4
FMH399a	FMH158a	450	37.1	0.006	274.74	154.5	56.2%	OK	Site 28B-4 (whole)
FMH158a	FMH159a	450	46.8	0.005	244.13	160.5	65.7%	OK	Site 28B-4 + Site 28B-1
FMH159a	FMH160b	450	42.0	0.006	269.18	160.5	59.6%	OK	Site 28B-4 + Site 28B-1
FMH160b	FMH162a	450	15.0	0.013	404.27	160.5	39.7%	OK	Site 28B-4 + Site 28B-1
FMH162a	FMH163a	560	57.5	0.004	407.34	263.6	64.7%	OK	Site 28B-4 + Site 28B-1 + Catchment A
FMH163a	FMH164a	560	39.7	0.006	481.41	263.6	54.7%	OK	Site 28B-4 + Site 28B-1 + Catchment A
FMH164a	FMH164_1	630	48.0	0.007	720.34	300.0	41.6%	OK	Site 28B-4 + Site 28B-1 + Catchment A + Site 28B-2
FMH164_1	FMH165a	630	49.8	0.003	475.71	300.0	63.1%	OK	Site 28B-4 + Site 28B-1 + Catchment A + Site 28B-2
FMH165a	FMH1119-1	710	39.2	0.003	634.39	382.1	60.2%	OK	Site 28B-4 + Site 28B-1+ Catchment A + Site 28B-2 + Site 28B-3 + Catchment B
FMH1119-1	FMH166b	710	42.3	0.003	635.83	382.1	60.1%	OK	Site 28B-4 + Site 28B-1+ Catchment A + Site 28B-2 + Site 28B-3 + Catchment B
FMH166b	FMH167a	710	52.6	0.005	777.05	581.5	74.8%	OK	Site 28B-4 + Site 28B-1 + Catchment A + Site 28B-2 + Site 28B-3 + Catchment B + Site 28A-3 + Half of Catchment C
FMH167a	FMH168a	710	63.5	0.005	790.53	581.5	73.6%	OK	Site 28B-4 + Site 28B-1 + Catchment A + Site 28B-2 + Site 28B-3 + Catchment B + Site 28A-3 + Half of Catchment C
FMH168a	FMH173a	710	67.0	0.003	672.74	625.5	93.0%	OK	Site 28B-4 + Site 28B-1 + Catchment A + Site 28B-2 + Site 28B-3 + Catchment B + Site 28A-3 + Half of Catchment C + Site 28A-1
FMH341A	FMH175a	500	28.9	0.007	383	23.1	6.0%	OK	Catchment D
FMH175a	FMH176b	710	22.7	0.007	998.34	73.2	7.3%	OK	Half of Site 28A-2 + Catchment D
FMH176b	FMH177a	710	36.3	0.008	1013.39	136.9	13.5%	OK	Half of Site 28A-2 + Catchment D + Catchment E
FMH177a	FMH178a	710	50.5	0.007	987.23	136.9	13.9%	OK	Half of Site 28A-2 + Catchment D + Catchment E
FMH178a	FMH173a	710	21.0	0.009	1069.26	176.6	16.5%	OK	Site 28A-2 + Catchment D + Catchment E
FMH173a	FMH179a	900	7.7	0.025	3387.43	765.0	22.6%	OK	Site 28B-1 + Site 28B-2 + Site 28B-3 + Site 28B-4 + Site 28A-1 + Site 28A-2 + Site 28A-3 + Catchment A + Catchment B + Half of Catchment C + Catchment D + Catchment E

Remark: The Proposed Development will have phasing based on indicative preliminary deisgn. This calculation is prepared base on 7 phasing (3 on Site 28A and 4 on Site 28B), serving only as an assumption for the Sewerage Appraisal.

S16 Planning Application for Proposed Flat and Shop and Services and Eating Place at Non-Domestic Podium within “G/IC(1)” Zone of Planning Area 34E of Hung Shui Kiu/ Ha Tsuen New Development Area
Sewerage Impact Assessment

ARUP		Job No.		Sheet No.		Rev.						
		278463										
		Member/Location										
Job Title		HSK/HT NDA Package A Works for Second Phase Development - Design and Construction				Drg. Ref.						
Calculation		Estimation of Sewage Flow (by SPS and Phase)				Made by		GC	Date	09/2025	Chd.	BT

Sewage Pumping Station ⁽¹⁾	Implementation Phase ⁽²⁾	Total Population ⁽³⁾	ADWF ⁽⁴⁾ (m ³ /day)	Cumulative ADWF ⁽⁵⁾ (m ³ /day)	Design Cumulative ADWF ⁽⁶⁾ (m ³ /day)	N ⁽⁷⁾	P ⁽⁸⁾	Q _{peak} ⁽⁹⁾ (m ³ /day)	Q _{peak} (m ³ /s)	Design Capacity (m ³ /day)	Utilization Ratio (%)
Post-Development (Based on latest parameters under the Revised RODP)											
SPS2	AWP1	0	0	0	0	0	0.00	0	0.000	47,229	0%
	AWP2	0	0	57	59	219	4.00	226	0.003		0%
	AWP3	3,239	907	4,834	4,955	18,352	3.50	16,918	0.196		10%
	S1	0	0	4,834	4,955	18,352	3.50	16,918	0.196		10%
	S2	1,627	456	45,266	46,399	171,849	2.79	126,344	1.462		98%
	S3	0	0	46,076	47,229	174,923	2.79	128,457	1.487		100%
	S4	0	0	46,076	47,229	174,923	2.79	128,457	1.487		100%
SPS3	AWP1	0	0	0	0	0	0.00	0	0.000	12,341	0%
	AWP2	0	0	0	0	0	0.00	0	0.000		0%
	AWP3	0	0	0	0	0	0.00	0	0.000		0%
	S1	0	0	0	0	0	0.00	0	0.000		0%
	S2	42,747	11,230	11,230	11,511	42,634	3.00	33,690	0.390		93%
	S3	2,893	810	12,040	12,341	45,708	3.00	36,120	0.418		100%
	S4	0	0	12,040	12,341	45,708	3.00	36,120	0.418		100%
HSKEPP	AWP1	0	0		0	0	0.00	0	0.000	0	-
	AWP2	0	0		0	0	0.00	0	0.000		-
	AWP3	0	0		0	0	0.00	0	0.000		-
	S1	0	0		0	0	0.00	0	0.000		-
	S2	133,886	41,998	47,872	49,070	181,741	2.78	133,133	1.541	60000	82%
	S3	29,899	6,304	83,207	85,288	315,882	2.68	223,232	2.584	90000	95%
	S4	9,031	2,082	85,289	87,421	323,782	2.68	228,449	2.644		97%

- Notes:**
- (1) Denotes the name of SPS to which the sewage flow is discharged
- (2) Implementation phases in accordance with the latest development schedule enclosed in Appendix F
- (3) Total projected population contributing to the respective SPS
- (4) Estimated ADWF from the catchment area of its own respective SPS
- (5) Cumulative ADWF of the SPS (i.e. SPS2 will receive sewage flow from SPS1 and SPS3)
- SPS2 will receive sewage flow from SPS1 and SPS3.
- SPS4 will receive sewage flow from existing Tin Wah Road Sewage Pumping Station (TWRSPS):
- | | |
|----------------------------|--------|
| ADWF (m ³ /day) | 43,546 |
|----------------------------|--------|
- HTSPS will receive sewage flow from Agreement No. CE 92/2017 (CE) Tan Kwai Tsuen Public Housing Development (TKT PHD) project for subsequent treatment at SWSTW:
- | | |
|----------------------------|-------|
| ADWF (m ³ /day) | 4,960 |
|----------------------------|-------|
- (6) Cumulative ADWF of the SPS taking into account the Return Liquid Allowance (RLA) of 2.5%
- | | |
|---------|-----|
| RLA (%) | 2.5 |
|---------|-----|
- (7) Contributing population N calculated in accordance with EPD's GESF
- (8) Peaking factor P calculated in accordance with EPD's GESF
- (9) Estimated peak flow Q to the respective SPS

Proposed Scenario

1. Sewage flow build-up for the Application Site
2. Estimation of sewage flow by SPS and phasing

S16 Planning Application for Proposed Flat and Shop and Services and Eating Place at Non-Domestic Podium within “G/IC(1)” Zone of Planning Area 34E of Hung Shui Kiu/ Ha Tsuen New Development Area
Sewerage Impact Assessment

Proposed Scenario

Baseline (Extracted from S16 Planning Application No. A/HSK/452 (approved on 23 Jun 2023))							
Site No.	Zoning	Domestic GFA (m ²)	Average Flat Size (m ²)	Total Number of Flat	Total ADWF (m ³ /day)	Design ADWF ⁽¹⁾ (m ³ /day)	Remarks
4-1	G	33600	70	480	436	447	- Divisional Fire Station cum Ambulance Depot - 140 workers - Divisional Fire Station cum Ambulance Depot - minimum site allocation of 3,830 sqm + Drill Yard of 1,635 sqm - 4 storeys podium for fire station/ambulance depot (Part of 1st-2nd floor will accommodate double-storey fire engine parking) - Two 31-storey residential towers (1 storey lobby + 30 storeys flats) (Reference: Existing footprint of developed FSD quarters)

(1) Design ADWF includes a return liquid allowance of 2.5%

Proposed Development							
Site No.	Zoning	GFA (m ²) ⁽²⁾	Population	UFF (m ³ /head/day)	Total ADWF (m ³ /day)	Design ADWF ⁽¹⁾ (m ³ /day)	Remarks
4-1	Domestic (R1)	46560	2420	0.27	653	670	- Assume person per flat ratio of 2.6, with reference to the latest C&SD projection of average household size starting from 2031
	Non-domestic (Commercial – General)	2716	96	0.28	27	28	- Assume worker density of 3.5 based on "Retail Trade" activity under Table 8 of CIFSUS by PlanD
	Non-domestic (Restaurants)	1164	60	1.58	95	97	- Assume worker density of 5.1 based on "Restaurants" activity under Table 8 of CIFSUS by PlanD
	Clubhouse (Commercial – General)	2095.2	70	0.28	20	20	- Assume worker density of 3.3 based on "Community, Social & Personal Services" activity under Table 8 of CIFSUS by PlanD
Total					795	815	

(1) Design ADWF includes a return liquid allowance of 2.5%

(2) Assume total non-domestic GFA (i.e. 3,880 m²) comprises 70% non-catering and 30% catering GFA.

Estimation of backwash flow from proposed swimming pools

Indoor swimming pool

Pool length =	20	m	
Pool width =	9	m	
Pool depth =	1.5	m	
Pool volume =	270	m ³	
Turnover rate =	6	hours	
Filter loading rate =	48	m ³ /m ² /hr	
Filter area required =	270 / 6 / 48 =	0.94	m ²
Backwash flow rate =	0.5	m ³ /m ² /mins.	
Backwash duration =	3	mins./day	
Daily backwash flow =	0.94 x 3 x 0.5 =	1.41	m ³ /day

Outdoor swimming pool

Pool length =	30	m	
Pool width =	9	m	
Pool depth =	1.5	m	
Pool volume =	405	m ³	
Turnover rate =	6	hours	
Filter loading rate =	48	m ³ /m ² /hr	
Filter area required =	405 / 6 / 48 =	1.41	m ²
Backwash flow rate =	0.5	m ³ /m ² /mins.	
Backwash duration =	3	mins./day	
Daily backwash flow =	1.41 x 3 x 0.5 =	2.12	m ³ /day
Total daily backwash flow =	1.41 + 2.12 =	3.53	m ³ /day

ARUP		Job No.		Sheet No.		Rev.					
		278463									
		Member/Location									
Job Title		HSK/HT NDA Package A Works for Second Phase Development - Design and Construction				Drg. Ref.					
Calculation		Estimation of Sewage Flow (by SPS and Phase)				Made by	GC	Date	09/2025	Chd.	BT

Sewage Pumping Station (1)	Implementation Phase (2)	Total Population (3)	ADWF (4) (m³/day)	Cumulative ADWF (5) (m³/day)	Design Cumulative ADWF (6) (m³/day)	N (7)	P (8)	Q _{peak} (9) (m³/day)	Q _{peak} (m³/s)	Design Capacity (m³/day)	Utilization Ratio (%)
Post-Development (Based on latest parameters under the Revised RODP)											
SPS2	AWP1	0	0	0	0	0	0.00	0	0.000	47,597	0%
	AWP2	0	0	57	59	219	4.00	226	0.003		0%
	AWP3	3,239	907	4,834	4,955	18,352	3.50	16,918	0.196		10%
	S1	0	0	4,834	4,955	18,352	3.50	16,918	0.196		10%
	S2	1,627	456	45,625	46,766	173,208	2.79	127,281	1.473		98%
	S3	0	0	46,435	47,597	176,286	2.79	129,393	1.498		100%
	S4	0	0	46,435	47,597	176,286	2.79	129,393	1.498		100%
SPS3	AWP1	0	0	0	0	0	0.00	0	0.000	12,709	0%
	AWP2	0	0	0	0	0	0.00	0	0.000		0%
	AWP3	0	0	0	0	0	0.00	0	0.000		0%
	S1	0	0	0	0	0	0.00	0	0.000		0%
	S2	42,747	11,589	11,589	11,879	43,997	3.00	34,766	0.402		93%
	S3	2,893	810	12,399	12,709	47,071	3.00	37,196	0.431		100%
	S4	0	0	12,399	12,709	47,071	3.00	37,196	0.431		100%
HSKEPP	AWP1	0	0		0	0	0.00	0	0.000	0	-
	AWP2	0	0		0	0	0.00	0	0.000		-
	AWP3	0	0		0	0	0.00	0	0.000		-
	S1	0	0		0	0	0.00	0	0.000		-
	S2	133,886	42,357	48,231	49,438	183,104	2.78	134,066	1.552	60000	82%
	S3	29,899	6,304	83,566	85,656	317,245	2.68	224,132	2.594	90000	95%
	S4	9,031	2,082	85,648	87,789	325,145	2.68	229,348	2.654		98%

Notes:
(1) Denotes the name of SPS to which the sewage flow is discharged
(2) Implementation phases in accordance with the latest development schedule enclosed in Appendix F
(3) Total projected population contributing to the respective SPS
(4) Estimated ADWF from the catchment area of its own respective SPS
(5) Cumulative ADWF of the SPS (i.e. SPS2 will receive sewage flow from SPS1 and SPS3)
- SPS2 will receive sewage flow from SPS1 and SPS3.
- SPS4 will receive sewage flow from existing Tin Wah Road Sewage Pumping Station (TWRSPS):

ADWF (m³/day)	43,546
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- HTSPS will receive sewage flow from Agreement No. CE 92/2017 (CE) Tan Kwai Tsuen Public Housing Development (TKT PHD) project for subsequent treatment at SWSTW:

ADWF (m³/day)	4,960
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(6) Cumulative ADWF of the SPS taking into account the Return Liquid Allowance (RLA) of 2.5%

RLA (%)	2.5
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(7) Contributing population N calculated in accordance with EPD's GESF
(8) Peaking factor P calculated in accordance with EPD's GESF
(9) Estimated peak flow Q to the respective SPS

Hydraulic Checking on Proposed Gravity Sewer

ARUP

Job Title HSK/H7 NDA Package A Works for Second Phase Development - Design and Construction

Calculation Hydraulic Checking on Proposed Sewerage Works in C4

Job No.	Sheet No.	Rev.
278463		
Member/Location		
Dig Rat.		
Made by GC	Date Sept 2025	Chd BT

NOTE:

Colebrook - White Equation is used for hydraulic calculation

Table 1c Capacity Check - Proposed Development

Location and Level/Depth Information										Pipe/Channel/BC/UC Information										Peak Flow Estimation					Pipework Capacity and Design							
US MH No.	DS MH No.	USGL (mPD)	DSGL (mPD)	USL (mPD)	DSL (mPD)	US DTL (m)	DS DTL (m)	DS MH Backdrop (DS-US, m)	US Cover Depth (m)	DS Cover Depth (m)	Length (m)	Shape (UC/Circular/BC/R)	Nominal Diameter	Pipe Material	Diameter of Pipe/Width of Channel (mm)	Diameter of Pipe/Width of Channel (m)	No of Cells or Pipes	Gradient (1 in)	Flow Area (m ²)	Wetted Perimeter (m)	Hydraulic Radius (m)	Colebrook-White Roughness Coefficient (mm)	Additional ADFW (m ³ /day)	Cumulative ADFW (m ³ /day)	Cumulative ADFW (m ³ /s)	Cumulative Contributing Population (Head)	Peak Factor	Total Peak Flow per Pipe or Cell (m ³ /s)	(32gR) ^{0.5}	Full-bore Velocity (m/s)	Full-bore Capacity per Cell (m ³ /s)	Utilization Ratio
FMHSP3-BP0	FMHSP3-BP1	11.25	8.70	7.700	7.650	3.550	1.050	0.000	3.06	0.56	8.75	Circular	NS660	HDPE (SDR17)	491.8	0.4918	2	175	0.190	1.545	0.123	0.3	12511	12511.00	0.145	46337	4.00	0.290	0.47	1.75	0.33	87%
FMHSP3-BP1	FMHSP3-BP2	8.70	10.98	7.650	7.440	1.050	3.530	0.000	0.56	3.04	36.37	Circular	NS660	HDPE (SDR17)	491.8	0.4918	2	182	0.190	1.545	0.123	0.3	0.00	12511.00	0.145	46337	4.00	0.290	0.46	1.71	0.33	89%
FMHSP3-BP2	FMHSP3-BP3	10.98	9.83	7.450	7.400	3.530	2.430	0.000	2.74	1.64	25.53	Circular	NS900	HDPE (SDR17)	791.6	0.7916	1	511	0.492	2.487	0.198	0.3	0.00	12511.00	0.145	46337	4.00	0.579	0.35	1.36	0.67	86%
FMHSP3-BP3	FMHSP3-BP4	9.83	8.67	7.400	7.340	2.430	1.330	0.000	1.64	0.54	32.33	Circular	NS900	HDPE (SDR17)	791.6	0.7916	1	539	0.492	2.487	0.198	0.3	0.00	12511.00	0.145	46337	4.00	0.579	0.34	1.33	0.65	89%
FMHSP3-BP4	FMHSP3-BP5	8.67	8.13	7.340	7.240	1.330	0.890	0.000	0.84	0.40	14.98	Circular	NS660	HDPE (SDR17)	491.8	0.4918	2	150	0.190	1.545	0.123	0.3	0.00	12511.00	0.145	46337	4.00	0.290	0.51	1.69	0.36	81%
FMHSP3-BP5	FMHSP3-BP6	8.13	7.93	7.240	7.070	0.890	0.860	0.000	0.40	0.37	15.05	Circular	NS660	HDPE (SDR17)	491.8	0.4918	2	89	0.190	1.545	0.123	0.3	0.00	12511.00	0.145	46337	4.00	0.290	0.66	2.47	0.47	62%
FMHSP3-BP6	FMHSP3-BP7	7.93	9.09	7.070	6.980	0.860	2.110	0.000	0.37	1.62	16.68	Circular	NS660	HDPE (SDR17)	491.8	0.4918	2	185	0.190	1.545	0.123	0.3	0.00	12511.00	0.145	46337	4.00	0.290	0.46	1.70	0.32	90%
FMHSP3-BP7	FMHSP3-BP8	9.09	9.72	6.980	6.953	2.110	2.767	0.000	1.32	1.98	23.50	Circular	NS900	HDPE (SDR17)	791.6	0.7916	2	870	0.492	2.487	0.198	0.3	0.00	12511.00	0.145	46337	4.00	0.290	0.27	1.04	0.51	57%
FMHSP3-BP8	FMHSP3-BP9	9.72	9.03	6.953	6.400	2.767	2.630	0.000	1.98	1.84	20.40	Circular	NS900	HDPE (SDR17)	791.6	0.7916	1	37	0.492	2.487	0.198	0.3	0.00	12511.00	0.145	46337	4.00	0.579	1.30	5.15	2.53	23%
FMHSP3-BP9	FMHSP3-BP10	9.03	8.03	6.400	5.580	2.630	2.450	0.000	1.84	1.56	25.53	Circular	NS900	HDPE (SDR17)	791.6	0.7916	1	31	0.492	2.487	0.198	0.3	0.00	12511.00	0.145	46337	4.00	0.579	1.41	5.60	2.75	21%
FMHSP3-BP10	SMH00L18	8.03	5.89	5.580	5.000	2.450	0.890	-	1.66	0.10	18.08	Circular	NS900	HDPE (SDR17)	791.6	0.7916	1	31	0.492	2.487	0.198	0.3	0.00	12511.00	0.145	46337	4.00	0.579	1.41	5.60	2.76	21%
LI-S4-4.2	FMH206a	15.00	14.85	12.000	11.890	3.000	3.160	0.050	2.65	2.81	31.42	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	101	0.097	1.104	0.088	0.3	854.85	854.85	0.010	3166	6.00	0.059	0.52	1.87	0.18	33%
FMH206a	FMH207a	14.85	14.53	11.640	11.310	3.210	3.220	0.000	2.81	2.82	17.56	Circular	NS450	HDPE (SDR17)	395.2	0.3952	1	114	0.123	1.242	0.099	0.3	26.55	881.40	0.010	3264	6.00	0.061	0.52	1.90	0.23	26%
FMH207a	FMH208a	14.53	13.85	10.710	10.500	3.360	3.350	0.000	3.42	2.95	37.04	Circular	NS450	HDPE (SDR17)	395.2	0.3952	1	176	0.123	1.242	0.099	0.3	457.39	1338.79	0.015	4958	6.00	0.093	0.42	1.52	0.19	50%
FMH208a	FMH209a	13.85	13.18	10.500	10.100	3.350	3.080	0.050	2.95	2.68	51.70	Circular	NS450	HDPE (SDR17)	395.2	0.3952	1	129	0.123	1.242	0.099	0.3	838.12	2176.90	0.025	8063	5.00	0.126	0.49	1.78	0.22	58%
FMH209a	FMH210b	13.18	13.88	10.050	9.950	3.130	4.290	0.120	2.69	3.85	65.74	Circular	NS500	HDPE (SDR17)	439.2	0.4392	1	143	0.152	1.380	0.110	0.3	838.12	3015.02	0.035	11061	4.00	0.140	0.49	1.81	0.27	51%
FMH210b	FMH211a	13.88	12.92	9.470	9.240	4.410	3.680	0.000	3.97	3.24	60.01	Circular	NS500	HDPE (SDR17)	439.2	0.4392	1	261	0.152	1.380	0.110	0.3	290.87	3305.89	0.038	12244	4.00	0.153	0.36	1.33	0.20	76%
FMH211a	FMH217a	12.92	11.97	9.240	9.020	3.680	2.950	0.000	3.19	2.46	69.92	Circular	NS560	HDPE (SDR17)	491.8	0.4918	1	277	0.190	1.545	0.123	0.3	290.87	3596.77	0.042	13321	4.00	0.167	0.37	1.38	0.26	63%
FMH217a	FMH218a	11.97	11.06	8.370	8.160	5.600	4.900	0.070	4.90	4.20	59.07	Circular	NS800	HDPE (SDR17)	703.9	0.7039	1	281	0.389	2.211	0.176	0.3	587.35	4184.11	0.048	15497	4.00	0.194	0.44	1.72	0.67	29%
FMH218a	FMH219a	11.06	10.51	6.090	5.910	4.970	4.600	0.000	4.09	3.72	57.10	Circular	NS1000	HDPE (SDR17)	879.8	0.8798	1	317	0.608	2.764	0.220	0.3	587.35	4771.46	0.055	17672	4.00	0.221	0.47	1.85	1.13	20%
FMH219a	FMH219a	10.51	12.08	5.910	5.750	4.600	6.330	0.010	3.79	5.52	60.40	Circular	NS1000	HDPE (SDR17)	879.8	0.8798	1	378	0.522	2.560	0.204	0.3	7106.65	11878.11	0.137	43963	4.00	0.550	0.41	1.62	0.84	65%
FMH219a	FMH219a	12.08	12.51	5.750	5.720	6.340	6.790	0.010	5.53	5.96	10.21	Circular	NS1000	HDPE (SDR17)	879.8	0.8798	1	510	0.522	2.560	0.204	0.3	0.00	11878.11	0.137	43963	4.00	0.550	0.36	1.39	0.72	75%
FMH219a-1	FMH219a-2	12.51	11.25	5.710	5.680	6.800	5.570	0.000	5.99	4.76	16.04	Circular	NS1000	HDPE (SDR17)	879.8	0.8798	1	535	0.522	2.560	0.204	0.3	0.00	5939.05	0.069	21996	4.00	0.275	0.35	1.36	0.71	39%
FMH219a-2	D-SPS3-1	11.25	6.68	5.680	5.670	5.570	1.010	-	4.69	0.13	6.35	Circular	NS1000	HDPE (SDR17)	879.8	0.8798	1	635	0.608	2.764	0.220	0.3	0.00	5939.05	0.069	21996	4.00	0.275	0.30	1.17	0.71	39%
FMH219a-1	FMH219a-3	12.51	11.25	5.710	5.680	6.800	5.570	0.000	5.99	4.76	17.50	Circular	NS1000	HDPE (SDR17)	879.8	0.8798	1	583	0.522	2.560	0.204	0.3	0.00	5939.05	0.069	21996	4.00	0.275	0.33	1.30	0.68	41%
FMH219a-3	D-SPS3-2	11.25	6.68	5.680	5.670	5.570	1.010	-	4.69	0.13	7.79	Circular	NS1000	HDPE (SDR17)	879.8	0.8798	1	779	0.608	2.764	0.220	0.3	0.00	5939.05	0.069	21996	4.00	0.275	0.30	1.17	0.71	39%
LI-S4-2-1	FMH206a	15.00	14.85	12.140	12.070	2.860	2.780	0.430	2.61	2.53	23.74	Circular	NS280	HDPE (SDR17)	245.9	0.2459	1	339	0.047	0.773	0.061	0.3	26.55	26.55	0.000	98	8.00	0.002	0.24	0.80	0.04	6%
LI-S4-2-2	FMH207a	15.00	14.53	12.140	12.050	2.860	2.480	1.340	2.61	2.23	14.98	Circular	NS280	HDPE (SDR17)	245.9	0.2459	1	166	0.047	0.773	0.061	0.3	26.55	26.55	0.000	98	8.00	0.002	0.34	1.16	0.05	4%
LI-S4-3-3	FMH207a	13.48	14.53	10.850	10.710	2.630	3.820	0.000	2.32	3.51	14.98	Circular	NS355	HDPE (SDR17)	311.6	0.3116	1	107	0.076	0.979	0.078	0.3	430.84	430.84	0.005	1596	6.00	0.030	0.48	1.69	0.13	23%
LI-S4-1-1	FMH208b	14.50	13.85	12.140	12.050	2.360	1.800	1.550	2.05	1.49	17.77	Circular	NS355	HDPE (SDR17)	311.6	0.3116	1	197	0.076	0.979	0.078	0.3	407.27	407.27	0.005	1508	6.00	0.028	0.35	1.23	0.09	30%
LI-S4-3-1	FMH208b	14.25	13.85	11.000	10.770	3.250	3.080	0.270	2.90	2.73	23.90	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	104	0.097	1.104	0.088	0.3	430.84	430.84	0.005	1596	6.00	0.030	0.52	1.84	0.18	17%
LI-S4-1-2	FMH209b	14.50	13.18	12.140	12.050																											

ARUP

Job Title HSK/HT NDA Package A Works for Second Phase Development - Design and Construction

Calculation Hydraulic Checking on Proposed Sewerage Works in C4

Job No.	Sheet No.	Rev.
278463		
Member/Location		
Dig. Rat.		
Made by GC	Date Sept 2025	Chd. BT

NOTE:

Colebrook - White Equation is used for hydraulic calculation

Table 1c Capacity Check - Proposed Development

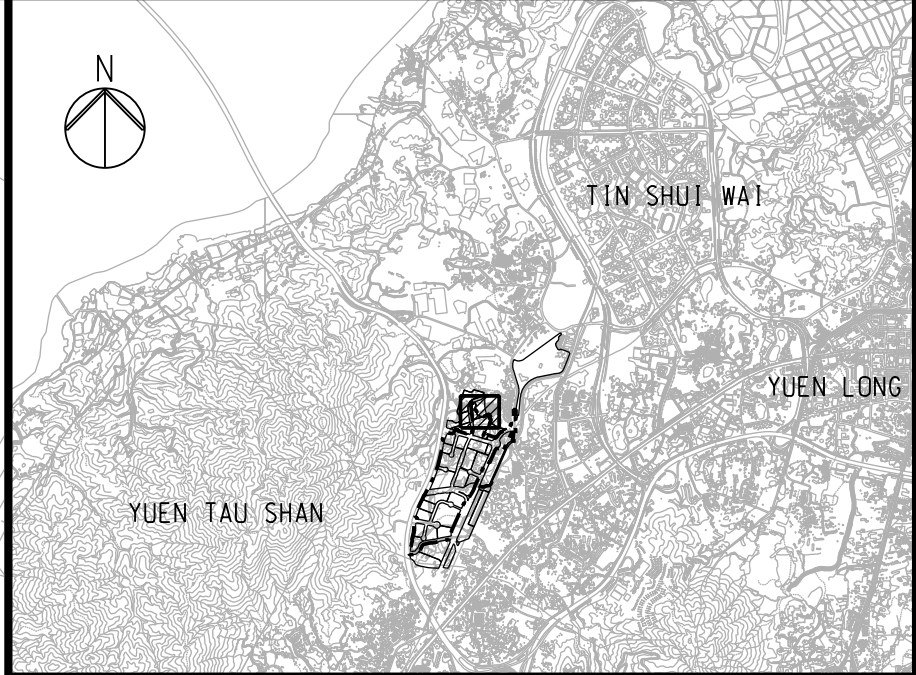
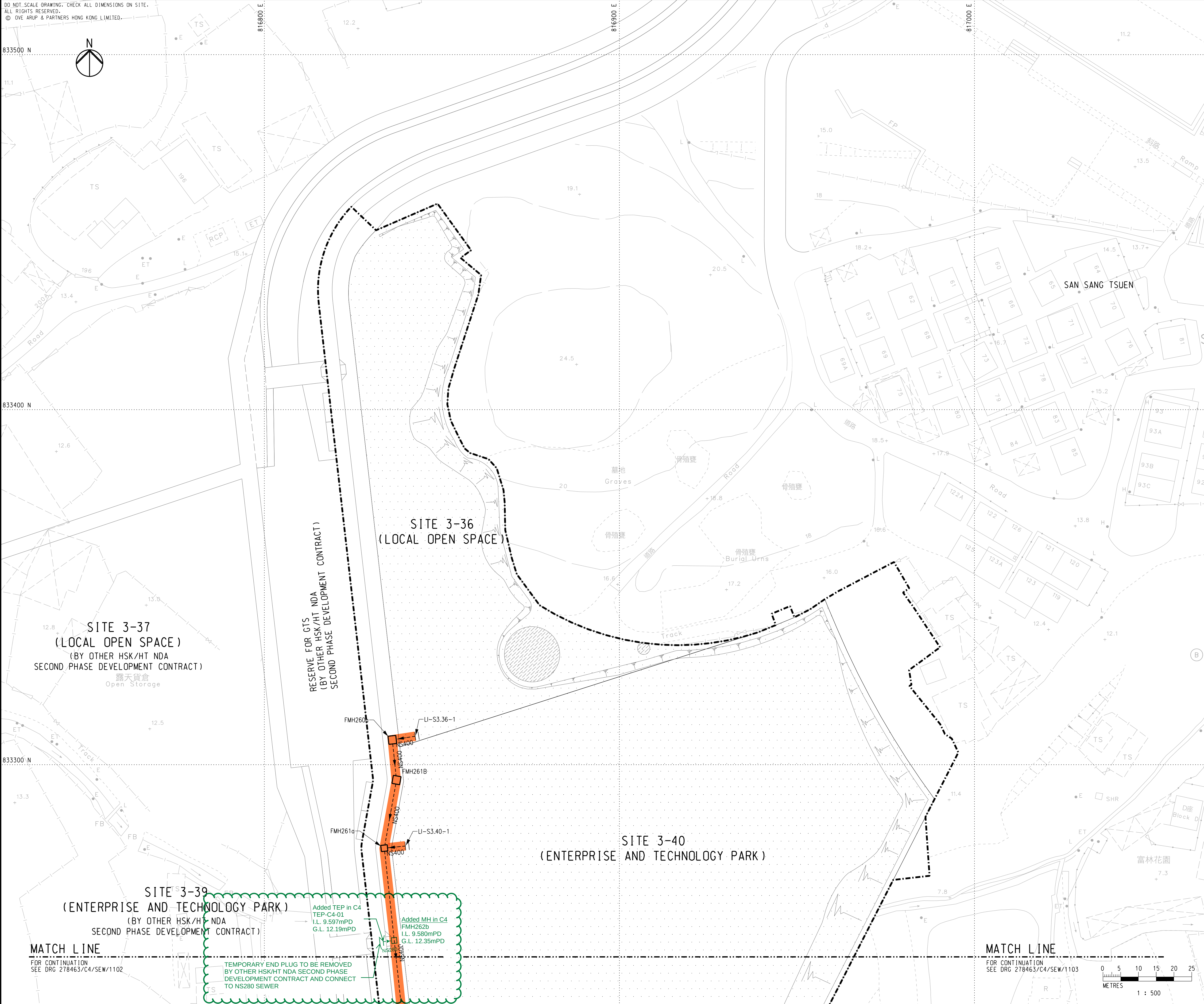
Location and Level/Depth Information										Pipe/Channel/BC/UC Information										Peak Flow Estimation					Pipeworks Capacity and Design							
US MH No.	DS MH No.	USGL (mPD)	DSGL (mPD)	USL (mPD)	DSL (mPD)	US DTL (m)	DS DTL (m)	DS MH BackDrop (DS _u - US _u)	US Cover Depth (m)	DS Cover Depth (m)	Length (m)	Shape (UC/Circular/ BC/C)	Nominal Diameter	Pipe Material	Diameter of Pipe/Width of Channel (mm)	Diameter of Pipe/Width of Channel (m)	No of Cells or Pipes	Gradient (1 in)	Flow Area (m ²)	Wetted Perimeter (m)	Hydraulic Radius (m)	Colebrook-White Roughness Coefficient (mm)	Additional ADWF (m ³ /day)	Cumulative ADWF (m ³ /day)	Cumulative ADWF (m ³ /s)	Cumulative Contributing Population (Head)	Peak Factor	Total Peak Flow per Cell (m ³ /s)	Velocity (12gRPS) ^{0.5}	Full-bore Velocity (m/s)	Full-bore Capacity per Cell (m ³ /s)	Utilization Ratio
LI-S4-5-2	FMH194.1	13.50	12.72	9.730	9.680	3.770	3.040	0.000	3.42	2.69	4.74	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	95	0.097	1.104	0.088	0.3	1271.51	1271.51	0.015	4709	6.00	0.088	0.54	1.93	0.19	47%
FMH194.1	FMH195.1	13.13	12.52	11.130	11.130	1.900	1.390	2.530	1.55	1.04	7.44	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	74	0.097	1.104	0.088	0.3	854.85	854.85	0.010	3166	6.00	0.059	0.61	2.18	0.21	28%
LI-S4-7-1	FMH212a	14.00	13.09	7.440	7.400	6.560	5.690	-0.850	6.21	5.34	9.63	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	241	0.097	1.104	0.088	0.3	0.00	0.00	0.000	0	8.00	0.000	0.34	1.20	0.12	0%
LI-S4-7-2	FMH215	14.00	12.87	11.680	11.640	2.320	1.230	3.500	1.97	0.88	9.71	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	243	0.097	1.104	0.088	0.3	0.00	0.00	0.000	0	8.00	0.000	0.34	1.20	0.12	0%
LI-S4-6-1	FMH423b	11.00	11.00	8.100	8.050	2.900	2.950	0.350	2.50	2.55	5.00	Circular	NS450	HDPE (SDR17)	395.2	0.3952	1	100	0.123	1.242	0.099	0.3	692.39	692.39	0.008	2564	6.00	0.048	0.56	2.02	0.25	19%
LI-S4-6-2	FMH216a	12.20	12.50	8.500	8.430	3.700	4.070	0.660	3.35	3.72	11.05	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	158	0.097	1.104	0.088	0.3	692.39	692.39	0.008	2564	6.00	0.048	0.42	1.49	0.14	33%
LI-S4-13b-2	FMH105a	13.50	12.71	11.050	10.950	2.450	1.760	0.000	2.01	1.32	18.90	Circular	NS500	HDPE (SDR17)	439.2	0.4392	1	189	0.152	1.380	0.110	0.3	777.89	777.89	0.009	2881	6.00	0.054	0.43	1.57	0.24	23%
FMH105a	FMH106a	12.71	12.78	10.950	10.880	1.760	1.900	0.000	1.32	1.46	13.95	Circular	NS500	HDPE (SDR17)	439.2	0.4392	1	199	0.152	1.380	0.110	0.3	0.00	777.89	0.009	2881	6.00	0.054	0.42	1.52	0.23	23%
FMH106a	FMH106b	12.78	13.39	10.880	10.640	1.900	2.750	0.000	1.41	2.26	46.34	Circular	NS560	HDPE (SDR17)	491.8	0.4918	1	193	0.190	1.545	0.123	0.3	2738.76	3516.65	0.041	13025	4.00	0.163	0.45	1.66	0.32	52%
FMH106b	FMH107a	13.39	14.54	10.640	10.490	2.750	4.050	0.000	2.26	3.56	26.99	Circular	NS560	HDPE (SDR17)	491.8	0.4918	1	180	0.190	1.545	0.123	0.3	0.00	3516.65	0.041	13025	4.00	0.163	0.46	1.72	0.33	50%
FMH107a	FMH108a	14.54	15.42	10.490	10.330	4.050	5.090	0.000	3.56	4.60	30.35	Circular	NS560	HDPE (SDR17)	491.8	0.4918	1	190	0.190	1.545	0.123	0.3	667.94	4184.59	0.048	15498	4.00	0.194	0.45	1.68	0.32	61%
FMH108a	FMH108a	15.42	15.68	10.330	10.200	5.090	5.480	0.000	4.47	4.86	23.86	Circular	NS710	HDPE (SDR17)	624.6	0.6246	1	184	0.306	1.962	0.156	0.3	667.94	4852.53	0.056	17972	4.00	0.225	0.52	1.98	0.61	37%
FMH108a	FMH109b	15.68	16.30	10.200	9.980	5.480	6.320	0.000	4.86	5.70	43.30	Circular	NS710	HDPE (SDR17)	624.6	0.6246	1	197	0.306	1.962	0.156	0.3	474.12	5326.66	0.062	19728	4.00	0.247	0.50	1.91	0.59	42%
FMH109b	FMH110a	16.30	17.21	9.980	9.710	6.320	7.500	0.000	5.70	6.88	51.73	Circular	NS710	HDPE (SDR17)	624.6	0.6246	1	192	0.306	1.962	0.156	0.3	474.12	5800.78	0.067	21484	4.00	0.269	0.51	1.94	0.59	45%
FMH110a	FMH115	17.21	18.25	9.710	9.520	7.500	8.730	0.000	6.88	8.11	35.57	Circular	NS710	HDPE (SDR17)	624.6	0.6246	1	187	0.306	1.962	0.156	0.3	524.77	6325.55	0.073	23428	4.00	0.293	0.51	1.96	0.60	49%
FMH115	FMH115a	18.25	18.86	9.520	9.380	8.730	9.480	0.000	8.15	8.90	27.07	Circular	NS710	HDPE (SDR11)	577.6	0.5776	1	193	0.262	1.815	0.144	0.3	524.77	6850.32	0.079	25372	4.00	0.317	0.48	1.84	0.48	66%
FMH115a	FMH122a	18.86	19.00	9.380	9.167	9.480	9.833	0.000	8.90	9.26	29.11	Circular	NS710	HDPE (SDR11)	577.6	0.5776	1	137	0.262	1.815	0.144	0.3	3065.75	9919.08	0.115	36726	4.00	0.459	0.58	2.19	0.57	80%
FMH122a	TEP-D7	19.00	9.59	9.167	8.700	9.833	0.890	-	9.10	0.16	81.94	Circular	NS900	HDPE (SDR11)	732.4	0.7324	1	175	0.421	2.301	0.183	0.3	1358.49	11274.57	0.130	41758	4.00	0.522	0.57	2.24	0.94	55%
LI-S4-12a-1	FMH119a	18.00	17.86	14.530	14.410	3.470	3.450	0.000	3.07	3.05	17.44	Circular	NS450	HDPE (SDR17)	395.2	0.3952	1	145	0.123	1.242	0.099	0.3	549.63	549.63	0.006	2036	6.00	0.038	0.46	1.68	0.21	19%
FMH119a	FMH120a	17.86	17.76	14.410	14.280	3.450	3.480	0.000	3.05	3.08	17.48	Circular	NS450	HDPE (SDR17)	395.2	0.3952	1	134	0.123	1.242	0.099	0.3	0.00	549.63	0.006	2036	6.00	0.038	0.48	1.74	0.21	18%
FMH120a	FMH121a	17.76	18.15	10.030	9.850	7.730	8.300	0.000	7.36	7.93	48.35	Circular	NS450	HDPE (SDR11)	365.4	0.3654	1	269	0.105	1.148	0.091	0.3	254.94	804.56	0.009	2980	6.00	0.056	0.33	1.17	0.12	46%
FMH121a	FMH122a	18.15	19.00	9.850	9.610	8.300	9.390	0.443	7.89	8.96	63.04	Circular	NS500	HDPE (SDR11)	406	0.406	1	263	0.129	1.275	0.102	0.3	553.93	1358.49	0.016	5031	5.00	0.079	0.35	1.26	0.16	48%
LI-S4-17	FMH117a	18.60	17.69	10.180	10.124	8.420	7.566	0.000	8.13	7.28	14.89	Circular	NS355	HDPE (SDR11)	288.3	0.2883	1	266	0.065	0.906	0.072	0.3	250.63	250.63	0.003	928	8.00	0.023	0.29	1.01	0.07	35%
FMH117a	FMH118a	17.69	17.87	10.124	10.083	7.566	7.787	0.000	7.28	7.50	10.78	Circular	NS355	HDPE (SDR11)	288.3	0.2883	1	263	0.065	0.906	0.072	0.3	0.00	250.63	0.003	928	8.00	0.023	0.29	1.01	0.07	35%
FMH118a	FMH120a	17.87	17.76	10.083	10.040	7.787	7.720	0.010	7.50	7.43	11.34	Circular	NS355	HDPE (SDR11)	288.3	0.2883	1	264	0.065	0.906	0.072	0.3	0.00	250.63	0.003	928	8.00	0.023	0.29	1.01	0.07	35%
LI-S4-15-1	FMH120a	18.00	17.76	14.830	14.750	3.170	3.010	4.720	2.86	2.70	13.56	Circular	NS355	HDPE (SDR17)	311.6	0.3116	1	170	0.076	0.979	0.078	0.3	4.31	4.31	0.000	16	8.00	0.000	0.38	1.33	0.10	0%
LI-S4-15-2	FMH121a	20.00	18.15	13.520	13.430	6.480	4.720	3.580	6.17	4.41	12.98	Circular	NS355	HDPE (SDR17)	311.6	0.3116	1	144	0.076	0.979	0.078	0.3	4.31	4.31	0.000	16	8.00	0.000	0.41	1.45	0.11	0%
LI-S4-12a-2	FMH121a	19.00	18.15	13.520	13.400	5.480	4.750	3.550	5.08	4.35	16.74	Circular	NS450	HDPE (SDR17)	395.2	0.3952	1	140	0.123	1.242	0.099	0.3	549.63	549.63	0.006	2036	6.00	0.038	0.47	1.71	0.21	18%
LI-S4-16-1	FMH111a	18.00	12.93	12.180	12.100	5.820	0.830	0.000	5.47	0.48	12.02	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	150	0.097	1.104	0.088	0.3	552.44	552.44	0.006	2046	6.00	0.038	0.43	1.53	0.15	26%
FMH111a	FMH112a	12.93	17.82	12.100	11.950	0.830	5.870	0.000	0.48	5.52	20.61	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	137	0.097	1.104	0.088	0.3	0.00	552.44	0.006	2046	6.00	0.038	0.45	1.60	0.16	25%
FMH112a	FMH114a	17.82	17.71	11.950	11.820	5.870	5.890	0.000	5.52	5.54	16.63	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	128	0.097	1.104	0.088	0.3	552.44	1104.89	0.013	4092	6.00	0.077	0.46	1.66	0.16	48%
FMH114a	FMH115a	17.71	17.88	11.820	11.630	5.890	6.250	0.000	5.49	5.85	26.57	Circular	NS450	HDPE (SDR17)	395.2	0.3952	1	140	0.123	1.242	0.099	0.3	1960.87	3065.75	0.035	11355	4.00	0.142	0.47	1.71	0.21	68%
FMH115a	FMH116a	17.88	18.86	11.630	11.360	6.250	7.500	1.980	5.88	7.13	36.63	Circular	NS450	HDPE (SDR11)	365.4	0.3654	1	143	0.105	1.148	0.091	0.3	0.00	3065.75	0.035	11355	4.00	0.142	0.45	1.61	0.17	84%
LI-S4-16-2	FMH112a	18.00	17.82	12.180	12.030	5.820	5.790	0.080	5.47	5.44	22.71	Circular	NS400	HDPE (SDR17)	351.3	0.3513	1	151	0.097	1.104	0.088	0.3	552.44	552.44	0.006	2046	6.00	0.038	0.43	1.52	0.15	26%
LI-S4-13a-1	FMH114a	18.00	17.71	12.180	12.030	5.680	0.210	5.38	5.24	22.09	Circular	NS500	HDPE (SDR17)	439.2	0.4392	1	147	0.152	1.380	0.110	0.3</											

Catchment of Sewerage Network

Table 1a Sewerage Catchment Summary

Catchment ID	Discharge Node	ADWF (m ³ /day) (2023 Aug RODP)	ADWF with 2.5% return liquid allowance (m ³ /day)	ADWF with 2.5% return liquid allowance and 1.15 FOS (m ³ /day)	Catchment Inflow Factors
Site 3-36	LI-S3.36-1	0.0	0.0	0.0	1
Site 3-37	LI-S3.37	0.0	0.0	0.0	1
Site 3-38	-	0.0	0.0	0.0	1
Site 3-39	LI-S3.39-1	283.8	290.9	334.5	1
	LI-S3.39-2	283.8	290.9	334.5	1
Site 3-40	LI-S3.40-1	573.0	587.3	675.4	1
	LI-S3.40-2	573.0	587.3	675.4	1
Site 3-41	FMHSPS3-BP0	2.8	2.9	3.3	1
Site 3-42	C4 Sewer	810.0	830.3	954.8	1
Site 4-1	LI-S4.1-1	397.3	407.3	468.4	1
	LI-S4.1-2	397.3	407.3	468.4	1
Site 4-2	LI-S4.2-1	25.9	26.5	30.5	1
	LI-S4.2-2	25.9	26.5	30.5	1
Site 4-3	LI-S4.3-1	420.3	430.8	495.5	1
	LI-S4.3-2	420.3	430.8	495.5	1
	LI-S4.3-3	420.3	430.8	495.5	1
Site 4-4	LI-S4.4-1	834.0	854.9	983.1	1
	LI-S4.4-2	834.0	854.9	983.1	1
Site 4-5	LI-S4.5-1	1240.5	1271.5	1462.2	1
	LI-S4.5-2	1240.5	1271.5	1462.2	1
Site 4-6	LI-S4.6-1	675.5	692.4	796.2	1
	LI-S4.6-2	675.5	692.4	796.2	1
Site 4-7	LI-S4.7-1	0.0	0.0	0.0	1
	LI-S4.7-2	0.0	0.0	0.0	1
Site 4-8	LI-S4.8-1	62.7	64.2	73.9	1
	LI-S4.8-2	62.7	64.2	73.9	1
Site 4-9	LI-S4.9-1	738.2	756.6	870.1	1
	LI-S4.9-2	738.2	756.6	870.1	1
Site 4-10	LI-S4.10-1	331.4	339.7	390.6	1
	LI-S4.10-2	331.4	339.7	390.6	1
Site 4-11	-	0.0	0.0	0.0	1
Site 4-12a	LI-S4.12a-1	512.0	524.8	603.5	1
	LI-S4.12a-2	512.0	524.8	603.5	1
Site 4-12b	LI-S4.12b-1	462.6	474.1	545.2	1
	LI-S4.12b-2	462.6	474.1	545.2	1
Site 4-12c	LI-S4.12c-1	651.7	667.9	768.1	1
	LI-S4.12c-2	651.7	667.9	768.1	1
Site 4-12d	LI-S4.12d-1	536.2	549.6	632.1	1
	LI-S4.12d-2	536.2	549.6	632.1	1
Site 4-13a	LI-S4.13a-1	1913.0	1960.9	2255.0	1
	LI-S4.13a-2	1913.0	1960.9	2255.0	1
Site 4-13b	LI-S4.13b-1	758.9	777.9	894.6	1
	LI-S4.13b-2	758.9	777.9	894.6	1
Site 4-15	LI-S4.15-1	4.2	4.3	5.0	1
	LI-S4.15-2	4.2	4.3	5.0	1
Site 4-16	LI-S4.16-1	539.0	552.4	635.3	1
	LI-S4.16-2	539.0	552.4	635.3	1
Site 4-17	LI-S4.17	244.5	250.6	288.2	1
Site 4-23	LI-S4.23	2.8	2.9	3.3	1

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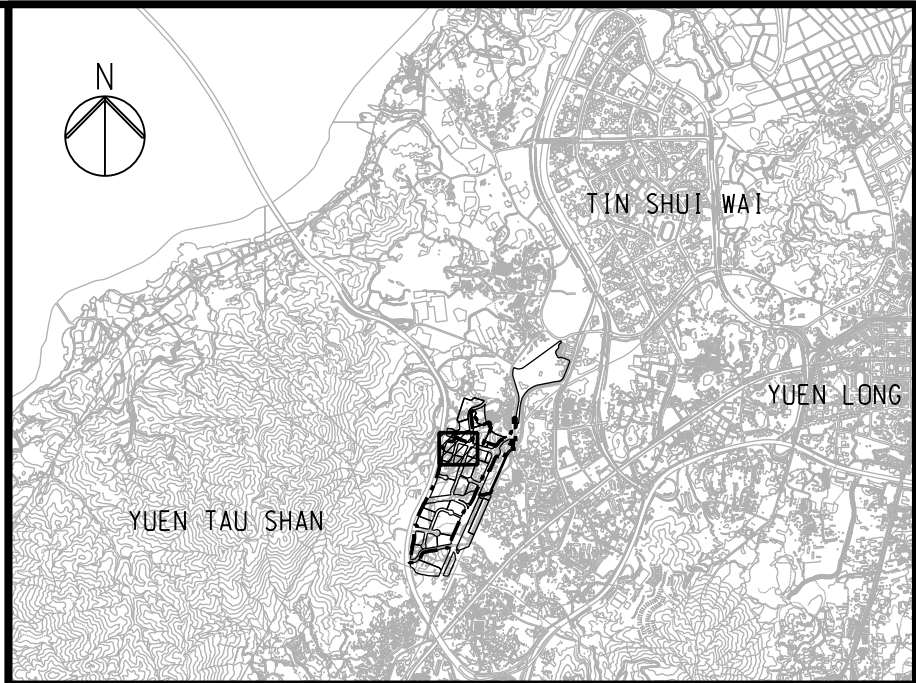
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- NS355** Adjustment for Hydraulic Performance

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Rev	Description	By	Date
Consultant			
ARUP			
Project Title			
Contract No. YL/2023/04			
Hung Shui Kiu/Ha Tsuen			
New Development Area			
Second Phase Development - Contract 4 -			
Site Formation and Engineering			
Infrastructure Works			
Drawing title			
SEWERAGE LAYOUT PLAN			
(SHEET 1)			
Drawing no.			Rev.
278463/C4/SEW/1101			00
Drawn	Date	Checked	Approved
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03	PIPE INFO UPDATE	BT	10/25
02	UPDATE FOR HD'S ASSESSMENTS	BT	09/25
01	RtoC SUBMISSION	JT	09/24
00	TENDER ISSUE	EF	02/24
Rev	Description	By	Date

Consultant

ARUP

Project Title Contract No. YL/2023/04 Hung Shui Kiu/Ha Tsuen New Development Area Second Phase Development - Contract 4 - Site Formation and Engineering Infrastructure Works
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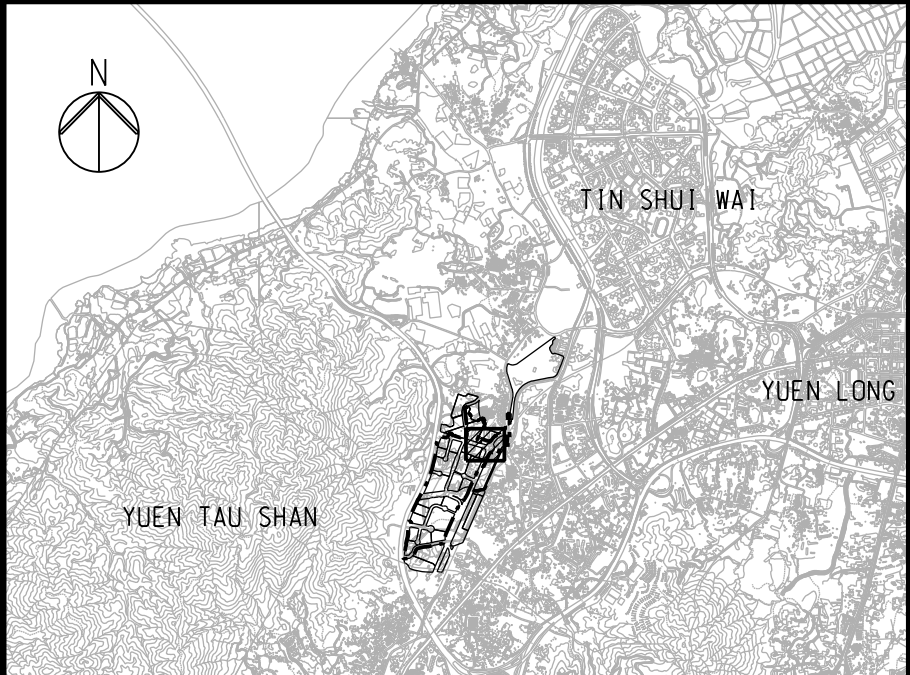
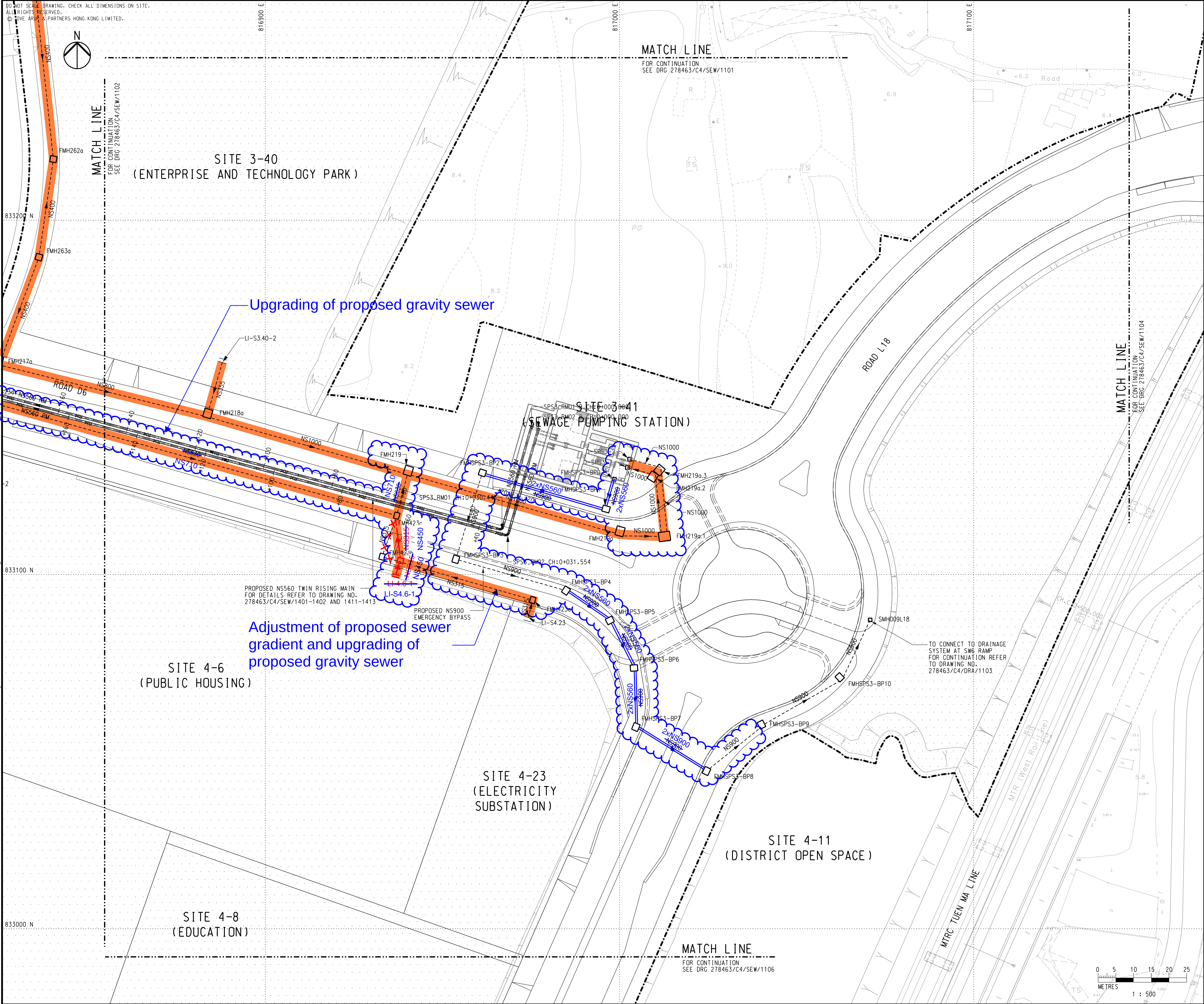
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SEWERAGE LAYOUT PLAN
(SHEET 2)

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NS357	Adjustment for Hydraulic Performance

Rev	Description	By	Date
01	RtoC SUBMISSION	JT	09/24
00	TENDER ISSUE	EF	02/24

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Project Title
Contract No. YL/2023/04
Hung Shui Kiu/Ha Tsuen
New Development Area
Second Phase Development - Contract 4 -
Site Formation and Engineering
Infrastructure Works

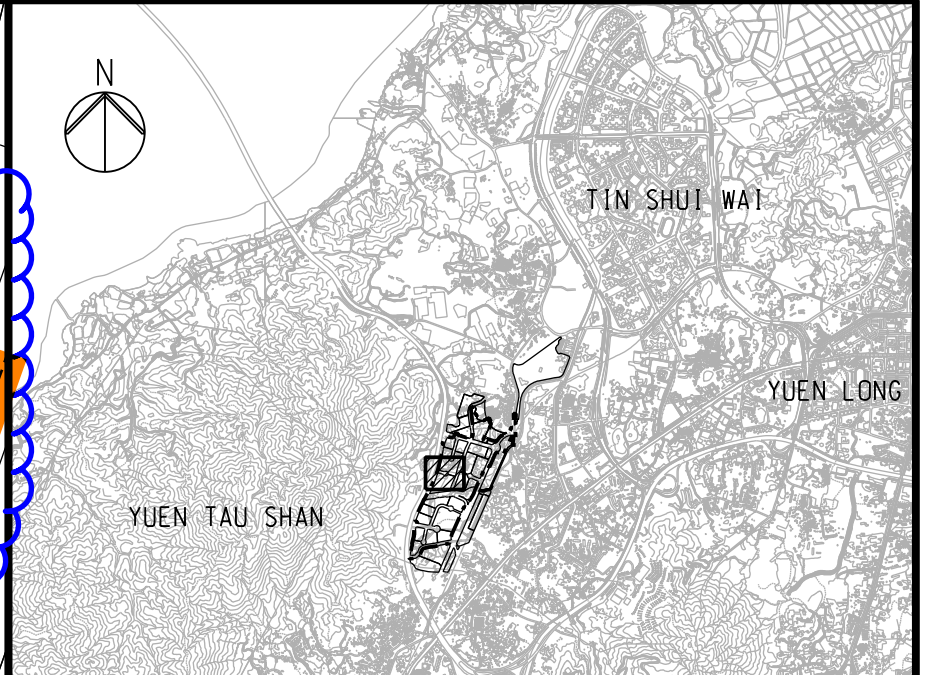
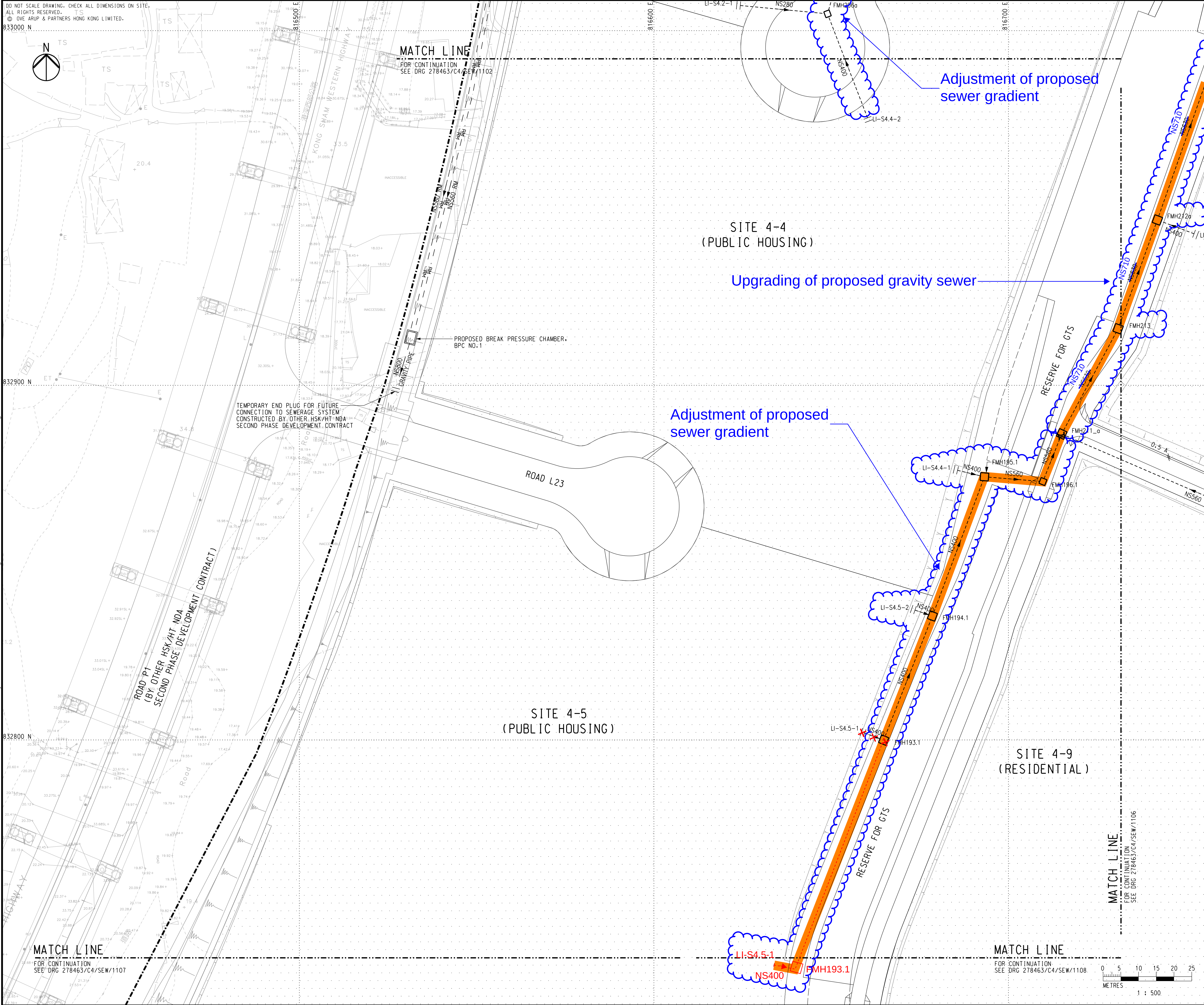
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**SEWERAGE LAYOUT PLAN
(SHEET 3)**

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Infrastructure Works			
Drawing title			
SEWERAGE LAYOUT PLAN			
(SHEET 5)			
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MATCH LINE

FOR CONTINUATION
SEE DRG 278463/C4/SEW/1102



Upgrading of proposed gravity sewer

Adjustment of proposed sewer gradient

Adjustment of proposed
sewer gradient

SITE 4-7
(LOCAL OPEN SPACE)

SITE 4-8
(EDUCATION)

SITE 4-9
(RESIDENTIAL)

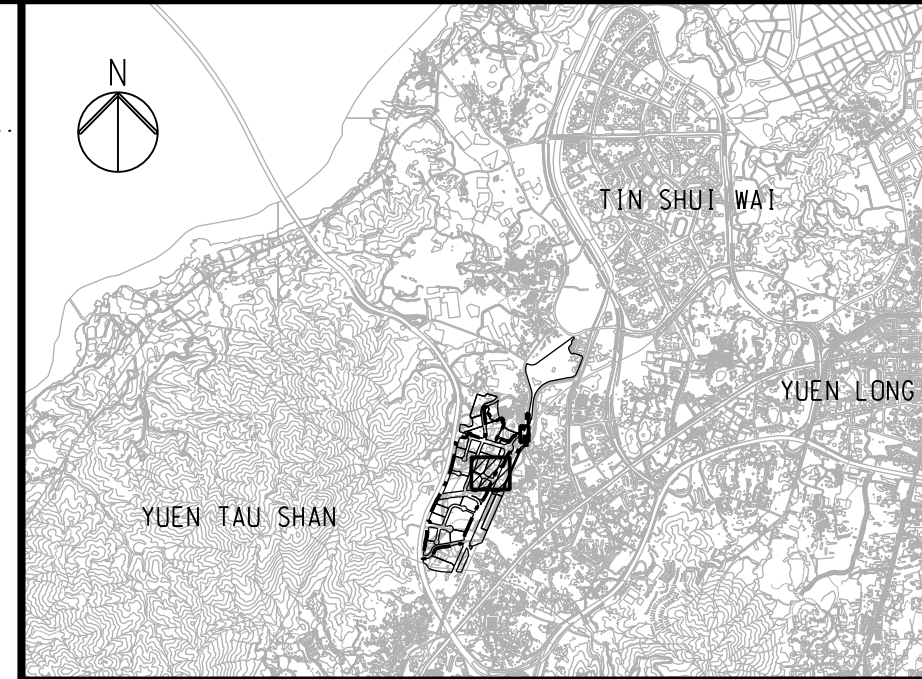
SITE 4-10
(RESIDENTIAL)

MATCH LINE

FOR CONTINUATION
SEE DRG 278463/C4/SEW/1108

MATCH LINE

FOR CONTINUATION
SEE DRG 278463/C4/SEW/1103



KEY PLAN

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Rev	Description	By	Date
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Contract No. YL/2023/04			
Hung Shui Kiu/Ha Tsuen			
New Development Area			
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Site Formation and Engineering			
Infrastructure Works			
Drawing title			
SEWERAGE LAYOUT PLAN			
(SHEET 6)			

Appendix D

**RLA Reference from the accepted
DSIA for the HSK/HT NDA**

Extract from the accepted DSIA (Report No. REP-031-07) (F3D) for the HSK/HT NDA regarding 2.5% return liquid allowance

Table 3.10 Estimated Sewage Flows (by Scenario)

Scenario	Proposed ADWF (m ³ /day) ⁽¹⁾	Total ADWF (m ³ /day) ⁽²⁾	Net Additional ADWF (m ³ /day) ⁽³⁾
Baseline (Year 2038)	93,526	93,526	85,408
Post-Development (Year 2038)	104,155	109,676	101,558
Notes: 1. ADWF from the proposed development sites inside the HSK/HT NDA boundary excluding the existing development sites such as existing villages (i.e. sites with an implementation phase under this Project); the yearly breakdown of the Post-Development scenario shall be referred to Table 3.11 below. 2. ADWF from all sites inside the HSK/HT NDA boundary including existing and planned development sites (i.e. Site nos. 5-06, 5-22, 5-25 and 5-33) 3. ADWF from the existing development within HSK/HT NDA boundary to be replaced by the proposed development sites (i.e. ADWF of 7,920 m ³ /day referenced from Table 5.1 of the P&E Study) deducted from 'Total ADWF' 4. A return liquid allowance of 2.5% was applied to all estimated ADWFs in the SIA Report under the P&E Study; therefore, the same assumption has been applied in this SIA for comparison purposes.			

Table 3.11 Estimated Sewage Flows under Post-Development Scenario (by Year)

Year	Implementation Phase	ADWF (m ³ /day)	Cumulative ADWF (m ³ /day)	Design Cumulative ADWF (m ³ /day) incl. RLA ⁽¹⁾
2024	AWP2, S1	2,996	2,996	3,071
2025	AWP2, S1	55	3,052	3,128
2026	AWP2	0	3,052	3,128
2027	AWP3, S2A, S2B	0	3,052	3,128
2028	AWP3, S2A, S2B	1,254	4,306	4,413
2029	AWP3, S2A, S2B	7,896	12,201	12,506
2030	AWP3, S2A, S2B	3,696	15,897	16,294
2031 (1 st -half)	AWP3, S2A, S2B	5,725	21,622	22,163
2031 (2 nd -half)	AWP3, S2A, S2B	7,672	29,294	30,026
2032	S2A, S2B, Remaining Phase	34,357	63,651	65,243
2033	Remaining Phase	0	63,651	65,243
2034	Remaining Phase	0	63,651	65,243
2035	Remaining Phase	189	63,840	65,436
2036	Remaining Phase	22,599	86,439	88,600
2037	Remaining Phase	3	86,442	88,603
2038	Remaining Phase	15,172	101,614	104,155

Notes:

[1] Design cumulative ADWF includes a return liquid allowance of 2.5%.