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Causeway Bay

Annex F Sewerage Impact Assessment



Proposed Redevelopment at Caroline Hill Road, Causeway Bay

Sewerage Impact Assessment for Proposed Redevelopment at Caroline Hill Road, Causeway Bay

Report Ref

06 | 17 September 2024

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 285077

Ove Arup & Partners Hong Kong Ltd
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
www.arup.com

ARUP

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ArchSD

1 Introduction

Sewerage Impact Assessment (“SIA”) had been submitted in fulfilment of the Special Conditions (61) (a) of the Conditions of Sale of the Lot requiring for submission of a SIA and was approved by EPD and DSD on 5 January 2022 and 3 May 2022 respectively.

This revised SIA had been submitted to support the Fresh S16 Planning Application with the revised layout plan submission. The recommendation established in the previously approved SIA remains unchanged.

1.1 Reference Materials

In evaluating the sewerage impact arising from the proposed development, the following sources of information have been specifically referred to:

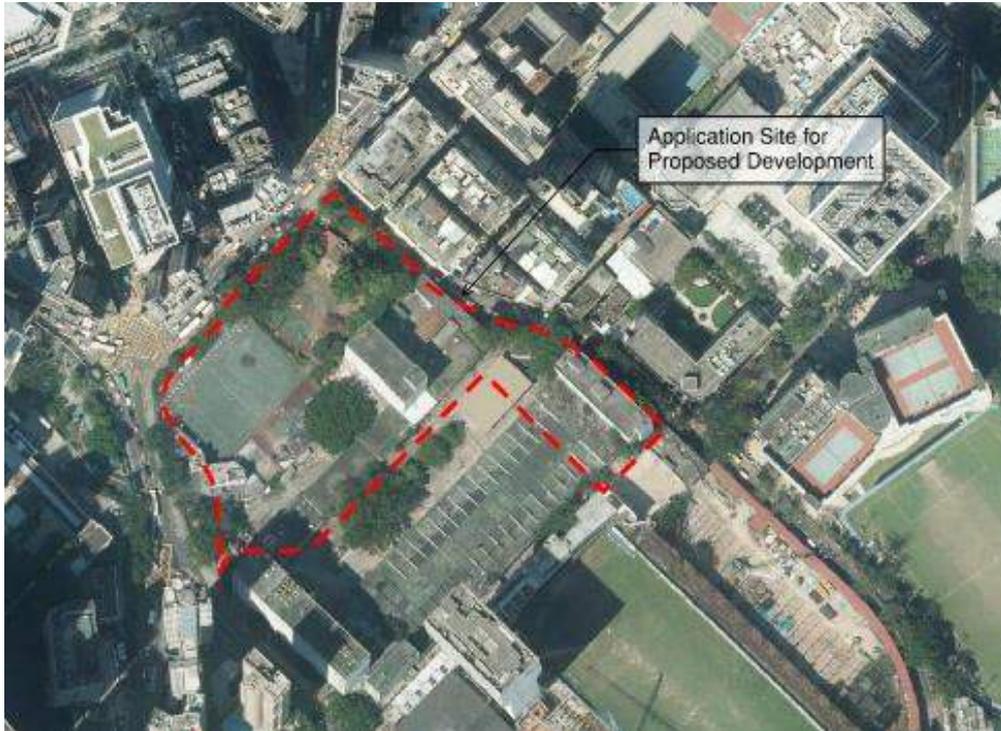
- Environmental Protection Department (EPD) Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning No. : EPD/TP 1/05;
- DSD Sewerage Manual – Key Planning Issues and Gravity Collection System; and
- Drainage Record Plans obtained from DSD.

2 The Development

For easy reference, a comparison table showing the difference between the Approved Scheme and the Proposed Scheme is shown in table below:

Description	Approved Scheme (No. A/H7/181)	Proposed Scheme	Difference
Project Title	Proposed Redevelopment at Caroline Hill Road, Causeway Bay		
Description	Two 24-storeys office towers (Tower 1 and Tower 2) and one 18-storeys office tower (Tower 3) for office, retail and GIC facilities use.		
Location	The site is located at Caroline Hill Road, Causeway Bay (see Figure 1).		
Land Use Zoning	Commercial		
Site Area	14,802 m ²	14,802 m ²	No change
Total Non-domestic GFA	102,000 m ²	102,000 m ²	No change
Office GFA	85,000 m ²	85,300 m ²	+300 m ²
Retail GFA	10,000 m ²	10,000 m ²	No change
Light Bus Lay-by GFA	2,000 m ²	1,600 m ²	-400 m ²
GIC GFA	3,000 m ²	3,100 m ²	+100 m ²
GIC GFA (Performing Art & Cultural Facilities)	2,000 m ²	2,000m ²	No change

Below is an aerial photograph of the Application Site.



3 Description of Existing Environment and Baseline Conditions

3.1 Site Location and Topography

The Application site is located at Causeway Bay at the junction of Caroline Hill Road and Leighton Road. The Application Site covers approximately 14802m² of area. It was occupied by the ex-Electrical and Mechanical Services Department (EMSD) Headquarters, the ex-Civil Aid Service Headquarters, the ex-Post Office Recreation Club and the PCCW Recreation Club.

3.2 Approach and Methodology

The sewage generated from the proposed development will be collected and conveyed to the existing sewerage system via the existing manhole FMH7058242 and FMH7058644. In order to assess the associated sewerage impact, the capacities of the existing public sewers along Caroline Hill Road were checked.

The adequacy of sewerage capacity along Caroline Hill Road was determined by using the estimate of future sewage generation from the proposed development.

The global unit flow factors recommended in the EPD Guidelines for Estimating Sewage Flows for Sewerage Infrastructure Planning No.: EPD/TP 1/05 have been adopted in the estimation.

3.3 Evaluation of Sewerage Impact

The sewage flow estimation from the proposed development, the unit flow factors as stated in EPD/TP 1/05 have been adopted.

The capacities of sewers have been calculated based on Colebrook-White equation, assuming full bore flow as below:

- (a) Pipe capacity is calculated based on the continuity equation

$$Q = AV$$

Where Q = pipe full flow capacity in m³/s

A = pipe cross-sectional area in m²

V = velocity at full bore flow in m/s

- (b) Velocity at full bore flow is based on the Colebrook-White equation

$$V = -\frac{1.49 R^{2/3} S^{0.5}}{(ks/14800R)^{10} + 10.58} \log \left\{ \frac{ks}{14800R} + \frac{10.58}{R} (32gRS)^{0.5} \right\}$$

Where g = acceleration due to gravity in m/s²

R = hydraulic radius in m

S = pipe gradient

ks = pipe roughness in mm

v = kinematic viscosity of water in m²/s

- (c) The sewerage impact due to the proposed development on the two existing public sewers have been evaluated by calculating the estimated peak flow against the capacity of the existing public sewer. One is the existing public sewer with downstream sewer of 600Ø run along the South of Caroline Hill Road. Another one is the existing public sewer with downstream sewer of 500Ø run along the East of Caroline Hill Road.
- (d) The detailed calculations are provided in **Appendix B** for reference.

3.4 Sewage Generation from the Proposed Development

The prediction for the proposed development sewage generation has been based on the information extracted from the development schedule (refer to Section 2). The quantity of sewage generated by the proposed is estimated from expected total population.

The table showing the sewage generation of the proposed development is calculated based on the guideline set in EPD Guidelines for Estimating Sewage Flows for Sewerage Infrastructure Planning and is shown on **Table B1** in **Appendix B** with the comparison between the Approved Scheme and the Proposed Scheme shown in the table below.

Description	Approved Scheme	Proposed Scheme	Difference
ADWF (m ³ /day)	973.20	975.44	+2.24
Catchment Inflow Factor	1.0	1.0	No change
Contributing Population	3,604	3,613	+9
Global Peaking Factor	6	6	No change
Peak Discharge, L/s	67.58	67.74	+0.16

3.5 Impact of the Proposed Development

In order to assess the impact on the existing public sewer associated with the proposed development, the capacities of the existing public sewers have been checked and shown on **Tables B2** in **Appendix B**.

The estimation of sewage generation in the vicinity of the Application Site is based on the assumptions as below:

- 1) Existing public sewer information based on DSD drainage record plans and shown in **Figure 2-5**;
- 2) Existing development parameters in the vicinity of the proposed development are obtained from public domain and sewerage catchment plan shown in **Figure 6**;
- 3) Flow factors as per EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning; and
- 4) Global peaking factor with stormwater allowance is adopted as per EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning.
- 5) The sewage flow and tentative sewerage system from Proposed District Court Complex is based on the design reference to the approved technical feasibility statement from ArchSD and shown in **Figure 7**.
- 6) As per ArchSD's current design, the sewer of FC tower is recommended to be connected to the existing sewerage manhole FSH7003584 and that of DC tower is recommended to be connected to the existing sewerage manhole FMH7009989.

The peak sewage flow from the proposed development is slightly increased from 67.58 L/s to 67.74 L/s.

On the South side of Caroline Hill Road, it has proven that an existing public sewerage serving the Application Site comprising an existing 300Ø public gravity sewer running along the south of Caroline Hill Road and the downstream existing public sewer of 600Ø running along the Leighton Road has sufficient capacity to carry the estimated sewage from the Application Site.

On the East side of Caroline Hill Road, it has proven that an existing 400Ø public gravity sewer running along the east of Caroline Hill Road and the downstream

existing public sewer of 500Ø running along Leighton Road has sufficient capacity to carry the estimated sewage from the Application Site.

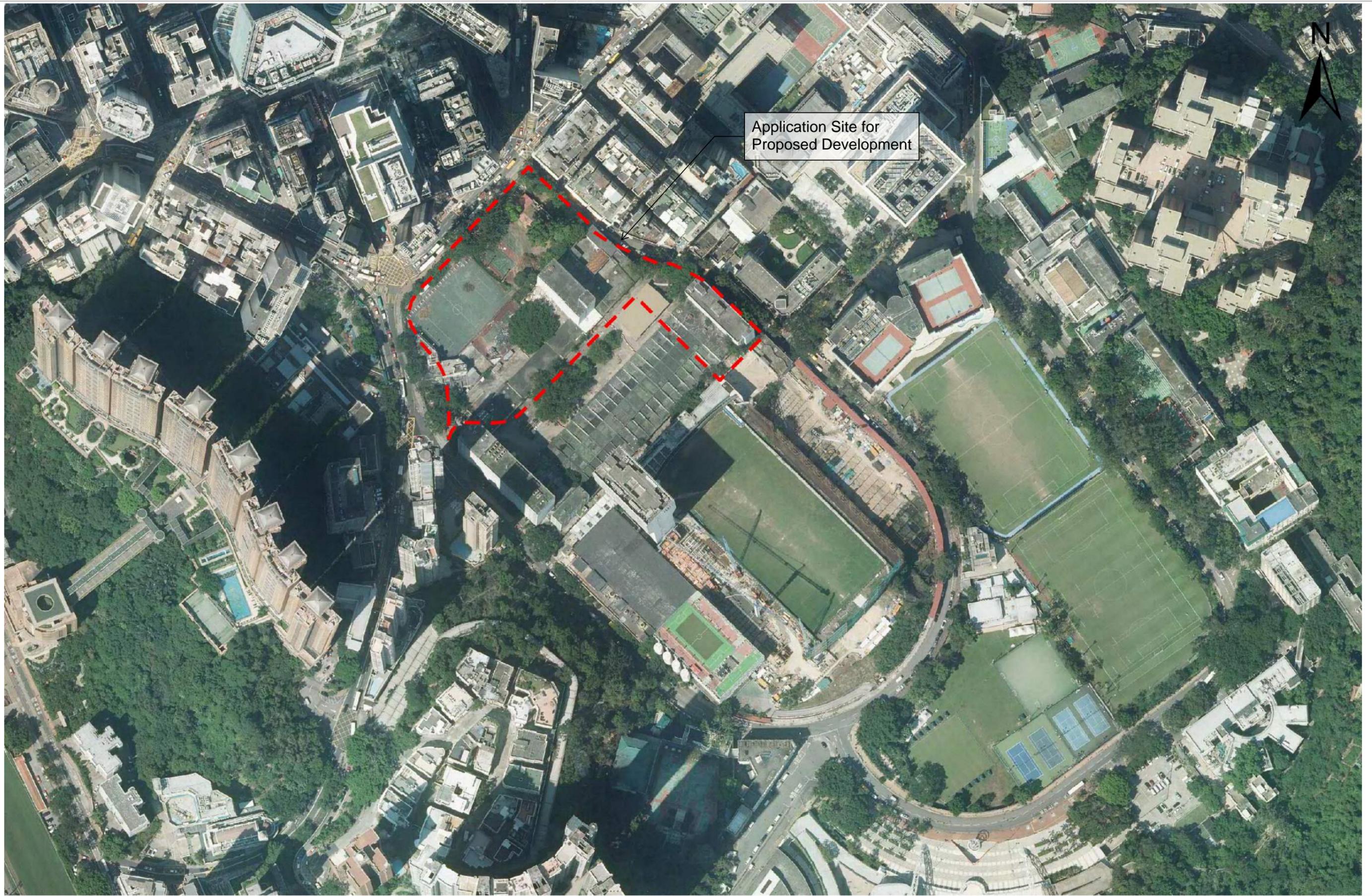
It is concluded that the proposed development would not result in any adverse sewerage impact to the existing public sewerage system. The capacities checking of the existing public sewers is shown in **Table B2**.

4 Conclusion

The peak sewage flow from the proposed development is slightly increased from 67.58 L/s to 67.74 L/s . It is observed that the two existing public sewerage serving the Application Site through existing FMH7058644 and FMH7058242 running along the Leighton Road, have sufficient capacity to carry the estimated sewage from the Application Site. It is concluded that the proposed development would not result in any adverse sewerage impact to the existing public sewerage system.

Appendix A

Figures



Application Site for
Proposed Development

LEGEND

 SITE BOUNDARY OF PROPOSED DEVELOPMENT

Mark Date By Rev.

Job Title
Proposed Redevelopment at Caroline
Hill Road, Causeway Bay

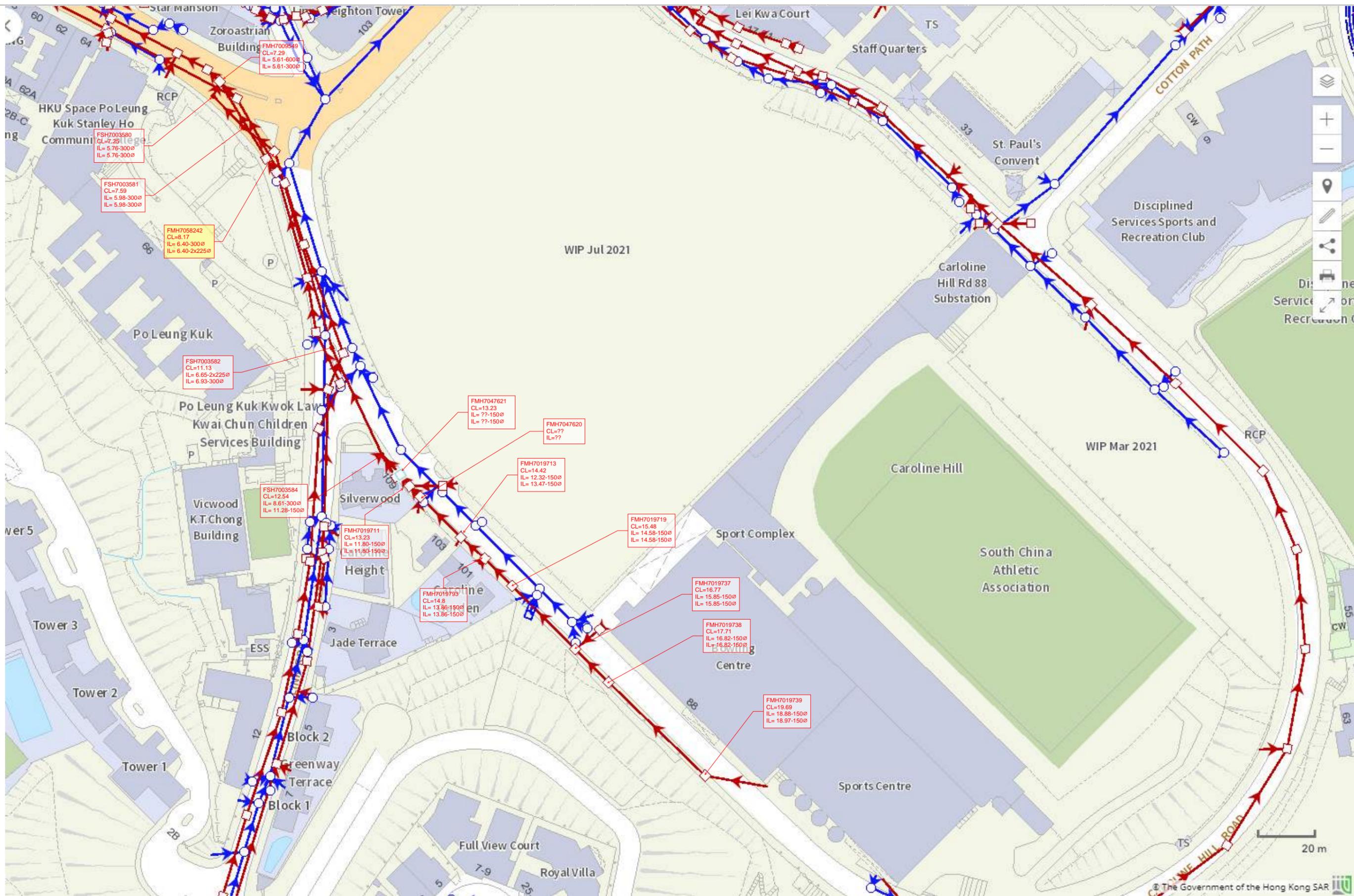
Drawing Title
LOCATION PLAN

ARUP

Drawing Status
FOR REFERENCE

Scale
Dwn. Date Chd. Passed

Job No. 285077 Drawing No. FIGURE 1 Rev.



WIP Jul 2021

WIP Mar 2021

FMH7009549
CL=7.29
IL= 5.61-600Ø
IL= 5.61-300Ø

FSH7003580
CL=7.25
IL= 5.76-300Ø
IL= 5.76-300Ø

FSH7003581
CL=7.53
IL= 5.98-300Ø
IL= 5.98-300Ø

FMH7058242
CL=8.17
IL= 6.40-300Ø
IL= 6.40-2x225Ø

FSH7003582
CL=11.13
IL= 6.65-2x225Ø
IL= 6.93-300Ø

FMH7047621
CL=13.23
IL= ??-150Ø
IL= ??-150Ø

FMH7047620
CL=??
IL= ??

FMH7019713
CL=14.42
IL= 12.32-150Ø
IL= 13.47-150Ø

FSH7003584
CL=12.54
IL= 8.61-300Ø
IL= 11.28-150Ø

FMH7019711
CL=13.23
IL= 11.80-150Ø
IL= 11.80-150Ø

FMH7019719
CL=15.48
IL= 14.58-150Ø
IL= 14.58-150Ø

FMH7019793
CL=14.9
IL= 13.96-150Ø
IL= 13.86-150Ø

FMH7019737
CL=16.77
IL= 15.85-150Ø
IL= 15.85-150Ø

FMH7019738
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IL= 16.82-150Ø
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FMH7019739
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IL= 18.88-150Ø
IL= 18.97-150Ø

Mark	Date	By	Rev.

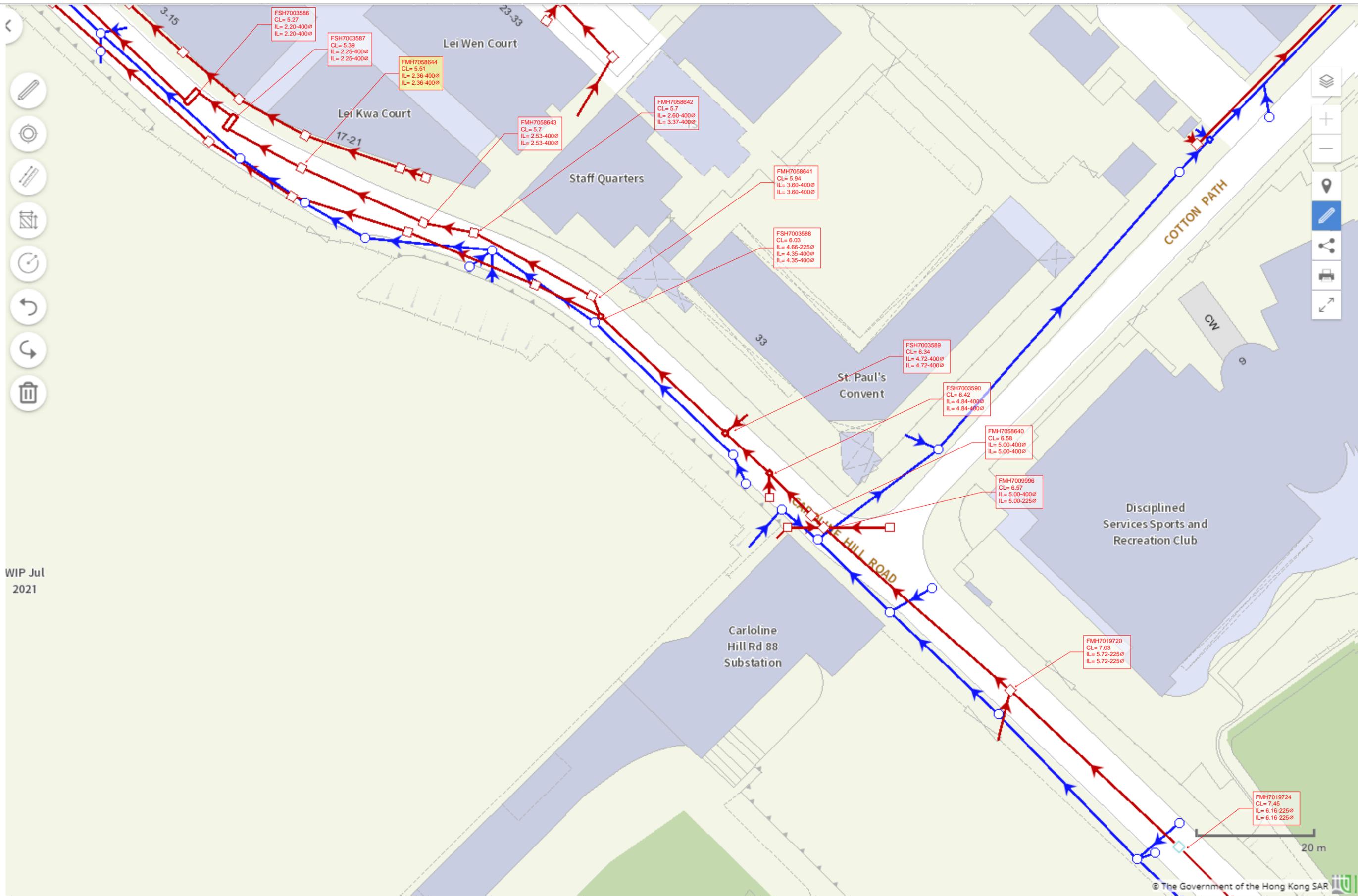
Job Title
Proposed Redevelopment at Caroline Hill Road, Causeway Bay

Drawing Title
EXISTING SEWERAGE LAYOUT PLAN - SOUTH

ARUP
Scale
Dwn. Date Chd. Passed

Drawing Status
FOR REFERENCE

Job No. 285077
Drawing No. FIGURE 2
Rev.



WIP Jul
2021

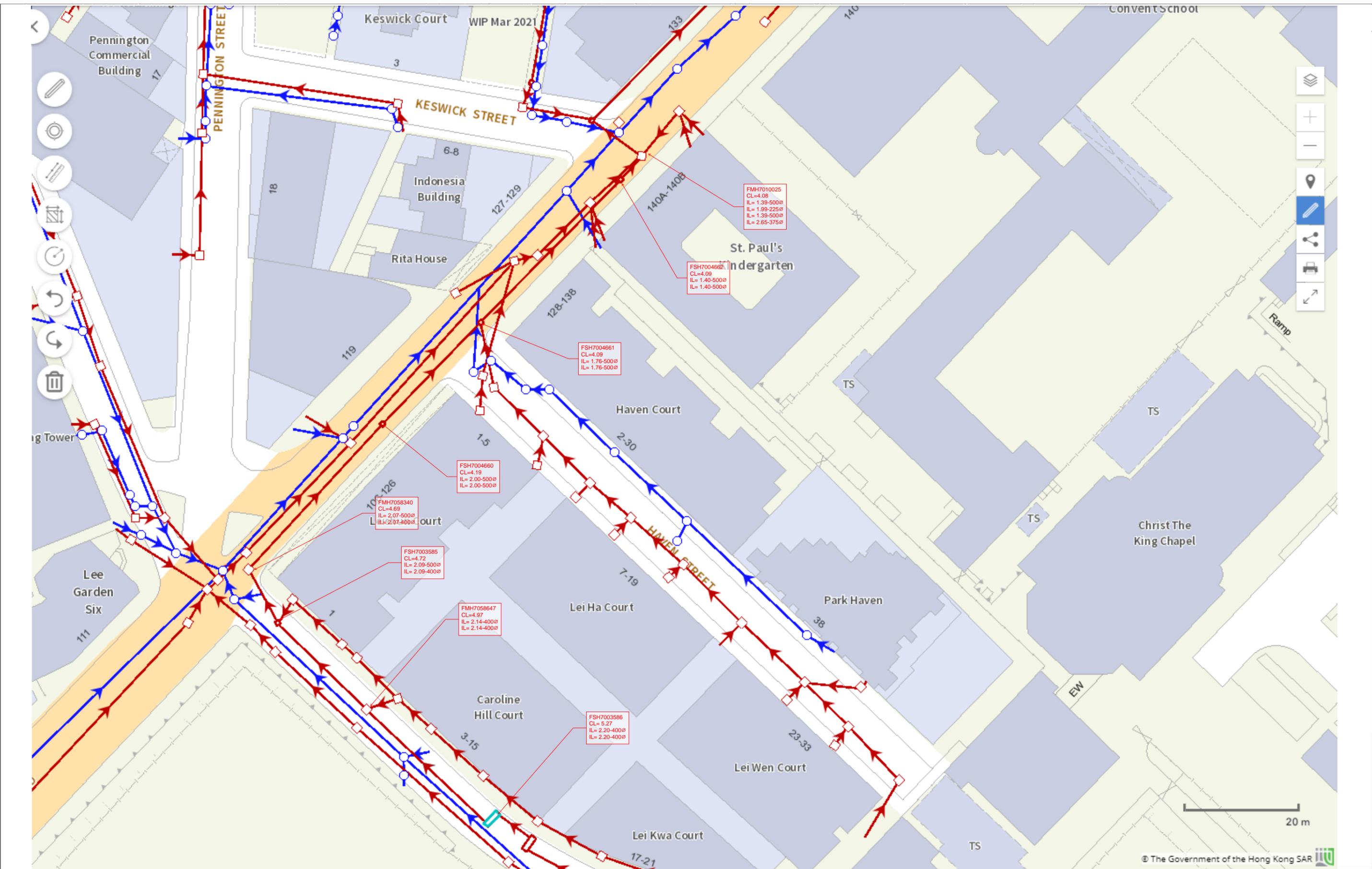
Mark	Date	By	Rev.

Job Title
Proposed Redevelopment at Caroline Hill Road, Causeway Bay

Drawing Title
EXISTING SEWERAGE LAYOUT PLAN - EAST (SHEET 2 OF 3)

Drawing Status
FOR REFERENCE

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Scale			
Dwn.	Date	Chd.	Passed
Job No.	Drawing No.		Rev.
285077	FIGURE 4		

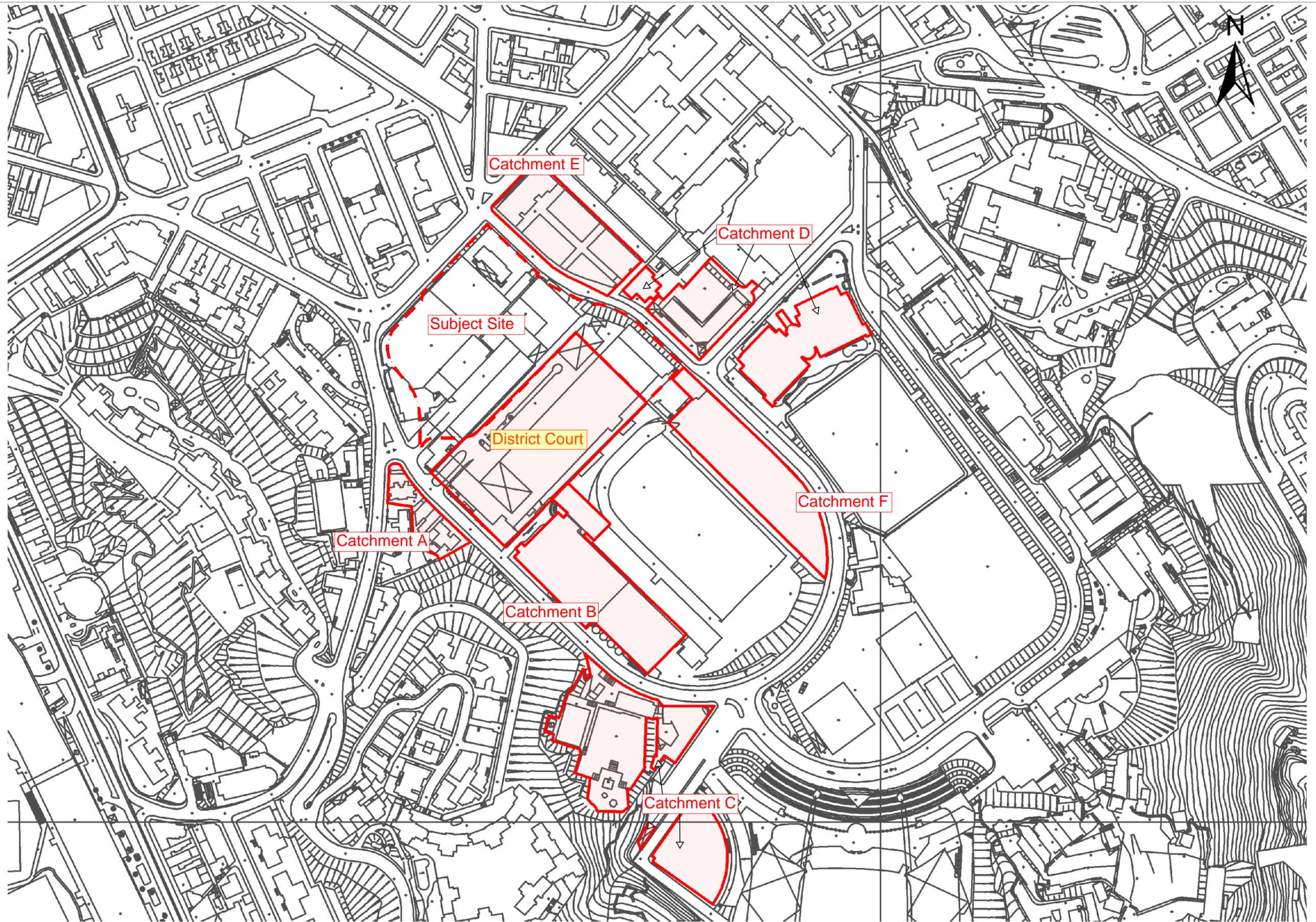


Mark	Date	By	Rev.

Job Title	Proposed Redevelopment at Caroline Hill Road, Causeway Bay
Drawing Title	EXISTING SEWERAGE LAYOUT PLAN - EAST (SHEET 3 OF 3)
Drawing Status	FOR REFERENCE

Scale	
Drn.	Date
Chd.	Passed
Job No.	285077
Drawing No.	FIGURE 5
Rev.	

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LEGEND

SEWAGE CATCHMENT

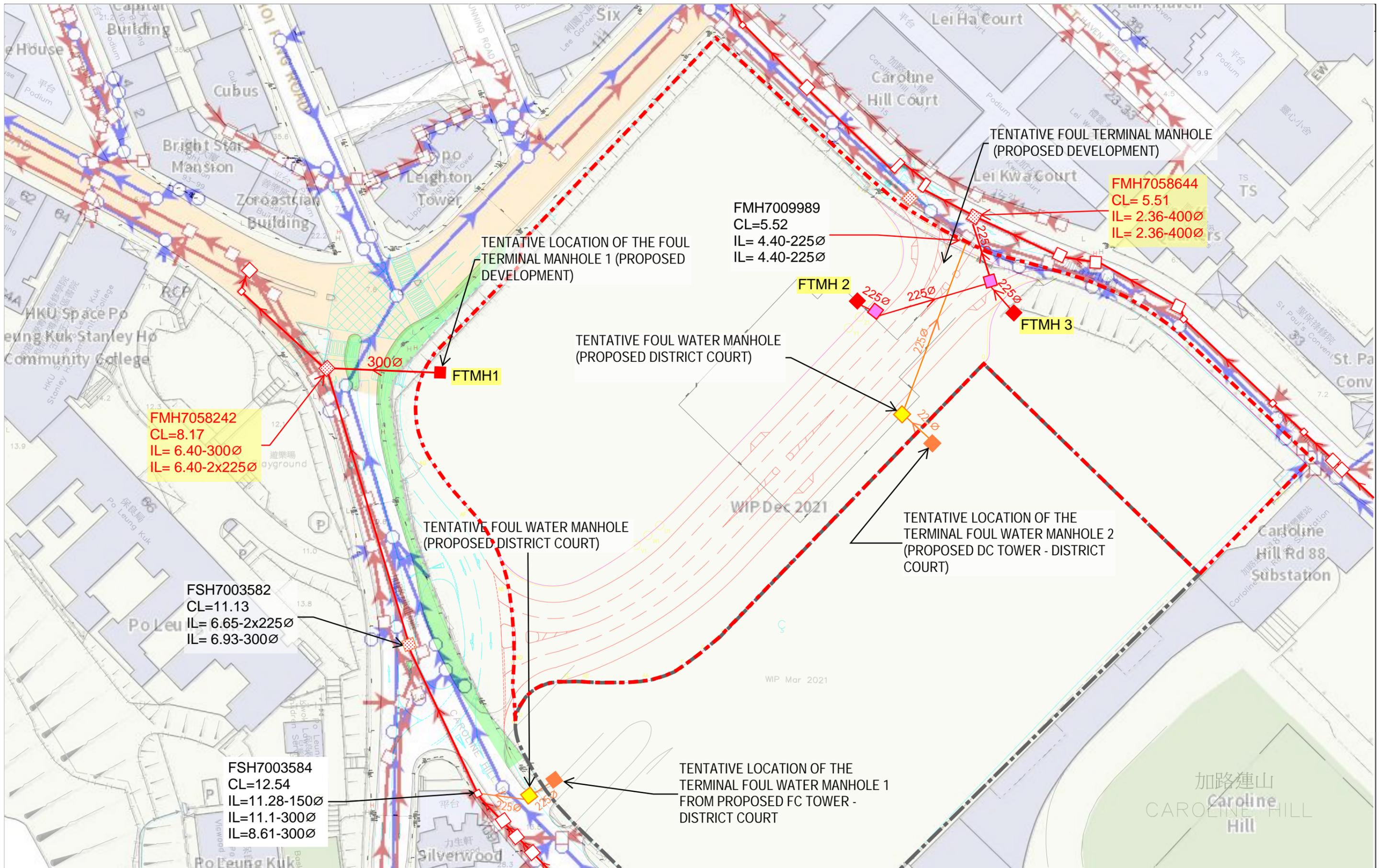
Mark	Date	By	Rev.

Job Title
Proposed Redevelopment at Caroline Hill Road, Causeway Bay

Drawing Title
SEWAGE CATCHMENT PLAN

ARUP

Scale		Chd.		Passed	
Dwn.	Date				
Drawing Status		Job No.	Drawing No.	Rev.	
FOR REFERENCE		285077	FIGURE 6		



Mark	Date	By	Rev.

LEGEND			
	PROPOSED TERMINAL FOUL WATER MANHOLE (PROPOSED DEVELOPMENT)		PROPOSED SEWER (PROPOSED DEVELOPMENT)
	PROPOSED TERMINAL FOUL WATER MANHOLE (PROPOSED DISTRICT COURT)		PROPOSED SEWER (PROPOSED DISTRICT COURT)
	SITE BOUNDARY OF PROPOSED DISTRICT COURT		PROPOSED CONNECTION POINT (PROPOSED DEVELOPMENT)
			PROPOSED CONNECTION POINT (PROPOSED DISTRICT COURT)
			PROPOSED FOUL WATER MANHOLE OF PROPOSED DEVELOPMENT
			PROPOSED FOUL WATER MANHOLE (PROPOSED DISTRICT COURT)

Job Title
Proposed Redevelopment at Caroline Hill Road, Causeway Bay

Drawing Title
Proposed Connection at Caroline Hill Road, Causeway Bay

Drawing Status
FOR REFERENCE

ARUP			
Scale	Date	Chd.	Passed
Job No. 285077	Drawing No. FIGURE 7	Rev.	

Appendix B

Calculation

TABLE B1
Sewage Flow Estimation for Proposed Development

(Based on EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning)

Design Assumption:

Global Peaking Factor, P (Including Stormwater Allowance) as per Table T-5
 Global Unit Flow Factors as per Tables T-2 and T-3
 Catchment Inflow Factor for Wan Chai (PCIF = 1.0) as per Table T-4

Development Schedule		
Sewage Flow Estimation for Caroline Hill Road - South	Estimation	Remark
Proposed Development		
(S) Subject Site		
GFA (m ²) for Office use	85,300	
Worker Density (No. of Worker per 100m ²)	5.5	
No. of Employee	4,692	
Unit flow factor (m ³ /person/day) - J6 Financial, Insurance, Real Estate & Business Services	0.08	
GFA (m ²) for F&B	10,000	
Worker Density (No. of Worker per 100m ²)	3.5	
No. of Employee	350	
Unit flow factor (m ³ /person/day) - J10 Restaurant & Hotels	1.58	
GFA (m ²) for GIC	5,100	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	168	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
Total ADWF, (m ³ /day)	975.44	
70% of Total ADWF, (m ³ /day)	682.8	
Total ADWF, (L/s)	11.29	
70% of Total ADWF, (L/s)	7.90	New Development
Catchment A		
A1 Silverwood		
Number of flats	81	
Population	219	
Unit flow factor (m ³ /person/day) - Residential R2	0.27	
ADWF, (m ³ /day)	59.05	
ADWF, (L/s)	0.68	P_{CF} = 1 included
A2 103 Caroline Hill Road (CHR)		
Number of flats	8	
Population	22	
Unit flow factor (m ³ /person/day) - Residential R2	0.270	
ADWF, (m ³ /day)	5.83	
ADWF, (L/s)	0.07	P_{CF} = 1 included
A3 Caroline Garden		
Number of flats	48	
Population	130	
Unit flow factor (m ³ /person/day) - Residential R2	0.270	
ADWF, (m ³ /day)	34.99	
ADWF, (L/s)	0.41	P_{CF} = 1 included
Catchment B		
B1 Bowling centre		
GFA (m ²)	5704	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	188	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
ADWF, (m ³ /day)	52.71	
ADWF, (L/s)	0.61	P_{CF} = 1 included
B2 Sport Complex		
GFA (m ²)	8352	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	276	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
ADWF, (m ³ /day)	77.17	
ADWF, (L/s)	0.89	P_{CF} = 1 included
B3 Sports Centre (50%)		
GFA (m ²)	6351	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	210	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
ADWF, (m ³ /day)	29.34	
ADWF, (L/s)	0.34	P_{CF} = 1 included
District Court		
District court - DC tower (connected to FMH7009989)		
ADWF, (m ³ /day)	20.72	According to recent SIA from development of District Court
Peak Flow, (m ³ /s)	0.0019	
District court - FC tower (connected to FSH7003584)		
ADWF, (m ³ /day)	313.00	According to recent SIA from development of District Court
Peak Flow, (m ³ /s)	0.0217	
Proposed Scenario Caroline Hill Road - South		
Total ADWF (m ³ /day)	1,255	
Total ADWF (L/s)	14.52	
Contributing Population	4,648	
Global Peaking Factor	6.00	
Total Peak Flow (L/s)	87.15	

Notes:
 Employment density shall refer to Commercial and Industrial Floor Space Utilization Survey published by PlanD.
 Office = 5.5 employee per 100m² of GFA
 Retail = 3.5 employee per 100m² of GFA
 Community, Social & Personal Services = 3.3 employee per 100m² of GFA

TABLE B1
Sewage Flow Estimation for Proposed Development

(Based on EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning)

Design Assumption:

Global Peaking Factor, P (Including Stormwater Allowance) as per Table T-5

Global Unit Flow Factors as per Tables T-2 and T-3

Catchment Inflow Factor for Wan Chai (PCIF = 1.0) as per Table T-4

Development Schedule		
Sewage Flow Estimation for Caroline Hill Road - East	Estimation	Remark
Proposed Development		
(S) Subject Site		
GFA (m ²) for Office use	85,300	
Worker Density (No. of Worker per 100m ²)	5.5	
No. of Employee	4,692	
Unit flow factor (m ³ /person/day) - J6 Financial, Insurance, Real Estate & Business Services	0.08	
GFA (m ²) for Retail use	10,000	
Worker Density (No. of Worker per 100m ²)	3.5	
No. of Employee	350	
Unit flow factor (m ³ /person/day) - J10 Restaurant & Hotels	1.58	
GFA (m ²) for GIC	5,100	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	168	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
Total ADWF, (m ³ /day)	975.44	
30% of Total ADWF, (m ³ /day)	292.63	
Total ADWF, (L/s)	11.29	
30% of Total ADWF, (L/s)	3.39	New Development
Catchment B		
B3 Sports Centre (50%)		
GFA (m ²)	6351	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	210	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
ADWF, (m ³ /day)	29.34	
ADWF, (L/s)	0.34	P_{CIF} = 1 included
Catchment C		
C1 Confucius Hall Secondary School		
Number of students	360	
Number of staffs	29	
Unit flow factor (m ³ /person/day) - students	0.04	
Unit flow factor (m ³ /person/day) - staffs	0.28	
ADWF, (m ³ /day)	22.52	
ADWF, (L/s)	0.26	P_{CIF} = 1 included
C2 So Kon Po Driving Test Centre		
GFA (m ²)	357	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	12	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
ADWF, (m ³ /day)	3.30	
ADWF, (L/s)	0.04	P_{CIF} = 1 included
C3 Olypmic House		
GFA (m ²)	4343	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	143	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
ADWF, (m ³ /day)	40.13	
ADWF, (L/s)	0.46	P_{CIF} = 1 included

TABLE B1

Sewage Flow Estimation for Proposed Development

(Based on EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning)

Design Assumption:

Global Peaking Factor, P (Including Stormwater Allowance) as per Table T-5

Global Unit Flow Factors as per Tables T-2 and T-3

Catchment Inflow Factor for Wan Chai (PCIF = 1.0) as per Table T-4

Development Schedule		
Sewage Flow Estimation for Caroline Hill Road - East	Estimation	Remark
Catchment D		
D1 Disciplined Services Sports and Recreation Club		
GFA (m ²)	10440	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	345	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
ADWF, (m ³ /day)	96.47	
ADWF, (L/s)	1.12	P_{CI}F = 1 included
D2 St. Paul Convent		
GFA (m ²)	1528	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	50	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
ADWF, (m ³ /day)	14.12	
ADWF, (L/s)	0.16	P_{CI}F = 1 included
Staff Quarters (D)		
D3 Number of units	25	
Population	68	
Unit flow factor (m ³ /person/day) - Residential R2	0.27	
ADWF, (m ³ /day)	18.23	
ADWF, (L/s)	0.21	P_{CI}F = 1 included
Catchment E		
E1 Leishun Court		
Number of flats	120	
Population	324	
Unit flow factor (m ³ /person/day) - Residential R2	0.27	
ADWF, (m ³ /day)	87.48	
ADWF, (L/s)	1.01	P_{CI}F = 1 included
E2 Caroline Hill Court		
Number of flats	1146	
Population	3094	
Unit flow factor (m ³ /person/day) - Residential R2	0.27	
ADWF, (m ³ /day)	835.43	
ADWF, (L/s)	9.67	P_{CI}F = 1 included
E3 Lei Kwa Court		
Number of flats	56	
Population	151	
Unit flow factor (m ³ /person/day) - Residential R2	0.27	
ADWF, (m ³ /day)	40.82	
ADWF, (L/s)	0.47	P_{CI}F = 1 included
E4 Lei Ha Court		
Number of flats	120	
Population	324	
Unit flow factor (m ³ /person/day) - Residential R2	0.27	
ADWF, (m ³ /day)	87.48	
ADWF, (L/s)	1.01	P_{CI}F = 1 included
E5 Lei Wen Court		
Number of flats	146	
Population	394	
Unit flow factor (m ³ /person/day) - Residential R2	0.27	
ADWF, (m ³ /day)	106.43	
ADWF, (L/s)	1.23	P_{CI}F = 1 included
Catchment F		
F1 Staff Quarters		
Number of units	35	
Population	95	
Unit flow factor (m ³ /person/day) - Residential R2	0.27	
ADWF, (m ³ /day)	25.52	
ADWF, (L/s)	0.30	P_{CI}F = 1 included
Proposed Scenario Caroline Hill Road - East		
Total ADWF (m ³ /day)	1,656	
Total ADWF (L/s)	19.17	
Contributing Population	6,134	
Global Peaking Factor	5.00	
Total Peak Flow (L/s)	95.84	

Notes:

Employment density shall refer to Commercial and Industrial Floor Space Utilization Survey published by PlanD.

Office = 5.5 employee per 100m² of GFA

Retails = 3.5 employee per 100m² of GFA

Community, Social & Personal Services = 3.3 employee per 100m² of GFA

Table B2 - Capacity Performance of Existing Sewer

Notes:

(1) Calculate by Colebrook-White Equation

$$\bar{V} = -\sqrt{32gRS_f} \log \left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}} \right]$$

where ks is roughness value
for clayware slimed sewers, ks equals 3mm
ν is kinematic viscosity of fluid = 1.14 x 10⁻⁶ m²/s and g is the gravity = 9.81m/s²
V is the velocity, D is the diameter of the sewer and S is the gradient of the sewer.

Abbreviation:

UP_MAN	Upstream Manhole	CON_POP	Contributing Population	DN_GL	Downstream Ground Level	CAP	Peak Pipe Capacity
DN_MAN	Downstream Manhole	DIA	Diameter	UP_INV	Upstream Invert Level	F/C	Peak Flow/Capacity
ADWF	Average Dry Weather Flow	LEN	Length	DN_INV	Downstream Invert Level		
ACC_ADWF	Accumulated Average Dry Weather Flow	UP_GL	Upstream Ground Level	VEL	Peak Pipe Velocity		

Proposed Development

UP_MAN No.	DN_MAN No.	Catchment	FROM SITE Description	CON_POP	PEAKING FACTOR	ACC_ADWF (L/s)	Peak Flow (L/s)	Existing Pipe Parameter														
								DIA (D) (mm)	LEN (m)	UP_GL (mPD)	DN_GL (mPD)	UP_INV (mPD)	DN_INV (mPD)	Gradient (S)	VEL (m/s)	AREA (m ²)	REDUCTION AREA (m ²)	CAP (L/s)	F/C (%)	Adequate Capacity?		
Caroline Hill Road - South																						
FMH7019739	FMH7019738	B1, 50%B3	Bowling centre, Sports Centre (50%)	304	8	0.95	7.60	150	44.5	19.69	17.71	18.88	16.82	22	1.67	0.0177	0.0159	26.58	28.6%	YES		
FMH7019738	FMH7019737	B1, 50%B3	Bowling centre, Sports Centre (50%)	304	8	0.95	7.60	150	15.7	17.71	16.77	16.82	15.85	16	1.93	0.0177	0.0159	30.70	24.7%	YES		
FMH7019737	FMH7019719	B1, 50%B3, B2	Bowling centre, Sports Centre (50%), Sport Complex	590	8	1.84	14.74	150	29.6	16.77	15.48	15.85	14.58	23	1.61	0.0177	0.0159	25.58	57.6%	YES		
FMH7019719	FMH7019793	B1, 50%B3, B2	Bowling centre, Sports Centre (50%), Sport Complex	590	8	1.84	14.74	150	12.8	15.48	14.80	14.58	13.86	18	1.84	0.0177	0.0159	29.29	50.3%	YES		
FMH7019793	FMH7019713	B1, 50%B3, B2, A3	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden	719	8	2.25	17.98	150	10.1	14.80	14.42	13.86	13.47	26	1.53	0.0177	0.0159	24.26	74.1%	YES		
FMH7019713	FMH7047620	B1, 50%B3, B2, A3	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden	719	8	2.25	17.98	150	17.0	14.42	13.46	12.32	11.91	41	1.21	0.0177	0.0159	19.27	93.3%	YES		
FMH7047620	FMH7019711	B1, 50%B3, B2, A3, A2	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden, 103 Caroline Hill Road	741	8	2.32	18.52	150	4.0	13.46	13.23	11.91	11.80	38	1.26	0.0177	0.0159	20.03	92.5%	YES		
FMH7019711	FMH7047621	B1, 50%B3, B2, A3, A2	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden, 103 Caroline Hill Road	741	8	2.32	18.52	150	4.7	13.23	13.23	11.80	11.64	30	1.42	0.0177	0.0159	22.54	82.2%	YES		
FMH7047621	FSH7003584	B1, 50%B3, B2, A3, A2	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden, 103 Caroline Hill Road	741	8	2.32	18.52	150	8.9	13.23	12.54	11.64	11.28	24	1.57	0.0177	0.0159	24.95	74.2%	YES		
FSH7003584	FSH7003582	B1, 50%B3, B2, A3, A2, A1	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden, 103 Caroline Hill Road, Silverwood, District Court FC tower	2,119	6	6.62	39.73	300	38.8	12.54	11.13	8.61	6.93	23	2.59	0.0707	0.0636	164.77	24.1%	YES		
FSH7003582	FMH7058242	B1, 50%B3, B2, A3, A2, A1, G	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden, 103 Caroline Hill Road, Silverwood, District Court FC tower	2,119	6	6.62	39.73	2x225	67.4	11.13	4.44	6.65	6.40	269	0.62	0.0398	0.0358	44.55	89.2%	YES		
FMH7058242	FSH7003581	B1, 50%B3, B2, A3, A2, A1, G, 70%S	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden, 103 Caroline Hill Road, Silverwood, District Court FC tower, Proposed development (70%)	4,648	6	14.52	87.15	300	13.1	4.44	4.44	6.40	5.98	31	2.23	0.0707	0.0636	141.76	61.5%	YES		
FSH7003581	FSH7003580	B1, 50%B3, B2, A3, A2, A1, G, 70%S	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden, 103 Caroline Hill Road, Silverwood, District Court FC tower, Proposed development (70%)	4,648	6	14.52	87.15	300	14.4	4.44	4.44	5.98	5.76	65	1.54	0.0707	0.0636	97.79	89.1%	YES		
FSH7003580	FMH7009549	B1, 50%B3, B2, A3, A2, A1, G, 70%S	Bowling centre, Sports Centre (50%), Sport Complex, Caroline Garden, 103 Caroline Hill Road, Silverwood, District Court FC tower, Proposed development (70%)	4,648	6	14.52	87.15	300	5.6	4.44	4.44	5.76	5.61	37	2.05	0.0707	0.0636	130.14	67.0%	YES		
FTMH 1	FMH7058242	70%S	Proposed development (70%)	2,529	6	7.90	47.42	300	3.0	8.00	4.44	6.43	6.40	100	1.24	0.0707	0.0636	79.08	60.0%	YES		
Caroline Hill Road - East																						
FMH7019744	FMH7019743	C1, C2, C3, 50%B3	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%)	353	8	1.1	8.82	225	37.5	13.37	11.84	10.78	10.55	163	0.80	0.0398	0.0358	28.66	30.8%	YES		
FMH7019743	FMH7019742	C1, C2, C3, 50%B3	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%)	353	8	1.1	8.82	225	33.4	11.84	10.48	10.55	9.20	25	2.06	0.0398	0.0358	73.75	12.0%	YES		
FMH7019742	FMH7019726	C1, C2, C3, 50%B3	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%)	353	8	1.1	8.82	225	33.4	10.48	9.20	9.20	7.89	25	2.03	0.0398	0.0358	72.65	12.1%	YES		
FMH7019726	FMH7019725	C1, C2, C3, 50%B3	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%)	353	8	1.1	8.82	225	28.3	9.20	8.17	7.89	6.68	23	2.12	0.0398	0.0358	75.86	11.6%	YES		
FMH7019725	FMH7019724	C1, C2, C3, 50%B3	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%)	353	8	1.1	8.82	225	41.5	8.17	7.45	6.68	6.16	80	1.15	0.0398	0.0358	41.02	21.5%	YES		
FMH7019724	FMH7019720	C1, C2, C3, 50%B3	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%)	353	8	1.1	8.82	225	38.1	7.45	7.03	6.16	5.72	87	1.10	0.0398	0.0358	39.37	22.4%	YES		
FMH7019720	FMH7009996	C1, C2, C3, 50%B3, F	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters	447	8	1.4	11.19	225	40.6	7.03	6.57	5.72	5.00	56	1.36	0.0398	0.0358	48.82	22.9%	YES		
FMH7009996	FMH7058640	C1, C2, C3, 50%B3, F, D1, D2	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent	857	8	2.68	21.43	400	3.1	6.57	6.58	5.00	5.00	2067	0.33	0.1257	0.1131	37.20	57.6%	YES		
FMH7058640	FSH7003590	C1, C2, C3, 50%B3, F, D1, D2	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent	857	8	2.68	21.43	400	10.1	6.58	6.42	5.00	4.84	63	1.90	0.1257	0.1131	214.45	10.0%	YES		
FSH7003590	FSH7003589	C1, C2, C3, 50%B3, F, D1, D2	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent	857	8	2.68	21.43	400	9.9	6.42	6.34	4.84	4.72	82	1.66	0.1257	0.1131	187.54	11.4%	YES		
FSH7003589	FSH7003588	C1, C2, C3, 50%B3, F, D1, D2	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent	857	8	2.68	21.43	400	28.4	6.34	6.03	4.72	4.35	77	1.72	0.1257	0.1131	194.44	11.0%	YES		
FSH7003588	FMH7058641	C1, C2, C3, 50%B3, F, D1, D2	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent	857	8	2.68	21.43	400	3.3	6.03	5.94	4.35	3.60	4	7.19	0.1257	0.1131	813.22	2.6%	YES		
FMH7058641	FMH7058642	C1, C2, C3, 50%B3, F, D1, D2	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent	857	8	2.68	21.43	400	21.9	5.94	5.70	3.60	3.37	95	1.54	0.1257	0.1131	174.54	12.3%	YES		
FMH7058642	FMH7058643	C1, C2, C3, 50%B3, F, D1, D2	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent	857	8	2.68	21.43	400	8.4	5.70	5.70	2.60	2.53	120	1.37	0.1257	0.1131	155.44	13.8%	YES		
FMH7058643	FMH7058644	C1, C2, C3, 50%B3, F, D1, D2	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent	857	8	2.68	21.43	400	22.4	5.70	5.51	2.53	2.36	134	1.30	0.1257	0.1131	147.01	14.6%	YES		
FMH7058644	FSH7003587	C1, C2, C3, 50%B3, F, D1, D2, 30%S	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%)	1,941	6	6.07	36.39	400	13.4	5.51	5.39	2.36	2.25	119	1.38	0.1257	0.1131	156.37	23.3%	YES		
FSH7003587	FSH7003586	C1, C2, C3, 50%B3, F, D1, D2, 30%S	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%)	1,941	6	6.07	36.39	400	7.8	4.53	5.27	2.25	2.20	156	1.21	0.1257	0.1131	136.29	26.7%	YES		
FSH7003586	FMH7058647	C1, C2, C3, 50%B3, F, D1, D2, 30%S	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%)	1,941	6	6.07	36.39	400	28.2	5.27	4.97	2.20	2.14	470	0.69	0.1257	0.1131	78.38	46.4%	YES		
FMH7058647	FSH7003585	C1, C2, C3, 50%B3, F, D1, D2, 30%S, E2, E3, E4, 50%E1	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%), Caroline Hill Court, Lei Kwa Court, Lei Wen Court, Lei Ha Court, Leishun Court (50%)	3,564	6	11.14	66.82	400	21.1	4.97	4.72	2.14	2.09	422	0.73	0.1257	0.1131	82.73	80.8%	YES		
FSH7003585	FMH7058340	C1, C2, C3, 50%B3, F, D1, D2, 30%S, E2, E3, E4, 50%E1	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%), Caroline Hill Court, Lei Kwa Court, Lei Wen Court, Lei Ha Court, Leishun Court (50%)	6,066	5	18.96	94.79	500	10.9	4.72	4.69	2.09	2.07	545	0.75	0.1963	0.1767	131.76	71.9%	YES		
FMH7058340	FSH7004660	C1, C2, C3, 50%B3, F, D1, D2, 30%S, E2, E3, E4, 50%E1	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%), Caroline Hill Court, Lei Kwa Court, Lei Wen Court, Lei Ha Court, Leishun Court (50%)	6,066	5	18.96	94.79	500	34.1	4.69	4.19	2.07	2.00	487	0.79	0.1963	0.1767	139.40	68.0%	YES		
FSH7004660	FSH7004661	C1, C2, C3, 50%B3, F, D1, D2, 30%S, E2, E3, E4, 50%E1	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%), Caroline Hill Court, Lei Kwa Court, Lei Wen Court, Lei Ha Court, Leishun Court (50%)	6,066	5	18.96	94.79	500	24.1	4.19	4.09	2.00	1.76	100	1.74	0.1963	0.1767	307.67	30.8%	YES		
FSH7004661	FSH7004662	C1, C2, C3, 50%B3, F, D1, D2, 30%S, E2, E3, E4, 50%E1, D3	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%), Caroline Hill Court, Lei Kwa Court, Lei Wen Court, Lei Ha Court, Leishun Court (50%), Staff Quarters (D)	6,134	5	19.17	95.84	500	34.5	4.09	4.09	1.76	1.40	96	1.78	0.1963	0.1767	314.95	30.4%	YES		
FSH7004662	FMH7010025	C1, C2, C3, 50%B3, F, D1, D2, 30%S, E2, E3, E4, 50%E1, D3	Confucius Hall Secondary School, So Kon Po Driving Test Centre, Olympic House, Sports Centre (50%), Staff Quarters, Disciplined Services Sports and Recreation Club, St. Paul Convent, Proposed development (30%), Caroline Hill Court, Lei Kwa Court, Lei Wen Court, Lei Ha Court, Leishun Court (50%), Staff Quarters (D)	6,134	5	19.17	95.84	500	6.0	4.09	4.08	1.40	1.39	600	0.71	0.1963	0.1767	125.55	76.3%	YES		
FTMH 2	FMH7058644	30%S	Proposed development (30%)	1,084	6	3.39	20.32	225	3.0	8.00	5.51	2.39	2.36	100	1.02	0.0398	0.0358	36.63	55.5%	YES		

Appendix C

Design of Sewerage System
from District Court Complex at
Caroline Hill Road, ArchSD



JOB TITLE:

Sewerage Impact Assessment for Discharge of Town Planning Board Approval Condition(s) for D&B District Court at Caroline Hill Road

CALCULATION:

A01 Calculation of Sewage Loading from Site

JOB NUMBER / FILE:
1032463

REV: B
CALCULATION BY: R. Leung

CALCULATION NUMBER:
01

DATE:
06 Dec 2023

DRAWING REFERENCE:

CHECKED BY:
H. Wong

VERIFIED BY:
H. Wong

Catchment	Sewer Manhole No.	Buildings in Zone	Type of Use	Estimated Population	Handwashing Flowrate (L/min)	Duration of Each Handwash (sec)	Flushing Demand (L/Flush)	Unit Flow Factor (m ³ /day/ person)	Estimated Average Dry Weather Flow (m ³ /day)	Remarks
Site	FMH7009989	East (DC Tower) - JJO and Staff	Institutional	74	-	-	-	0.28	20.7	Unit Flow Factor: GESF - Combined UFF of commercial employees and commercial activities in J11 Community, Social & Personal Services is 0.280 m3/person/day. Worker density: Population from the latest GBP(san-fit schedule) adopted in BEAM Plus.
		East (DC Tower) - Public	Institutional	0	4.0	20.0	6.5	0.01	-	Unit Flow Factor: Based on the BEAM Plus for New Buildings Version 2.0 WU P1 and WU7 assumption for water consumption calculation. Worker density: Population from the latest GBP(san-fit schedule) adopted in BEAM Plus.
Site	FSH7003584	West (FC Tower) - JJO and Staff	Institutional	946	-	-	-	0.28	264.9	Unit Flow Factor: GESF - Combined UFF of commercial employees and commercial activities in J11 Community, Social & Personal Services is 0.280 m3/person/day. Worker density: Population from the latest GBP(san-fit schedule) adopted in BEAM Plus.
		West (FC Tower) - Public	Institutional	6143	4.0	20.0	6.5	0.01	48.1	Unit Flow Factor: Based on the BEAM Plus for New Buildings Version 2.0 WU P1 and WU7 assumption for water consumption calculation. Worker density: Population from the latest GBP(san-fit schedule) adopted in BEAM Plus.