Appendix E

Sewerage Impact Assessment

Prepared by

Ramboll Hong Kong Limited

SECTION 16 PLANNING APPLICATION FOR PROPOSED MINOR RELAXATION OF GROSS FLOOR AREA AND BUILDING HEIGHT RESTRICTIONS FOR PERMITTED OFFICE USE AND OTHER PERMITTED USES IN "COMMERCIAL (7)" ZONE BOUNDED BY KING'S ROAD AND TAIKOO SHING ROAD, QUARRY BAY

SEWERAGE IMPACT ASSESSMENT

Date	**December 2025**
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Project Reference	**SA1111KREI00**
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1. INTRODUCTION

1.1 Background and Objectives

1.1.1 The "Commercial (7)" ("C(7)") zone bounded by King's Road and Taikoo Shing Road on the Quarry Bay Outline Zoning Plan (OZP) consists of 1111 King's Road (formerly known as Cityplaza One), Cityplaza and east HONG KONG.

1.1.2 The "C(7)" zone is subject to a maximum non-domestic gross floor area (GFA) of 123,129m^2 and is subject to 2 building height (BH) bands: 1111 King's Road and east HONG KONG are subject to maximum BH of 135mPD; while Cityplaza in between 1111 King's Road and east HONG KONG is subject to maximum BH of 45mPD.

1.1.3 In this planning application, to support office extension of 1111 King's Road, extra GFA and BH is required for 1111 King's Road. Therefore, two items that require planning permission from the Town Planning Board (the Board) are involved:

- Minor relaxation of the GFA restriction of "C(7)" zone from 123,129m^2 to 148,629m^2 (+25,500m^2 / 20.7%)
- Minor relaxation of the BH restriction of 1111 King's Road from 135mPD to 165mPD (+30m / 22.2%)

1.1.4 The increase in GFA and BH will be absorbed by 1111 King's Road only, other buildings in the "C(7)" zone will not be affected.

1.1.5 The location of "C(7)" Zone and 1111 King's Road extension is shown in **Figure 1.1**.

1.1.6 Ramboll Hong Kong Limited is commissioned by the project proponent to carry out sewerage impact assessment for the additional sewage generated from the development arising from the proposed minor relaxation of GFA and BH restrictions.

1.2 Proposed Development

1.2.1 The Applicant proposes additional GFA and BH to 1111 King's Road for its extension above the existing office building. The proposed extension will be constructed on top of the existing office building, no changes to the existing 1111 King's Road will be made.

1.2.2 The existing GFA of 1111 King's Road is about 78,069m^2. This planning application applies for an increase in office GFA, brining 13 new storeys to the existing office building of 1111 King's Road, involving 25,500m^2 increase in GFA for office use. Out of the 13 new storeys, 10 storeys will be for office use, 2 floors are for mechanical and electrical (M&E) facilities, and 1 floor will be designated as refuge floor-cum-sky garden. **Figure 1.2** shows the indicative floor plan of 1111 King's Road extension and section plan.

1.2.3 The tentative completion of Proposed Development is in Year 2029.

2. SEWERAGE IMPACT ASSESSMENT

2.1 Scope of Work

2.1.1 The aim of this SIA is to show the sewerage network is sufficient to cope with the additional sewage flow from the Proposed Development.

2.2 Assessment Criteria and Methodology

2.2.1 The Commercial and Industrial Floor Space Utilization Survey (CIFSUS) conducted by the Planning Department has been used to determine the worker density for various economic activities and planned usage types.

2.2.2 Environmental Protection Department’s (EPD’s) Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, Version 1 (GESF) has been referred to for the purposes of estimating the quantity of the sewage generated from the Proposed Development. Sewage flow parameters and global peaking factors in this document have been adopted for this SIA.

2.2.3 According to the GESF, the overall unit flow is composed of flows due to employees and the associated activities. The following unit flow factors have been adopted in the SIA calculation in accordance with Tables T-1, T-2 and T-3 of the GESF:

- J6 – Finance, Insurance, Real Estate & Business Services: 0 m3/day

2.2.4 The catchment inflow, P_{CIF} of 1.25 (Shau Kei Wan), is adopted in catchment calculations.

2.3 Existing Sewerage System

2.3.1 According to the Geoinfo Map, the sewers discharged from Proposed Development will be conveyed to the existing public manhole FMH7036243.

2.4 Wastewater Generated by the Existing and Proposed Development

2.4.1 The increase in GFA covers the use of office use, M&E facilities and refuge floor-cum-sky garden. As a conservative assessment, it is assumed all additional area is for office use.

2.4.2 Detailed calculations of sewage generation from the Existing and Proposed Development are given in **Table 2-1** below and **Appendix 2.1**.

Table 2-1 Estimated Peak Flow from the Proposed Development

Calculation for Sewage Generation Rate of the Proposed Development at the Subject Site			
1. Office			
Assumed Area	=	25500	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	=	1403	employees
Design flow for commercial employees	=	0.08	m^3/employee/day – (refer to Table T-3 of GESF – J6 Finance, Insurance, Real Estate & Business Services)
Sewerage generation rate	=	112.2	m^3/day
Total Flow from the Proposed Development			
Flow rate	=	112.2	m^3/day
Flow rate with P$_{CIF}$	=	140.3	m^3/day (refer to Table T-4 of GESF – Shau Kei Wan - 1.25)
Contributing population	=	520	people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P$_{CIF}$ ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor	=	8	(refer to Table T-5 of GESF for a population between 5,000 – 10,000 incl. stormwater allowance)
Peak flow	=	**13.0**	litre/sec

2.5 Assessment of Sewerage Impact

2.5.1 Sewage generated from the Proposed Development will be discharged to the existing public manhole FMH7036243 at Taikoo Shing Road as shown in **Figure 2.1**. The sewerage record plans obtained from Drainage Services Department (DSD) are attached in **Appendix 2.2**. Catchment in the vicinity of the Subject Site is shown in **Figure 2.2**.

2.5.2 Detailed calculation of sewage generation, peak flow estimation and the capacity of the public sewers can be referred to **Appendix 2.1**. Based on the assessment results, there would be sufficient capacity for the future public sewers to cater for the sewage generated from the Proposed Development as well as the surrounding existing buildings.

2.5.3 The sewerage generated from the Proposed Development would be conveyed to the nearby Tai Koo Shing Pumping Station (TKSPS) with its design capacity of 22,464m^3 (i.e. 260 L/s). It will occupy 5% of the TKSPS which is deemed insignificant. Therefore, it can be deduced that the capacity of the TKSPS and the pipes connected to TKSPS are enough for the sewage generated from the Proposed Development. The contributions of sewage generated from the Subject Site on TKSPS can be referred to Table 13 of **Appendix 2.1**.

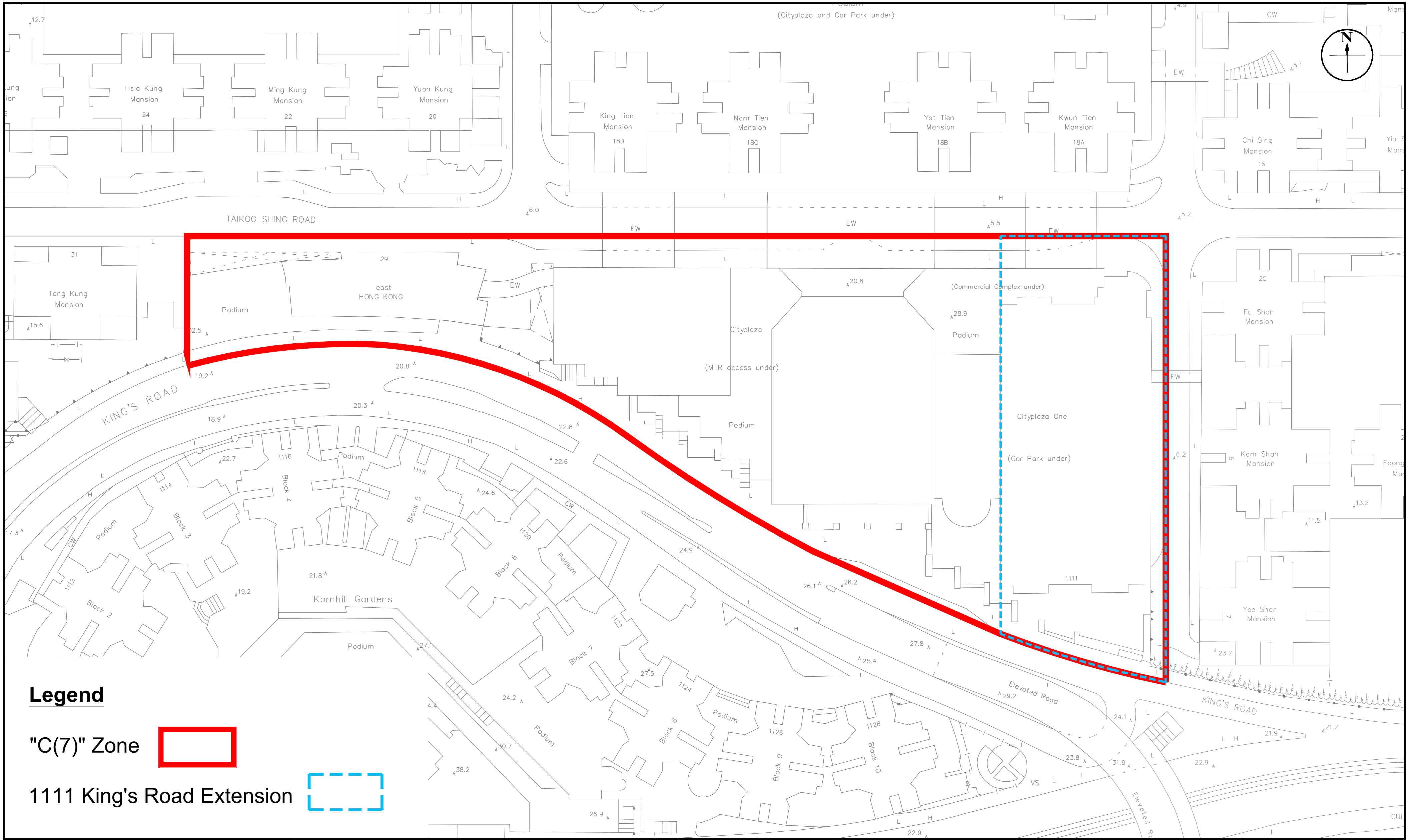
2.5.4 Hence, no further upgrading of the public sewers is required.

3. CONCLUSION

3.1.1 The potential sewerage impact arising from the Proposed Development has been quantitatively assessed by comparing the estimated sewage flow from the existing development and Proposed Development.

3.1.2 Based on the calculations as shown in **Appendix 2.1**, the increase in GFA for the Proposed Development would generate the peak flow of 13 L/s. The capacity of existing sewers and Tai Koo Shing Pumping Station are sufficient to cater for the sewage generated from the Proposed Development. Upgrading on the sewerage system is NOT required.

Figure


N
Hsia Kung Mansion
24
Ming Kung Mansion
22
Yuan Kung Mansion
20
(Cityplaza and Car Park under)
King Tien Mansion
18D
Nam Tien Mansion
18C
Yat Tien Mansion
18B
Kwun Tien Mansion
18A
Chi Sing Mansion
16
TAIKOO SHING ROAD
Tang Kung Mansion
31
29
east HONG KONG
Podium
Cityplaza
(MTR access under)
(Commercial Complex under)
Cityplaza One
(Car Park under)
1111
25
Fu Shan Mansion
Kam Shan Mansion
Yee Shan Mansion
KING'S ROAD
Kornhill Gardens
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8
Block 9
Block 10
Elevated Road
EW
CW

Legend

"C(7)" Zone 🟥

1111 King's Road Extension ⬚

Figure: 1.1

Title: Location of "C(7)" Zone and 1111 King's Road Extension

Project: Section 16 Planning Application for Proposed Minor Relaxation of Gross Floor Area and Building Height Restrictions for Permitted Office Use and Other Permitted Uses in "Commercial (7)" Zone Bounded by King's Road and Taikoo Shing Road, Quarry Bay

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Checked by: TC
Rev.: 1.1
Date: Dec 2025

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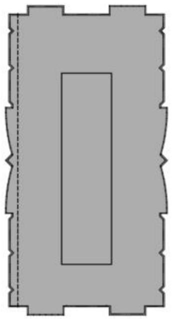
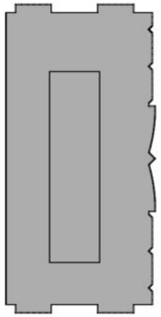
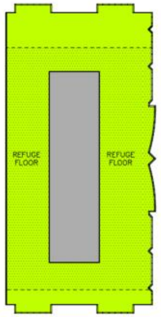


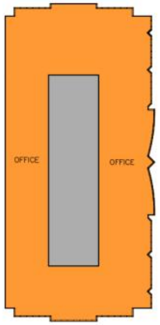
28TH FLOOR PLAN
(M/E FLOOR)
PREVIOUS ROOF PLAN (PHASE 1)



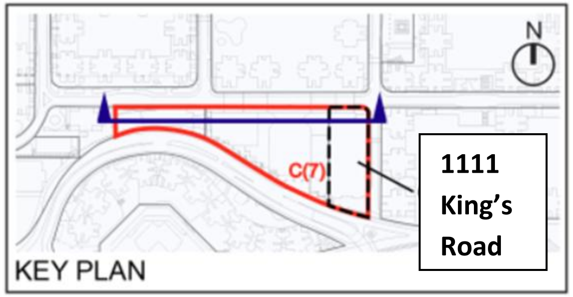
29TH FLOOR PLAN
(M/E FLOOR)
PREVIOUS UPPER ROOF PLAN (PHASE 1)


REFUGE FLOOR
REFUGE FLOOR

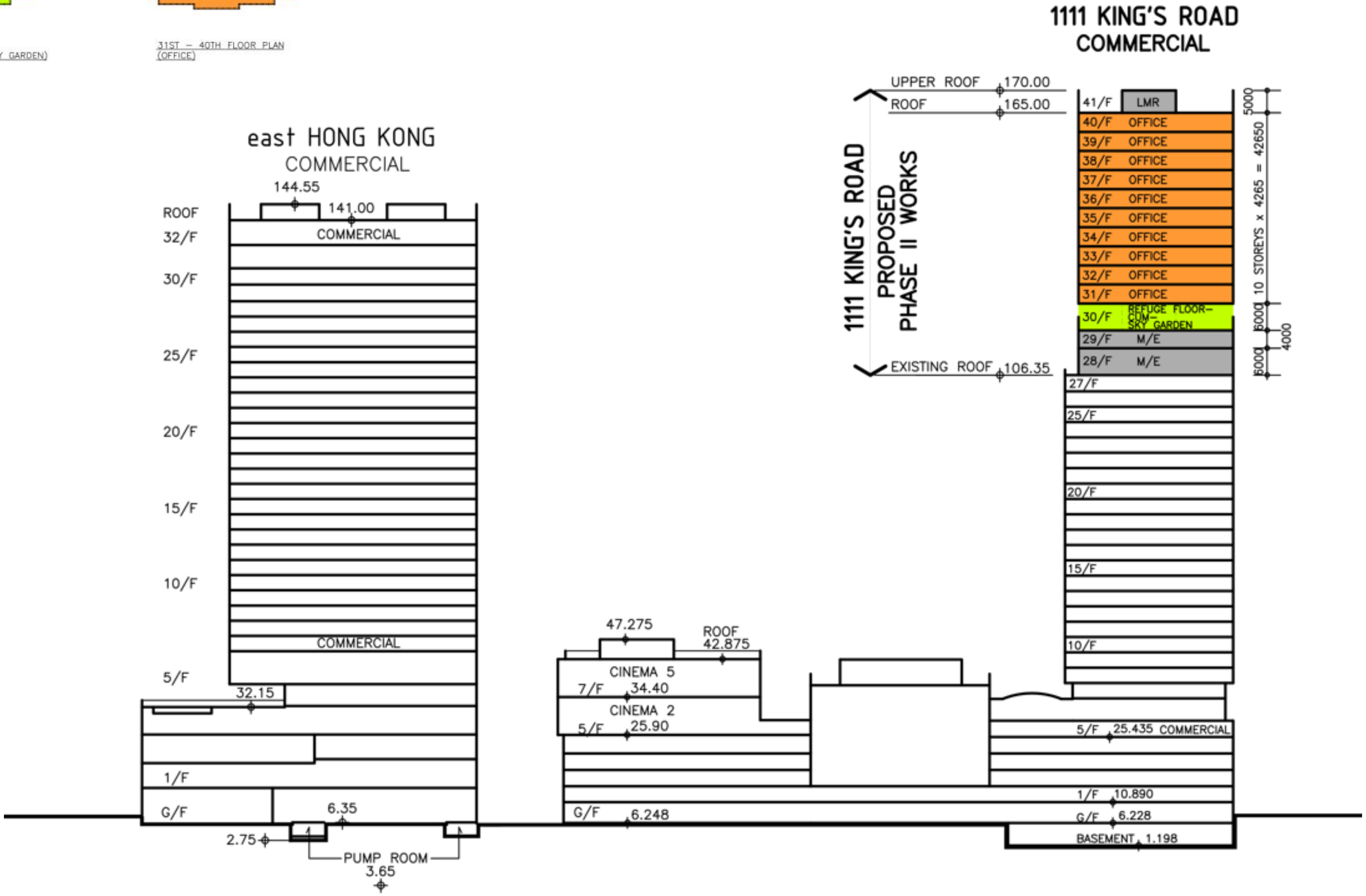
30TH FLOOR PLAN
(REFUGE FLOOR-CUM-SKY GARDEN)


OFFICE
OFFICE

31ST – 40TH FLOOR PLAN
(OFFICE)


N
C(7)
1111 King's Road

KEY PLAN


1111 KING'S ROAD
COMMERCIAL
UPPER ROOF 170.00
ROOF 165.00
1111 KING'S ROAD
PROPOSED
PHASE II WORKS
EXISTING ROOF 106.35
41/F LMR
40/F OFFICE
39/F OFFICE
38/F OFFICE
37/F OFFICE
36/F OFFICE
35/F OFFICE
34/F OFFICE
33/F OFFICE
32/F OFFICE
31/F OFFICE
30/F REFUGE FLOOR-CUM-SKY GARDEN
29/F M/E
28/F M/E
27/F
25/F
20/F
15/F
10/F
5000
10 STOREYS x 4265 = 42650
6000
4000
6000
east HONG KONG
COMMERCIAL
144.55
ROOF
141.00
COMMERCIAL
32/F
30/F
25/F
20/F
15/F
10/F
COMMERCIAL
5/F
32.15
1/F
G/F
6.35
2.75
PUMP ROOM
3.65
47.275
ROOF
42.875
CINEMA 5
7/F 34.40
CINEMA 2
5/F 25.90
G/F 6.248
5/F 25.435 COMMERCIAL
1/F 10.890
G/F 6.228
BASEMENT 1.198

LEGEND :–

🟧	OFFICE
▨	E&M / BACK OF HOUSE AREA
🟩	REFUGE FLOOR–CUM–SKY GARDEN

Figure: 1.2

Title: Indicative Floor Plan of 1111 King's Road Extension and Section Plan

Project: Section 16 Planning Application for Proposed Minor Relaxation of Gross Floor Area and Building Height Restrictions for Permitted Office Use and Other Permitted Uses in "Commercial (7)" Zone bounded by King's Road and Taikoo Shing Road, Quarry Bay

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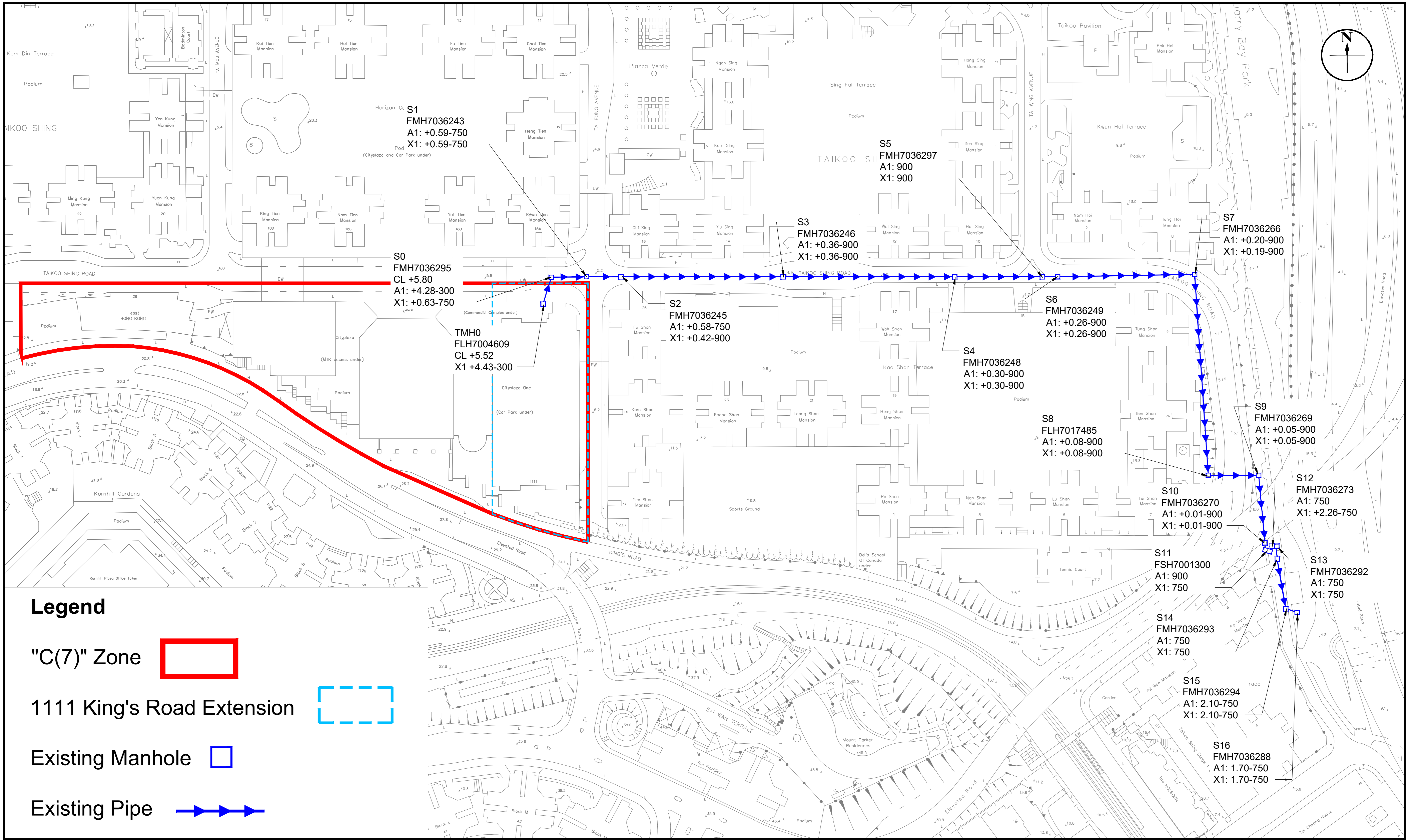
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CL +5.80
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X1: +0.63-750
S1
FMH7036243
A1: +0.59-750
X1: +0.59-750
TMH0
FLH7004609
CL +5.52
X1 +4.43-300
S2
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X1: +0.42-900
S3
FMH7036246
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X1: +0.36-900
S4
FMH7036248
A1: +0.30-900
X1: +0.30-900
S5
FMH7036297
A1: 900
X1: 900
S6
FMH7036249
A1: +0.26-900
X1: +0.26-900
S7
FMH7036266
A1: +0.20-900
X1: +0.19-900
S8
FLH7017485
A1: +0.08-900
X1: +0.08-900
S9
FMH7036269
A1: +0.05-900
X1: +0.05-900
S10
FMH7036270
A1: +0.01-900
X1: +0.01-900
S11
FSH7001300
A1: 900
X1: 750
S12
FMH7036273
A1: 750
X1: +2.26-750
S13
FMH7036292
A1: 750
X1: 750
S14
FMH7036293
A1: 750
X1: 750
S15
FMH7036294
A1: 2.10-750
X1: 2.10-750
S16
FMH7036288
A1: 1.70-750
X1: 1.70-750
TAIKOO SHING ROAD
KING'S ROAD
Cityplaza
Cityplaza One
Kornhill Gardens
SAI WAN TERRACE
Quarry Bay Park
Legend
"C(7)" Zone
1111 King's Road Extension
Existing Manhole
Existing Pipe

Figure: 2.1

Title: Existing Sewerage System in the Vicnity of the Subject Site

Project: Section 16 Planning Application for Proposed Minor Relaxation of Gross Floor Area and Building Height Restrictions for Permitted Office Use and Other Permitted Uses in "Commercial (7)" Zone Bounded by King's Road and Taikoo Shing Road, Quarry Bay

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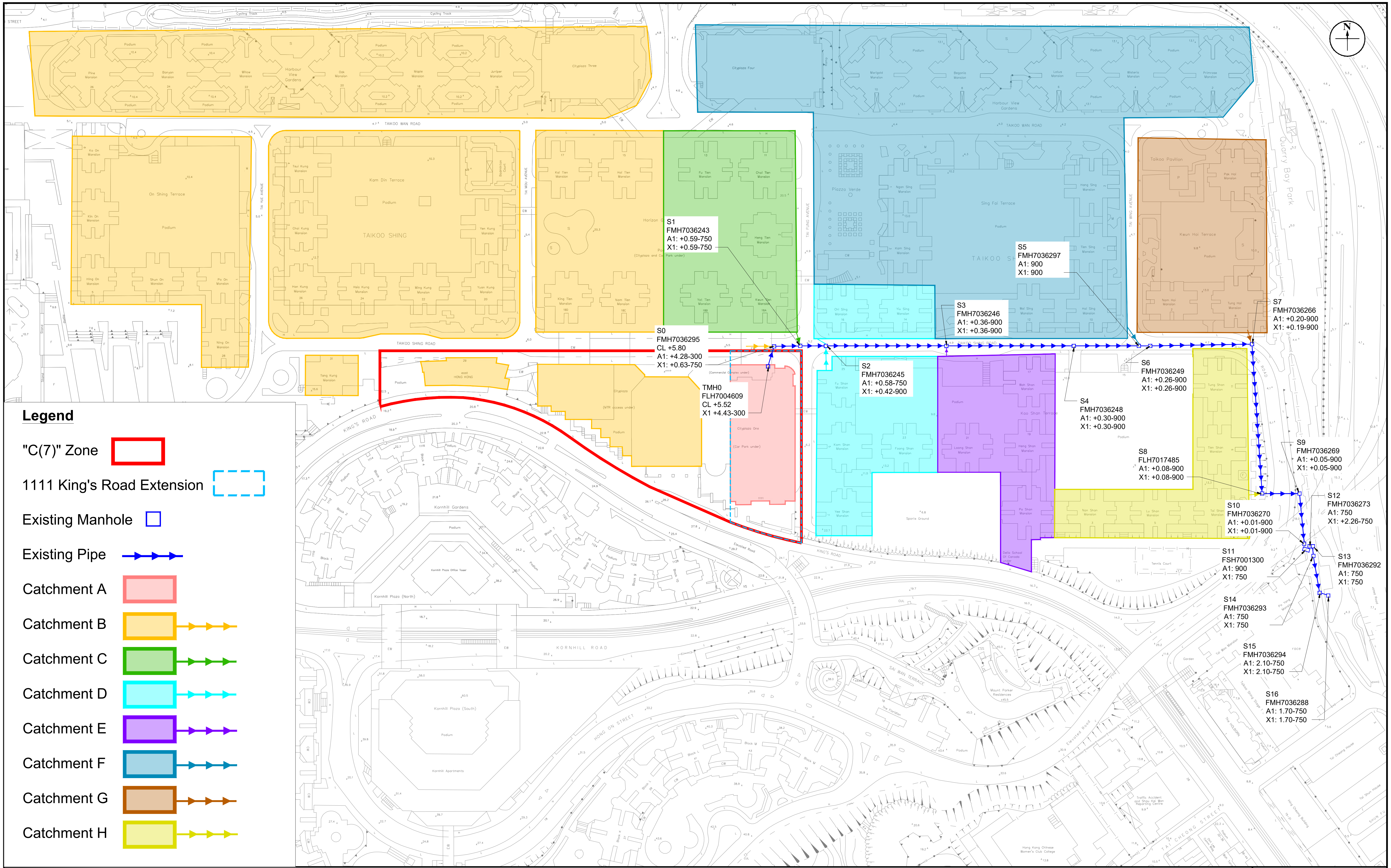
Legend
"C(7)" Zone
1111 King's Road Extension
Existing Manhole
Existing Pipe
Catchment A
Catchment B
Catchment C
Catchment D
Catchment E
Catchment F
Catchment G
Catchment H
S0
FMH7036295
CL +5.80
A1: +4.28-300
X1: +0.63-750
S1
FMH7036243
A1: +0.59-750
X1: +0.59-750
TMH0
FLH7004609
CL +5.52
X1 +4.43-300
S2
FMH7036245
A1: +0.58-750
X1: +0.42-900
S3
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X1: +0.36-900
S4
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X1: +0.30-900
S5
FMH7036297
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X1: 900
S6
FMH7036249
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X1: +0.26-900
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X1: +0.19-900
S8
FLH7017485
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X1: +0.08-900
S9
FMH7036269
A1: +0.05-900
X1: +0.05-900
S10
FMH7036270
A1: +0.01-900
X1: +0.01-900
S11
FSH7001300
A1: 900
X1: 750
S12
FMH7036273
A1: 750
X1: +2.26-750
S13
FMH7036292
A1: 750
X1: 750
S14
FMH7036293
A1: 750
X1: 750
S15
FMH7036294
A1: 2.10-750
X1: 2.10-750
S16
FMH7036288
A1: 1.70-750
X1: 1.70-750
TAIKOO SHING
Kam Din Terrace
On Shing Terrace
Sing Fai Terrace
Kwun Hoi Terrace
Kao Shan Terrace
Piazza Verde
Harbour View Gardens
Taikoo Pavilion
Cityplaza One
Cityplaza Three
Cityplaza Four
TAIKOO WAN ROAD
TAIKOO SHING ROAD
KING'S ROAD
KORNHILL ROAD
HONG ON STREET
TAI KOO WAN ROAD
TAI FUNG AVENUE
TAI WING AVENUE
TAI YUE AVENUE
TAI MOU AVENUE
SAI WAN TERRACE
TAI CHEONG STREET
Kornhill Gardens
Kornhill Plaza (North)
Kornhill Plaza (South)
Kornhill Apartments
Quarry Bay Park
Sports Ground
Tennis Court
Elevated Road
N

Figure: 2.2

Title: Existing Sewerage System and Catchment Area in the Vicnity of the Subject Site

Project: Section 16 Planning Application for Proposed Minor Relaxation of Gross Floor Area and Building Height Restrictions for Permitted Office Use and Other Permitted Uses in "Commercial (7)" Zone Bounded by King's Road and Taikoo Shing Road, Quarry Bay

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Date:	Dec 2025

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Appendix 2.1 Detailed Sewerage Impact Assessment Calculations

Table 1 Calculation for Sewage Generation Rate of the Future Development (Proposed Additional Office at 1111 King's Road)

1. Office

Assumed area = 25500 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 = 1403 employees

Design flow for commercial employees = 0.08 m^3/employee/day -- (refer to Table T-2 of GESF - J6 Finance, Insurance, Real Estate & Business Services)

Sewage generation rate = **112.2** m^3/day

Total Flow from the Future Development

Flow rate = 112.2 m^3/day

Flow rate with P_{CIF} = 140.3 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)

Contributing population = 520 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)

Peaking factor = 8 (refer to Table T-5 of GESF for a population <1,000 incl. stormwater allowance)

Peak flow = **13.0** litre/sec

Table 2 Calculation for Sewage Generation Rate of Catchment A

1. 1111 King's Road
Assumed area = 78069 m^2
Assumed floor area per employee = 18.2 m^2 per employee -- (refer to Table 8 of CIFSUS - Financial, Insurance, Real Estate and Business Services)
Total number of employees = 4294.0 employees
Design flow for commercial employees = 0.08 m^3/employee/day -- (refer to Table T-2 of GESF - J6 Finance, Insurance, Real Estate and Busiess Services)
Sewage generation rate **343.5** m^3/day

Total Flow from the Future Development and Catchment A
Flow rate = 455.8 m^3/day
Flow rate with P_{CIF} = 569.7 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)
Contributing population = 2110 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees
Peaking factor = 6 (refer to Table T-5 of GESF for a population between 1,000 - 5,000 incl. stormwater allowance)
Peak flow = **39.6** litre/sec

Table 3 Calculation for Sewage Generation Rate of Catchment B

1a. On Shing Terrace
Number of units = 1357 units (from Centaline: https://hk.centanet.com/estate/en/Taikoo-Shing/2-OVDUURFSJJ)
Number of residents = 3800 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **1026.0** m^3/day

1b. Restaurants
Assumed area = 2201 m^2
Assumed floor area per employee = 19.6 m^2 per employee -- (refer to Table 8 of CIFSUS - Restaurant)
Total number of employees = 112 employees
Design flow for commercial employees = 1.58 m^3/employee/day -- (refer to Table T-2 of GESF - J10 Restaurant & Hotels)
Sewage generation rate = **177.4** m^3/day

2. Kam Din Terrace
Number of units = 1663 units (from centaline: https://hk.centanet.com/estate/en/Taikoo-Shing-Kam-Din-Terrace/2-OVDUURFSSJ)
Number of residents = 4656 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **1257.1** m^3/day

3. East Hong Kong
Assumed area = 15680 m^2 (measured in Geoinfo Map)
Assumed floor area per employee = 31.3 m^2 per employee -- (refer to Table 8 of CIFSUS - Hotels and Boarding Houses)
Total number of employees = 502 employees
Design flow for commercial employees = 1.58 m^3/employee/day -- (refer to Table T-2 of GESF - J10 Restaurant & Hotels)
Sewage generation rate = **792.8** m^3/day

4. City Plaza
Assumed Area = 29380 m^2
Assumed floor area per employee = 18.2 m^2 per employee -- (refer to Table 8 of CIFSUS - Financial, Insurance, Real Estate and Business Services)
Total number of employees = 1616.0 employees
Design flow for commercial employees = 0.08 m^3/employee/day -- (refer to Table T-2 of GESF - J6 Finance, Insurance, Real Estate and Busiess Services)
Sewage generation rate = **129.3** m^3/day

5a. Harbour View Gardens (West)
Number of units = 1328 units (from Centaline: https://hk.centanet.com/estate/en/Taikoo-Shing/2-OVDUURFSUJ)
Number of residents = 3718 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **1003.9** m^3/day

5b. Swimming Pool in Harbour View Gardens
Assumed area = 248.7 m^2
Assumed depth of water = 1.5 m
Volume of water = 373.0 m^3
Turnover Rate = 6.0 hr (CAP132, Section 42 Swimming Pools Regulation (open air pool))
Surface loading rate of filter = 50.0 m^3/m^2/hr
Filter areas required = 1.2 m^2
Backwashing flow rate = 30.0 m^3/m^2/hr
Design flow for backwashing = 37.3 m^3/hr
Backwash duration = 3.0 min/day
Backwash generation rate = 1.86 m^3/day
Backwash generation rate = **10.4** litre/sec

6. 14 Tai Koo Wan Road
Assumed Area = 31920 m^2
Assumed floor area per employee = 29.4 m^2 per employee -- (refer to Table 8 of CIFSUS - All Economic Activities (All Types))
Total number of employees = 1085 employees
Design flow for commercial employees = 0.08 m^3/employee/day -- (refer to Table T-2 of GESF)
Sewage generation rate = **86.8** m^3/day

7a. Horizon Gardens (Kai Tien Mansion, Hoi Tien Mansion, King Tien Mansion, Nam Tien Mansion)

Number of units = 768 units
Number of residents = 2150 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **580.5** m^3/day

7b. Swimming Pool in Horizon Gardens

Assumed area = 490.0 m^2
Assumed depth of water = 1.5 m
Volume of water = 735.0 m^3
Turnover Rate = 6.0 hr (CAP132, Section 42 Swimming Pools Regulation (open air pool))
Surface loading rate of filter = 50.0 m^3/m^2/hr
Filter areas required = 2.5 m^2
Backwashing flow rate = 30.0 m^3/m^2/hr
Design flow for backwashing = 73.5 m^3/hr
Backwash duration = 3.0 min/day
Backwash generation rate = 3.68 m^3/day
Backwash generation rate = **20.4** litre/sec

8. Half of City Plaza Two

Assumed Area = 28266 m^2
Assumed floor area per employee = 29.4 m^2 per employee -- (refer to Table 8 of CIFSUS - All Economic Activities (All Types))
Total number of employees = 961 employees
Design flow for commercial employees = 0.08 m^3/employee/day -- (refer to Table T-2 of GESF)
Sewage generation rate = **76.9** m^3/day

Total Flow from the Catchment B

Flow rate = 5130.6 m^3/day
Flow rate with P_{CIF} = 5130.6 m^3/day (refer to Table T-4 of GESF - North Point - 1.0)
Contributing population = 19002 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 4 (refer to Table T-5 of GESF for a population between 1,000 - 5,000 incl. stormwater allowance)
Peak flow = **237.5** litre/sec

Total Flow from the Future Development and Catchment A and B to Manhole FMH7036295

Flow rate = 5586.4 m^3/day
Flow rate with P_{CIF} = 6983.0 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)
Contributing population = 25863 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 4 (refer to Table T-5 of GESF for a population between 10,000 - 50,000 incl. stormwater allowance)
Peak flow (without swimming pool) = 323.3 litre/sec
Peak flow (with swimming pool) = **354.1** litre/sec

Table 4 Calculation for Sewage Generation Rate of Catchment C

1a. Horizons Garden (Fu Tien Mansion, Choi Tien Mansion, Heng Tien Mansion, Yat Tien Mansion, Kwun Tien Mansion)

Number of units = 960 units
Number of residents = 2688 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **725.8** m^3/day

2. Half of City Plaza Two

Assumed Area = 29648 m^2
Assumed floor area per employee = 29.4 m^2 per employee -- (refer to Table 8 of CIFSUS - All Economic Activities (All Types))
Total number of employees = 1008 employees
Design flow for commercial employees = 0.08 m^3/employee/day -- (refer to Table T-2 of GESF)
Sewage generation rate = **80.6** m^3/day

Total Flow from the Catchment C

Flow rate = 806.4 m^3/day
Flow rate with P_{CIF} = 806.4 m^3/day (refer to Table T-4 of GESF - North Point - 1.0)
Contributing population = 2987 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 6 (refer to Table T-5 of GESF for a population between 1,000 - 5,000 incl. stormwater allowance)
Peak flow = **56.0** litre/sec

Total Flow from the Future Development and Catchment A, B and C to FMH7036243

Flow rate = 6392.8 m^3/day
Flow rate with P_{CIF} = 7991.0 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)
Contributing population = 29596 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 4 (refer to Table T-5 of GESF for a population between 10,000 - 50,000 incl. stormwater allowance)
Peak flow (without swimming pool) = 370.0 litre/sec
Peak flow (with swimming pool) = **400.7** litre/sec

Table 5 Calculation for Sewage Generation Rate of Catchment D

1. Fu Shan Mansion
Number of units = 216 units
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

2. Kam Shan Mansion
Number of units = 216 units
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

3. Yee Shan Mansion
Number of units = 216 units
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

4. Foong Shan Mansion
Number of units = 216 units
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

5. Chi Sing Mansion
Number of units = 208 units
Number of residents = 582 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **157.1** m^3/day

6. Yiu Sing Mansion
Number of units = 208 units
Number of residents = 582 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **157.1** m^3/day

7. Restaurants
Assumed area = 661 m^2
Assumed floor area per employee = 19.6 m^2 per employee -- (refer to Table 8 of CIFSUS - Restaurant)
Total number of employees = 34 employees
Design flow for commercial employees = 1.58 m^3/employee/day -- (refer to Table T-2 of GESF - J10 Restaurant & Hotels)
Sewage generation rate = **53.3** m^3/day

Total Flow from the Catchment D
Flow rate = 1020.9 m^3/day
Flow rate with P$_{CIF}$ = 1276.2 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)
Contributing population = 4727 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P$_{CIF}$ ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 6 (refer to Table T-5 of GESF for a population between 1,000 - 5,000 incl. stormwater allowance)
Peak flow = **88.6** litre/sec

Total Flow from the Future Development and Catchment A, B, C and D to FMH7036245
Flow rate = 7413.7 m^3/day
Flow rate with P$_{CIF}$ = 9267.1 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)
Contributing population = 34323 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P$_{CIF}$ ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 4 (refer to Table T-5 of GESF for a population between 10,000 - 50,000 incl. stormwater allowance)
Peak flow (without swimming pool) = 429.0 litre/sec
Peak flow (with swimming pool) = **459.8** litre/sec

Table 6 Calculation for Sewage Generation Rate of Catchment E

1. Po Shan Mansion
Number of units = 216 units
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

2. Heng Shan Mansion
Number of units = 216 units
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

3. Wah Shan Mansion
Number of units = 216 units
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

4. Loong Shan Mansion
Number of units = 216 units
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

5. Delia School of Canada
Total number of teachers & staff = 160 people (information from https://en.wikipedia.org/wiki/DSC_International_School,_Hong_Kong)
Design flow for teachers & staff = 0.28 m^3/person/day (refer to Table T-2 of GESF , Community, Social & Personal Services)
Total number of students = 1300 people (information from https://en.wikipedia.org/wiki/DSC_International_School,_Hong_Kong)
Design flow for students = 0.04 m^3/person/day (refer to Table T-2 of GESF, School Student)
Sewage Generation rate = **96.8** m^3/day

Total Flow from the Catchment E
Flow rate = 750.2 m^3/day
Flow rate with P_{CIF} = 750.2 m^3/day (refer to Table T-4 of GESF - North Point - 1.0)
Contributing population = 2779 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 6 (refer to Table T-5 of GESF for a population between 1,000 - 5,000 incl. stormwater allowance)
Peak flow = **52.1** litre/sec

Total Flow from the Future Development and Catchment A, B, C, D and E to FMH7036246
Flow rate = 8163.9 m^3/day
Flow rate with P_{CIF} = 10204.9 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)
Contributing population = 37796 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 4 (refer to Table T-5 of GESF for a population between 10,000 - 50,000 incl. stormwater allowance)
Peak flow (without swimming pool) = 472.4 litre/sec
Peak flow (with swimming pool) = **503.2** litre/sec

Table 7 Calculation for Sewage Generation Rate of Catchment F

1. 12 Tai Koo Wan Road

Assumed Area = 40824 m^2

Assumed floor area per employee = 18.2 m^2 per employee -- (refer to Table 8 of CIFSUS - Financial, Insurance, Real Estate and Business Services)

Total number of employees = 2245.0 employees

Design flow for commercial employees = 0.08 m^3/employee/day -- (refer to Table T-2 of GESF - J6 Finance, Insurance, Real Estate and Busiess Services)

Sewage generation rate = **179.6** m^3/day

2a. Harbour View Gardens (East)

Number of units = 1071 units (from Centaline: https://hk.centanet.com/estate/en/Taikoo-Shing-Harbour-View-Gardens-East/2-OVDUURFSOJ)

Number of residents = 2999 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)

Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)

Sewage generation rate = **809.7** m^3/day

2b. Swimming Pool in Harbour View Gardens

Assumed area = 280.0 m^2

Assumed depth of water = 1.5 m

Volume of water = 420.0 m^3

Turnover Rate = 6.0 hr (CAP132, Section 42 Swimming Pools Regulation (open air pool))

Surface loading rate of filter = 50.0 m^3/m^2/hr

Filter areas required = 1.4 m^2

Backwashing flow rate = 30.0 m^3/m^2/hr

Design flow for backwashing = 42.0 m^3/hr

Backwash duration = 3.0 min/day

Backwash generation rate = 2.10 m^3/day

Backwash generation rate = **11.7** litre/sec

3. Ngan Sing Mansion

Number of units = 208 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)

Number of residents = 582 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)

Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)

Sewage generation rate = **157.1** m^3/day

4. Kam Sing Mansion

Number of units = 208 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)

Number of residents = 582 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)

Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)

Sewage generation rate = **157.1** m^3/day

5. Wai Sing Mansion

Number of units = 208 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)

Number of residents = 582 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)

Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)

Sewage generation rate = **157.1** m^3/day

5. Hoi Sing Mansion

Number of units = 208 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)

Number of residents = 582 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)

Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)

Sewage generation rate = **157.1** m^3/day

6. Tien Sing Mansion

Number of units = 208 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)

Number of residents = 582 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)

Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)

Sewage generation rate = **157.1** m^3/day

7. Hang Sing Mansion

Number of units = 208 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)

Number of residents = 582 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)

Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)

Sewage generation rate = **157.1** m^3/day

8. Restaurants

Assumed area = 662 m^2

Assumed floor area per employee = 19.6 m^2 per employee -- (refer to Table 8 of CIFSUS - Restaurant)

Total number of employees = 34 employees

Design flow for commercial employees = 1.58 m^3/employee/day -- (refer to Table T-2 of GESF - J10 Restaurant & Hotels)

Sewage generation rate = **53.3** m^3/day

Total Flow from the Catchment F

Flow rate = 1985.5 m^3/day

Flow rate with P_{CIF} = 2481.9 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)

Contributing population = 9192 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)

Peaking factor = 5 (refer to Table T-5 of GESF for a population between 1,000 - 5,000 incl. stormwater allowance)

Peak flow = **143.6** litre/sec

Total Flow from the Future Development and Catchment A, B, C, D, E and F to FMH7036249

Flow rate = 10149.4 m^3/day

Flow rate with P_{CIF} = 12686.8 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)

Contributing population = 46988 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)

Peaking factor = 4 (refer to Table T-5 of GESF for a population between 5,000 - 10,000 incl. stormwater allowance)

Peak flow (without swimming pool) = **587.4** litre/sec

Peak flow (with swimming pool) = **629.8** litre/sec

Table 8 Calculation for Sewage Generation Rate of Catchment G

1. Pak Hoi Mansion
Number of units = 216 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

2. Nam Hoi Mansion
Number of units = 216 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

3. Tung Hoi Mansion
Number of units = 216 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

4. Swimming Pool in Kwun Hoi Terrace
Assumed area = 200.0 m^2
Assumed depth of water = 1.5 m
Volume of water = 300.0 m^3
Turnover Rate = 6.0 hr (CAP132, Section 42 Swimming Pools Regulation (open air pool))
Surface loading rate of filter = 50.0 m^3/m^2/hr
Filter areas required = 1.0 m^2
Backwashing flow rate = 30.0 m^3/m^2/hr
Design flow for backwashing = 30.0 m^3/hr
Backwash duration = 3.0 min/day
Backwash generation rate = 1.50 m^3/day
Backwash generation rate = **8.3** litre/sec

5. Saint Anna Anglo Chinese Kindergarten
Total number of teachers & staff = 16 people (information from https://kgp2024.azurewebsites.net/edb/schoolinfo.php?lang=en&schid=5939&district=hkeast&category=&voucher=&schoolno=&schoolname=%E8%81%96%E5%AE%89%E5%A8%9C%E4%B8%AD%E8%8B%B1%E6%96%87%E5%B9%BC%E7%A8%9A%E5%9C%92&othe
Design flow for teachers & staff = 0.28 m^3/person/day (refer to Table T-2 of GESF , Community, Social & Personal Services)
Total number of students = 173 people (information from https://kgp2024.azurewebsites.net/edb/schoolinfo.php?lang=en&schid=5939&district=hkeast&category=&voucher=&schoolno=&schoolname=%E8%81%96%E5%AE%89%E5%A8%9C%E4%B8%AD%E8%8B%B1%E6%96%87%E5%B9%BC%E7%A8%9A%E5%9C%92&othe
Design flow for students = 0.04 m^3/person/day (refer to Table T-2 of GESF, School Student)
Sewage Generation rate = **11.4** m^3/day

Total Flow from the Catchment G
Flow rate = 501.5 m^3/day
Flow rate with P_{CIF} = 501.5 m^3/day (refer to Table T-4 of GESF - North Point - 1.0)
Contributing population = 1857 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 6 (refer to Table T-5 of GESF for a population between 1,000 - 5,000 incl. stormwater allowance)
Peak flow = **34.8** litre/sec

Total Flow from the Future Development and Catchment A, B, C, D, E, F and G to FMH7036266
Flow rate = 10650.9 m^3/day
Flow rate with P_{CIF} = 13313.6 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)
Contributing population = 49310 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 4 (refer to Table T-5 of GESF for a population between 10,000 - 50,000 incl. stormwater allowance)
Peak flow (without swimming pool) = 616.4 litre/sec
Peak flow (with swimming pool) = **667.1** litre/sec

Table 9 Calculation for Sewage Generation Rate of Catchment H

1. Nan Shan Mansion
Number of units = 216 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

2. Lu Shan Mansion
Number of units = 216 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

3. Tai Shan Mansion
Number of units = 216 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

4. Tien Shan Mansion
Number of units = 216 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

5. Tung Shan Mansion
Number of units = 216 units (from https://zh.wikipedia.org/zh-hk/%E5%A4%AA%E5%8F%A4%E5%9F%8E)
Number of residents = 605 residents (refer to Census and Statistics Department 2021 data - average household size of 2.8 in Eastern)
Design flow = 0.27 m^3/day (Private R2 in Table T-1 of GESF)
Sewage generation rate = **163.4** m^3/day

Total Flow from the Catchment H
Flow rate = 816.8 m^3/day
Flow rate with P_{CIF} = 816.8 m^3/day (refer to Table T-4 of GESF - North Point - 1.0)
Contributing population = 3025 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Peaking factor = 6 (refer to Table T-5 of GESF for a population between 1,000 - 5,000 incl. stormwater allowance)
Peak flow = **56.7** litre/sec

Total Flow from the Future Development and Catchment A, B, C, D, E, F, G and H to FMH7036266
Flow rate = 11467.6 m^3/day
Flow rate with P_{CIF} = 14334.5 m^3/day (refer to Table T-4 of GESF - Shau Kei Wan - 1.25)
Contributing population = 53091 people (refer to Section 12 of GESF -- Contributing population is the Flow rate with P_{CIF} ÷ 0.27, while 0.27 is the average unit flow factor of all typical
Peaking factor = 4 (refer to Table T-5 of GESF for a population between <50,000 incl. stormwater allowance)
Peak flow (without swimming pool) = 667.5 litre/sec
Peak flow (with swimming pool) = **718.3** litre/sec

Table 10 Hydraulic Capacity of Existing Sewers

Segment	**Manhole Reference**	**Manhole Reference**	**Pipe Dia. (mm)**	**Pipe Length (m)**	**Invert Level 1 (mPD)**	**Invert Level 2 (mPD)**	**g (m/s^2)**	**k_s (m)**	**s**	**v (m^2/s)**	**V (m/s)**	**Area (m^2)**	**Q (m^3/s)**	**Estimated Capacity (L/s)**	**Remark**
TMH0 - S0	FLH7004609	FMH7036295	300	10.3	4.43	4.28	9.81	0.0003	0.0146	0.000001	2.07	0.071	0.1	146.1	
S0 - S1	FMH7036295	FMH7036243	750	13.4	0.63	0.59	9.81	0.0003	0.0030	0.000001	1.64	0.442	0.7	723.6	
S1 - S2	FMH7036243	FMH7036245	750	14.3	0.59	0.58	9.81	0.0015	0.0007	0.000001	0.66	0.442	0.3	290.3	
S2 - S3	FMH7036245	FMH7036246	900	70.3	0.42	0.36	9.81	0.0015	0.0009	0.000001	0.82	0.636	0.5	519.5	
S3 - S4	FMH7036246	FMH7036248	900	74.3	0.36	0.30	9.81	0.0015	0.0008	0.000001	0.79	0.636	0.5	505.2	
S4 - S5	FMH7036248	FMH7036297	900	37.6	0.3	N/A	9.81	0.0015	0.0067	0.000001	2.29	0.636	1.5	1457.4	(5) (7)
S5 - S6	FMH7036297	FMH7036249	900	5.9	N/A	0.26	9.81	0.0015	0.0067	0.000001	2.29	0.636	1.5	1457.4	(5) (7)
S6 - S7	FMH7036249	FMH7036266	900	59.3	0.26	0.2	9.81	0.0003	0.0010	0.000001	1.06	0.636	0.7	672.7	
S7 - S8	FMH7036266	FLH7017485	900	87.5	0.19	0.08	9.81	0.0003	0.0013	0.000001	1.18	0.636	0.8	751.5	
S8 - S9	FLH7017485	FMH7036269	900	21.3	0.08	0.05	9.81	0.0003	0.0014	0.000001	1.25	0.636	0.8	796.7	
S9 - S10	FMH7036269	FMH7036270	900	27.6	0.05	0.01	9.81	0.0003	0.0014	0.000001	1.27	0.636	0.8	807.8	
S10 - S11	FMH7036270	FSH7001300	900	2.4	0.01	N/A	9.81	0.0003	/	0.000001	#VALUE!	0.636	#VALUE!	#VALUE!	(5) (6)
S11 - S12	FSH7001300	FMH7036273	750	1.7	N/A	N/A	9.81	0.0003	/	0.000001	#VALUE!	0.442	#VALUE!	#VALUE!	(5) (6)
S12 - S13	FMH7036273	FMH7036292	750	0.9	2.26	N/A	9.81	0.0003	0.0067	0.000001	2.46	0.442	1.1	1086.3	(5) (7)
S13 - S14	FMH7036292	FMH7036293	750	5.0	N/A	N/A	9.81	0.0003	0.0067	0.000001	2.46	0.442	1.1	1086.3	(5) (7)
S14 - S15	FMH7036293	FMH7036294	750	21.1	N/A	2.1	9.81	0.0003	0.0067	0.000001	2.46	0.442	1.1	1086.3	(5) (7)
S15 - S16	FMH7036292	FMH7036288	750	4.7	2.1	1.7	9.81	0.0003	0.0843	0.000001	8.81	0.442	3.9	3890.9	

Remarks:

(1) g=gravitational acceleration; k_s=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity

(2) The values of ks = 1.5mm and 0.3mm is used for the calculation of slimed uPVC sewer, poor condition @mean velocity = approximately 0.75m/s and 1.2m/s (based on Table 5: Recommended Roughness Values in Sewerage Manual)

(3) The value of velocity (V) is referred to the Tables for the hydraulic design of pipes, sewers and channels (8th edition)

(4) Equation used: $V = -\sqrt{(8gDs)}\log(\frac{k_s}{3.7D} + \frac{2.51\nu}{D\sqrt{(2gDs)}})$

(5) N/A = No information is provided in the geoinfo map and sewerage plan provided by DSD.

(6) The calculations for segments S10-S11 and S11-S12 are further conducted in Table 13.

(7) As there are no invert level information for FMH7036292 and FMH7036293, the slope of the segment is assumed to be in 1/150.

Table 11 Contributions of Sewage generated from the subject site and Catchments

Segment	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	Included Catchment	Estimated Flow from the Proposed Development only (L/s)	Contributed by the Proposed Development only (%)	Estimated Flow from the Proposed Development and Catchments (L/s)	Contributed by the Proposed Development and Catchments (%)	Status	Remark
TMH0 - S0	300	10.3	0.0146	146.1	Proposed Development + Catchment A	13.0	8.9	39.6	27.1	OK	
S0 - S1	750	13.4	0.0030	723.6	Proposed Development + Catchment A+B	13.0	1.8	354.1	48.9	OK	
S1 - S2	750	14.3	0.0007	290.3	Proposed Development + Catchment A+B+C	13.0	4.5	400.7	138.0	Spill	[1]
S2 - S3	900	70.3	0.0009	519.5	Proposed Development + Catchment A+B+C+D	13.0	2.5	459.8	88.5	OK	
S3 - S4	900	74.3	0.0008	505.2	Proposed Development + Catchment A+B+C+D+E	13.0	2.6	503.2	99.6	Spill	
S4 - S5	900	37.6	0.0067	1457.4	Proposed Development + Catchment A+B+C+D+E	13.0	0.9	503.2	34.5	OK	
S5 - S6	900	5.9	0.0067	1457.4	Proposed Development + Catchment A+B+C+D+E+F	13.0	0.9	629.8	43.2	OK	
S6 - S7	900	59.3	0.0010	672.7	Proposed Development + Catchment A+B+C+D+E+F	13.0	1.9	629.8	93.6	Spill	
S7 - S8	900	87.5	0.0013	751.5	Proposed Development + Catchment A+B+C+D+E+F+G	13.0	1.7	667.1	88.8	OK	
S8 - S9	900	21.3	0.0014	796.7	Proposed Development + Catchment A+B+C+D+E+F+G+H	13.0	1.6	718.3	90.2	OK	
S9 - S10	900	27.6	0.0014	807.8	Proposed Development + Catchment A+B+C+D+E+F+G+H	13.0	1.6	718.3	88.9	OK	
S10 - S11	900	2.4	/	#VALUE!	Proposed Development + Catchment A+B+C+D+E+F+G+H	13.0	#VALUE!	718.3	#VALUE!	#VALUE!	[2]
S11 - S12	750	1.7	/	#VALUE!	Proposed Development + Catchment A+B+C+D+E+F+G+H	13.0	#VALUE!	718.3	#VALUE!	#VALUE!	[2]
S12 - S13	750	0.9	0.0067	1086.3	Proposed Development + Catchment A+B+C+D+E+F+G+H	13.0	1.2	718.3	66.1	OK	
S13 - S14	750	5.0	0.0067	1086.3	Proposed Development + Catchment A+B+C+D+E+F+G+H	13.0	1.2	718.3	66.1	OK	
S14 - S15	750	21.1	0.0067	1086.3	Proposed Development + Catchment A+B+C+D+E+F+G+H	13.0	1.2	718.3	66.1	OK	
S15 - S16	750	4.7	0.0843	3890.9	Proposed Development + Catchment A+B+C+D+E+F+G+H	13.0	0.3	718.3	18.5	OK	

[1] Further calculation is conducted in Table 12

[2] The calculations for segments S10-S11 and S11-S12 are further conducted in Table 13.

Table 12a Hydraulic Capacity of Existing Sewers for Segment TMH0 to S5 -- surcharge condition

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	Foulwater Level 1	Foulwater Level 2	Cover Level 1	Cover Level 2	Freeboard 1	Freeboard 2	Friction Loss	Entry and Exit Loss	g	k_s	Required $s_{hydraulic}$	v	V	Area	Q [6]	Delivered Flow rate
			mm	m	mPD	mPD	mPD	mPD	mPD	mPD	m	m	m	m	m/s^2	m	-	m^2/s	m/s	m^2	m^3/s	L/s
TMH0 - S0	FLH7004609	FMH7036295	300	10.3	4.43	4.28	1.57	1.54	4.43	5.80	2.86	4.26	0.01	0.02	9.81	0.0003	0.0011	0.000001	0.56	0.07	0.04	39.6
S0 - S1	FMH7036295	FMH7036243	750	13.4	0.63	0.59	1.54	1.48	5.80	5.20	4.26	3.72	0.01	0.05	9.81	0.0003	0.0007	0.000001	0.80	0.44	0.35	354.1
S1 - S2	FMH7036243	FMH7036245	750	14.3	0.59	0.58	1.48	1.39	5.20	5.15	3.72	3.76	0.02	0.06	9.81	0.0015	0.0013	0.000001	0.91	0.44	0.40	400.7
S2 - S3	FMH7036245	FMH7036246	900	70.3	0.42	0.36	1.39	1.31	5.15	4.90	3.76	3.59	0.05	0.04	9.81	0.0015	0.0007	0.000001	0.72	0.64	0.46	459.8
S3 - S4	FMH7036246	FMH7036248	900	74.3	0.36	0.3	1.31	1.20	4.90	4.63	3.59	3.43	0.06	0.05	9.81	0.0015	0.0008	0.000001	0.79	0.64	0.50	503.2
S4 - S5	FMH7036248	FMH7036297	900	37.6	0.3		1.20															

Note: 1. For this assessment, the Colebrook-White Equation has been used to calculate the friction loss. (Sewerage Mannual section 5.2.1)

2. According to DSD'sSewerage Manual (Part 1) section 5.2.2, Local losses are usually small in realtion to the pipeline head losses and are not normally considered. However, as a conservative approach, further allowances have been included for local losses at pipe entry (K=0.5) and exit (K = 1), with a total local loss coefficient of 1.5

3. Friction loss is deduced by required hydraulic gradient x pipe length, while the local loss is deduced by the equation: $h_f = K\frac{V^2}{2g}$

4. Comparing the Cover levels and foulwater levels at manhole between FLH7004609 and FMH7036297, the freeboards are found sufficient (>1m). Therefore, no unacceptable adverse sewerage impacts are identified for manhole from FLH7004609 to FMH7036297. Further calculation (i.e. 1.15 Safety factor) is conducted in Table 12b.

Table 12b Hydraulic Capacity of Existing Sewers TMH0 to S5 - surcharge condition with 1.15 safety factor

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	Foulwater Level 1	Foulwater Level 2	Cover Level 1	Cover Level 2	Freeboard 1	Freeboard 2	Friction Loss	Entry and Exit Loss	g	k_s	Required $s_{hydraulic}$	v	V	Area	Q [6]	Required Peak Flow
			mm	m	mPD	mPD	mPD	mPD	mPD	mPD	m	m	m	m	m/s^2	m	-	m^2/s	m/s	m^2	m^3/s	L/s
TMH0 - S0	FLH7004609	FMH7036295	300	10.3	4.43	4.3	1.69	1.64	4.43	5.80	2.74	4.16	0.02	0.03	9.81	0.0003	0.0015	0.000001	0.64	0.07	0.05	45.5
S0 - S1	FMH7036295	FMH7036243	750	13.4	0.63	0.6	1.64	1.57	5.80	5.20	4.16	3.63	0.01	0.06	9.81	0.0003	0.0010	0.000001	0.92	0.44	0.41	407.2
S1 - S2	FMH7036243	FMH7036245	750	14.3	0.59	0.6	1.57	1.46	5.20	5.15	3.63	3.69	0.03	0.08	9.81	0.0015	0.0017	0.000001	1.04	0.44	0.46	460.8
S2 - S3	FMH7036245	FMH7036246	900	70.3	0.42	0.4	1.46	1.34	5.15	4.90	3.69	3.56	0.06	0.05	9.81	0.0015	0.0009	0.000001	0.83	0.64	0.53	528.8
S3 - S4	FMH7036246	FMH7036248	900	74.3	0.36	0.3	1.34	1.20	4.90	4.63	3.56	3.43	0.08	0.06	9.81	0.0015	0.0011	0.000001	0.91	0.64	0.58	578.7
S4 - S5	FMH7036248	FMH7036297	900	37.6	0.3		1.20															

Note: 1. For this assessment, the Colebrook-White Equation has been used to calculate the friction loss. (Sewerage Mannual section 5.2.1)

2. According to DSD'sSewerage Manual (Part 1) section 5.2.2, Local losses are usually small in realtion to the pipeline head losses and are not normally considered. However, as a conservative approach, further allowances have been included for local losses at pipe entry (K=0.5) and exit (K = 1), with a total local loss coefficient of 1.5

3. Friction loss is deduced by required hydraulic gradient x pipe length, while the local loss is deduced by the equation: $h_f = K\frac{V^2}{2g}$

4. Comparing the Cover levels and foulwater levels at manhole between FLH7004609 and FMH7036297, the freeboards are found sufficient (>0m). Therefore, no unacceptable adverse sewerage impacts are identified for manhole from FLH7004609 to FMH7036297.

Remarks: (1) g=gravitational acceleration; k_s=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity

(2) Table 5a & 5b: The value of ks is with reference to Table 2.

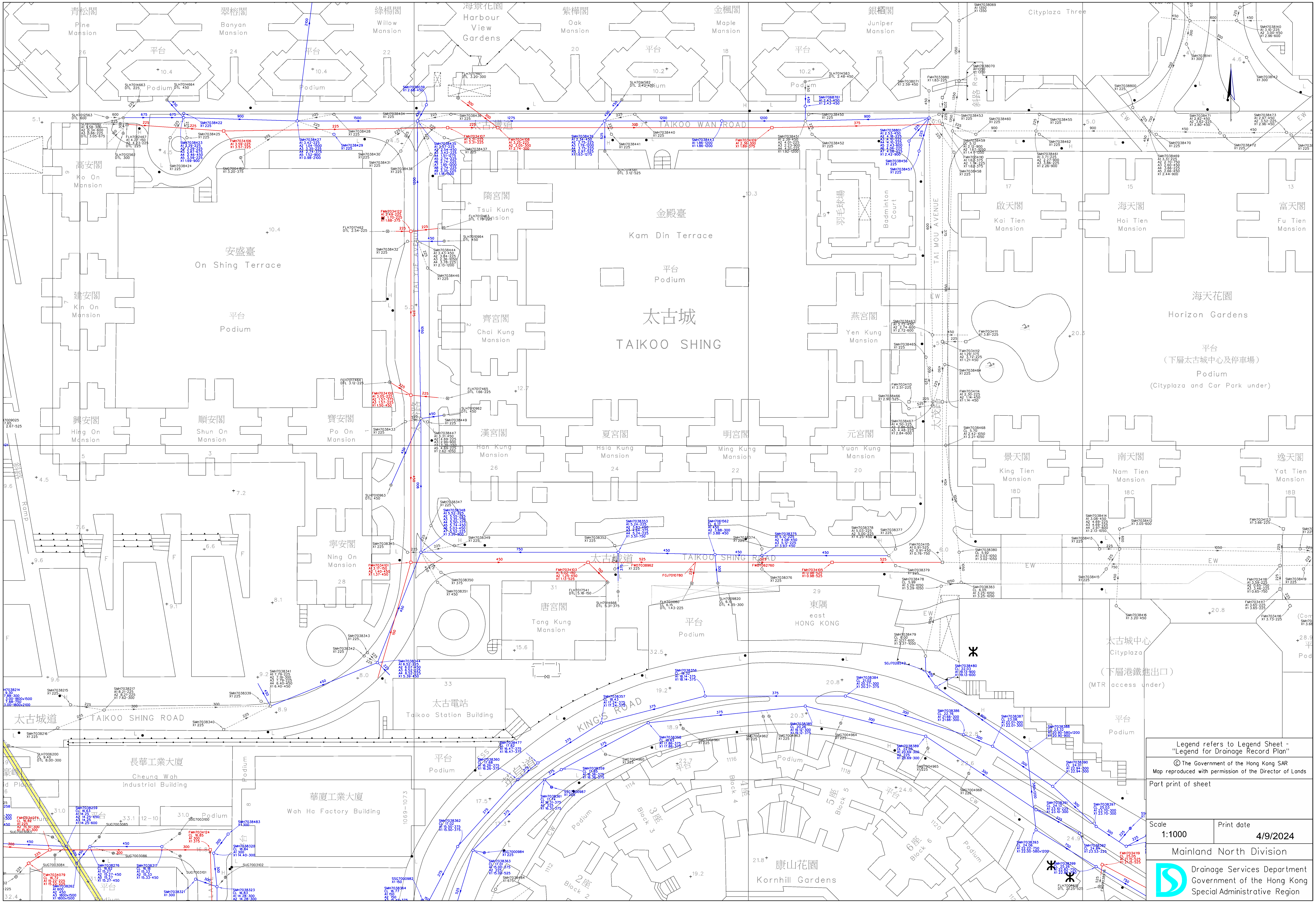
(3) The value of velocity (V) is referred to the Tables for the hydraulic design of pipes, sewers and channels (8th edition)

(4) Equation used: $V = -\sqrt{(8gDs)}\log(\frac{k_s}{3.7D} + \frac{2.51v}{D\sqrt{(2gDs)}})$

Table 13 Contributions of Sewage generated from the Subject Site on Tai Koo Shing Pumping Station (TKSPS)

Design Capacity of Tai Koo Shing Pumping Station (m3/day)	Design Capacity of Tai Koo Shing Pumping Station (L/s)	Estimated Flow from the Proposed Development (L/s)	Contributed by the Proposed Development (%)
22464	260	13.0	5%

Appendix 2.2 Sewerage Record Plans obtained from DSD


青松閣
Pine Mansion
翠榕閣
Banyan Mansion
綠楊閣
Willow Mansion
海景花園
Harbour View Gardens
紫樺閣
Oak Mansion
金楓閣
Maple Mansion
銀栢閣
Juniper Mansion
Cityplaza Three
平台
Podium
TAIKOO WAN ROAD
太古灣道
高安閣
Ko On Mansion
安盛臺
On Shing Terrace
建安閣
Kin On Mansion
隋宮閣
Tsui Kung Mansion
金殿臺
Kam Din Terrace
羽毛球場
Badminton Court
TAI MOU AVENUE
太茂路
啟天閣
Kai Tien Mansion
海天閣
Hoi Tien Mansion
富天閣
Fu Tien Mansion
海天花園
Horizon Gardens
（下層太古城中心及停車場）
(Cityplaza and Car Park under)
齊宮閣
Chai Kung Mansion
太古城
TAIKOO SHING
燕宮閣
Yen Kung Mansion
TAI YUE AVENUE
太裕路
興安閣
Hing On Mansion
順安閣
Shun On Mansion
寶安閣
Po On Mansion
漢宮閣
Han Kung Mansion
夏宮閣
Hsia Kung Mansion
明宮閣
Ming Kung Mansion
元宮閣
Yuan Kung Mansion
景天閣
King Tien Mansion
南天閣
Nam Tien Mansion
逸天閣
Yat Tien Mansion
Ramp
寧安閣
Ning On Mansion
太古城道
TAIKOO SHING ROAD
唐宮閣
Tang Kung Mansion
東滙
east HONG KONG
太古城中心
Cityplaza
（下層港鐵進出口）
(MTR access under)
太古電站
Taikoo Station Building
KING'S ROAD
英皇道
長華工業大廈
Cheung Wah Industrial Building
華厦工業大廈
Wah Ha Factory Building
康山花園
Kornhill Gardens
Block 2
Block 3
Block 4
Block 5
Block 6

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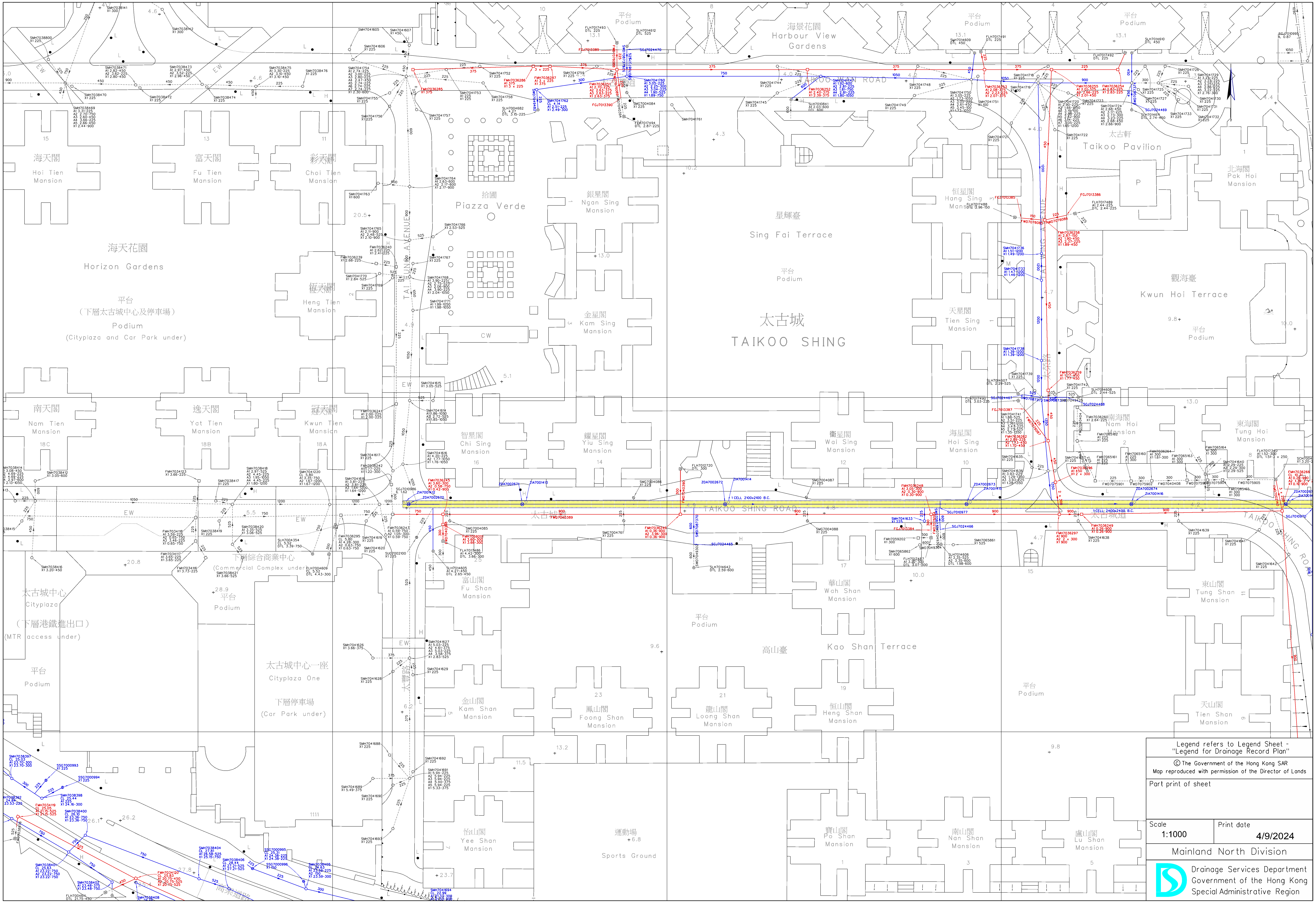
海景花園
Harbour View Gardens
平台
Podium
太古軒
Taikoo Pavilion
北海閣
Pak Hoi Mansion
海天閣
Hoi Tien Mansion
富天閣
Fu Tien Mansion
彩天閣
Choi Tien Mansion
拾圃
Piazza Verde
銀星閣
Ngan Sing Mansion
星輝臺
Sing Fai Terrace
恒星閣
Hang Sing Mansion
觀海臺
Kwun Hoi Terrace
海天花園
Horizon Gardens
恒天閣
Heng Tien Mansion
平台
（下層太古城中心及停車場）
Podium
(Cityplaza and Car Park under)
TAI KOO SHING ROAD
金星閣
Kam Sing Mansion
太古城
TAIKOO SHING
天星閣
Tien Sing Mansion
南天閣
Nam Tien Mansion
逸天閣
Yat Tien Mansion
冠天閣
Kwun Tien Mansion
智星閣
Chi Sing Mansion
耀星閣
Yiu Sing Mansion
衛星閣
Wai Sing Mansion
海星閣
Hoi Sing Mansion
南海閣
Nam Hoi Mansion
東海閣
Tung Hoi Mansion
TAIKOO SHING ROAD
太古城道
TAIKOO SHING ROAD
太古城中心
Cityplaza
（下層港鐵進出口）
(MTR access under)
平台
Podium
下層綜合商業中心
(Commercial Complex under)
平台
Podium
富山閣
Fu Shan Mansion
華山閣
Wah Shan Mansion
東山閣
Tung Shan Mansion
太古城中心一座
Cityplaza One
下層停車場
(Car Park under)
平台
Podium
高山臺
Kao Shan Terrace
平台
Podium
天山閣
Tien Shan Mansion
金山閣
Kam Shan Mansion
鳳山閣
Foong Shan Mansion
龍山閣
Loong Shan Mansion
恒山閣
Heng Shan Mansion
怡山閣
Yee Shan Mansion
運動場
Sports Ground
寶山閣
Po Shan Mansion
南山閣
Nam Shan Mansion
廬山閣
Lu Shan Mansion

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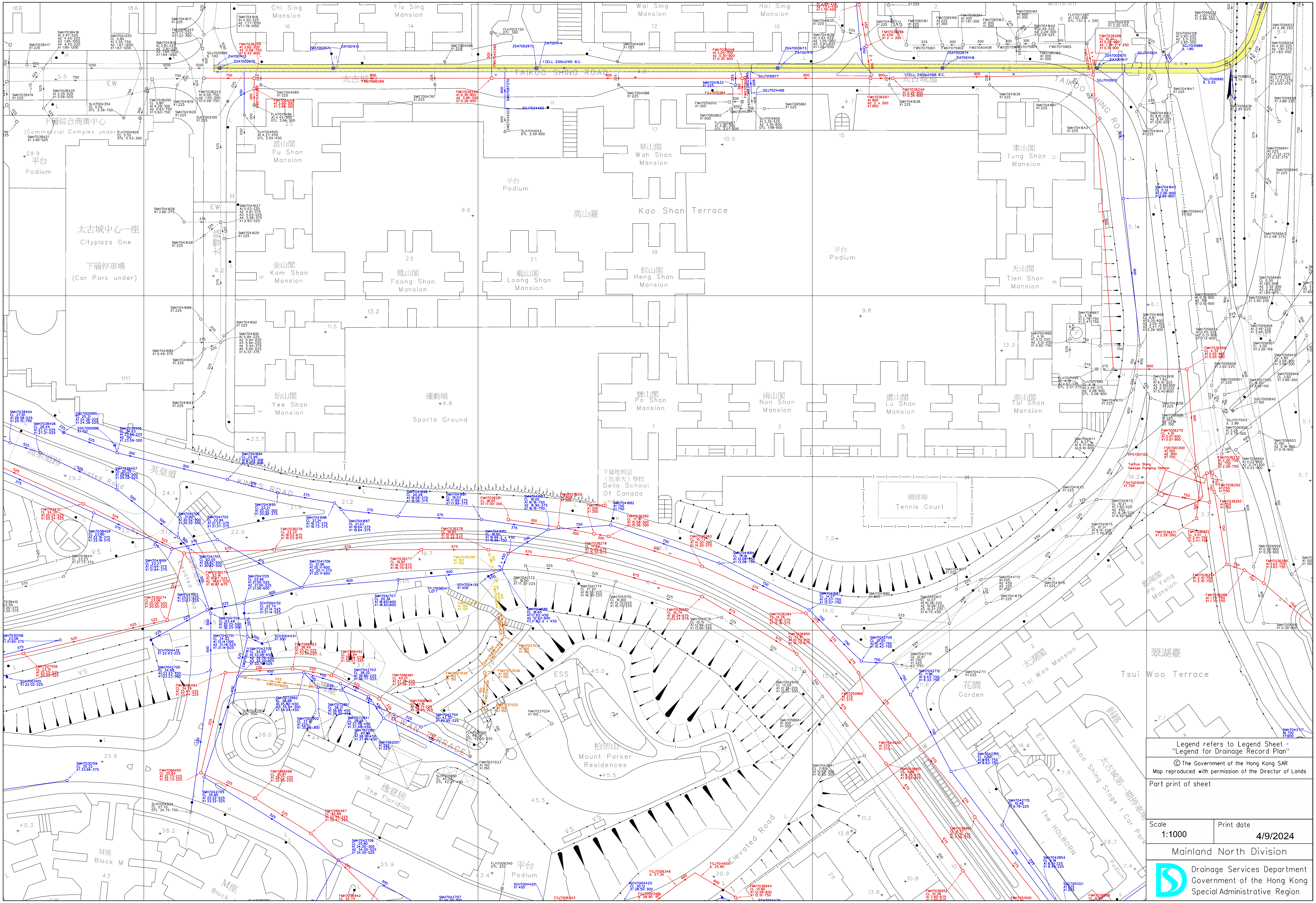
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太古城道
KING'S ROAD
英皇道
Elevated Road
Chi Sing Mansion
Yiu Sing Mansion
Wai Sing Mansion
Hoi Sing Mansion
富山閣
Fu Shan Mansion
華山閣
Wah Shan Mansion
東山閣
Tung Shan Mansion
平台
Podium
高山臺
Kao Shan Terrace
太古城中心一座
Cityplaza One
下層停車場
(Car Park under)
下層綜合商業中心
(Commercial Complex under)
金山閣
Kam Shan Mansion
鳳山閣
Foong Shan Mansion
龍山閣
Loong Shan Mansion
恒山閣
Heng Shan Mansion
天山閣
Tien Shan Mansion
怡山閣
Yee Shan Mansion
運動場
Sports Ground
寶山閣
Po Shan Mansion
南山閣
Nan Shan Mansion
廬山閣
Lu Shan Mansion
泰山閣
Tai Shan Mansion
下層加利亞（加拿大）學校
Delia School of Canada
網球場
Tennis Court
Taikoo Shing Sewage Pumping Station
寶揚閣
Po Yang Mansion
翠湖臺
Tsui Woo Terrace
太湖閣
Tai Woo Mansion
花園
Garden
柏架山
Mount Parker Residences
逸意居
The Floridian
The HOLBORN
太古城第一期停車場
Taikoo Shing Stage 1 Car Park
M座
M Block
ESS
1 CELL 2100x2100 B.C.
1 CELL 2400x2400 B.C.

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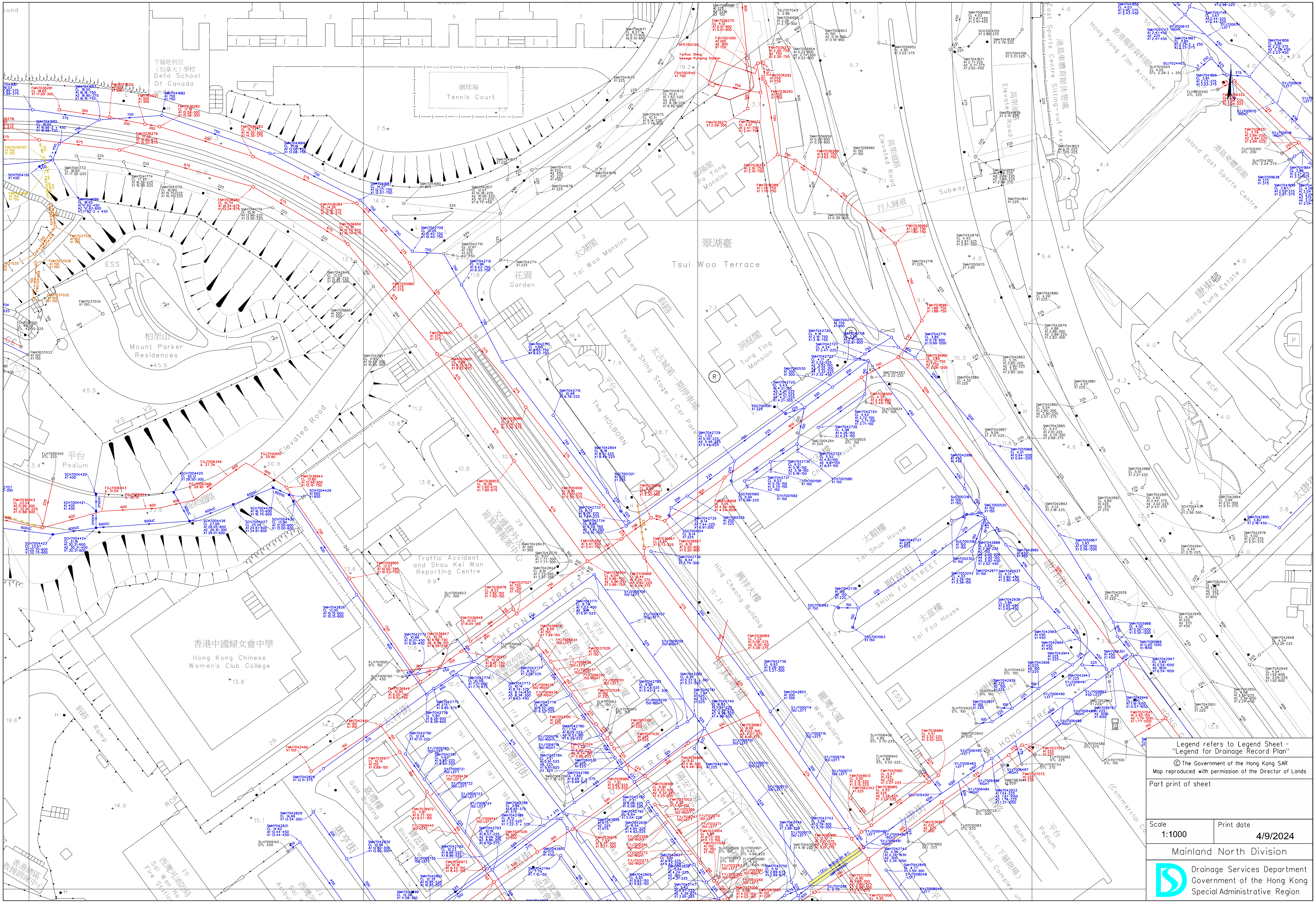
下層地利亞（加拿大）學校
Delia School Of Canada
網球場
Tennis Court
柏架山
Mount Parker Residences
平台
Podium
Elevated Road
太湖閣
Tai Woo Mansion
花園
Garden
翠湖臺
Tsui Woo Terrace
鄱陽閣
Po Yang Mansion
洞庭閣
Tung Ting Mansion
Taikoo Shing Stage 1 Car Park
The HOLBORN
Taikoo Shing Sewage Pumping Station
Elevated Road
行人隧道
Subway
East Sports Centre Sitting-out Area
Hong Kong Film Archive
Island East Sports Centre
康東邨
Hong Tung Estate
Traffic Accident and Shau Kei Wan Reporting Centre
香港中國婦女會中學
Hong Kong Chinese Women's Club College
CHEONG STREET
興祥大廈
Hing Cheong Building
太順樓
Tai Shun House
順富街
SHUN FU STREET
太富樓
Tai Foo House
HONG STREET
Gala Building
Commercial Complex
Ramp
RCP
斜路
Ramp

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