

銅鑼灣



Causeway Bay

Annex E

Replacement Pages of Sewerage Impact Assessment

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
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	-	-2,000 m ²

Sewage 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	956.96	-16.24
Catchment Inflow Factor	1.0	1.0	No change
Contributing Population	3,604	3,544	-60
Global Peaking Factor	6	6	No change
Peak Discharge, L/s	67.58	66.46	-1.12

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 reduced from 67.58 L/s to 66.46 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 reduced from 67.58 L/s to 66.46 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 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	3,100	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	102	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
Total ADWF, (m ³ /day)	956.96	
70% of Total ADWF, (m ³ /day)	669.9	
Total ADWF, (L/s)	11.08	
70% of Total ADWF, (L/s)	7.75	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)	119.46	
ADWF, (L/s)	3.32	According to approved technical feasibility statement from ArchSD
District court - FC tower (connected to FSH7003584)		
ADWF, (m ³ /day)	38.39	
ADWF, (L/s)	1.07	According to approved technical feasibility statement from ArchSD
Proposed Scenario Caroline Hill Road - South		
Total ADWF (m ³ /day)	967	
Total ADWF (L/s)	11.82	
Contributing Population	3,583	
Global Peaking Factor	6.00	
Total Peak Flow (L/s)	70.93	

11.82

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	3,100	
Worker Density (No. of Worker per 100m ²)	3.3	
No. of Employee	102	
Unit flow factor (m ³ /person/day) - J11 Community, Social & Personal Services	0.28	
Total ADWF, (m ³ /day)	956.96	
30% of Total ADWF, (m ³ /day)	287.09	
Total ADWF, (L/s)	11.08	
30% of Total ADWF, (L/s)	3.32	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_{CIF} = 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_{CIF} = 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_{CIF} = 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_{CIF} = 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_{CIF} = 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_{CIF} = 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_{CIF} = 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_{CIF} = 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_{CIF} = 1 included
Proposed Scenario Caroline Hill Road - East		
Total ADWF (m ³ /day)	1,651	
Total ADWF (L/s)	19.10	
Contributing Population	6,113	
Global Peaking Factor	5.00	
Total Peak Flow (L/s)	95.52	

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 lined 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: Table with columns for UP_MAN, DN_MAN, ADWF, ACC_ADWF, CON_POP, DIA, LEN, UP_GL, DN_GL, UP_INV, DN_INV, VEL, CAP, F/C, Peak Pipe Capacity, Peak Flow/Capacity.

Main data table with columns: Manhole (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 (m²), REDUCTION AREA (m²), CAP (L/s), F/C (%), Adequate Capacity?