Appendix 4

Sewerage Impact Assessment

Prepared for

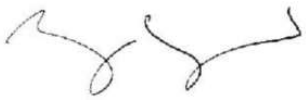
Lead Engineering Limited

Prepared by

Ramboll Hong Kong Limited

AMENDMENT TO THE APPROVED SOCIAL WELFARE FACILITY (RESIDENTIAL CARE HOME FOR THE ELDERLY) IN "RESIDENTIAL (GROUP B)" ZONE AT 349 PRINCE EDWARD ROAD WEST, KOWLOON

SEWERAGE IMPACT ASSESSMENT

Date	**August 2024**
Prepared by	**Jolene Wong** **Assistant Environmental Consultant**
Signed	
Approved by	**Katie Yu** **Senior Manager**
Signed	
Project Reference	**WSLPE349EI00**
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CHAPTERS

TABLES

FIGURES

APPENDICES

1. INTRODUCTION

1.1 Background and Objectives

1.1.1 The Subject Site is zoned as "Residential (Group B)" under the Approved Ho Man Tin Outline Zoning Plan No. S/K10/30, with site area of 582.9 m^2. This S16 application is submitted to the Town Planning Board for the amendment to the approved Social Welfare Facility (Residential Care Home for the Elderly) (Town Planning Board Ref. A/K10/261) at 349 Prince Edward Road West, Kowloon.

1.1.2 Ramboll Hong Kong Limited has been commissioned by Lead Engineering Limited (hereinafter referred to as "Applicant") to conduct this Sewerage Impact Assessment for the subject S16 application.

1.2 Subject Site and its Environs

1.2.1 The Subject Site is bounded by Prince Edward Road West to the North and is surrounded by existing elderly home and residential buildings e.g. Woodland Villa, Ka Wah Court and Blue Haven.

1.2.2 **Figure 1.1** shows the location of the Subject Site and its environs.

1.3 Proposed Development

1.3.1 The proposed development would consist of 11 storeys including basement, with a total of 2914.5 m^2 gross floor area. The plot ratio of the proposed development is 5.0. The population intake year is anticipated to be 2027.

1.3.2 **Appendix 1.1** shows the indicative Master Layout Plan of the proposed development.

2. SEWERAGE IMPACT ASSESSMENT

2.1 Scope of Work

2.1.1 The aim of this study is to assess whether the capacity of the existing sewerage networking to the Subject Site is sufficient to cope with the sewage flow generated from the proposed development and existing development in the vicinity.

2.2 Existing Sewerage System

2.2.1 The drainage record shows that there are existing Ø300mm, Ø600mm and Ø675mm sewers running along Prince Edward Road West to the north of the Subject Site (manhole reference no. FMH4027438 to FMH4048827).

2.2.2 According to a previous SIA submitted under the approved planning application no. A/K10/261, a manhole survey was conducted to obtain the invert levels of several manholes, as the information was not shown in the drainage records. According to our site survey, manholes FMH4048826 and FMH4050810 could not be located. And previous manhole survey results show that manhole FMH4067900 is connected to manhole FMH4050809, in contrary to the online drainage records. The manhole survey report from the previous planning application is extracted and attached as **Appendix 2.2**. It is assumed that the pipe material of existing Ø300mm is vitrified clay, while that of Ø600mm and Ø675mm sewers are concrete. This SIA is conducted according to the sewerage system alignment observed in the manhole survey. The underground pipeline survey is shown in **Appendix 2.2**.

2.3 Assessment Criteria and Methodology

2.3.1 Environmental Protection Department's (EPD's) Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, Version 1.0 (GESF) is referenced to estimate the quantity of the sewage generated from the proposed development and the existing development. Sewage flow parameters and global peaking factors in this document are adopted.

2.3.2 For the purpose of this SIA, area in the proposed development is considered as institutional uses. According to Table T-1 of the GESF, the domestic unit flow of Institutional and special class is 0.19 m^3/day.

2.3.3 According to Table T-2 of the GESF, the unit flow of Community, Social & Personal Services (J11) is 0.2 m^3/day, resulting in 0.28 m^3/day for each employee.

2.3.4 Full bore flow of the sewer segments between manhole FMH4050807 and FMH4048824 is used to estimate the sewage generation rate of the northern portion of catchment B.

2.4 Assessment of Sewerage Impact

2.4.1 The wastewater generated by the proposed development will be contributed by the elderly and employees of the proposed elderly home. Sewage generated from the Subject Site will be directed to sewers along Prince Edward Road West.

2.4.2 **Appendix 2.1** shows the detailed calculation on the estimated hydraulic capacity of the existing sewer sections and the calculation of the amount of sewage entering each segment of the said sewer network.

2.4.3 Along Prince Edward Road West, the existing public foul water manhole (FMH4027438) is the closest to the proposed development, while the invert level (7.8mPD) of the existing pipes is suitable for the connection to the proposed development (9.2mPD at

ground level). The proposed sewage pipe and the existing sewerage system in the vicinity of the subject site is shown in **Figure 2.1** while the catchment in the vicinity of the Subject Site is shown in **Figure 2.2**.

2.4.4 Calculation of the sewage generation rate for the proposed development is given in **Table 2.1**.

Table 2.1 Estimated Peak Flow of the Proposed Development

Calculation for Sewage Generation Rate of the Proposed Development			
1. Proposed Elderly Home			
1a. Total number of beds	=	141	units
1b. Total number of elderlies	=	141	people
1c. Design flow	=	190	litre/person/day -- (Special class in Table T-1 of GESF)
1d. Sewage Generation rate	=	**26.8**	m^3/day
2a. Total number of nursing staff	=	21	staff (Estimated based on Code of Practice for Residential Care Homes (Nursing Homes) for the Elderly)
2b. Design flow	=	280	litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social & Personal Services)
2c. Sewage Generation rate	=	**5.9**	m^3/day
3a. Assumed area for RCHE communal facilities	=	247.9	m^2
3b. Assumed floor area per employee	=	30.3	m^2 per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
3c. Total number of employees	=	8	employees
3d. Design flow	=	280	litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social & Personal Services)
3e. Sewage generation rate	=	**2.3**	m^3/day
Total Flow from Proposed Development			
Flow Rate	=	35.0	m^3/day
Contributing Population	=	129	people
Peaking factor	=	8	Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance
Peak Flow	=	**3.2**	litre/sec

2.5 Discussion

2.5.1 The average and peak flow rates from the proposed development are about 35.0m^3/day and 3.2 litre/sec respectively.

2.5.2 After calculating the appropriate capacities as mentioned above, the estimated sewage flow from the proposed development has been compared with the capacity of the existing sewerage system to determine whether it has adequate spare capacity to accommodate the flow from the proposed development and existing catchment area.

2.5.3 According to Table 4 of **Appendix 2.1**, it is found that the contribution from the sewage generated from the proposed development and surrounding catchment areas will be within 90% of the existing sewage system capacity. Therefore, the existing sewerage system is sufficient to cater for the sewage generated from the proposed development.

3. OVERALL CONCLUSION

3.1 Conclusion

3.1.1 The development of an Elderly Home is proposed at 349 Prince Edward Road West, Kowloon. The potential sewerage impact has been quantitatively addressed.

3.1.2 Based on the sewerage impact assessment results, it is found that the capacity of the existing sewers serving the Subject Site will be sufficient to cater for the sewage generation from the proposed development and the surrounding catchment areas. Therefore, adverse sewerage impacts are not anticipated.

Figures

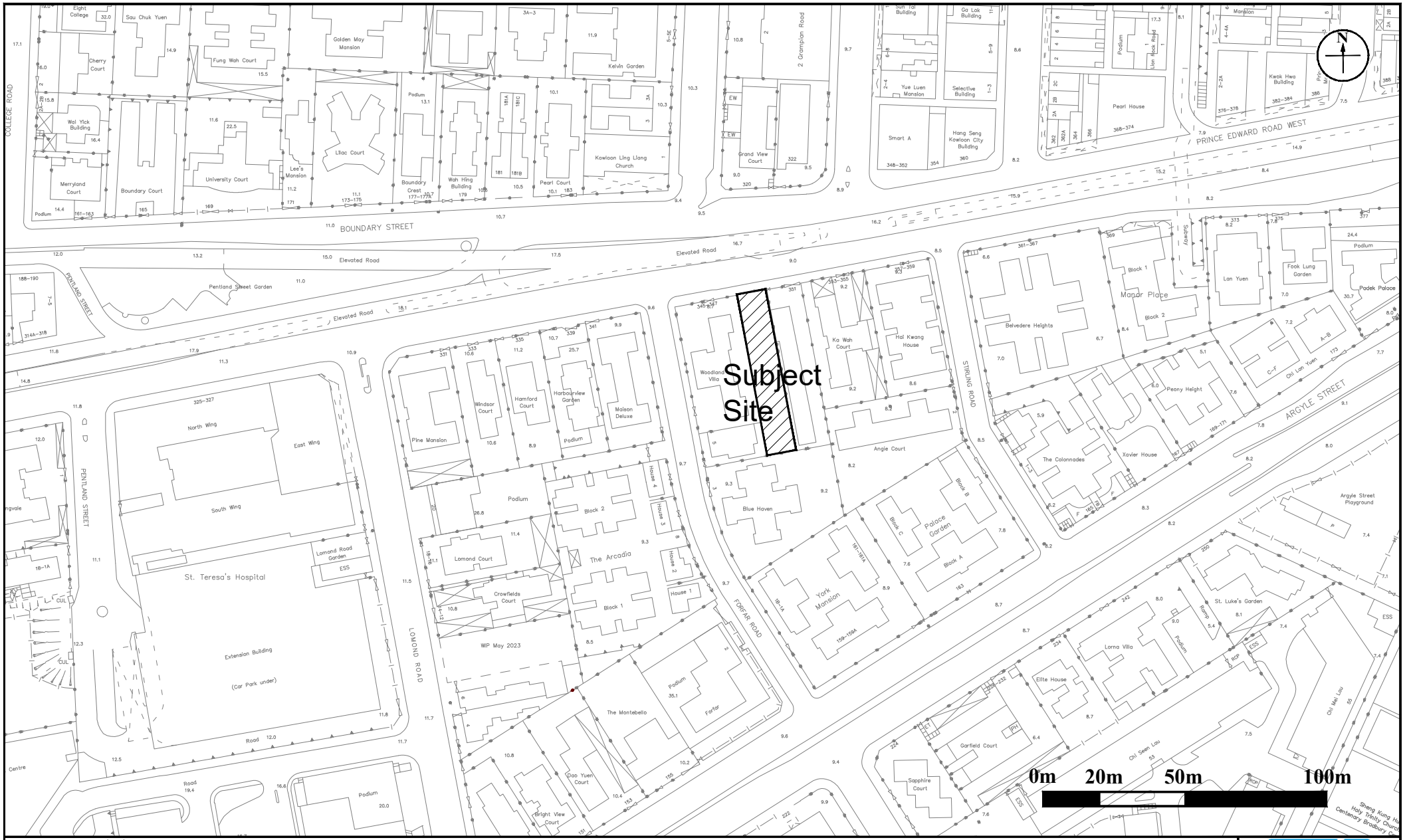

Figure: 1.1

Title: Subject Site and its Environs

Project: Amendment to the Approved Social Welfare Facility (Residential Care Home for the Elderly) in "Residential (Group B)" Zone at 349 Prince Edward Road West, Kowloon

RAMBOLL

Drawn by:	JW
Checked by:	KY
Rev.:	1.1
Date:	Aug 2024

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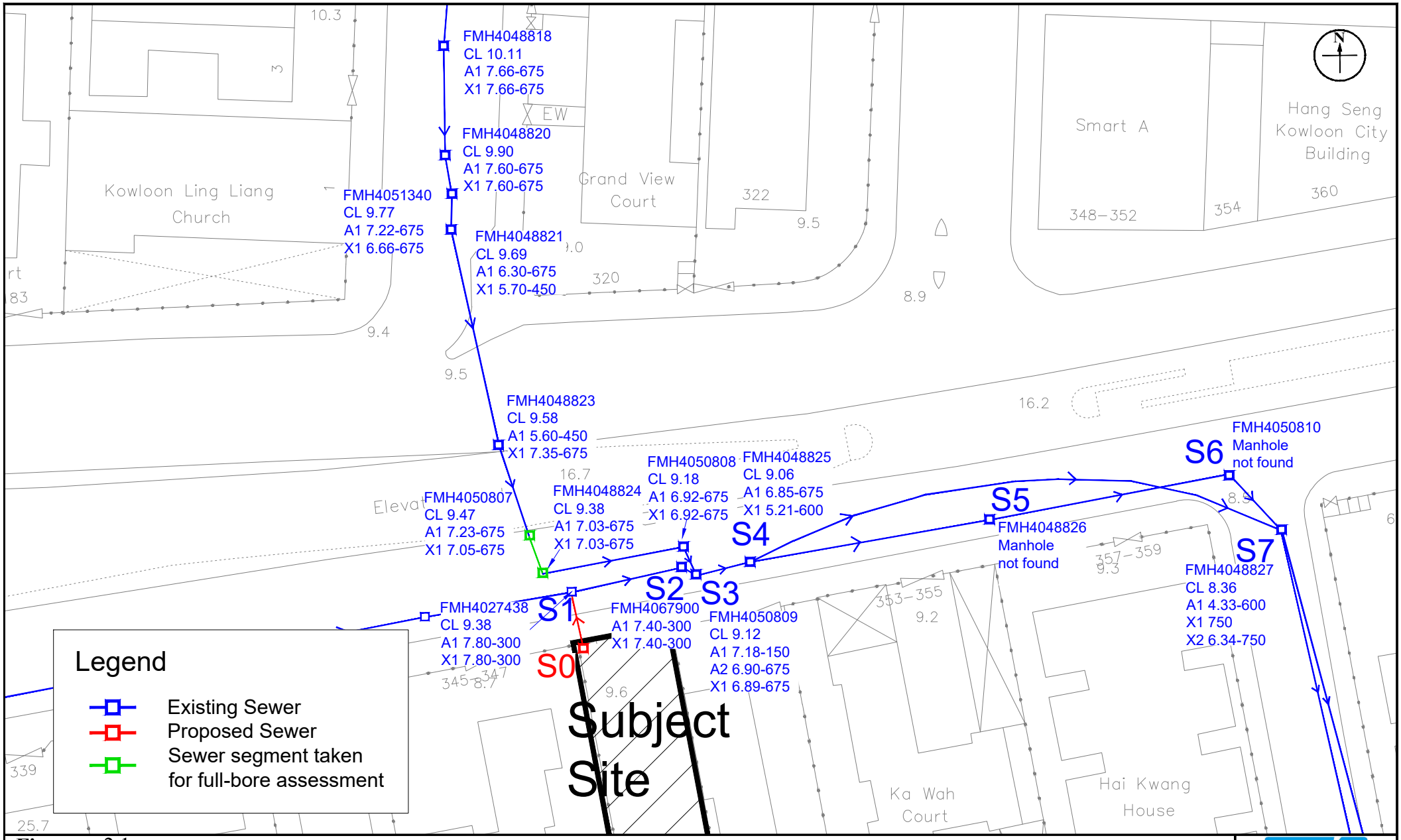

Figure: 2.1	RAMBOLL
Title: Existing Sewerage System in the Vicinity of the Subject Site	Drawn by: JW Checked by: KY
Project: Amendment to the Approved Social Welfare Facility (Residential Care Home for the Elderly) in "Residential (Group B)" Zone at 349 Prince Edward Road West, Kowloon	Rev.: 1.1 Date: Aug 2024

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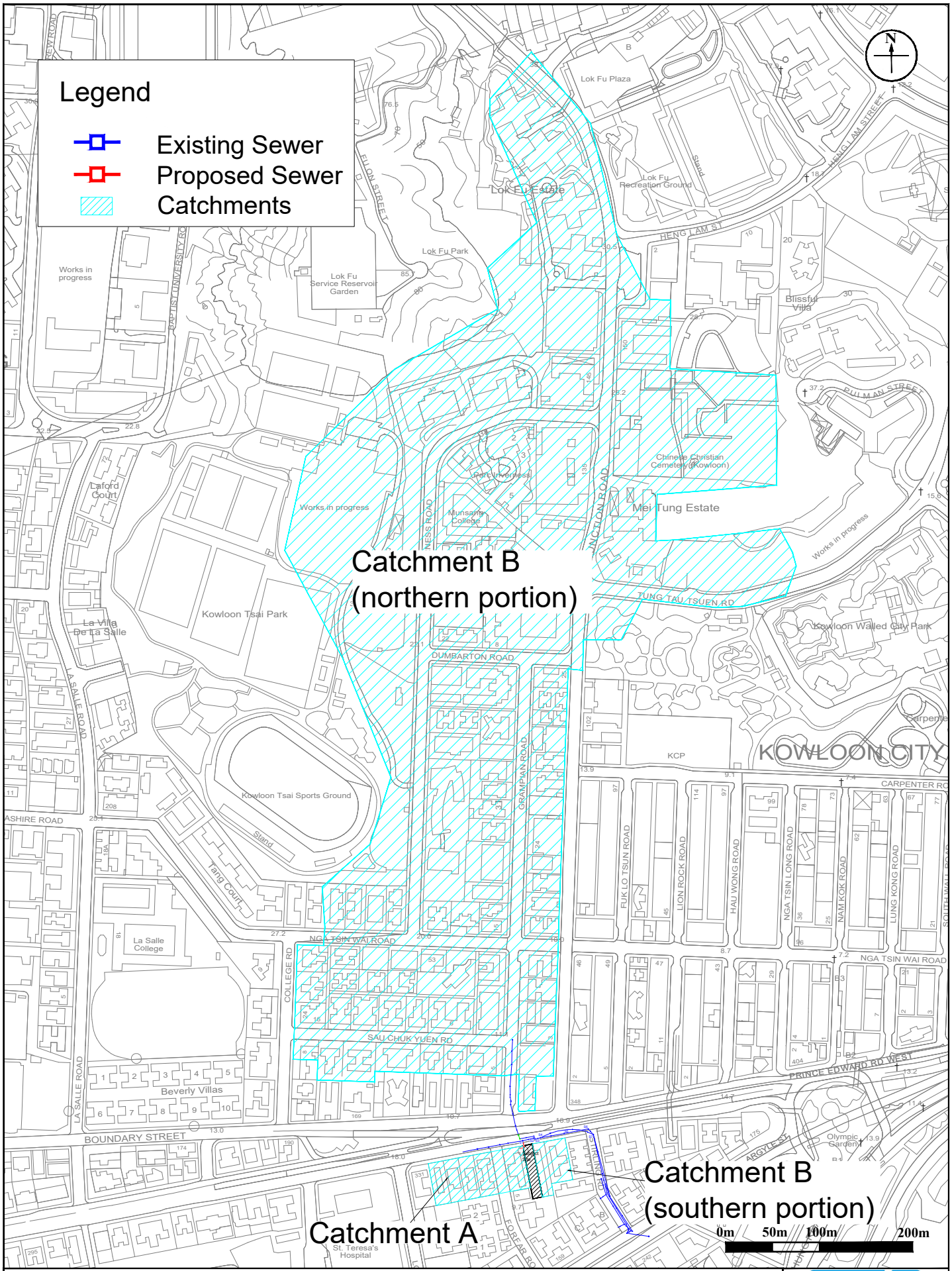

Figure:	2.2	RAMBOLL	
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Project:	Amendment to the Approved Social Welfare Facility (Residential Care Home for the Elderly) in "Residential (Group B)" Zone at 349 Prince Edward Road West, Kowloon	Rev.:	1.1
		Date:	Aug 2024

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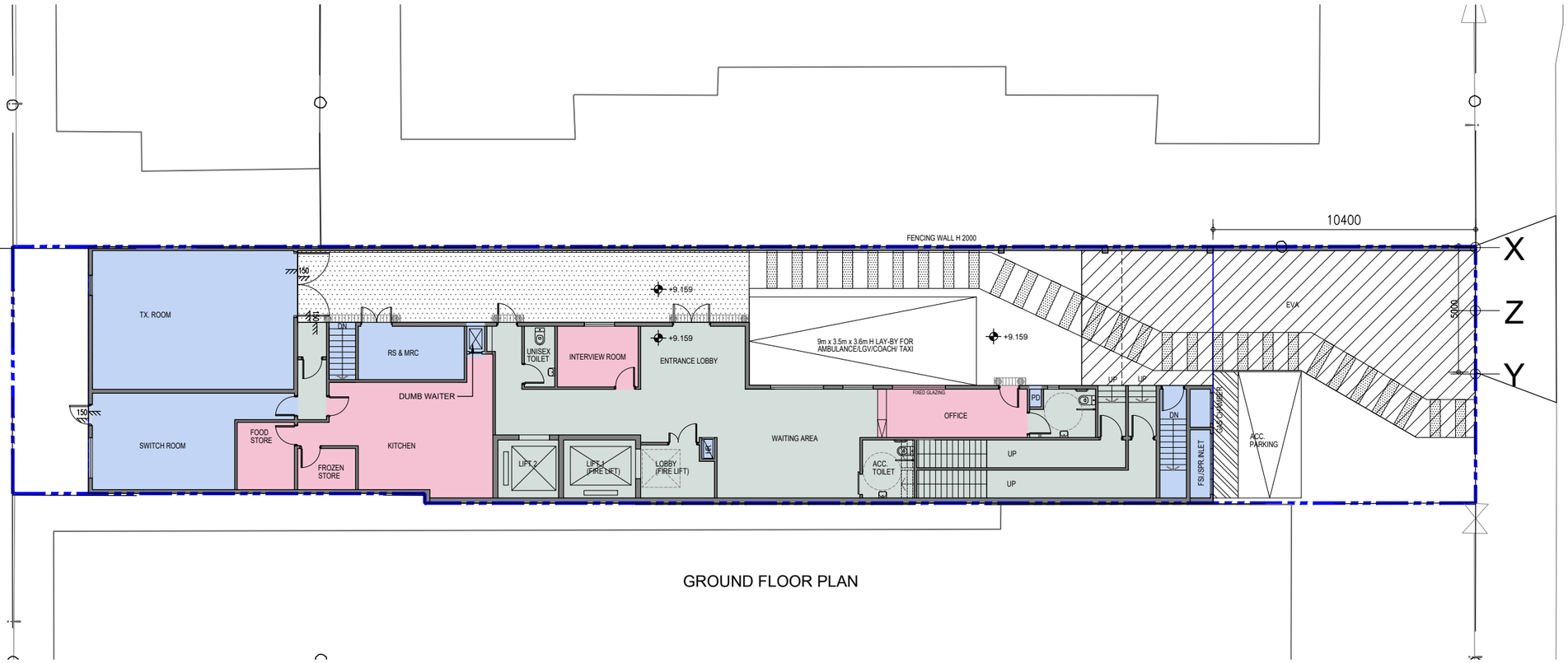
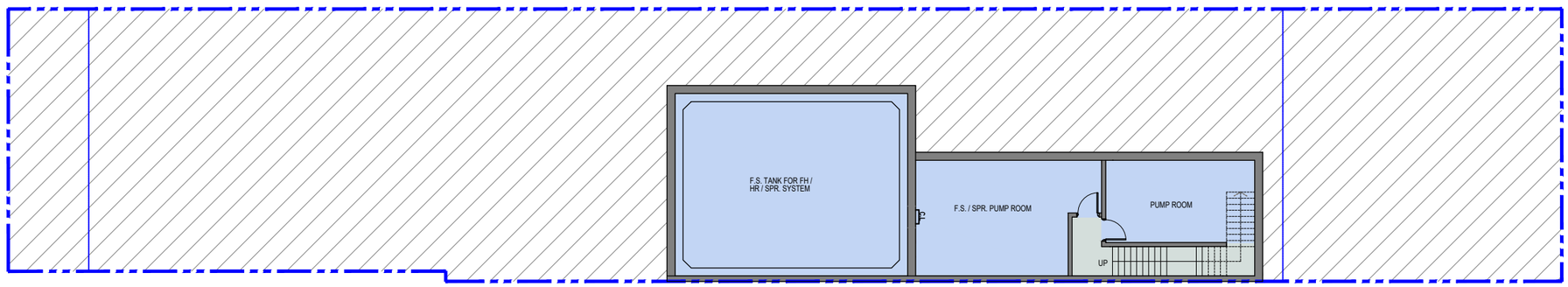
Appendix 1.1 Indicative MLP of the Proposed Development

SITE BOUNDARY
FOOTPATH
WARD
ANCILLARY AREA
COMMON / CIRCULATION SPACE
PLANT ROOM/ STAIRCASE TO U/G PLANT ROOM



GROUND FLOOR PLAN

G/F LAYOUT 1:200



B/S LAYOUT 1:200

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PRINCE EDWARD ROAD WEST

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Wilson & Associates Ltd

PROJECT E/M ENGINEER:

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PURPOSE BUILT C&A HOME DEVELOPMENT AT 349 PRINCE EDWARD ROAD WEST

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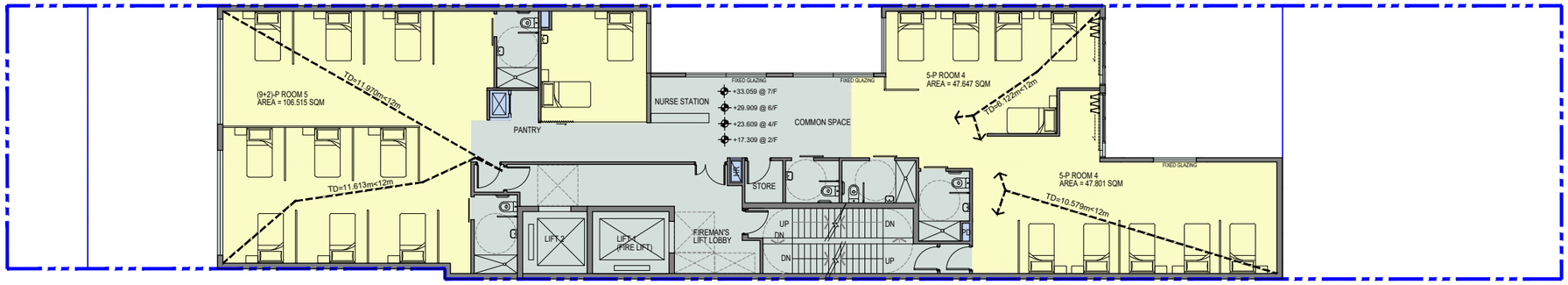
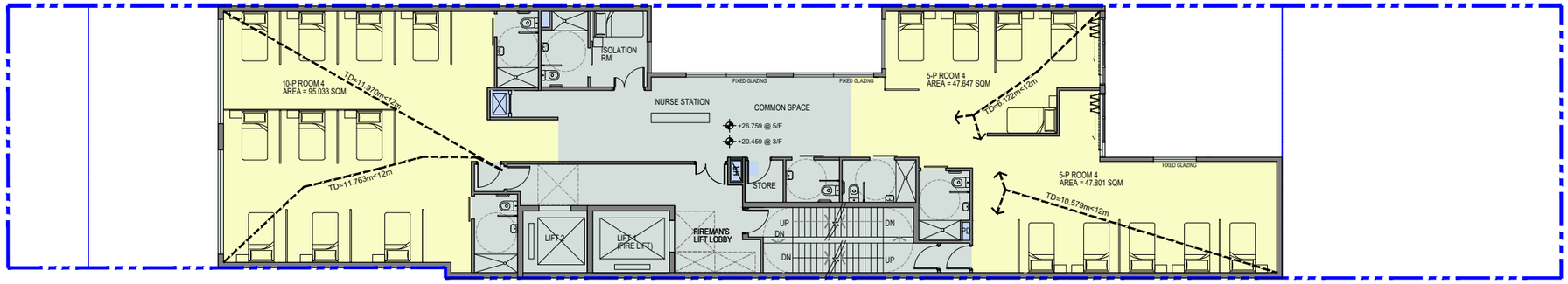


2/F, 4/F, 6/F, 7/F LAYOUT 1:200



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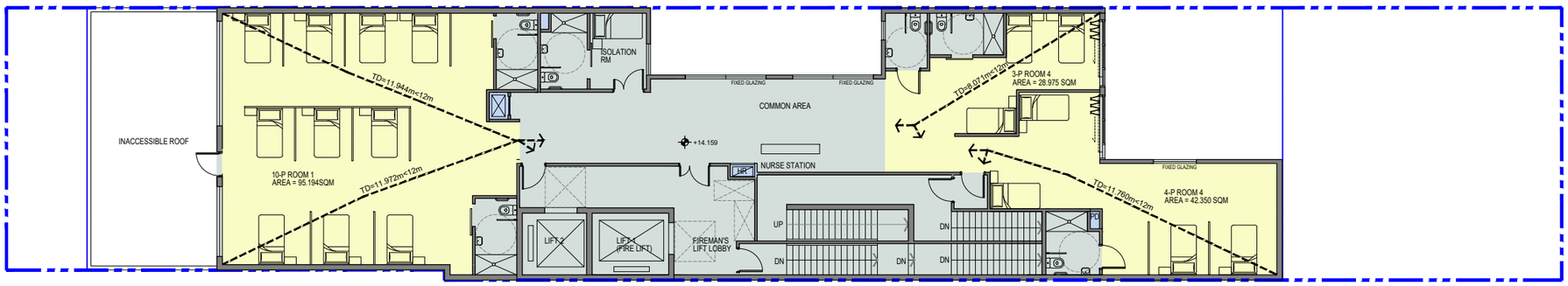

1/F LAYOUT 1:200

SITE BOUNDARY
FOOTPATH
WARD
ANCILLARY AREA
COMMON / CIRCULATION SPACE
PLANT ROOM/ STAIRCASE TO U/G PLANT ROOM

NOS. OF BED (9.5m²/ppl)

G/F	0
1/F	17
2/F	21
3/F	20
4/F	21
5/F	20
6/F	21
7/F	21
TOTAL	141

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PURPOSE BUILT C&A HOME DEVELOPMENT AT 349 PRINCE EDWARD ROAD WEST

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TYPICAL FLOOR PLAN (2/F,4/F,6/F& 7/F)

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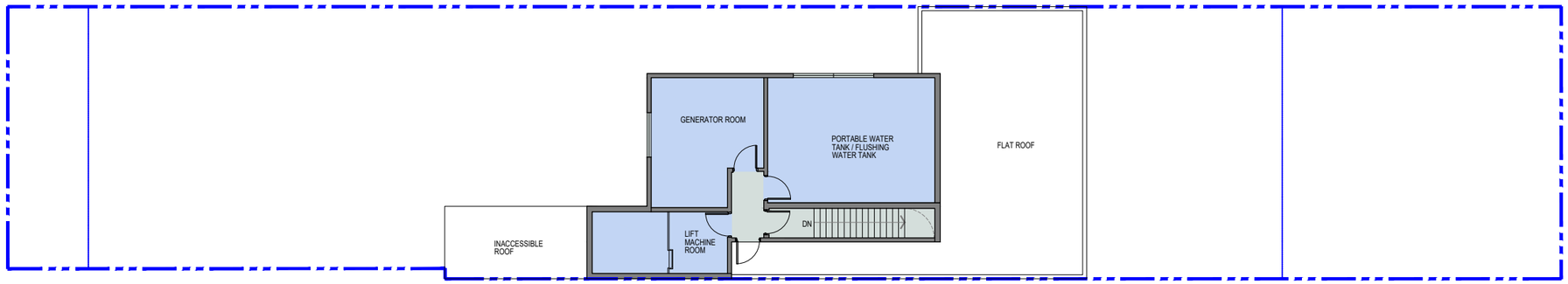

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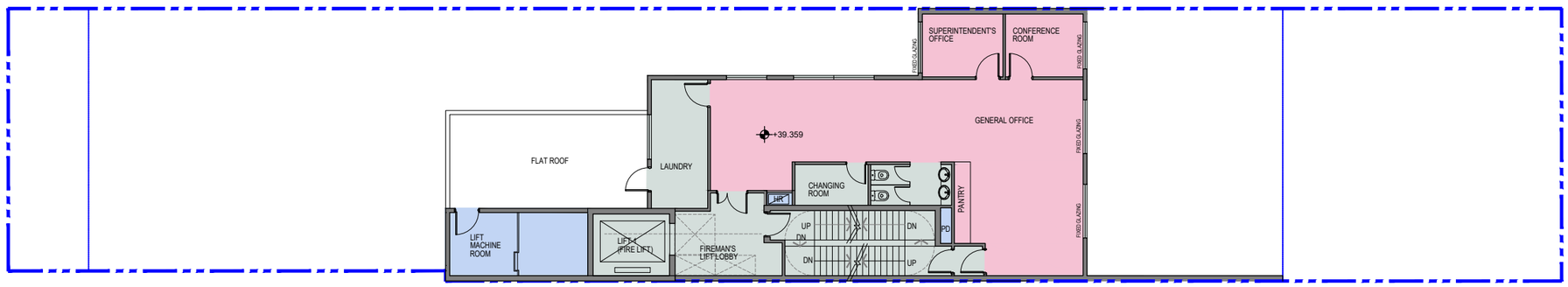

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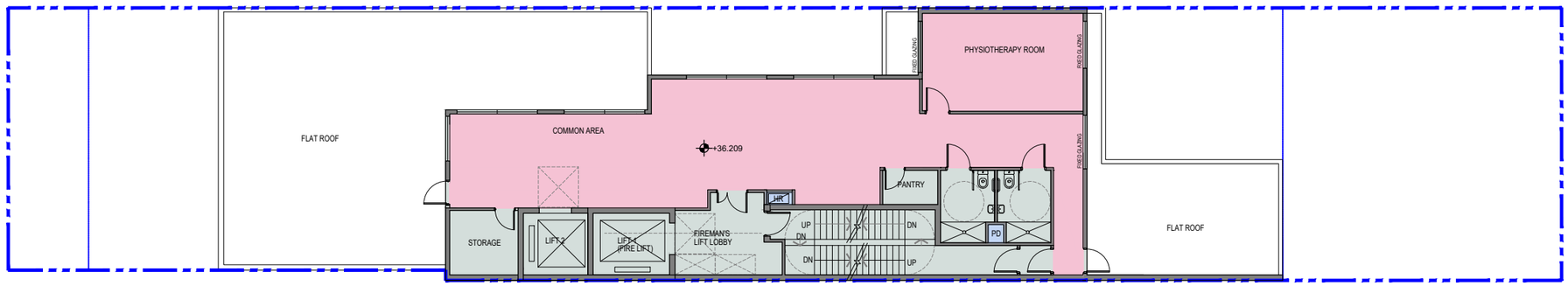

8/F LAYOUT 1:200

- SITE BOUNDARY
- FOOTPATH
- WARD
- ANCILLARY AREA
- COMMON / CIRCULATION SPACE
- PLANT ROOM/ STAIRCASE TO U/G PLANT ROOM

NOS. OF BED (9.5m²/ppl)

G/F	0
1/F	17
2/F	21
3/F	20
4/F	21
5/F	20
6/F	21
7/F	21
TOTAL	141

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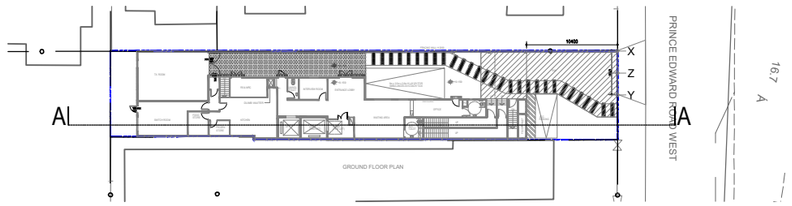

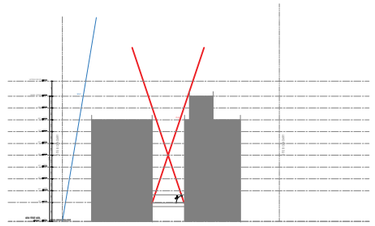

- SITE BOUNDARY
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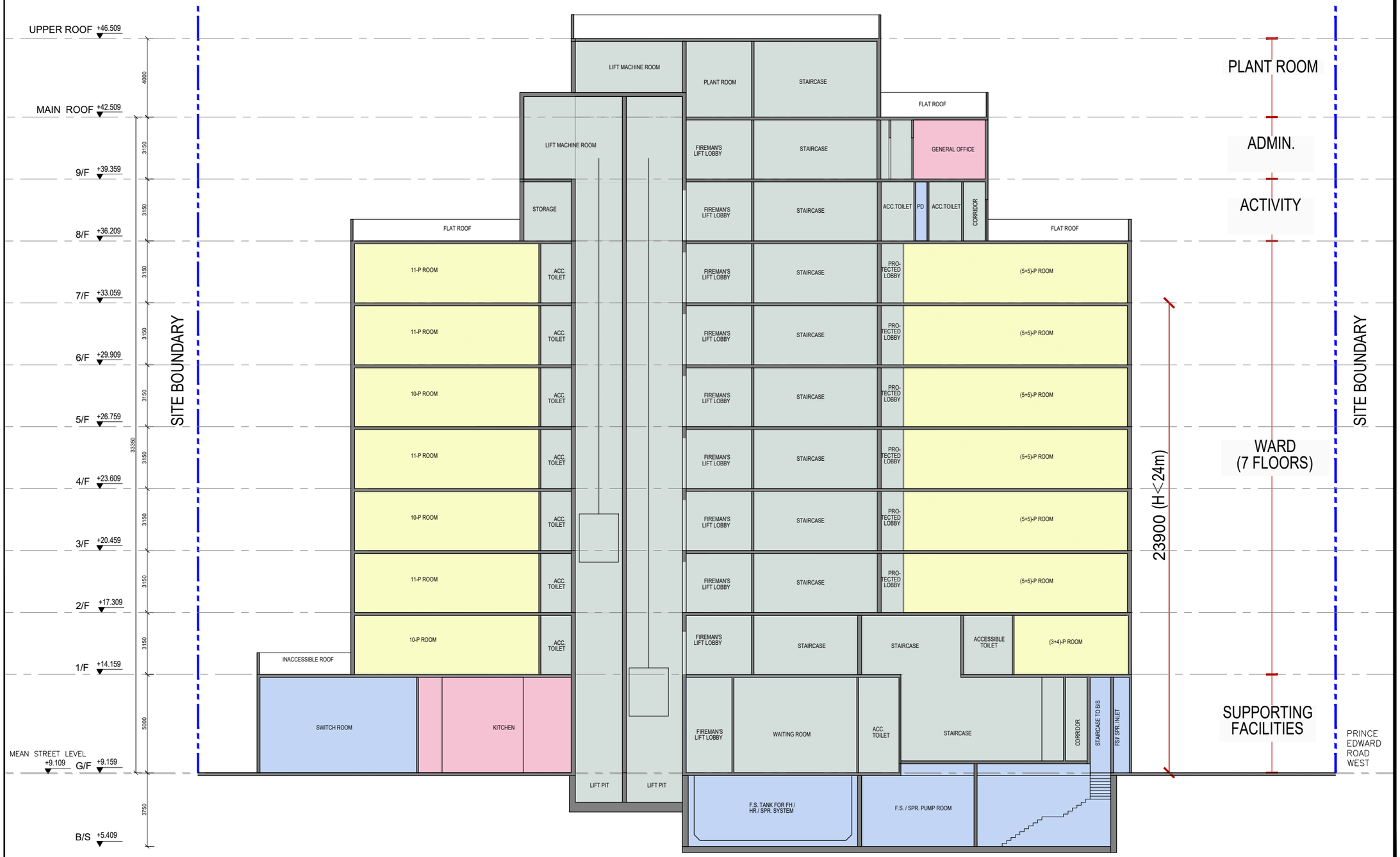

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Appendix 2.1 Detailed Sewerage Impact Assessment Calculations

Table 1 Calculation for Sewage Generation Rate of the Proposed Development at the Application Site

Proposed Development

1. Proposed Elderly Home

1a. Total number of beds	=	141	beds
1b. Total number of elderlies	=	141	people
1c. Design flow	=	190	litre/person/day -- (Institutional and special class in Table T-1 of GESF)
1d. Sewage Generation rate	=	**26.8**	m^3/day
2a. Total number of nursing staff	=	21	staff (Estimated based on Code of Practice for Residential Care Homes (Nursing Homes) for the Elderly)
2b. Design flow	=	280	litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social & Personal Services)
2c. Sewage Generation rate	=	**5.9**	m^3/day
3a. Assumed area for RCHE communal facilities	=	247.3	m^2
3b. Assumed floor area per employee	=	30.3	m^2 per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
3c. Total number of employees	=	8	employees
3d. Design flow	=	280	litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social & Personal Services)
3e. Sewage generation rate	=	**2.3**	m^3/day

Total Flow from Proposed Development

Flow Rate	=	35.0	m^3/day
Contributing Population	=	129	people
Peaking factor	=	8	Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance
Peak Flow	=	**3.2**	litre/sec

Table 2a Hydraulic Capacity of Existing Sewers at Prince Edward Road West

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Cover Level 1[2]	Cover Level 2[2]	Depth 1	Depth 2	Invert Level 1[3]	Invert Level 2[3]	g	k_s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
S1-S2	FMH4027438	FMH4067900	300	12.2	9.38	9.10	1.7	1.7	7.80	7.40	9.81	0.0006	0.033	0.000001	2.86	0.07	0.20	202
S2-S3	FMH4067900	FMH4050809	300	1.8	9.10	9.10	1.7	2.2	7.40	6.90	9.81	0.0006	0.281	0.000001	8.39	0.07	0.59	593
S3-S4	FMH4050809	FMH4048825	675	4.9	9.10	9.06	2.2	2.2	6.89	6.85	9.81	0.003	0.009	0.000001	2.02	0.36	0.72	722
S4-S5	FMH4048825	FMH4048826	675	25.1	9.06	8.80	2.2	-	6.86	-	9.81	0.003	-	0.000001	-	0.36	-	-
S5-S6	FMH4048826	FMH4050810	675	25.0	8.80	8.94	-	-	-	-	9.81	0.003	-	0.000001	-	0.36	-	-
S6-S7	FMH4050810	FMH4048827	675	7.3	8.94	8.36	-	-	-	-	9.81	0.003	-	0.000001	-	0.36	-	-
S4-S7'	FMH4048825	FMH4048827	600	57.9	-	8.36	-	-	5.21	4.33	9.81	0.003	0.015	0.000001	2.43	0.28	0.69	687

Note:

[1] According to the Drainage Record Plans (DSD), the invert levels of several manholes are missing. According to planning application no. A/K10/261, a manhole survey was conducted to determine the depth and alignment of the concerned manholes. The survey results show that manhole FMH4067900 (S2) is connected to FMH4050809 (S3), which is different from the online Drainage Record Plans published by DSD. Since the invert levels of manholes downstream of S4 are not available in the Drainage Record Plan, interpolation is adopted to assess the hydraulic capcity of sewers at segment S4-S5-S6-S7 as shown in **Table 2b**.

[2] The cover levels of S2, S5 and S6 are referenced from the previous planning application no. A/K10/261.

[3] The incoming invert levels of S1-S2 and S2-S3, and outgoing invert levels of S2-S3 and S4-S5 are deduced by subtracting the depth from the cover level.

[4] g=gravitational acceleration; ks=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity

[5] The value of k_s = 0.6mm or 3mm are used for the calculation of slimed clayware sewer, poor condition (based on Table 5: Recommended roughness values in Sewerage Manual)

[6] The value of k_s = 3mm or 6mm are used for the calculation of slimed concrete sewer, poor condition (based on Table 5: Recommended roughness values in Sewerage Manual)

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

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

Table 2b Hydraulic Capacity of Existing Sewers at Prince Edward Road West - Overall hydraulic capacity of several segments

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k_s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
S4-S5	FMH4048825	FMH4048826	675	25.1	6.86	6.48	9.81	0.0006	0.015	0.000001	3.24	0.36	1.16	1160
S5-S6	FMH4048826	FMH4050810	675	25.0	6.48	6.09	9.81	0.0006	0.015	0.000001	3.24	0.36	1.16	1160
S6-S7	FMH4050810	FMH4048827	675	7.3	6.09	5.98	9.81	0.0006	0.015	0.000001	3.24	0.36	1.16	1160

Note:

[1] The invert levels are calculated based on the assumption that S4-S5, S5-S6, and S6-S7 has the same gradient ("s") as S4-S7'.

Table 2c Hydraulic Capacity of Existing Sewers at Prince Edward Road West - after corrections

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k_s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
S1-S2	FMH4027438	FMH4067900	300	12.2	7.80	7.40	9.81	0.0006	0.033	0.000001	2.86	0.07	0.20	202
S2-S3	FMH4067900	FMH4050809	300	1.8	7.40	6.90	9.81	0.0006	0.281	0.000001	8.39	0.07	0.59	593
S3-S4	FMH4050809	FMH4048825	675	4.9	6.89	6.85	9.81	0.003	0.009	0.000001	2.02	0.36	0.72	722
S4-S5	FMH4048825	FMH4048826	675	25.1	6.86	6.48	9.81	0.003	0.015	0.000001	2.62	0.36	0.94	939
S5-S6	FMH4048826	FMH4050810	675	25.0	6.48	6.09	9.81	0.003	0.015	0.000001	2.62	0.36	0.94	939
S6-S7	FMH4050810	FMH4048827	675	7.3	6.09	5.98	9.81	0.003	0.015	0.000001	2.62	0.36	0.94	939
S4-S7'	FMH4048825	FMH4048827	600	57.9	5.21	4.33	9.81	0.003	0.015	0.000001	2.43	0.28	0.69	687

Table 2d Hydraulic Capacity of Proposed Sewers at Prince Edward Road West

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k_s	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
S0-S1	Proposed TM	FMH4027438	225	6.2	7.85	7.80	9.81	0.0006	0.008	0.000001	1.17	0.04	0.05	47

Table 3a Calculation for Sewage Generation Rate of the Existing Surrounding Building

Catchment A

1. Windsor Court (333 Prince Edward Road West)

1a. Total number of residential units	=	18	units
1b. Total number of residents	=	49	people -- (2023 Population Census: Kowloon City District of 2.7)
1c. Design flow	=	270	litre/person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	**13.1**	m^3/day

2. Hamford Court (335 Prince Edward Road West)

1a. Total number of residential units	=	24	units
1b. Total number of residents	=	65	people -- (2023 Population Census: Kowloon City District of 2.7)
1c. Design flow	=	270	litre/person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	**17.5**	m^3/day

3. Harbourview Garden (339 Prince Edward Road West)

1a. Total number of residential units	=	34	units
1b. Total number of residents	=	92	people -- (2023 Population Census: Kowloon City District of 2.7)
1c. Design flow	=	270	litre/person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	**24.8**	m^3/day

4. Maison Deluxe (341 Prince Edward Road West)

1a. Total number of residential units	=	33	units
1b. Total number of residents	=	89	people -- (2023 Population Census: Kowloon City District of 2.7)
1c. Design flow	=	270	litre/person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	**24.1**	m^3/day

5. Woodland Vila (345-347 Prince Edward Road West)

1a. Total number of residential units	=	35	units
1b. Total number of residents	=	95	people -- (2023 Population Census: Kowloon City District of 2.7)
1c. Design flow	=	270	litre/person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	**25.5**	m^3/day

Sub-total Flow of Catchment A

Flow Rate	=	105.0	m^3/day
Contributing Population	=	389	people
Peaking factor	=	8	Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance
Peak Flow	=	**9.7**	litre/sec

Total Flow at Manhole S1 (FMH4027438), including Proposed Development

Flow Rate	=	139.9	m^3/day
Contributing Population	=	518	people
Peaking factor	=	8	Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance
Peak Flow	=	**13.0**	litre/sec

Table 3b-1 Full-bore assessment for the northern part of catchment B (Northern Portion)

Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Invert Level 1	Invert Level 2	g	k_s	s	v	V	Area	Q	Estimated Capacity
		mm	m	mPD	mPD	m/s^2	m		m^2/s	m/s	m^2	m^3/s	L/s
FMH4048815	FMH4050983	675	11.5	8.05	7.94	9.81	0.003	0.009	0.000001	2.01	0.36	0.72	718
FMH4050983	FMH4048817	675	13.5	7.94	7.82	9.81	0.003	0.009	0.000001	2.01	0.36	0.72	718
FMH4048817	FMH4048818	675	22.9	7.82	7.66	9.81	0.003	0.007	0.000001	1.77	0.36	0.63	635
FMH4048818	FMH4048820	675	10.7	7.66	7.60	9.81	0.003	0.006	0.000001	1.61	0.36	0.58	577
FMH4048820	FMH4051340	675	3.5	7.60	7.22	9.81	0.003	0.110	0.000001	7.03	0.36	2.52	2516
FMH4051340	FMH4048821	675	3.0	6.66	6.30	9.81	0.003	0.119	0.000001	7.34	0.36	2.63	2625
FMH4048821	FMH4048823	450	22.6	5.70	5.60	9.81	0.0006	0.004	0.000001	1.35	0.16	0.21	214
FMH4048823	FMH4050807	675	9.5	7.35	7.23	9.81	0.003	0.012	0.000001	2.37	0.36	0.85	849
FMH4050807	FMH4048824	675	3.4	7.05	7.03	9.81	0.003	0.0058	0.000001	1.62	0.36	0.58	**581**
FMH4048824	FMH4050808	675	14.3	7.03	6.92	9.81	0.003	0.0080	0.000001	1.90	0.36	0.68	678
FMH4050808	FMH4050809	675	2.3	6.92	6.89	9.81	0.003	0.0130	0.000001	2.42	0.36	0.87	866

Remarks:

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

(2) Table 1a: The value of k_s = 3mm is used for the calculation of slimed **concrete** sewer, poor condition (based on Table 5: Recommended roughness values in Sewerage Manual)

(2) Table 1a: The value of k_s = 0.6mm is used for the calculation of slimed **clayware** sewer, poor condition (based on Table 5: Recommended roughness values in Sewerage Manual)

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

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

Table 3b-2 Calculation for Sewage Generation Rate of the Existing Surrounding Building

Catchment B (Southern Portion)

1. Ka Wah Court

1a. Total number of residential units	=	27	units
1b. Total number of residents	=	73	people -- (2023 Population Census: Kowloon City District of 2.7)
1c. Design flow	=	270	litre/person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	**19.7**	m^3/day

2. Prince Home for the Elderly (Prince Edward Road West 351, G/F) Reference: https://elderlyinfo.swd.gov.hk/en/content/prince-home-elderly

1a. Total number of bedspaces	=	40	spaces
1b. Design flow	=	190	litre/person/day -- (Institutional and special class in Table T-1 of GESF)
1a. Total number of Elderly Care Employee	=	12	employees
1b. Design flow	=	280	litre/person/day -- (J11 in Table T-2 of GESF)
1d. Sewage Generation rate	=	**11.0**	m^3/day

3. Hung To for the Home (Prince Edward Road West 351, 1/F) Reference: https://www.elderlyinfo.swd.gov.hk/en/content/hung-home

1a. Total number of bedspaces	=	48	spaces
1b. Design flow	=	190	litre/person/day -- (Institutional and special class in Table T-1 of GESF)
1a. Total number of Elderly Care Employee	=	9	employees
1b. Design flow	=	280	litre/person/day -- (J11 in Table T-2 of GESF)
1d. Sewage Generation rate	=	**11.6**	m^3/day

4. Kin Tat Home for the Aged (Prince Edward Road West 351, 2/F) Reference: https://www.elderlyinfo.swd.gov.hk/en/content/kin-tat-home-aged

1a. Total number of bedspaces	=	47	spaces
1b. Design flow	=	190	litre/person/day -- (Institutional and special class in Table T-1 of GESF)
1a. Total number of Elderly Care Employee	=	13	employees
1b. Design flow	=	280	litre/person/day -- (J11 in Table T-2 of GESF)
1d. Sewage Generation rate	=	**12.6**	m^3/day

Catchment B (Northern Portion)

Sewage Generated from the northern portion of Catchment B	=	**581**	litre/sec

Sub-total Flow of Catchment B

Flow Rate	=	54.9	m^3/day
Contributing Population	=	203	people
Peaking factor	=	8	Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance
Peak Flow	=	**5.1**	litre/sec
Peak Flow with the northern portion of Catchment B	=	**585.8**	litre/sec

Total Flow at Manhole S3 (FMH4050809), including Proposed Development

Flow Rate	=	194.8	m^3/day
Contributing Population	=	721	people
Peaking factor	=	8	Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance
Peak Flow	=	**18.0**	litre/sec
Peak Flow with the northern portion of Catchment B	=	**598.7**	litre/sec

Table 4 Comparison of the Hydraulic Capacity of Existing and Proposed Sewers for the Sewage generated from the Proposed Development and Surrounding Catchment Areas

Segment	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	Peak Flow from the Proposed Development only (L/s)	Contribution from the Proposed Development only (%)	Status	Peak Flow from the Proposed Development and Catchment Areas (L/s)	Contribution from the Proposed Development and the Surrounding Catchment Areas (%)	Status
S0-S1	225	6.2	0.008	47	3.2	6.9%	OK	3.2	6.9%	OK
S1-S2	300	12.2	0.033	202	3.2	1.6%	OK	13.0	6.4%	OK
S2-S3	300	1.8	0.281	593	3.2	0.5%	OK	13.0	2.2%	OK
S3-S4	675	4.9	0.009	722	3.2	0.4%	OK	598.7	82.9%	OK
S4-S5	675	25.1	0.015	939	3.2	0.3%	OK	598.7	63.8%	OK
S5-S6	675	25.0	0.015	939	3.2	0.3%	OK	598.7	63.8%	OK
S6-S7	675	7.3	0.015	939	3.2	0.3%	OK	598.7	63.8%	OK
S4-S7'	600	57.9	0.015	687	3.2	0.5%	OK	598.7	87.1%	OK

Remark:

According to a manhole survey conducted under planning application no. A/K10/261, the outlet of S5 is blocked and unable to be surveyed any further. For conservative purposes, both the calculations of S4-S5-S6-S7 and S4-S7' are shown in the above table, with no exceedance in either route. It should be noted that the sewage will be preferentially discharged to S4-S5-S6-S7, instead of S4-S7', due to the lower incoming invert level of the former.

Appendix 2.2 Manhole Survey Report

Pipeline Drainage Ltd.

PRE-CCTV SURVEY REPORT

Work Location: Prince Edward Rd West,
Kowloon City, Kowloon

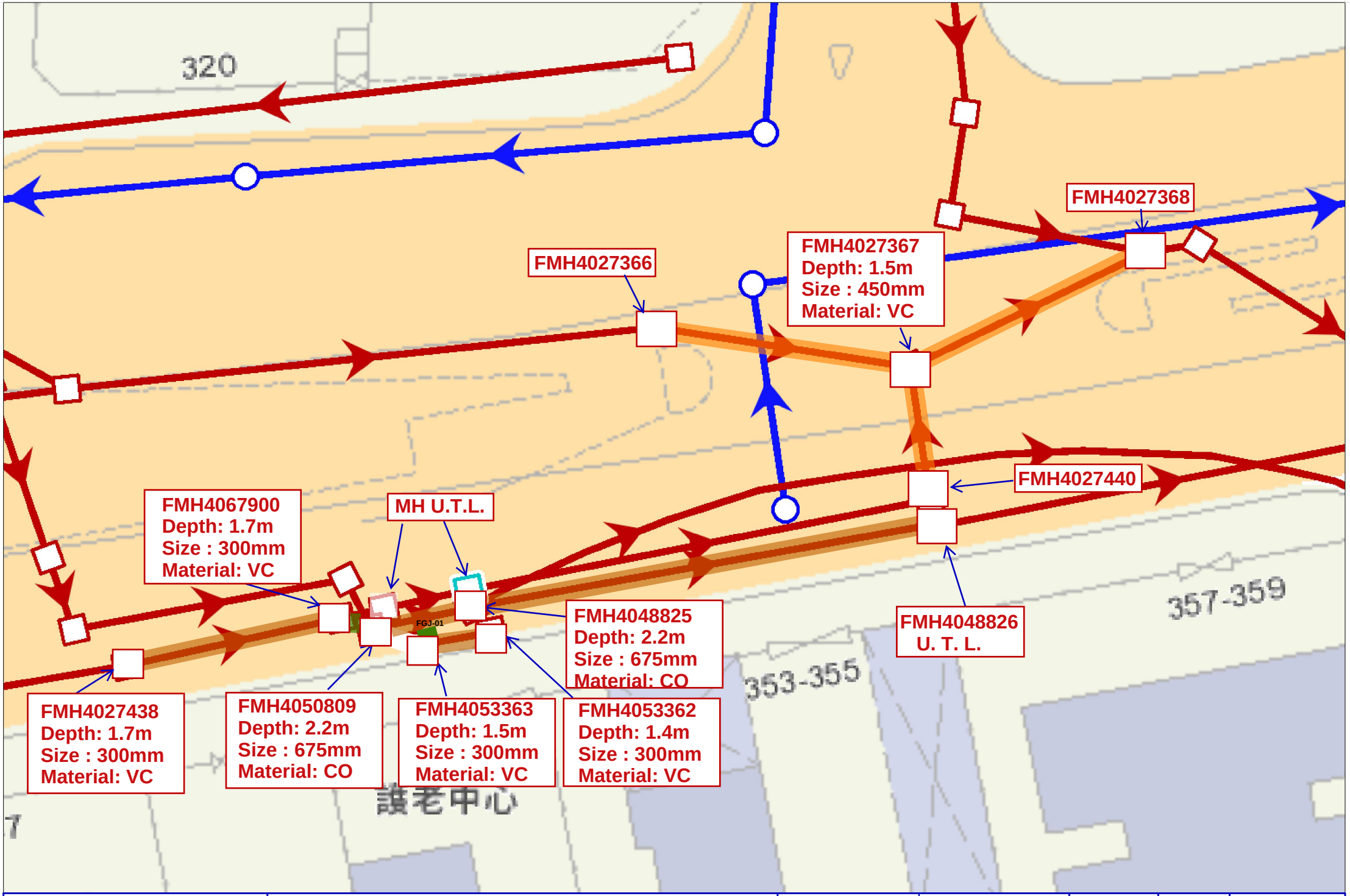
CCTV Survey Date: June 04, 2019

Job No: N/A

Works Order No: N/A

Work Description: CCTV Survey for underground pipelines

Flat 02, 6th Floor, Block E, Kai Tak Factory Building Stage 2, 39-41 Tseuk Luk Street, San Po Kong, Kowloon
九龍 新蒲崗 爵祿街 39-41 號，啟德工廠大廈 2 期 E座 6 樓 2 室 ☎ : 9219 7884



Pipeline Drainage Ltd ☎ : 9219 7884
高實渠務工程有限公司 Email:pipelinedrainage@gmail.com
九龍 新蒲崗 爵祿街 39-41 號 啟德工廠大廈 2 期 E 座 6 樓 2 室

地 點 : PD440 Prince Edward Rd West, Kowloon City
LOCATION : 九龍城 太子道西

DATE: 日期: 03-06-2019
PROJECT TITLE : 工程名稱: PRE - CCTV
SCALE: 比例 N.T.S.
REVISION : 修正: 0

Summary of Defects

Works Order No.					Colour CCTV Drainage Survey																		
					Pipe									Service Condition								MISC	
Item No.	Manhole From	Manhole To	Meters (m)	Urgent	Cracked	Fractured	Broken	Deformed	Collapsed	Hole	Surface Spalling/Wear	Joint Displaced	Open Joint	Roots	Infiltration	Encrustation	Silt	Grease	Obstruction	Water Line	Line	Survey Abandoned	camera Under Water
001	FMH4053362	FMH4053363	002.8																	**1**			
002	FMH4053363	FGJ-01	001.5																	**1**			
003	FMH4067900	FMH4027438	012.9	**2**	**1**	**7**							**1**							**1**			
004	FMH4067900	FMH4050809	001.5																	**1**			
005	FMH4050809	FMH4048825	000.9																	**1**			
006	FMH4048825	FMH4048826	039.1			**1**														**1**		**1**	
007	FMH4027367	FMH4027368	010.1																	**1**			**1**
008	FMH4027367	FMH4027440	008.3	**1**		**1**	**1**										**2**			**1**			
009	FMH4027367	FMH4027366	012.2			**1**					**1**									**1**			
		Total	89.3	**3**	**1**	**10**	**1**				**1**		**1**				**2**			**9**		**1**	**1**

Summary of Pipelines

Project/Contract/Wo No. | Slope Reference No. -

Date : **04.06.19**

Location : **Kowloon City**

Drain / Sewer use : **Foul**

Item	Manhole		Pipe			Manhole(From)			Grades			Remarks
	From	To	Lengths(m)	Size(mm)	Material	I.L.	C.L.	Depths(m)	SCG	ICG	SPG	
1	FMH4053362	FMH4053363	002.8	300	VC				1	1	1	
2	FMH4053363	FGJ-01	001.5	300	VC				1	1	1	
3	FMH4067900	FMH4027438	012.9	300	VC				1	4	4	
4	FMH4067900	FMH4050809	001.5	300	VC				1	1	1	
5	FMH4050809	FMH4048825	000.9	675	CO				1	1	1	
6	FMH4048825	FMH4048826	039.1	675	CO				1	3	3	S.A. DUE TO UNABLE TO PUSH FORWARD
7	FMH4027367	FMH4027368	010.1	450	VC				1	1	1	
8	FMH4027367	FMH4027440	008.3	300	VC				1	4	4	
9	FMH4027367	FMH4027366	012.2	450	VC				1	3	3	

Contract No. :
PRE-CCTV SURVEY REPORT AT
PRINCE EDWARD ROAD WEST
KOWLOON CITY, KOWLOON

CCTV SURVEY

Works Order No. :

Summary of CCTV Survey Results:

ID	Pipe Length Ref.	Start MH	Finish MH	Survey Area	Function	Size	Grade	Length	Clean	Remarks
1	FMH4053362X	FMH4053362	FMH4053363	-	F	300	1	2.8m	N	FH
2	FMH4053363X	FMH4053363	FGJ-01	-	F	300	1	1.5m	N	FH
3	FMH4027438X	FMH4067900	FMH4027438	-	F	300	4	12.9m	N	FH
4	FMH4067900X	FMH4067900	FMH4050809	-	F	300	1	1.5m	N	FH
5	FMH4050809X	FMH4050809	FMH4048825	-	F	675	1	0.9m	N	FH
6	FMH4048825X	FMH4048825	FMH4048826	-	F	675	3	39.1m	N	SA, UNABLE TO PUSH FORWARD
7	FMH4027367X	FMH4027367	FMH4027368	-	F	450	1	10.1m	N	FH
8	FMH4027440X	FMH4027367	FMH4027440	-	F	300	4	8.3m	N	FH
9	FMH4027366X	FMH4027367	FMH4027366	-	F	450	3	12.2m	N	FH

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	001
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4053362X
Start MH	FMH4053362	Finish MH	FMH4053363	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Downstream
Cover Level		Cover Level		Score	0	Pipe Length	
Invert Level		Invert Level		Grade	1	Total Length	2.8

Road	Prince Edward Road West	Size	300 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Vitrified clay
Area Code	-	Lining	Nil
District	-	Comment	
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

Video No.	1:25	Chainage	Code	Observation	Photo	Grade
				FMH4053362		
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4053362		0
		0.0	WL	Water Level, 5 % height/diameter		0
0:00:30		0.0	GP	General Photograph	001	0
0:00:38		1.2	GP	General Photograph	002	0
0:00:41		1.8	GP	General Photograph	003	0
0:00:45		2.2	GP	General Photograph	004	0
		2.8	MH	Manhole Remark : FMH4053363		0
0:01:24		2.8	FH	Finished Survey		0
				FMH4053363		

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4053362**	Size	**300 mm**	ID	**001**
Location	**Kowloon City**	Finish Pt.	**FMH4053363**	Shape	**Circular**	PLR	**FMH4053362X**
				Material	**Vitrified clay**		

Photo Ref. : 001
Video Tape : 0001, 0:00:30
Observation : General Photograph

Photo Ref. : 002
Video Tape : 0001, 0:00:38
Observation : General Photograph

Photo Ref. : 003
Video Tape : 0001, 0:00:41
Observation : General Photograph

Photo Ref. : 004
Video Tape : 0001, 0:00:45
Observation : General Photograph

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	002
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4053363X
Start MH	FMH4053363	Finish MH	FGJ-01	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Downstream
Cover Level		Cover Level		Score	0	Pipe Length	
Invert Level		Invert Level		Grade	1	Total Length	1.5

Road	Prince Edward Road West	Size	300 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Vitrified clay
Area Code	-	Lining	Nil
District	-	Comment	
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

Video No.	1:25	Chainage	Code	Observation	Photo	Grade
		FMH4053363				
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4053363		0
		0.0	WL	Water Level, 5 % height/diameter		0
0:00:30		0.0	GP	General Photograph	005	0
0:00:33		0.5	GP	General Photograph	006	0
0:00:59		1.5	GP	General Photograph	007	0
		1.5	MH	Manhole Remark : FGJ-01		0
0:01:18		FGJ-01 1.5	FH	Finished Survey		0

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4053363**	Size	**300 mm**	ID	**002**
Location	**Kowloon City**	Finish Pt.	**FGJ-01**	Shape	**Circular**	PLR	**FMH4053363X**
				Material	**Vitrified clay**		

Photo Ref. : 005
Video Tape : 0001, 0:00:30
Observation : General Photograph

Photo Ref. : 006
Video Tape : 0001, 0:00:33
Observation : General Photograph

Photo Ref. : 007
Video Tape : 0001, 0:00:59
Observation : General Photograph

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	003
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4027438X
Start MH	FMH4067900	Finish MH	FMH4027438	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Upstream
Cover Level		Cover Level		Score	80	Pipe Length	
Invert Level		Invert Level		Grade	4	Total Length	12.9

Road	Prince Edward Road West	Size	300 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Vitrified clay
Area Code	-	Lining	Nil
District	-	Comment	
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

Video No.	1:100	Chainage	Code	Observation	Photo	Grade
				FMH4067900		
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4067900		0
		0.0	WL	Water Level, 5 % height/diameter		0
0:00:37		0.0	GP	General Photograph	008	0
0:00:47		1.4	CCJ	Crack Circumferential AT Joint, from 10 to 05 o'clock	009	2
0:00:54		2.7	FCJ	Fracture Circumferential AT Joint, from 03 to 05 o'clock	010	3
0:00:58		3.4	FCJ	Fracture Circumferential AT Joint, from 02 to 06 o'clock	011	3
0:01:03		**4.5**	**FM**	**Fracture Multiple, from 07 to 10 o'clock**	**012**	**4**
0:01:13		**5.6**	**FM**	**Fracture Multiple, from 07 to 01 o'clock**	**013**	**4**
0:01:33		6.7	FC	Fracture Circumferential, from 07 to 04 o'clock	014	3
0:02:00		10.5	FCJ	Fracture Circumferential AT Joint, from 09 to 03 o'clock	015	3
0:02:06		11.5	FL	Fracture Longitudinal, at 09 o'clock	016	3
0:02:09		11.6	OJL	Open Joint Large	017	2
0:02:26		12.9	GP	General Photograph	018	0
		12.9	MH	Manhole Remark : FMH4027438		0
0:03:14		12.9	FH	Finished Survey		0
				FMH4027438		

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4067900**	Size	**300 mm**	ID	**003**
Location	**Kowloon City**	Finish Pt.	**FMH4027438**	Shape	**Circular**	PLR	**FMH4027438X**
				Material	**Vitrified clay**		

Photo Ref. : 008
Video Tape : 0001, 0:00:37
Observation : General Photograph

Photo Ref. : 009
Video Tape : 0001, 0:00:47
Observation : Crack Circumferential AT Joint, from 10 to 05 o'clock

Photo Ref. : 010
Video Tape : 0001, 0:00:54
Observation : Fracture Circumferential AT Joint, from 03 to 05 o'clock

Photo Ref. : 011
Video Tape : 0001, 0:00:58
Observation : Fracture Circumferential AT Joint, from 02 to 06 o'clock

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4067900**	Size	**300 mm**	ID	**003**
Location	**Kowloon City**	Finish Pt.	**FMH4027438**	Shape	**Circular**	PLR	**FMH4027438X**
				Material	**Vitrified clay**		

Photo Ref. : 012
Video Tape : 0001, 0:01:03
Observation : Fracture Multiple, from 07 to 10 o'clock

Photo Ref. : 013
Video Tape : 0001, 0:01:13
Observation : Fracture Multiple, from 07 to 01 o'clock

Photo Ref. : 014
Video Tape : 0001, 0:01:33
Observation : Fracture Circumferential, from 07 to 04 o'clock

Photo Ref. : 015
Video Tape : 0001, 0:02:00
Observation : Fracture Circumferential AT Joint, from 09 to 03 o'clock

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4067900**	Size	**300 mm**	ID	**003**
Location	**Kowloon City**	Finish Pt.	**FMH4027438**	Shape	**Circular**	PLR	**FMH4027438X**
				Material	**Vitrified clay**		

Photo Ref. : 016
Video Tape : 0001, 0:02:06
Observation : Fracture Longitudinal, at 09 o'clock

Photo Ref. : 017
Video Tape : 0001, 0:02:09
Observation : Open Joint Large

Photo Ref. : 018
Video Tape : 0001, 0:02:26
Observation : General Photograph

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	004
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4067900X
Start MH	FMH4067900	Finish MH	FMH4050809	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Downstream
Cover Level		Cover Level		Score	0	Pipe Length	
Invert Level		Invert Level		Grade	1	Total Length	1.5

Road	Prince Edward Road West	Size	300 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Vitrified clay
Area Code	-	Lining	Nil
District	-	Comment	
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

Video No.	1:25	Chainage	Code	Observation	Photo	Grade
				FMH4067900		
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4067900		0
		0.0	WL	Water Level, 5 % height/diameter		0
0:00:32		0.0	GP	General Photograph	019	0
0:00:36		0.7	GP	General Photograph	020	0
0:00:37		1.3	GP	General Photograph	021	0
0:00:40		1.4	GP	General Photograph	022	0
		1.5	MH	Manhole Remark : FMH4050809		0
0:01:01		1.5	FH	Finished Survey		0
				FMH4050809		

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4067900**	Size	**300 mm**	ID	**004**
Location	**Kowloon City**	Finish Pt.	**FMH4050809**	Shape	**Circular**	PLR	**FMH4067900X**
				Material	**Vitrified clay**		

Photo Ref. : 019
Video Tape : 0001, 0:00:32
Observation : General Photograph

Photo Ref. : 020
Video Tape : 0001, 0:00:36
Observation : General Photograph

Photo Ref. : 021
Video Tape : 0001, 0:00:37
Observation : General Photograph

Photo Ref. : 022
Video Tape : 0001, 0:00:40
Observation : General Photograph

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	005
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4050809X
Start MH	FMH4050809	Finish MH	FMH4048825	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Downstream
Cover Level		Cover Level		Score	0	Pipe Length	
Invert Level		Invert Level		Grade	1	Total Length	0.9

Road	Prince Edward Road West	Size	675 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Concrete
Area Code	-	Lining	Nil
District	-	Comment	
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

Video No.	1:25	Chainage	Code	Observation	Photo	Grade
				FMH4050809		
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4050809		0
		0.0	WL	Water Level, 10 % height/diameter		0
0:00:55		0.0	GP	General Photograph	023	0
0:00:59		0.4	GP	General Photograph	024	0
0:01:01		0.7	GP	General Photograph	025	0
		0.9	MH	Manhole Remark : FMH4048825		0
0:02:05		0.9	FH	Finished Survey		0
				FMH4048825		

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4050809**	Size	**675 mm**	ID	**005**
Location	**Kowloon City**	Finish Pt.	**FMH4048825**	Shape	**Circular**	PLR	**FMH4050809X**
				Material	**Concrete**		

Photo Ref. : 023
Video Tape : 0001, 0:00:55
Observation : General Photograph

Photo Ref. : 024
Video Tape : 0001, 0:00:59
Observation : General Photograph

Photo Ref. : 025
Video Tape : 0001, 0:01:01
Observation : General Photograph

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	006
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4048825X
Start MH	FMH4048825	Finish MH	FMH4048826	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Downstream
Cover Level		Cover Level		Score	40	Pipe Length	
Invert Level		Invert Level		Grade	3	Total Length	

Road	Prince Edward Road West	Size	675 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Concrete
Area Code	-	Lining	Nil
District	-	Comment	S.A. DUE TO UNABLE TO PUSH FORWARD
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

FMH4048825

Video No.	1:300	Chainage	Code	Observation	Photo	Grade
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4048825		0
		0.0	WL	Water Level, 15 % height/diameter		0
000054		1.1	GP	General Photograph	026	0
0:03:19		3.2	FC	Fracture Circumferential, from 06 to 09 o'clock	027	3
0:01:20		7.6	DE	Debris, 20 % cross-sectional area loss	028	1
0:01:32		11.4	DE	Debris, 05 % cross-sectional area loss	029	1
0:01:42		14.5	DE	Debris, 10 % cross-sectional area loss	030	1
0:02:15		24.5	DE	Debris, 10 % cross-sectional area loss	031	1
0:02:28		28.3	DE	Debris, 15 % cross-sectional area loss	032	1
0:02:52		35.9	GP	General Photograph	033	0
0:01:28		39.1	SA	Survey Abandoned Remark : UNABLE TO PUSH FORWARD	034	0

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4048825**	Size	**675 mm**	ID	**006**
Location	**Kowloon City**	Finish Pt.	**FMH4048826**	Shape	**Circular**	PLR	**FMH4048825X**
				Material	**Concrete**		

Photo Ref. : 026
Video Tape : 0001, 000054
Observation : General Photograph

Photo Ref. : 027
Video Tape : 0001, 0:03:19
Observation : Fracture Circumferential, from 06 to 09 o'clock

Photo Ref. : 028
Video Tape : 0001, 0:01:20
Observation : Debris, 20 % cross-sectional area loss

Photo Ref. : 029
Video Tape : 0001, 0:01:32
Observation : Debris, 05 % cross-sectional area loss

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4048825**	Size	**675 mm**	ID	**006**
Location	**Kowloon City**	Finish Pt.	**FMH4048826**	Shape	**Circular**	PLR	**FMH4048825X**
				Material	**Concrete**		

Photo Ref. : 030
Video Tape : 0001, 0:01:42
Observation : Debris, 10 % cross-sectional area loss

Photo Ref. : 031
Video Tape : 0001, 0:02:15
Observation : Debris, 10 % cross-sectional area loss

Photo Ref. : 032
Video Tape : 0001, 0:02:28
Observation : Debris, 15 % cross-sectional area loss

Photo Ref. : 033
Video Tape : 0001, 0:02:52
Observation : General Photograph

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4048825**	Size	**675 mm**	ID	**006**
Location	**Kowloon City**	Finish Pt.	**FMH4048826**	Shape	**Circular**	PLR	**FMH4048825X**
				Material	**Concrete**		

Photo Ref. : 034
Video Tape : 0001, 0:01:28
Observation : Survey Abandoned
Remark : UNABLE TO PUSH FORWARD

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	007
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4027367X
Start MH	FMH4027367	Finish MH	FMH4027368	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Downstream
Cover Level		Cover Level		Score	0	Pipe Length	
Invert Level		Invert Level		Grade	1	Total Length	10.1

Road	Prince Edward Road West	Size	450 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Vitrified clay
Area Code	-	Lining	Nil
District	-	Comment	
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

Video No.	1:75	Chainage	Code	Observation	Photo	Grade
	FMH4027367					
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4027367		0
		0.0	WL	Water Level, 5 % height/diameter		0
0:01:03		0.0	GP	General Photograph	035	0
0:01:17		2.8	GP	General Photograph	036	0
0:01:34		6.9	CU	Camera Underwater	037	0
0:01:52		10.1	GP	General Photograph	038	0
		10.1	MH	Manhole Remark : FMH4027368		0
0:01:34	FMH4027368	10.1	FH	Finished Survey		0

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4027367**	Size	**450 mm**	ID	**007**
Location	**Kowloon City**	Finish Pt.	**FMH4027368**	Shape	**Circular**	PLR	**FMH4027367X**
				Material	**Vitrified clay**		

Photo Ref. : 035
Video Tape : 0001, 0:01:03
Observation : General Photograph

Photo Ref. : 036
Video Tape : 0001, 0:01:17
Observation : General Photograph

Photo Ref. : 037
Video Tape : 0001, 0:01:34
Observation : Camera Underwater

Photo Ref. : 038
Video Tape : 0001, 0:01:52
Observation : General Photograph

- Structural Defects
- **Structural Defects with Grade 4 or 5**
- Constructional Features
- Service Defects
- **Service Defects with Grade 4 or 5**
- Miscellaneous Features

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	008
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4027440X
Start MH	FMH4027367	Finish MH	FMH4027440	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Upstream
Cover Level		Cover Level		Score	80	Pipe Length	
Invert Level		Invert Level		Grade	4	Total Length	8.3

Road	Prince Edward Road West	Size	300 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Vitrified clay
Area Code	-	Lining	Nil
District	-	Comment	
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

Video No.	1:75	Chainage	Code	Observation	Photo	Grade
				FMH4027367		
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4027367		0
		0.0	WL	Water Level, 0 % height/diameter		0
0:00:43		0.0	GP	General Photograph	039	0
		0.0	FC	Fracture Circumferential, from 06 to 09 o'clock		3
0:01:31		2.0	DES	Debris Silt, 05 % cross-sectional area loss, Start	040	1
0:01:40		3.5	DES	Debris Silt, 15 % cross-sectional area loss, Change	041	1
0:01:55		**5.8**	**B**	**Broken Pipe, from 12 to 12 o'clock**	**042**	**4**
0:01:57		6.2	MC	Material Change Remark : Concrete	043	0
0:02:14		7.9	GP	General Photograph	044	0
		8.3	MH	Manhole Remark : FMH4027440		0
0:02:14		8.3	FH	Finished Survey		0
				FMH4027440		

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4027367**	Size	**300 mm**	ID	**008**
Location	**Kowloon City**	Finish Pt.	**FMH4027440**	Shape	**Circular**	PLR	**FMH4027440X**
				Material	**Vitrified clay**		

Photo Ref. : 039
Video Tape : 0001, 0:00:43
Observation : General Photograph

Photo Ref. : 040
Video Tape : 0001, 0:01:31
Observation : Debris Silt, 05 % cross-sectional area loss, Start

Photo Ref. : 041
Video Tape : 0001, 0:01:40
Observation : Debris Silt, 15 % cross-sectional area loss, Change

Photo Ref. : 042
Video Tape : 0001, 0:01:55
Observation : Broken Pipe, from 12 to 12 o'clock

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4027367**	Size	**300 mm**	ID	**008**
Location	**Kowloon City**	Finish Pt.	**FMH4027440**	Shape	**Circular**	PLR	**FMH4027440X**
				Material	**Vitrified clay**		

Photo Ref. : 043
Video Tape : 0001, 0:01:57
Observation : Material Change
Remark : Concrete

Photo Ref. : 044
Video Tape : 0001, 0:02:14
Observation : General Photograph

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Survey Report

Heading

Contract No.	-	Operator	W.K, Lam	Date	04.06.19	ID	009
Purpose	Structural defects	Job No.	-	Time		PLR	FMH4027366X
Start MH	FMH4027367	Finish MH	FMH4027366	Weather	Dry	Use	Foul
Depth		Depth		Cleaned	No	Direction	Upstream
Cover Level		Cover Level		Score	40	Pipe Length	
Invert Level		Invert Level		Grade	3	Total Length	12.2

Road	Prince Edward Road West	Size	450 mm
Location	Kowloon City	Shape	Circular
Loc. Code	Light road	Material	Vitrified clay
Area Code	-	Lining	Nil
District	-	Comment	
Division	-	Loc. Details	
Category	Z	Tape	0001

Coding

FLOW

Video No.	1:100	Chainage	Code	Observation	Photo	Grade
	FMH4027367					
0:00:00		0.0	ST	Start Of Survey		0
		0.0	MH	Manhole Remark : FMH4027367		0
		0.0	WL	Water Level, 0 % height/diameter		0
0:00:28		0.0	GP	General Photograph	045	0
000327		2.0	SSS	Surface Damage Spalling Slight, from 08 to 09 o'clock	046	2
0:00:45		2.4	FCJ	Fracture Circumferential AT Joint, from 12 to 08 o'clock	047	3
0:01:06		4.7	GP	General Photograph	048	0
0:01:36		8.4	GP	General Photograph	049	0
0:01:49		10.5	GP	General Photograph	050	0
		12.2	MH	Manhole Remark : FMH4027366		0
0:02:49		12.2	FH	Finished Survey		0
	FMH4027366					

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4027367**	Size	**450 mm**	ID	**009**
Location	**Kowloon City**	Finish Pt.	**FMH4027366**	Shape	**Circular**	PLR	**FMH4027366X**
				Material	**Vitrified clay**		

Photo Ref. : 045
Video Tape : 0001, 0:00:28
Observation : General Photograph

Photo Ref. : 046
Video Tape : 0001, 000327
Observation : Surface Damage Spalling Slight, from 08 to 09 o'clock

Photo Ref. : 047
Video Tape : 0001, 0:00:45
Observation : Fracture Circumferential AT Joint, from 12 to 08 o'clock

Photo Ref. : 048
Video Tape : 0001, 0:01:06
Observation : General Photograph

- Structural Defects
- Service Defects
- **Structural Defects with Grade 4 or 5**
- **Service Defects with Grade 4 or 5**
- Constructional Features
- Miscellaneous Features

CCTV Photographs

Road	**Prince Edward Road West**	Start MH	**FMH4027367**	Size	**450 mm**	ID	**009**
Location	**Kowloon City**	Finish Pt.	**FMH4027366**	Shape	**Circular**	PLR	**FMH4027366X**
				Material	**Vitrified clay**		

Photo Ref. : 049
Video Tape : 0001, 0:01:36
Observation : General Photograph

Photo Ref. : 050
Video Tape : 0001, 0:01:49
Observation : General Photograph

With all the defects scored, the peak score and mean score is then calculated.

The peak score is calculated by determining the sum of all scores for all defects in any one length/ in one metre, (whichever is appropriate) and determining the score of the worst sewer/drain length or one metre. Unless otherwise directed by the asset owner/water authority it may be assumed that pipes have a unit length of 1 metre.

For peak score calculation:

1. Assume longitudinal defects extend for 1 m, unless the "Continuous Defect" facility is in use.
2. Deformation should also be regarded as longitudinal where it extends over 1m or where it is associated with another longitudinal defect.
3. If a number of circumferential defects appear at the same chainage, only the most severe single defect is included, regardless of the radial extent.

The **mean** score is determined by summing all the individual defect scores for the entire length (node to node), and dividing by the total length from node to node.

Two grades are assigned by considering both peak score and mean score according to the following tables. The final grade (ICG or SCG) is taken from whichever higher value.

Structural Grades for ICG

Grade	* Appropriate response in normal circumstances	Peak Score	Mean Score
1	No apparent need for further investigation, acceptable structural condition.	< 10	< 5
2	No immediate action required, minimal collapse risk in short term but potential for further deterioration.	10 to 30	5 to 19.9
3	Consider review in 12 months time, collapse unlikely in near future but further deterioration likely.	40 to 79	20 to 39.9
4	Consider overall circumstances on a programmed basis, collapse likely in foreseeable future.	80 to 164	40 to 82
5	Urgent need to investigate overall circumstances, collapsed or collapse imminent.	> 165	> 82

Table 1 Grading threshold for Internal Condition Grade

Service/ operational Grades for SCG

Grade	* Appropriate response in normal circumstances	Peak Score	Mean Score
1	No apparent need for action.	Less than 1	Less than 0.5
2	No immediate action required.	1 to 1.9	0.5 to 0.9
3	Consider review in 12 months time	2 to 4.9	1to 2.4
4	Consider response on a programmed basis.	5 to 9.9	2.5 to 4.9
5	Appropriate action to be investigated urgently.	Greater than 10	Greater than 5

Table 2 Grading threshold for Service Condition Grade

Notes:

1. The actual action taken will depend on the owner's asset management system and procedures.
2. Peak score is the maximum score in any 1m of length.
3. Mean score is the total score dividend by the total length.
4. The average score is the total score divided by the number of observations entered.

CONDITION CODES

Code	Definition
B	Broken pipe at…(OR From … to …) o'clock
BR	Branch major
CC	Crack circumferential from … to … o'clock
CL	Crack longitudinal at … o'clock
CM	Cracks multiple from … to … o'clock
CN	Connection at … o'clock, diameter … mm
CNI	Connection at … o'clock, diameter … mm, intrusion … mm
CU	Camera under water
CX	Connection defective at … o'clock, diameter … mm
CXI	Connection defective at … o'clock, diameter … mm, intrusion …mm
D	Deformed sewer … %
DB	Displaced bricks at … (OR from … to …) o'clock
DC	Dimension of sewer changes, new dimension … mm
DE	Debris … % cross-sectional area loss
DEG	Debris grease … % cross-sectional area loss
DES	Debris silt … % cross-sectional area loss
DI	Dropped invert, gap … mm
EH(J)	Encrustation heavy from … to… o'clock …% cross-sectional area loss (at joint)
EL(J)	Encrustation light from … to… o'clock …% (at joint)
EM(J)	Encrustation medium from … to … o'clock … % cross-sectional area loss (at joint)
ESL	Scale light … % cross-sectional area loss from … to … o'clock
ESH	Scale heavy from … to … o'clock … %
ESM	Scale medium … % cross sectional area loss from … to … o'clock
FC	Fracture circumferential from … to … o'clock
FL	Fracture longitudinal at … o'clock
FM	Fractures multiple from … to … o'clock
FH	Finish of sewer length
GO	General observation at this point
GP	General photograph number … taken at this point
H	Hole in sewer at … (OR from … to …) o'clock
ID(J)	Infiltration dripper at … (OR from … to …) o'clock (at joint)
IG(J)	Infiltration gusher at … (OR from … to …) o'clock (at joint)
IR(J)	Infiltration runner at … (OR from … to …) o'clock (at joint)
IS(J)	Infiltration seeper at … (OR from … to …) o'clock (at joint)
JDL	Joint displaced large
JDL	Joint displaced large
JDM	Joint displaced medium
JN	Junction at … o'clock, diameter … mm
JX	Junction defective at … o'clock, diameter … mm, diameter … mm
LC	Lining of sewer changes/starts/finishes at this point
LD	Line of sewer deviates down
LL	Line of sewer deviates left
LN	Lining defect at … (OR from … to …) o'clock
LR	Liner of sewer deviates right
LU	Line of sewer deviates up
MB	Missing
MC	Material of sewer changes at this point
MH	Manhole/node
MM	Mortar missing medium at … (OR from … to …) o'clock
MS	Mortar missing surface at … (OR from … to …) o'clock
MT	Mortar missing total at … (OR from … to …) o'clock
OB	Obstruction … % height/diameter loss
OJL	Open joint large
OJM	Open joint medium
PC	Length of pipe forming sewer changes at this point, new length … mm
RF(J)	Roots fine (at joint)
RM(J)	Roots mass … % cross-sectional area loss (at joint)
RT(J)	Roots tap (at joint)
SA	Survey abandoned
SC	Shape of sewer changes at this point
SSL	Surface damage, spalling large at … (or from … to …) o'clock
SSM	Surface damage, spalling medium at … (or from … to …) o'clock
SSS	Surface damage, spalling slight at … (or from … to …) o'clock
SWL	Surface damage, wear large at … (OR from … to …) o'clock
SWM	Surface damage, wear medium at … (OR from … to …) o'clock
SWS	Surface damage, wear slight at … (OR from … to …) o'clock
ST	Start of Survey
V	Vermin (rats and mice)
WL	Water level … % height/diameter
X	Sewer collapsed … % cross-sectional area loss