

Appendix 5: Sewage Impact Assessment

**Layout Plan Submission and
Proposed Minor Relaxation of
Building Height Restriction for
Permitted Flat Use At 131 Pok Fu
Lam Road, Hong Kong, RBL 136RP**

Sewerage Impact Assessment
Report

183437/LILY/003/Issue 1

Binnies Hong Kong Limited
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Hong Kong

November 2023

Layout Plan Submission and Proposed Minor Relaxation of Building Height Restriction for Permitted Flat Use At 131 Pok Fu Lam Road, Hong Kong, RBL 136RP

**Sewerage Impact Assessment Report
183437/LILY/003/Issue 1**

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*The Registered Recipient is responsible for destroying or marking as 'superseded' all superseded documents.

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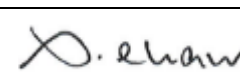
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Appendix B	Hydraulic Calculation of Sewage Flow of Proposed Development

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1. INTRODUCTION

- 1.1 Binnies Hong Kong Limited (Binnies) has been commissioned to carry out sewerage impact assessment to support a Section 16 planning application for layout plan submission and proposed minor relaxation of building height restriction for permitted flat use (Proposed Development) at 131 Pok Fuk Lam Road, Hong Kong, RBL 136RP (Application Site). This report presents the findings of the sewerage impact assessment for the Proposed Development at the Application Site.
- 1.2 The Application Site is currently the Ebenezer School and Home for the Visually Impaired. Access to the Application Site is via Pok Fu Lam Road as shown in **Drawing No. LILY16/LP/001**.
- 1.3 The Proposed Development consists of residential flats, clubhouse facilities and carpark area. The Application Site occupies an area of approximately 0.65 ha.
- 1.4 The Proposed Development consists of four residential blocks with 9-10 residential storeys excluding one level of lobby, car parking facilities and 4 club houses. The Proposed Development layout is shown in **Drawing No. LILY16/MLP/001**. A summary of key information of the Proposed Development is shown below in **Table 1**.

Table 1--- Development Schedule

	Proposed Development
<i>Site Area</i>	About 6,460 m ²
<i>Plot Ratio</i>	1.9
<i>No. of Storey</i>	9-10 residential storeys excluding one level of lobby
<i>Total Gross Floor Area (GFA)</i>	Not more than 12,274 m ²
<i>No. of Residential Units</i>	135
<i>Total Non-Domestic GFA (Residential Clubhouse)</i>	Not more than 614 m ²

- 1.5 This SIA report comprises the following sections after this introduction:
- **Section 2** discusses the sewage flow under the existing conditions;
 - **Section 3** presents the estimation of sewage generated from the Proposed Development;
 - **Section 4** assesses the potential impacts arising from the Proposed Development and proposed mitigation measures;
 - **Section 5** evaluates the impact arising from the construction of the proposed sewerage works; and
 - **Section 6** provides conclusion and recommendation of the SIA report.

2. ESTIMATION OF SEWAGE FLOW UNDER THE EXISTING CONDITIONS

Existing Sewerage and Sewage Treatment Facilities

- 2.1 According to the latest Drainage Record Plan from Drainage Services Department (DSD), there are 300 mm dia. sewers at Pok Fu Lam Road in the vicinity of the Application Site.
- 2.2 The Application Site is located within the sewage catchment of Sandy Bay Preliminary Treatment Works (SBPTW). Sewage generated from the Application Site is currently collected and conveyed through the existing sewer along Pok Fu Lam Road, Sasoon Road and Victoria Road to SBPTW for treatment and disposal. The existing public sewerage system is shown in ***Drawing No. LILY16/SIA/001***.
- 2.3 The capacity of the SBPTW has been upgraded to 34,560 m³/day (ADWF) in 2018 under Contract No. DC/2009/24 - Upgrading of Preliminary Treatment Works at Sandy Bay, Cyberport, Wah Fu, Aberdeen and Ap Lei Chau under Harbour Area Treatment Scheme Stage 2A.

Existing Sewage Flow

- 2.4 The 300 mm dia. sewers at Pok Fu Lam Road serve the Application Site, which is currently the Ebenezer School and Home for the Visually Impaired. The existing sewage flow from the Application Site was estimated by the number of students, teacher and staff as shown in ***Table 2***.

Table 2 --- Number of Students, Teacher and Specialist Staff

	No. of Students	No. of Teacher and Staff
Ebenezer School	59	105
New Hope School	66	102
Child Care Centre	50	30
Resource Support Programme to visually impaired students	322	32
TOTAL	497	269

- 2.5 The existing Average Dry Weather Flow (ADWF) was estimated by referencing to the "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0)" (GESF) published by Environmental Protection Department (EPD) in 2005. Sewage flow is estimated by the following equations:
Average Dry Weather Flow (ADWF) = Population × Unit Flow Factor × Catchment Inflow Factor

Table 3 --- Estimation of Existing Sewage Flow

	No.	Unit Flow	ADWF
Community, Social & Personal Services (J11)	497	0.280 m ³ /day/employee	75.32 m ³ /day
School student	269	0.040 m ³ /day/person	19.88 m ³ /day
Catchment Inflow Factor			1.00
TOTAL			95.20 m ³ /day

2.6 For the existing swimming pool in the Application site, the estimation of backwash flow is summarized in **Table 4**.

Table 4 --- Estimation of Sewage Flow from Existing Swimming Pool

Pool Area	130 m ²
Pool Depth	1.3 m
Pool Volume	169 m ³
Turnover Rate	4 hrs
Surface Loading Rate of Filter	20 m ³ /m ² /hr
Filter Areas Required	169 / 4 / 20 = 2.11 m ²
Backwash Duration	3 min /day
Backwash Flow Rate	30 m ³ /m ² /hr
Design Flow for Swimming Pool Backwashing	30 x 2.11 x 3 /60 = 3.17 m ³ /day (0.037 l/s)

2.7 Peak flows are estimated by multiplying the average dry weather flows by appropriate peaking factors. The peaking factors established in the GESF are adopted to assess the performance of the sewerage systems. The peaking factors used in this SIA are reproduced in **Table 5**.

Table 5 --- Adopted Peaking Factors

Population Range	Peaking Factor (including stormwater allowance) for facility with existing upstream sewerage	Peaking Factor (excluding stormwater allowance) for facility with new upstream sewerage
(a) For sewers		
< 1,000	8	6
1,000 – 5,000	6	5
5,000 – 10,000	5	4
10,000 – 50,000	4	3
> 50,000	Max (7.3 / N ^{0.15} , 2.4)	Max (6 / N ^{0.175} , 1.6)

Population Range	Peaking Factor (including stormwater allowance) for facility with existing upstream sewerage	Peaking Factor (excluding stormwater allowance) for facility with new upstream sewerage
(b) Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations		
<10,000	4	3
10,000 – 25,000	3.5	2.5
25,000 – 50,000	3	2
> 50,000	Max (3.9 / N ^{0.065} , 2.4)	Max (2.6 / N ^{0.065} , 1.6)
Note: N is the contributing population in thousands		

2.8 In view that there is existing upstream sewerage, peaking factor (including stormwater allowance) of 8 (contributing population = (95.20 / 0.27 = 353) will be adopted. The existing total design sewage flow generated is summarized in **Table 6**.

Table 6 --- Existing Total Design Total Sewage Flow

Item	Units	ADWF	Peaking Factor	Swimming Pool	Peak Flow
Total Design Sewage Flow	m ³ /day	95.20	8	3.17	764.77
	l/s	1.10	8	0.04	8.85

3. ESTIMATION OF SEWAGE FLOW FOR THE PROPOSED DEVELOPMENT

Population Forecast

3.1 A population forecast was undertaken to identify the design population of the Proposed Development. The design residential population is estimated by the following equation:

$$\text{Design Residential Population} = \text{Number of Residential Unit} \times \text{Person-Per-Unit Ratio}$$

3.2 As a conservative estimation, Person-Per-Unit Ratio of 3.7 was adopted, which was estimated based on the average domestic household size in Tertiary Planning Unit 171 in 2021 published by Census and Statistics Department.

3.3 Based on the above assumption, the design residential population is summarized in **Table 7** below:

Table 7 --- Estimation of Residential Population

No. of Residential Units	135
Person-Per-Unit Ratio	3.7
Design Population	
<i>Residential</i>	500
<i>Management Staff (J11)*</i>	25
Remark: -	
*assume no. management staff = 5% of no. of residents	

Estimation of Sewage Flow of the Proposed Development

3.4 The Average Dry Weather Flow (ADWF) of the Proposed Development was estimated by referencing to the GESF.

3.5 The Proposed Development is shown on **Drawing No. LILY16/MLP/001** and the design assumptions are summarized in **Table 8**.

Table 8 --- Estimation of Sewage Flow for Proposed Development

	No.	Unit Flow	ADWF
Residential	500	0.370 m ³ /day/employee	185 m ³ /day
Management Staff (I11)	25	0.280 m ³ /day/person	7 m ³ /day
Catchment Inflow Factor			1.00
TOTAL			192 m ³ /day

3.6 For the swimming pool in the Proposed Development, the estimation of backwash flow from the swimming pool is summarized in **Table 9**.

Table 9 --- Estimation of Sewage Flow from Proposed Swimming Pool

Pool Area	25 m x 6 m
Pool Depth	1.3 m
Pool Volume	195 m ³
Turnover Rate	4 hrs
Surface Loading Rate of Filter	20 m ³ /m ² /hr
Filter Areas Required	195 / 4 / 20 = 2.44 m ²
Backwash Duration	3 min /day
Backwash Flow Rate	30 m ³ /m ² /hr
Design Flow for Swimming Pool Backwashing	30 x 2.44 x 3 /60 = 3.66 m ³ /day (0.042 l/s)

3.7 Similar with existing condition, peaking factors (including stormwater allowance) of 8 (contributing population = 192 / 0.27 = 711) will be adopted. The design total sewage flow generated from the Proposed Development is summarized in **Table 10**.

Table 10 --- Design Total Sewage Flow of the Proposed Development

Item	Units	ADWF	Peaking Factor	Swimming Pool	Peak Flow
Total Design Sewage Flow	m ³ /day	192	8	3.66	1,539.66
	l/s	2.22	8	0.04	17.82

4. POTENTIAL IMPACTS ON SEWERAGE NETWORKS & PROPOSED MITIGATION MEASURES

- 4.1 The peak flow increased from the Application Site is approximately 2% of the capacity of SBPTW. It is expected that the SBPTW will be able to handle the increased sewage flow from the Application Site.
- 4.2 The sewage generated from the Proposed Development is estimated to be 192 m³/day (ADWF) and 3.66 m³/day design flow for swimming pool backwashing, with total peak discharge of 17.82 l/s. It is proposed to discharge the sewage flow to the public sewerage system at Pok Fu Lam Road.
- 4.3 It is understood that a student hostel is constructing at rural building lot no. 925 under application no. A/H10/94 now. The estimation of existing sewage flow at Pok Fu Lam Road have been assessed and presented in **Appendix A**. It is observed that two sewers at Pok Fu Lam Road (from manhole no. FMH7022544 to FMH7022539, and from FMH7022538 to FMH7022536) do not have adequate capacity.
- 4.4 To minimize the impact to the public sewer, the sewage generated from the Proposed Development will be discharged to further downstream (manhole no. FMH7038820), which has spare capacity (Current utilization is approximately 45 %).
- 4.5 As the proposed formation level of the Application Site (approximately +120 mPD) is located below the level of the existing public sewerage system at Pok Fu Lam Road. A sump pit (with size 0.5m x 1m x 1.5m) and sewage pump (with pump rate of 24,804 l/h or 0.00689 m³/s) are proposed to pump the sewage generated from the Proposed Development to a new manhole (MH001) and further discharge to manhole no. FMH7038820 via a new 225 mm dia. sewer. **Drawing No. LILY16/SIA/002** shows the proposed sewage disposal scheme. The estimation of proposed sewage flows at Pok Fu Lam Road as well as calculation of sump pit size and sewer size is enclosed in **Appendix B**.

5. EVALUATION OF THE STRATEGY AND RECOMMENDATIONS

Land matters

- 5.1 The proposed sewerage work will be within the area of the Application Site. No requisition of extra land is envisaged.

Construction

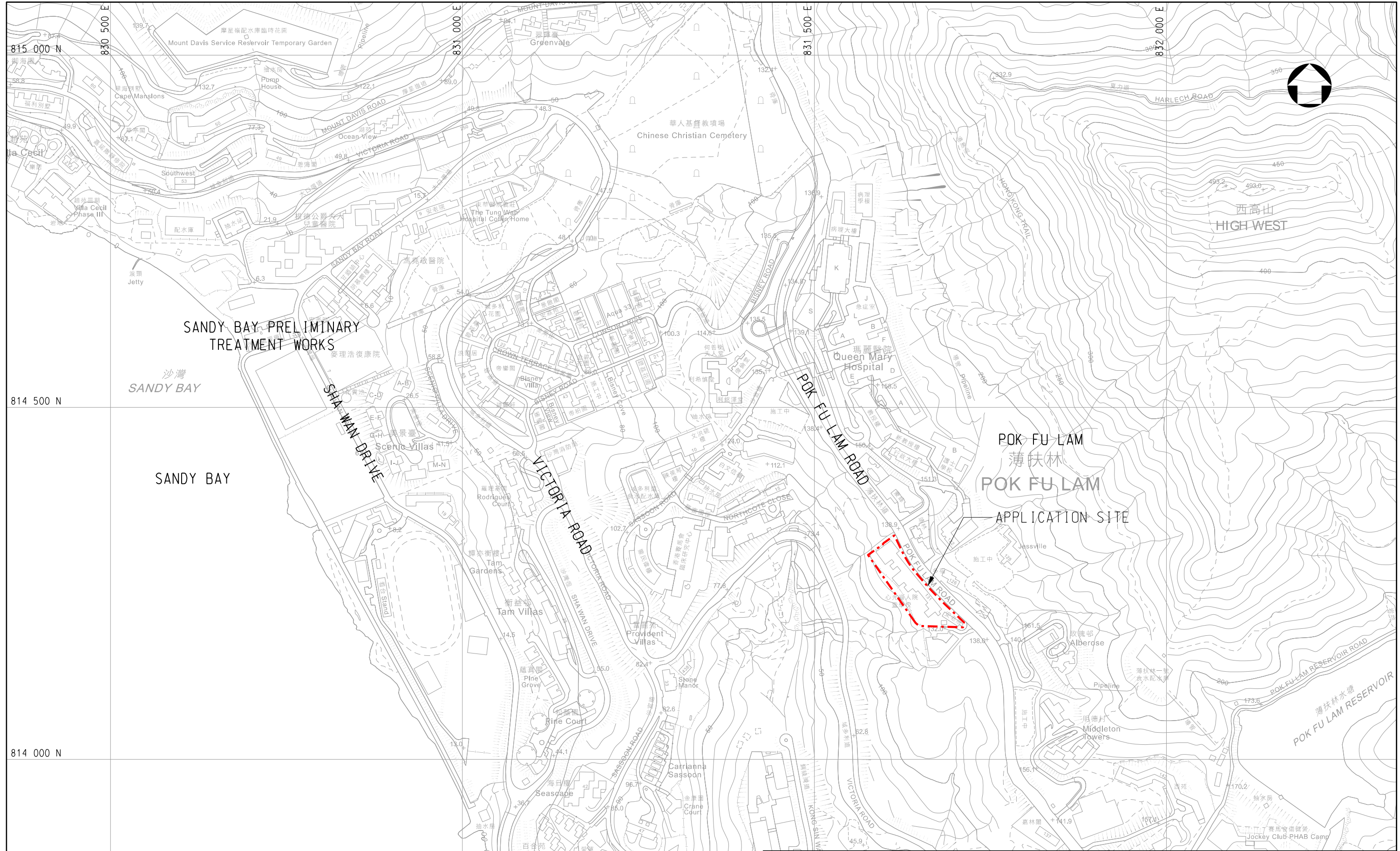
- 5.2 Construction of the connection from the Application Site to the existing public sewers would mainly involve conventional technology such as cut and cover techniques. There is no significant constraint in terms of complexity by a general civil works contractor.

6. CONCLUSION

- 6.1 The existing sewage flow within the Application Site is approximately 95.20 m³/day (ADWF) and 3.17 m³/day design flow for swimming pool backwashing, with total peak discharge of 8.85 l/s. The estimated sewage to be generated from the Proposed Development is approximately 192 m³/day (ADWF) and 3.66 m³/day design flow for swimming pool backwashing, with total peak discharge of 17.82 l/s.
- 6.2 Sewage generated from the Proposed Development would be conveyed to the public sewerage networks by pumping within the Application Site, leading to the SBPTW. The treatment capacity of SBPTW is considered sufficient to handle the flow from the Application Site.
- 6.3 The proposed strategy is considered feasible in terms of regional sewerage strategy, land and construction considerations. The Proposed Development is considered sustainable in terms of sewerage.

END OF TEXT

Drawings



SANDY BAY PRELIMINARY TREATMENT WORKS
 沙灣 SANDY BAY

SANDY BAY

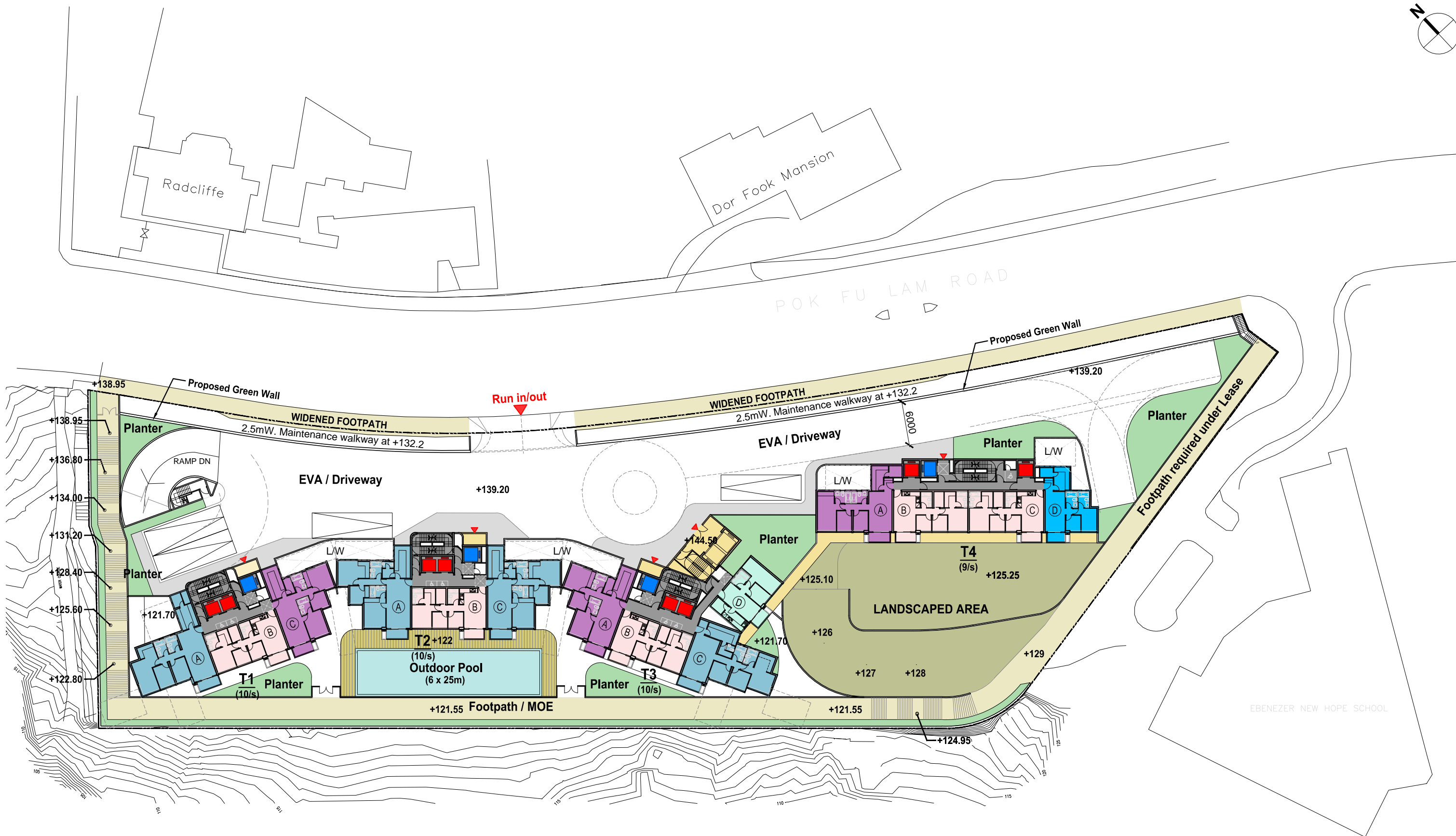
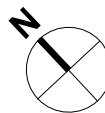
POK FU LAM
 薄扶林
 POK FU LAM
 APPLICATION SITE

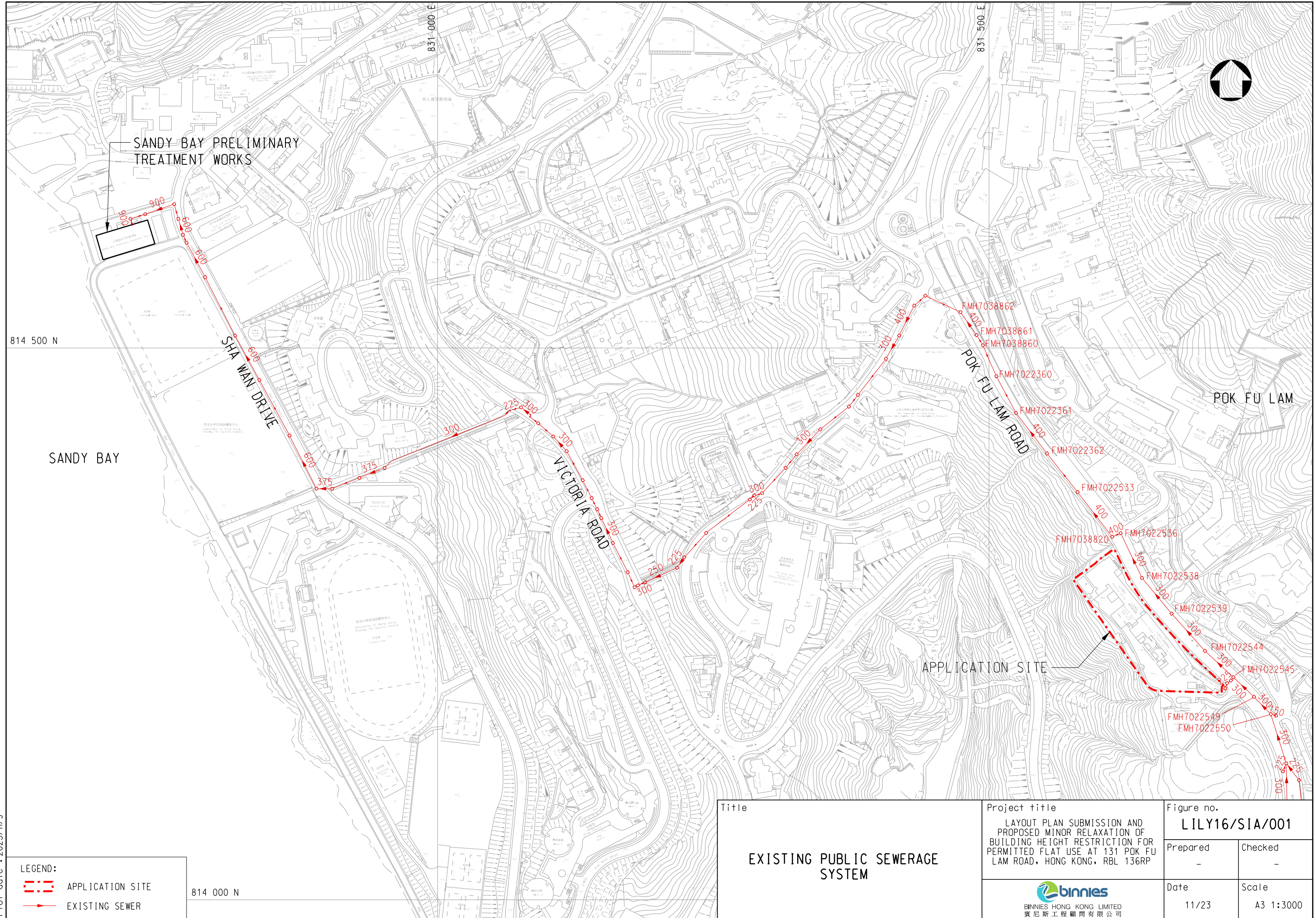
薄扶林水塘
 POK FU LAM RESERVOIR

Plot date : 2023/11/9

LEGEND:
 APPLICATION SITE

LOCATION PLAN	Project title LAYOUT PLAN SUBMISSION AND PROPOSED MINOR RELAXATION OF BUILDING HEIGHT RESTRICTION FOR PERMITTED FLAT USE AT 131 POK FU LAM ROAD, HONG KONG, RBL 136RP		Figure no. LILY16/LP/001	
	BINNIES HONG KONG LIMITED 賓尼士工程顧問有限公司		Prepared -	Checked -
		Date 11/23	Scale A3 1:5000	





SANDY BAY PRELIMINARY TREATMENT WORKS

814 500 N

SHA WAN DRIVE

SANDY BAY



VICTORIA ROAD


POK FU LAM ROAD

POK FU LAM

APPLICATION SITE

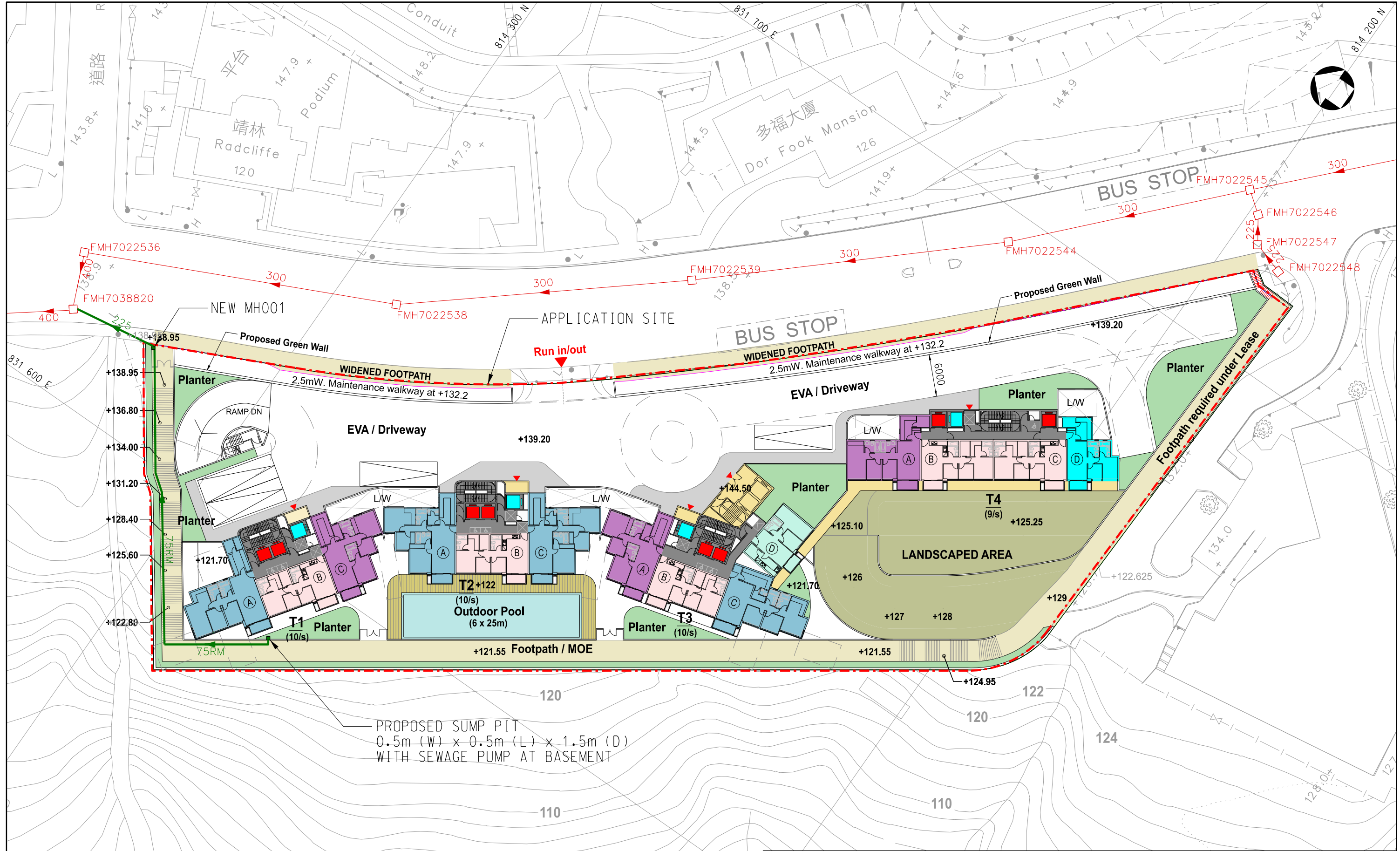
814 000 N

LEGEND:
 APPLICATION SITE
 EXISTING SEWER

Title EXISTING PUBLIC SEWERAGE SYSTEM	Project title LAYOUT PLAN SUBMISSION AND PROPOSED MINOR RELAXATION OF PERMITTED FLAT USE AT 131 POK FU LAM ROAD, HONG KONG, RBL 136RP		Figure no. LILY16/SIA/001	
	 BINNIES HONG KONG LIMITED 賓尼士工程顧問有限公司	Date 11/23	Prepared -	Checked -

Plot date : 2023/11/9

CAD Filename : Y:\Daily Work\20231108a\183437-LILY16-SIA-001.dgn



Plot date : 2023/11/9

LEGEND:

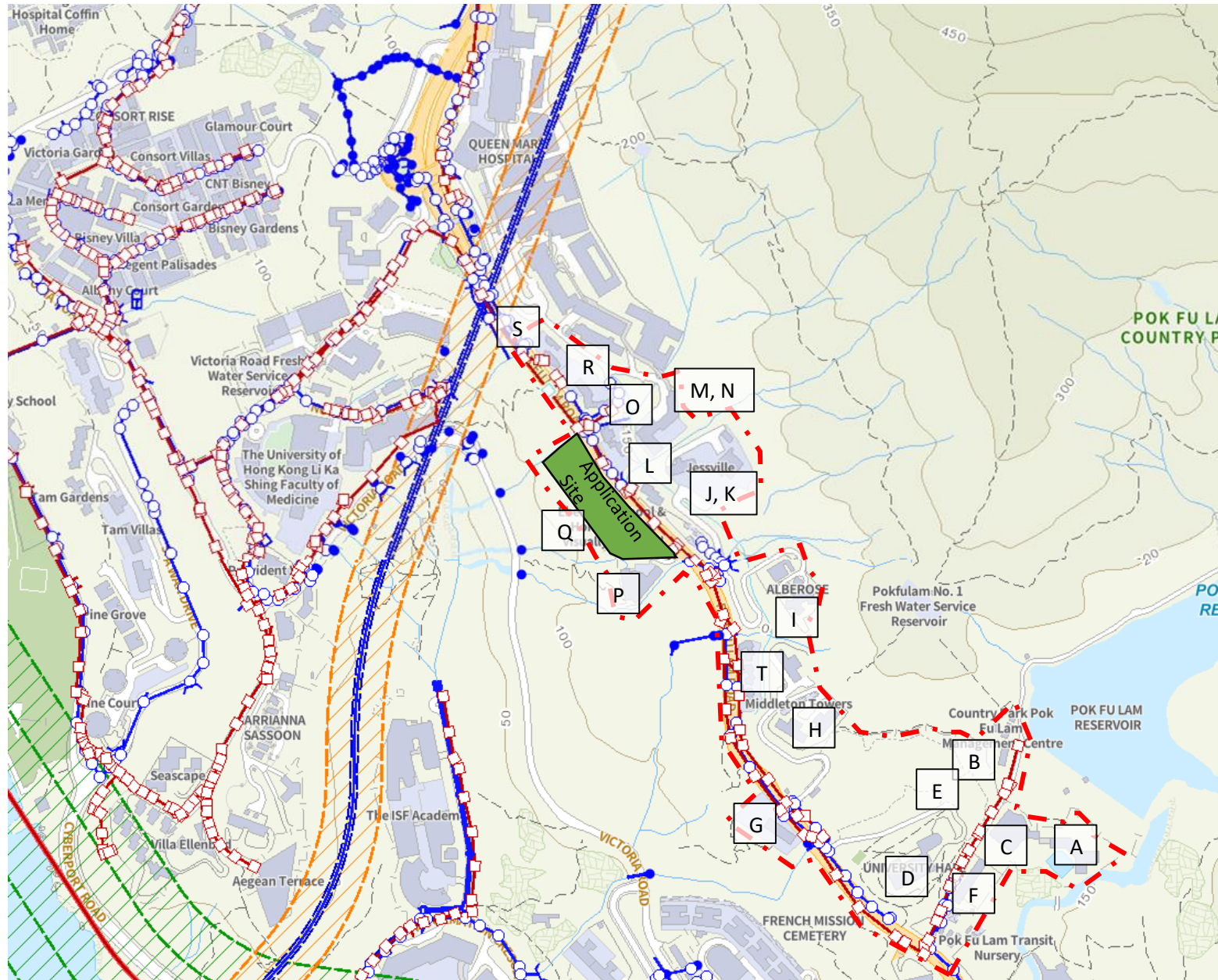
	APPLICATION SITE
	EXISTING SEWER
	PROPOSED SEWER

CAD Filename : Y:\Daily Work\20231108a\183437-LILY16-SIA-002.dgn

Title PROPOSED SEWAGE DISPOSAL SCHEME	Project title LAYOUT PLAN SUBMISSION AND PROPOSED MINOR RELAXATION OF BUILDING HEIGHT RESTRICTION FOR PERMITTED FLAT USE AT 131 POK FU LAM ROAD, HONG KONG, RBL 136RP		Figure no. LILY16/SIA/002	
	 BINNIES HONG KONG LIMITED 賓尼士工程顧問有限公司		Prepared -	Checked -
	Date 11/23	Scale A3 1:500		

Appendix A

Hydraulic Calculation of Sewage Flow at Existing Condition



- - - Sewerage Catchment
- - - Area at Pok Fu Lam Road

Project

Layout Plan Submission and Proposed Minor Relaxation of Building Height Restriction for Permitted Flat Use At 131 Pok Fu Lam Road, Hong Kong, RBL 136RP

Subject

Estimation of Existing Sewage Flow at Pok Fu Lam Road

Sewerage Catchment (From FMH7022574 to FMH7038862)

	Source	Category	Population	Unit Flow (m3/h/d)	Daily Flow (m3/d)	Peaking Factor	Cumulative Peak Flow (m3/s)	Remark
A	Pok Fu Lam Park Management Centre							
	Park Personnel	J11	5	0.28	1.4	8	0.00013	Estimated Population
	Swimming Pool (515m2)				12.55		0.00027	
B	WSD Staff Quarters	Insitutional	24	0.19	4.56	8	0.00070	12Units x 2PPF, say
C	HKJC PHAB Camp	Insitutional	124	0.19	23.56	8	0.00288	Data from website
D	University Hall	Insitutional	110	0.19	20.9	8	0.00481	Data from website
E	Planned Development A/H10/94-1*	Insitutional			461.2	6	0.03684	Flow provided by EPD
F	HKJC Riding School	J11	10	0.28	2.8	6	0.03704	Estimated Poluation
G	Woodbury Court							30 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	111	0.27	29.97	6	0.03912	
	Management Staff	J11	6	0.28	1.68	6	0.03923	
	Swimming Pool (105m2)				2.56		0.03926	
H	Middleton Towers							70 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	259	0.27	69.93	6	0.04412	
	Management Staff	J11	13	0.28	3.64	6	0.04437	
I	Alberose	R3	4	0.37	1.48	6	0.04448	1 Units from Centadata, average occupancy 3.7 PPF
J	Jessville Manor							4 Units from website, average occupancy 3.7 PPF
	Residents	R2	15	0.27	4.05	6	0.04476	
	Management Staff	J11	1	0.28	0.28	6	0.04478	
K	Jessville Tower							28 Units from website, average occupancy 3.7 PPF
	Residents	R2	104	0.27	28.08	6	0.04673	
	Management Staff	J11	6	0.28	1.68	6	0.04684	
	Swimming Pool (240m2)				5.85		0.04691	
P	Ebenezer New Hope School							
	Student	Student	66	0.04	2.64	6	0.04709	
	Teacher & Staff	J11	102	0.28	28.56	6	0.04908	
Q	Ebenezer School & Home for the Visually Impairer							Data from Ebenezer
	Student	Student	431	0.04	17.24	6	0.05027	
	Teacher & Staff	J11	167	0.28	46.76	6	0.05352	
	Swimming Pool (130m2)				3.17		0.05356	
L	Dor Fook Mansion							25 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	93	0.27	25.11	6	0.05530	
	Management Staff	J11	5	0.28	1.4	6	0.05540	
M	Government Quarters							
	Residents	R2	592	0.27	159.84	6	0.06650	Estimated population (20 floors x 8 flats/floor = 160 Units)
	Management Staff	J11	30	0.28	8.4	6	0.06708	
N	Hospital Authority	J11	126	0.28	35.28	6	0.06953	Building Area 1.907m2 x 2 floors = 3.814m2
O	Radcliffe							10 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	37	0.27	9.99	6	0.07023	
	Management Staff	J11	2	0.28	0.56	6	0.07027	
	Swimming Pool (290m2)				7.07		0.07035	
R	Royalton							30 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	111	0.27	29.97	6	0.07243	
	Management Staff	J11	6	0.28	1.68	6	0.07254	
	Swimming Pool (70m2)				1.71		0.07256	
S	Royalton II							17 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	63	0.27	17.01	6	0.07375	
	Management Staff	J11	4	0.28	1.12	6	0.07382	
	Swimming Pool (105m2)				2.56		0.07385	

Total Flow
Average Flow (l/s)
Since the PI

1076.2
12.46

Inflow Factor = 1.00 GESF Table T-4

*Estimated sewage flow of Planned Development A/H10/94-1 is being incorporated into the existing estimation of sewage flow as it is under construction.

The estimation of backwash flow from swimming pool is based on following assumption

Turnover Rate	4 hr
Surface Loading Rate of Filter	20 m3/m2/hr
Backwash Duration	3 min /day
Backwash Flow Rate	30 m3/m2/hr

From Manhole No.	To Manhole No.	Upstream CL (mPD)	Downstream CL (mPD)	Upstream I.L. (mPD) ¹	Downstream I.L. (mPD) ¹	Distance (m)	Diameter (mm)	Gradient (1 in)	Capacity (m ³ /s)	Peak Discharge (existing) (m ³ /s)	% of Capacity (existing)	Remark
FMH7022550	FMH7022549	139.22	138.78	137.32	137.23	20.6	300	228.9	0.058	0.04691	80.58%	Existing Flow from Source A to K
FMH7022549	FMH7022545	138.62	138.62	137.22	137.07	24.3	300	162.0	0.069	0.05356	77.40%	Connection Point from P(Ebenezer New Hope School), Q(Ebenezer School & Home for the Visually Impaired)
FMH7022545	FMH7022544	138.74	138.74	137.07	136.89	33.6	300	186.7	0.064	0.05356	83.08%	
FMH7022544	FMH7022539	138.89	138.89	136.89	136.74	44.3	300	295.3	0.051	0.05540	108.10%	Connection Point from L (Dor Fook Mansion)
FMH7022539	FMH7022538	139.02	139.02	136.74	136.52	41.5	300	188.6	0.064	0.05540	86.39%	
FMH7022538	FMH7022536	138.98	138.98	136.52	136.35	42.7	300	251.2	0.056	0.07035	126.59%	Connection Point from O(Radcliffe), M(Government Quarters), N(Hospital Authority)
FMH7022536	FMH7038820	138.71	138.71	136.33	136.26	7.7	400	110.0	0.181	0.07035	38.91%	
FMH7038820	FMH7022533	138.37	138.37	136.25	135.91	50.6	400	148.8	0.155	0.07035	45.26%	
FMH7022533	FMH7022362	138.00	138.00	135.89	135.55	42.7	400	125.6	0.169	0.07256	42.89%	Connection Point from R (Royalton)
FMH7022362	FMH7022361	138.40	138.40	135.54	135.26	45	400	160.7	0.150	0.07385	49.38%	Connection Point from S (Royalton II)
FMH7022361	FMH7022360	138.43	138.43	135.54	134.65	36.9	400	41.5	0.294	0.07385	25.08%	
FMH7022360	FMH7038860	138.24	138.24	134.65	134.11	29.4	400	54.4	0.257	0.07385	28.74%	
FMH7038860	FMH7038861	137.63	137.63	134.11	133.63	10.5	400	21.9	0.405	0.07385	18.22%	
FMH7038861	FMH7038862	135.42	135.42	133.63	133.00	24.3	400	38.6	0.305	0.07385	24.19%	

Surface roughness k_s 3 mm
 kinematic viscosity ν 1.14 mm²/s

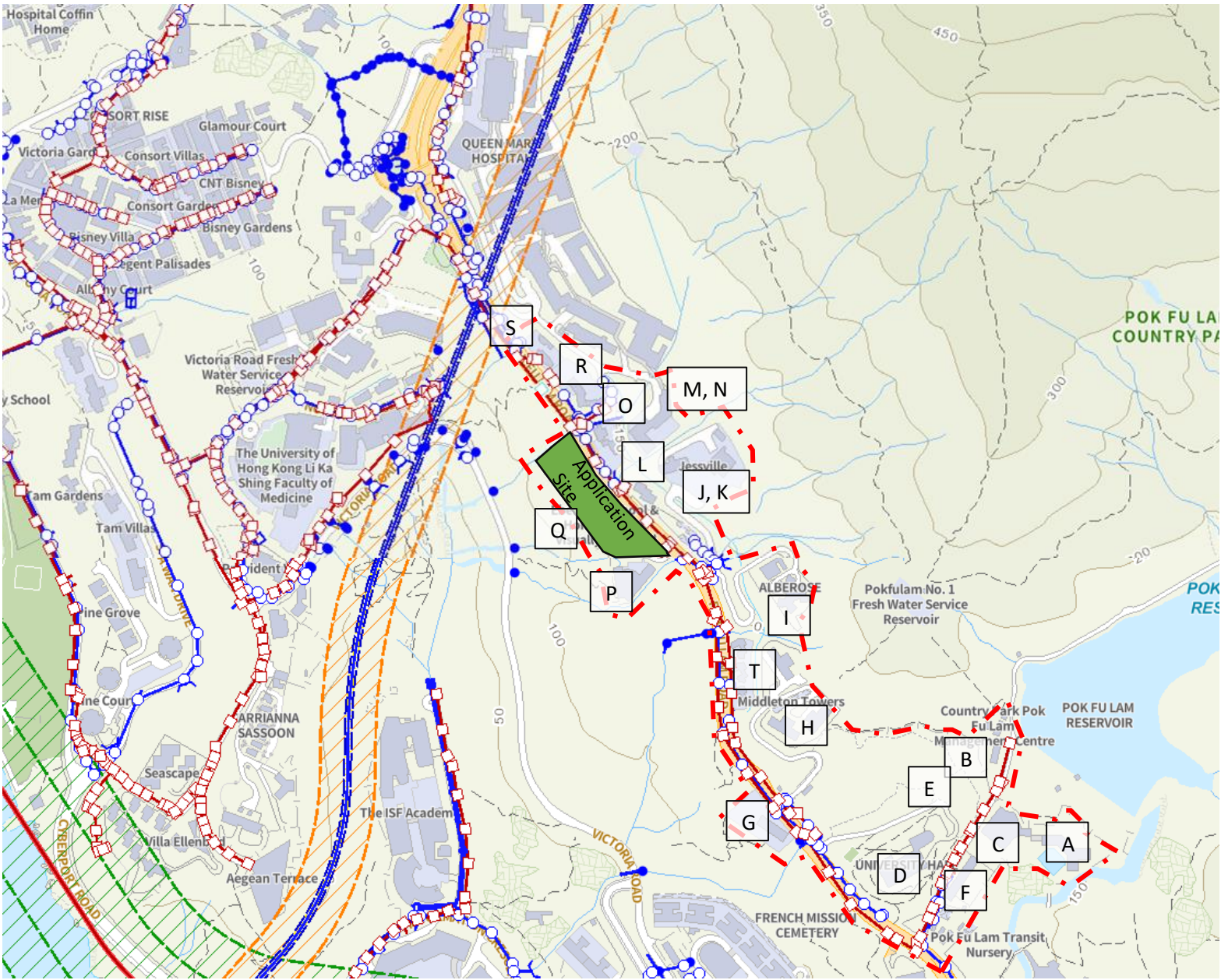
Mean velocity (Colebrook-White) $\bar{V} = -\sqrt{32gRS_f} \log \left[\frac{k_s}{14.8R} + \frac{1.25\nu}{R\sqrt{32gRS_f}} \right]$

Capacity provided $Q = V \times \text{Cross Section Area of Drain}$

1. All invert levels are extracted from GEOINFO MAP and only the invert levels of the main alignment are presented.
 2. Drainage record plan refers to Drawing No. LILY16/SIA/001

Appendix B

Hydraulic Calculation of Sewage Flow of Proposed Development



- Sewerage Catchment
- - - Area at Pok Fu Lam Road

Project

Layout Plan Submission and Proposed Minor Relaxation of Building Height Restriction for Permitted Flat Use At 131 Pok Fu Lam Road, Hong Kong, RBL 136RP

Subject

Estimation of Sewage Flow at Pok Fu Lam Road (After Development)

Sewerage Catchment (From FMH7022574 to FMH7038862)

	Source	Category	Population	Unit Flow (m3/h/d)	Daily Flow (m3/d)	Peaking Factor	Cumulative Peak Flow (m3/s)	Remark
A	Pok Fu Lam Park Management Centre							
	Park Personnel	J11	5	0.28	1.4	8	0.00013	Estimated Population
	Swimming Pool (515m2)				12.55		0.00027	
B	WSD Staff Quarters	Insitutional	24	0.19	4.56	8	0.00070	12Units x 2PPF, say
C	HKJC PHAB Camp	Insitutional	124	0.19	23.56	8	0.00288	Data from website
D	University Hall	Insitutional	110	0.19	20.9	8	0.00481	Data from website
E	Planned Development A/H10/94-1	Insitutional			461.2	6	0.03684	Flow provided by EPD
F	HKJC Riding School	J11	10	0.28	2.8	6	0.03704	Estimated Poluation
G	Woodbury Court							30 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	111	0.27	29.97	6	0.03912	
	Management Staff	J11	6	0.28	1.68	6	0.03923	
	Swimming Pool (105m2)				2.56		0.03926	
H	Middleton Towers							70 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	259	0.27	69.93	6	0.04412	
	Management Staff	J11	13	0.28	3.64	6	0.04437	
T	Planned Development Lot No. RBL 757							
	Residents	R3	12	0.37	4.44	6	0.04468	3 Units from Midland Realty data, average occupancy 3.7 PPF
	Management Staff	J11	1	0.28	0.28	6	0.04470	
I	Alberose	R3	4	0.37	1.48	6	0.04480	1 Units from Centadata, average occupancy 3.7 PPF
J	Jessville Manor							4 Units from website, average occupancy 3.7 PPF
	Residents	R2	15	0.27	4.05	6	0.04508	
	Management Staff	J11	1	0.28	0.28	6	0.04510	
K	Jessville Tower							28 Units from website, average occupancy 3.7 PPF
	Residents	R2	104	0.27	28.08	6	0.04705	
	Management Staff	J11	6	0.28	1.68	6	0.04717	
	Swimming Pool (240m2)				5.85		0.04724	
L	Dor Fook Mansion							25 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	93	0.27	25.11	6	0.04898	
	Management Staff	J11	5	0.28	1.4	6	0.04908	
M	Government Quarters							
	Residents	R2	592	0.27	159.84	6	0.06018	Estimated population (20 floors x 8 flats/floor = 160 Units)
	Management Staff	J11	30	0.28	8.4	6	0.06076	
N	Hospital Authority	J11	126	0.28	35.28	6	0.06321	Building Area 1.907m2 x 2 floors = 3.814m2
O	Radcliffe							10 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	37	0.27	9.99	6	0.06391	
	Management Staff	J11	2	0.28	0.56	6	0.06395	
	Swimming Pool (290m2)				7.07		0.06403	
P	Existing Facilities (to be relocated)							Proposed Development
	Student	Student	0	0.04	0	6	0.06403	
	Teacher & Staff	J11	0	0.28	0	6	0.06403	
Q	Proposed Development							
	Residents	R3	500	0.37	185	6	0.07687	
	Management Staff*	J11	25	0.28	7	6	0.07736	
	Swimming Pool (150m2)				3.66		0.07740	
R	Royalton							30 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	111	0.27	29.97	6	0.07948	
	Management Staff	J11	6	0.28	1.68	6	0.07960	
	Swimming Pool (70m2)				1.71		0.07962	
S	Royalton II							17 Units from Centadata, average occupancy 3.7 PPF
	Residents	R2	63	0.27	17.01	6	0.08080	
	Management Staff	J11	4	0.28	1.12	6	0.08088	
	Swimming Pool (105m2)				2.56		0.08091	

Total Flow 1178.2
Average Flow (l/s) 13.64

Inflow Factor = 1.00 GESF Table T-4

*assume no. management staff = 5% of no. of residents

The estimation of backwash flow from swimming pool is based on following assumption

Turnover Rate	4 hr
Surface Loading Rate of Filter	20 m3/m2/hr
Backwash Duration	3 min /day
Backwash Flow Rate	30 m3/m2/hr

Project

Layout Plan Submission and Proposed Minor Relaxation of Building Height Restriction for Permitted Flat Use At 131 Pok Fu Lam Road, Hong Kong, RBL 136RP

Subject

Estimation of Sewage Flow at Pok Fu Lam Road (After Development)

From Manhole No.	To Manhole No.	Upstream CL (mPD)	Downstream CL (mPD)	Upstream I.L. (mPD) ¹	Downstream I.L. (mPD) ¹	Distance (m)	Diameter (mm)	Gradient (1 in)	Capacity (m ³ /s)	Peak Discharge (existing) (m ³ /s)	% of Capacity (existing)	Peak Discharge (future) (m ³ /s)	% of Capacity (future)	Remark
New MH001	FMH7038820	138.95	138.71	137.00	136.80	13.5	225	67.5	0.050	-	-	0.01829	36.82%	Connection Point from Proposed Development. ²
FMH7038820	FMH7022533	138.37	138.37	136.25	135.91	50.6	400	148.8	0.155	0.07035	45.26%	0.07740	49.80%	Existing Flow from Source A to Q and T
FMH7022533	FMH7022362	138.00	138.00	135.89	135.55	42.7	400	125.6	0.169	0.07256	42.89%	0.07962	47.06%	Connection Point from R (Royalton)
FMH7022362	FMH7022361	138.40	138.40	135.54	135.26	45	400	160.7	0.150	0.07385	49.38%	0.08091	54.10%	Connection Point from S (Royalton II)
FMH7022361	FMH7022360	138.43	138.43	135.54	134.65	36.9	400	41.5	0.294	0.07385	25.08%	0.08091	27.48%	
FMH7022360	FMH7038860	138.24	138.24	134.65	134.11	29.4	400	54.4	0.257	0.07385	28.74%	0.08091	31.49%	
FMH7038860	FMH7038861	137.63	137.63	134.11	133.63	10.5	400	21.9	0.405	0.07385	18.22%	0.08091	19.96%	
FMH7038861	FMH7038862	135.42	135.42	133.63	133.00	24.3	400	38.6	0.305	0.07385	24.19%	0.08091	26.50%	

Surface roughness k_s 3 mm
 kinematic viscosity ν 1.14 mm²/s

Mean velocity (Colebrook-White) $\bar{V} = -\sqrt{32gRS} \log \left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{(32gRS)}} \right]$

Capacity provided $Q = V \times \text{Cross Section Area of Drain}$

- All invert levels are extracted from GEONFO MAP and only the invert levels of the main alignment are presented.
- As this is new sewer proposed to connect to public sewerage system from the Proposed Development, peaking factor (excluding stormwater allowance) of 8 has been applied.
- Drainage record plan refers to Drawing No. LILY16/SIA/001

Project Layout Plan Submission and Proposed Minor Relaxation of Building Height Restriction for Permitted Flat Use At 131 Pok Fu Lam Road, Hong Kong, RBL 136RP

Subject Proposed Sewerage Works for Application Site

Capacity Check

ADWF = 0.00232 m³/s
 Peak Flow (Sewer) = 0.01829 m³/s
 Peak Flow (Pumping Station) = 0.00689 m³/s

Pumped Mains to FMH7038820

Capacity of Pipe

Velocity (Assumed) v = 1.000 m/s

Cross Section Area of Drain = Q / v
 = 0.00689 m²

Min. Pipe Size = 93.633471 mm

Design for Pipe Size < 93.633471 = 75 mm
 OK

Sump pit

Volume of Pit

Pump Capacity q = 0.00689 m³/s
 Cycle Time T = 360 s 10 time start/stop per hour

Minimum Volume

$$V_{min} = \frac{T_{min} \tilde{q}}{4}$$

= 0.6197188 m³
 Volume of pit V = 0.75 m³ (0.5(L)x1(W)x1.5(D))
 OK