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[redacted]

Our Ref: 60776275/0054/26/2026000019D
Your Ref: TPB/A/H10/98
Date: 6 July 2026

By Email and by Hand

The Secretary
Town Planning Board
15/F, North Point Government Offices
333 Java Road
Hong Kong.

Dear Sir/Madam,

Planning Application under Section 16 of the Town Planning Ordinance for Proposed Residential Institution (Student Hostel) at Middleton Towers, 140 Pokfulam Road (RBL No. 825 RP) (Application No. A/H10/98)
Submission of Responses to Comments (3rd Batch)

Reference is made to the captioned Section 16 Planning Application received by Town Planning Board (TPB) on 11 May 2026.

On behalf of the Applicant, the University of Hong Kong, we hereby submit the third batch of table of responses to departmental comments (RtoC table) at **Annex A** in response to departmental comments from Environmental Protection Department (EPD) and Drainage Services Department (DSD), received via emails from Planning Department on 2 and 5 June 2026 respectively.

Upon receipt of the comments, we have proactively engaged with EPD and DSD to address the issues raised. Following receipt of EPD's feedback dated 30 June 2026 on our initial replies, an advanced copy of the responses to comments was delivered to EPD and DSD on 2 July 2026. We also received feedback from DSD on 3 July 2026 and immediatelly followed up on the necessary updates to the Drainage and Sewerage Impact Assessment (DSIA) Report.

This submission does not result in a material change of the nature of the captioned planning application. We sincerely hope that with the above information, the outstanding issues can be resolved satisfactorily with the concerned departments. Should you have any queries or require further information, please do not hesitate to contact our Ms. Winnie HUNG at [redacted] (or email [redacted]) or Ms. Pearl HUI at [redacted] (or email [redacted]).

Yours faithfully,
For and on behalf of
AECOM Asia Company Limited

Pearl HUI
Executive Director, Urban Planning
Encl.
cc: The University of Hong Kong w/e

Annex A Response to Departmental Comments

S.16 Planning Application for Proposed Residential Institution (Student Hostel) in "Residential (Group C)" with a minor portion within "Green Belt" Zones at Middleton Towers, 140 Pok Fu Lam Road (Rural Building Lot No. 825 RP) and adjoining Government Land, Pok Fu Lam, Hong Kong

Responses to Departmental Comments (3rd Batch)

Item	Bureau/Department	Date
1.	Environmental Protection Department	2 June 2026
2.	Drainage Services Department	5 June 2026

Response to Departmental Comments – Application No. A/H10/98

Item	Comments Received	Responses
1.	Director of Environmental Protection (Received via email from PlanD dated 2.6.2026) (Contact Officer: Ms. Clara HO, tel: 2835 1594)	
1.1.	Please find our comments on the SIA report below: Noted that the no. of residents is reduced from 1000 to 900 and the tentative completion year is postponed from Yr 2027 to Yr 2028 when compared to the SIA in pre-submission. Please highlight changes between submissions for easy reference.	Noted. Revisions made as compared with pre-submissions were highlighted in the updated DSIA for your easy reference.
1.2.	For Section 2.5.1, it is reflected in Figures 2.1 and 2.2 that the 3 proposed terminal manholes FMH1, FMH2 and FMH3 are located at the upstream of FMH7022565 outside the site boundary, please advise if the 3 proposed manholes will be constructed between existing FMH7022566 and FMH7022565.	Please be advised that FMH1, FMH2 and FMH3 were already constructed on site as per the approved SIA for "Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road". Please find the attachment **Annex I** for your reference.
1.3.	For Section 2.5.1, please revise typo "MH7022565" to "FMH7022565".	Noted and revised accordingly.
1.4.	For Tables 2 and 14 in Appendix 2.1, total ADWF in Catchment A should be sum of 1a, 1b, 2a, 2b, 2c and 2d, please revise the hydraulic calculations accordingly.	Noted and updated accordingly.
1.5.	For Table 3 in Appendix 2.1, unit is missing in estimated sewage flow for Catchment 4, please supplement.	Noted and updated accordingly.

Item	Comments Received	Responses
1.6.	For Table 3 in Appendix 2.1, please verify if there is swimming pool in Catchment 3b.	Noted and irrelevant information has been removed. Please refer to Table 13 in **Appendix 2.1** for the calculation of the swimming pool.
1.7.	For Table 3 in Appendix 2.1, backwash of swimming pools shall be accounted for in calculating peak flow only, please remove such sewage generation in calculating ADWF to avoid duplication.	Noted and updated accordingly.
1.8.	For Table 5 in Appendix 2.1, Ebenezer School & Home for the Visually impairers instead of Ebenezer New Hope School are included in Catchment D, please also include Ebenezer New Hope School in estimating existing sewage flow estimation.	Noted and updated accordingly.
1.9.	For Tables 14 and 15 in Appendix 2.1, the pipe length of sewer section S24-S25 should be 24.2m instead of 125m, please revise and update the hydraulic calculation accordingly.	Noted and revised accordingly.
1.10.	For Table 14 in Appendix 2.1, please advise why Catchment A2 and E are excluded when calculating total ADWF.	Irrelevant information has been removed.
1.11.	For Tables 14, 15 and Tables – Backwater Analysis for Surcharged Sections in Appendix 2.1, backwash of swimming pools shall be included in respective catchment handled by corresponding sewer section, please revise.	Noted and updated accordingly.
1.12.	For Tables – Backwater Analysis for Surcharged Sections in Appendix 2.1, please seek DSD's agreement on the calculation of freeboard.	Noted. The same submission has been referred to DSD for comment in parallel by Planning Department.

Item	Comments Received	Responses
2.	Chief Engineer/Hong Kong and Islands, Drainage Services Department (Received via email from PlanD dated 5.6.2026) (Contact Officer: Mr. Caryl POON, tel: 3101 2361)	
2.1.	This is a coordinated reply from Land Drainage Division and Hong Kong and Islands Divison. Table 14 & 15 – Roughness value for slimed clayware sewers in poor condition should be 3.0mm (v<0.75m/s) and 0.6mm (v>1.2m/s). Please review the adopted roughness.	Noted and updated accordingly.
2.2.	Table 3 – Please show the adopted headloss coefficient in the table for checking.	Noted and updated accordingly.
2.3.	Table 3 – Please critically review the water level. For example, the water level at FMH1 is 132.18mPD while the invert level is 140.2mPD.	Noted and updated accordingly.
2.4.	It appears that the consultants have not provided the sewage assessment under the existing case for comparison. Please review and append.	Noted and updated accordingly in **Appendix 2.2**, with existing case included.
2.5.	Figure 2.2 – For the proposed new alignment/manhole, please use another colour for indication on the layout and update the legend accordingly. They should not be labelled as "existing manhole/pipe" in the legend.	Noted and updated accordingly.
2.6.	Please review and upgrade the pipe size with capacity exceeding 100% with risk of overflowing.	Based on the calculations for the backwater profile under peak flow conditions (including a 1.15 safety factor), the freeboard

Item	Comments Received	Responses
		between the cover/ground level and the hydraulic grade line (HGL) at all manholes is greater than 1.72m. This is substantially more than the minimum DSD requirement of 1.0m. The proposed development intends to be an interim stage under the overall planning by the University to achieve soonest provision of student hostel supply, and further redevelopment is already under planning by the University as the building has already reached 60 years of age. For sewers connecting manholes FMH702255 to FMH702252 identified in this DSIA report as having capacity above 100% and hence recommended for upgrading by DSD on 3 July 2026 in upcoming redevelopment stage of the Middleton development, the Applicant commits to further liaise with DSD and submit revised DSIA based on the finalized design of the Middleton at redevelopment stage, and undertake the unnecessary upgrading works if entrusted by the Authority.
2.7.	Please be reminded that SIG/EPD is the planning authority of sewerage infrastructure as to whether or not a SIA is required for the revitalization project and it shall be subject to the discretion of SIG/EPD.	Noted and the team will coordinate with SIG/EPD at appropriate timing.

Annex I

Approved Sewerage Impact Assessment report of "Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road

Prepared for

Andrew Lee King Fun & Associates Architects Limited

Prepared by

Ramboll Hong Kong Limited

STUDENT RESIDENCES AND RESIDENTIAL DEVELOPMENT FOR THE UNIVERSITY OF HONG KONG AT 142 POK FU LAM ROAD, POK FU LAM, R.B.L. NO. 925

SEWERAGE IMPACT ASSESSMENT

Date	**April 2023**
Prepared by	**Kitty Wong** **Senior Consultant**
Signed	
Approved by	**Tony Cheng** **Senior Manager**
Signed	
Project Reference	**ALKHKUHWED00**
Document No.	**R7842_v4.0**

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CHAPTERS

TABLES

FIGURES

APPENDICES

1. INTRODUCTION

1.1 Background

1.1.1 Andrew Lee King Fun & Associates Architects Limited (ALKF) is the Project's Architect for the student residences and residential development (the proposed development) for the University of Hong Kong (HKU) at 142 Pok Fu Lam Road, Pok Fu Lam, Rural Building Lot (R.B.L.) No. 925 (the Subject Site). The Site Location is shown on **Figure 1**.

1.1.2 The drainage and sewerage impact assessment (DSIA) for the Subject Site was conducted and approved in 2019 (DSIA – 2019) under Section 16 Planning Application (Application No.: A/H10/94) in 2019. There are no approval conditions related to SIA under this approved planning application.

1.1.3 The General Building Plan was further updated for the additional 1 storey of Q2 block and 7 staff quarter flats. A revised SIA (ref: R7842_v3.0) prepared based on the latest design parameter of the proposed development was submitted in August 2022 and no adverse technical comments was received. In that SIA report, an upgrading work in terms of adjusting the sewer gradients of a sewer segment was recommended.

1.1.4 Under the detailed design, instead of provision of the upgrading work, an alternative proposal by constructing new sewers is proposed to bypass the concerned sewer segment. An updated SIA (ref: R7842_v3.1) was prepared to assess the alternative proposal. It must be noted that the development parameters of the proposed development remain unchanged. The revised SIA (ref: R7842_v3.1) was approved in February 2023.

1.1.5 The Subject Site consists of the proposed development and the existing University Hall, they have separate sewage discharge approach. Currently, the sewage generated from the existing University Hall discharge to Manhole FMH7022586 that is located to the southeast of the Subject Site. According to the latest Drainage Plan Amendment Submission and the University Hall Drainage Submission, new internal sewers to be constructed for the existing University Hall will join the terminal manhole of the Proposed Development then discharge the sewage via the public sewerage network towards northwest direction (see **Figure 5** and **Appendix D**). This updated SIA is prepared to reflect the above changes for the new internal sewers of the existing University Hall, please note the development parameters and relevant assessment for the proposed development remains unchanged.

1.1.6 Ramboll Hong Kong Limited has been appointed by ALKF to update the SIA based on the latest technical information of the proposed development were largely provided by Project Team.

1.2 Subject Site and Its Environs

1.2.1 The Subject Site falls within an area zoned as Residential (Group C) (R(C)) except a very small area at the northern fringe covered by vegetated slope falls within the "Green Belts" (GB) zone.

1.2.2 The Subject Site is of situated at the hillside of Pok Fu Lam Country Park and to the southwest of Pok Fu Lam Reservoir. The Subject Site is bounded by the Pok Fu Lam Road on the Southwest. Further down the hill, there are several residential developments, such as Woodbury Court and Baguio Bay.

1.2.3 The area of the Subject Site is about 29,740m^2. The proposed development within the Subject Site comprises i) student residence and ii) staff quarters. Although the

University Hall is located within the Subject Site, the existing sewerage system of the University Hall will not connect to the new sewerage system of the proposed development. Therefore, a SIA of the University Hall will not include in the estimated sewage flow for the proposed development.

1.2.4 **Figure 1** shows the location of the Subject Site and its environs.

1.3 Existing Development

1.3.1 The area of the proposed development is a staff quarter owned by HKU, a landscape area and tennis courts with changing room facility.

1.4 Proposed Development

1.4.1 As mentioned above, the proposed development includes i) student residence and ii) staff quarters.

1.4.2 The proposed student residence includes two 19-storey high towers (H1 and H2) on a single-storey common podium. As advised by ALKF, it will accommodate 952 hostel places for students, and living accommodation for management staff. The podium will provide common spaces, canteen, and supporting facilities for shared used.

1.4.3 The proposed staff quarters include one 19-storey high residential tower (Q1) and one 20-storry high residential tower (Q2) providing a 2-bedroom to 3-bedroom flat units. Supporting facilities and car-parking spaces at four lower ground floors of Q1 will be also provided.

1.4.4 Garden with soft landscape will be also provided within the proposed development.

1.4.5 Latest layout plan provided by ALKF is presented in **Appendix A**.

2. SEWERAGE IMPACT ASSESSMENT

2.1 Scope of Work

2.1.1 The aim of this SIA is to assess whether the capacity of the existing sewerage network serving the proposed development is sufficient to cope with the sewage flow from the proposed development and the existing developments in the vicinity. Drainage records from the Drainage Services Department (DSD) and LandsD's Geoinfo Map were obtained for the information for this SIA.

2.2 Existing Sewerage System

2.2.1 According to the Drainage records obtained from DSD and the Geoinfo Map, there are existing Ø225mm sewers along Pok Fu Lam Road, which flow northwest towards larger (Ø300mm) sewers along Pok Fu Lam Road (refer to **Figure 2**).

2.2.2 The sewage generated from the proposed development will be discharged to modified manhole ref.: FMH7022569 (as shown in **Figure 2**), located at the southwest corner of the proposed development.

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 (GESF) has been referred to for the purposes of estimating the quantity of the sewage generated from the proposed development and the existing nearby catchment area. Sewage flow parameters, global peaking factors and inflow factors from GESF have been adopted for this SIA.

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

2.3.3 The following unit flow factors from the GESF have been adopted for this SIA:

- General commercial employee: 0.08m^3/day per employee
- Student canteen (F&B Area): 1.58m^3/day per employee (J10)
- Support facilities & office/meeting rooms: 0.28 m^3/day per employee (J11)
- Student residence towers (H1 & H2): 0.19m^3/day per person (Institutional)
- Staff quarters (Q1 & Q2): 0.27m^3/day per person (R2)

2.4 Assessment of Sewerage Impact

2.4.1 Wastewater arising from the proposed development will be primarily contributed by the residential flow by the student residence towers and staff quarters, staff living accommodation & support spaces floor, and ground floor common facilities area.

2.4.2 An average household size of 3 (from the Hong Kong 2019 Population By-Census – Southern District) has been adopted to estimate the residential population for staff quarters and Catchment A – Middleton Towers. The identified catchment in the vicinity is indicated in **Figure 2**.

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

2.4.4 The estimated sewage flow for the proposed development is given in **Table 2.1**. The relevant calculation is presented in **Table 1** of **Appendix B**.

Table 2.1 Estimated Sewage Flow from the Proposed Development

Development Parameter		Flow
Student canteen (F&B)	31 employees	49.0
Support facilities & office/meeting rooms	35 employees	9.8
Student residence towers (H1 & H2) (including student and staff)	984 ppl	187.0
Staff quarters (Q1 & Q2)	819 ppl	221.1
	Total Flow Rate	466.9m^3/day
	Peak Flow	32.4litre/sec

2.4.5 To the northwest of the proposed development, along Pok Fu Lam Road, the sewer serving the proposed development joins an adjacent sewerage system before discharging to a single Ø300mm sewer. The populations and flows discharging to the adjacent system, together with the overall combined flow are also included in **Table 1** of **Appendix B**.

New Internal Sewer Connection from the Existing University Hall

2.4.6 Currently, the sewage generated from the existing University Hall currently discharge to Manhole FMH7022586 that is located to the southeast of the Subject Site (see **Figure 2**). According to the latest Drainage Plan Amendment Submission and the University Hall Drainage Submission, new internal sewers to be constructed for the existing University Hall will join the terminal manhole of the Proposed Development then discharge the sewage via the public sewerage network towards northwest direction (see **Figure 5** and **Appendix D**). According to the calculation presented in **Table 1 of Appendix B**, the sewage generated from the existing University Hall (for 110 Resident Students and 20 Staff) is 26.5m^3/day.

2.5 Discussion

2.5.1 The total flowrate with the catchment inflow factor from the proposed development is about 466.9m^3/day, while the peak flow is 32.4litre/sec. Together with the sewage generation from the existing University Hall (26.5m^3/day), the overall flowrate from the Subject Site is 493.4m^3/day, while the peak flow is 34.3litre/sec.

2.5.2 After calculating the capacities of the sewerage system serving the proposed development, 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 nearby catchment areas (cumulative flow). The flows and sewerage capacities are shown in **Table 2** of **Appendix B**.

2.5.3 According to **Table 2** of **Appendix B,** the cumulative flow is slightly greater than the existing sewer capacity in some sections. A backwater assessment has therefore been undertaken to assess the likely hydraulic conditions at peak flow.

2.5.4 The local sewerage system would apparently be under-capacity from Manhole FMH7022563 to Manhole FMH7022554. Furthermore, based on surveyed invert levels, there are apparent reverse gradients between Manholes FMH7022568 and FMH7022566 and between FMH7022566 and FMH7022565. The backwater assessment has therefore been carried out from Manhole FMH7022554 upstream to the existing Terminal Manhole of the proposed development. The sewer immediately downstream of Manhole FMH7022554 has more than adequate capacity for the flow and it would be expected that the flow depth would be less than the pipe diameter, although, for simplicity and as a conservative assumption, it has been assumed that the sewer would be flowing full at Manhole FMH7022554. The sewer between FMH7022565 and FMH7022563 has adequate capacity for the peak flow and the water level would be less than the pipe diameter, so it has been assumed that the water level would pass through Critical Depth at Manhole FMH7022565 (N.B. this is an approximation, but a reasonable simplification for this assessment). In accordance with the DSD Sewerage Manual, two assessments have been undertaken, i.e. 1) to assess freeboard and Peak Flow conditions and 2) to assess the potential for flooding at Peak Flow x 1.15. Existing (surveyed) sewer and manhole levels have been used for this assessment.

2.5.5 The backwater calculations and results are included in **Tables 3** and **4** in **Appendix B** and illustrated in **Figures 3** and **4**. The analyses indicate that there will be more than 1m freeboard at Peak Flow and no potential flooding at Peak Flow x 1.15. However, the reverse gradients will tend to promote sedimentation at low flows and will therefore represent an on-going maintenance liability. The assessment calculation shows that improvement work should be provided for the sewer between the manhole FMH7022565 and FMH7022566 if the sewage from the proposed development is to be discharged to the manhole FMH7022566; while the sewers further downstream, between Manholes FMH7022563 and FMH7022554 are only slightly surcharged and it is considered that the disruption involved in reconstructing these sewers and manholes is not justified. It is noted that the peak flow and downstream boundary conditions for the hydraulic assessment are quite conservative and any actual surcharging is likely to be minimal and very temporary.

2.5.6 The capacity assessment has also covered the existing Ø300mm sewer downstream from Manhole FMH7022552, i.e. the first sewer downstream of the connection between the local connection system serving the proposed development and the adjacent system serving adjacent catchment areas. The combined Peak Flow from the entire upstream catchment represents on 75.6% of the sewer capacity, so no adverse impacts are identified in the downstream system.

New connection from the proposed development to the existing sewer

2.5.7 In the previous SIA report, it was proposed to provide a new Terminal Manhole (TM) and connection to the existing manhole FMH7022566, and the Manhole FMH7022566 would be reconstructed to new levels so that the gradient of the sewer between FMH7022566 and FMH7022565 is increased to have sufficient capacity. However, in this current submission, the sewage from the proposed development is to be discharged to the manhole FMH7022565 via new 225mm diameter sewers. The new sewers will be constructed along the existing sewer from the new terminal manhole of the proposed development to the manhole FMH7022565, its alignment is shown in **Figure 5**. The design information of this new sewer is provided by the project Building Services Engineer, Meinhardt (M&E) Limited. According to design information in **Appendix C**, the capacity of this new sewer is 48.4litre/sec while the amount of sewage from the proposed development and the existing University Hall is 34.3litre/sec. Therefore, the new sewer would have sufficient capacity to cater for the proposed development.

2.5.8 The project proponent will be responsible for the construction of the new sewers. The new terminal manholes would be located at the area outside the existing drainage reserve. During the construction of the new terminal manhole and sewers, the existing sewers between FMH7022566 and FMH7022579 would be sealed.

3. CONCLUSION

3.1 Conclusion

3.1.1 Student accommodation and Staff Quarters are proposed at the proposed development within the Subject Site, together with various supporting and ancillary facilities.

3.1.2 Although the expected future peak flows would not result in water levels exceeding 1m freeboard and would not result in flooding under Peak Flow x 1.15 conditions, the existing reverse gradients would result in a maintenance liability and improvement works in terms of construction new sewers to connect the proposed development to further downstream manhole FMH7022565 have therefore been proposed to eliminate this problem.

3.1.3 The new sewers for the proposed development and the existing University Hall will be constructed by the project proponent.

3.1.4 This SIA confirms the feasibility of the proposed development in terms of Sewerage Impact.

Figures

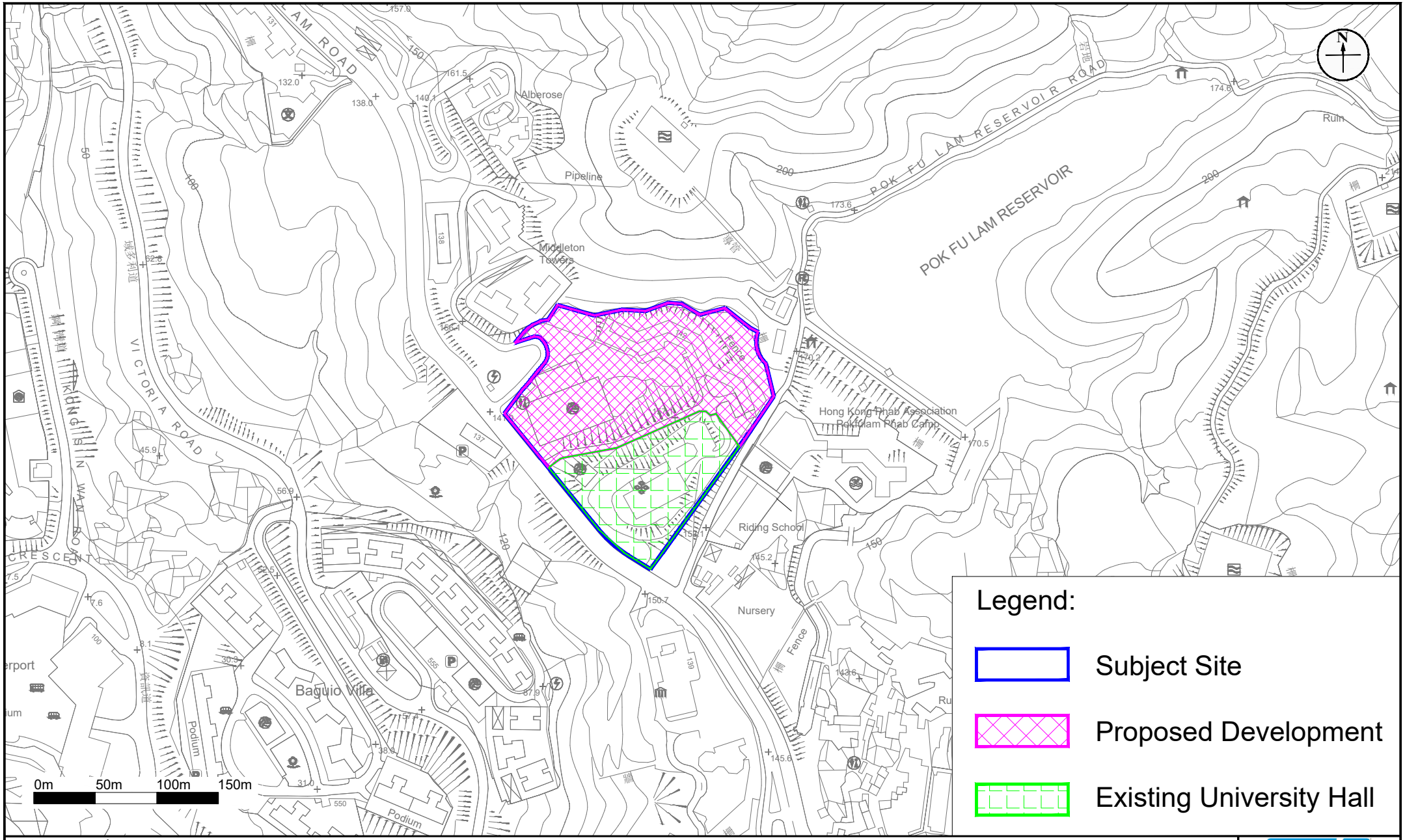

Figure: 1

Title: Location of the Subject Site and Its Environs

Project: Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road, Pok Fu Lam, R.B.L.No. 925

RAMBOLL

Drawn by:	KC
Checked by:	LC
Rev.:	1.0
Date:	Feb 2021

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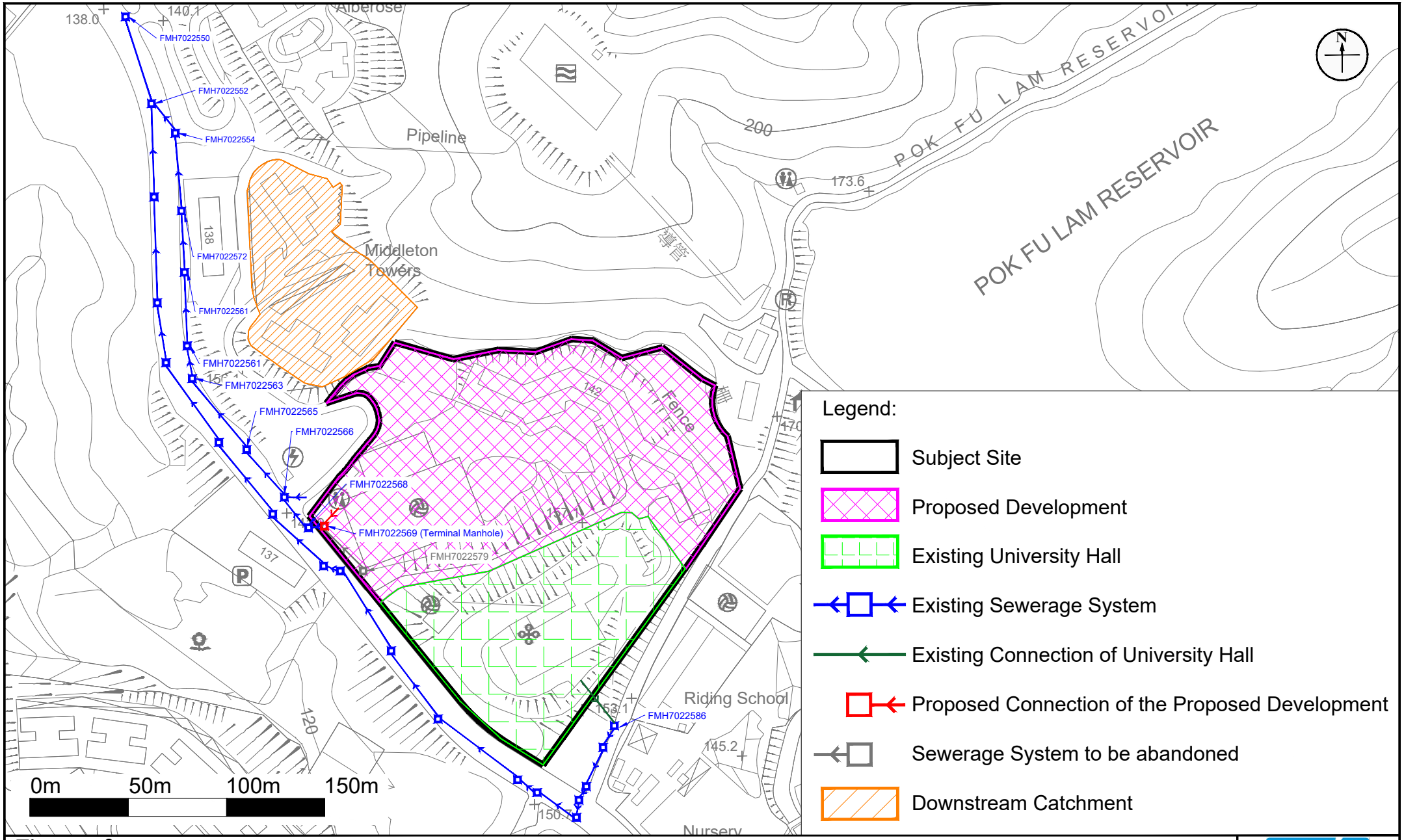

Figure: 2	RAMBOLL
Title: Catchment, Existing Sewerage System and Connection of the Proposed Development	Drawn by: KC Checked by: LC
Project: Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road, Pok Fu Lam, R.B.L.No. 925	Rev.: 4.0 Date: Apr 2023

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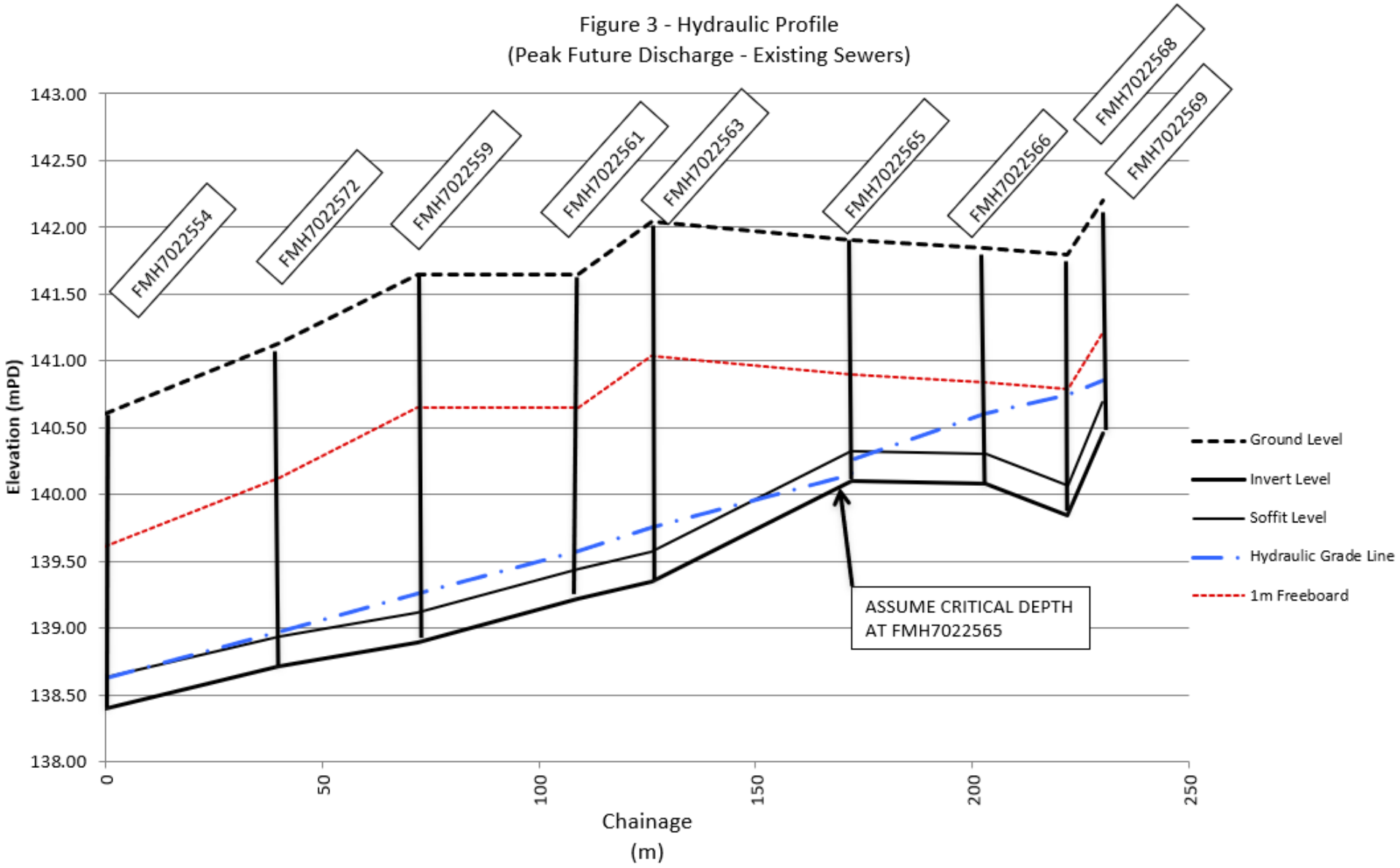

Figure: 3	RAMBOLL
Title: Hydraulic Profile (Peak Future Discharge)	Drawn by: KC
	Checked by: YH
Project: Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road, Pok Fu Lam, R.B.L. No. 925	Rev.: 4.0
	Date: Apr 2023

Figure 4 - Hydraulic Profile
(Peak Future Discharge x 1.15 - Existing Sewers)

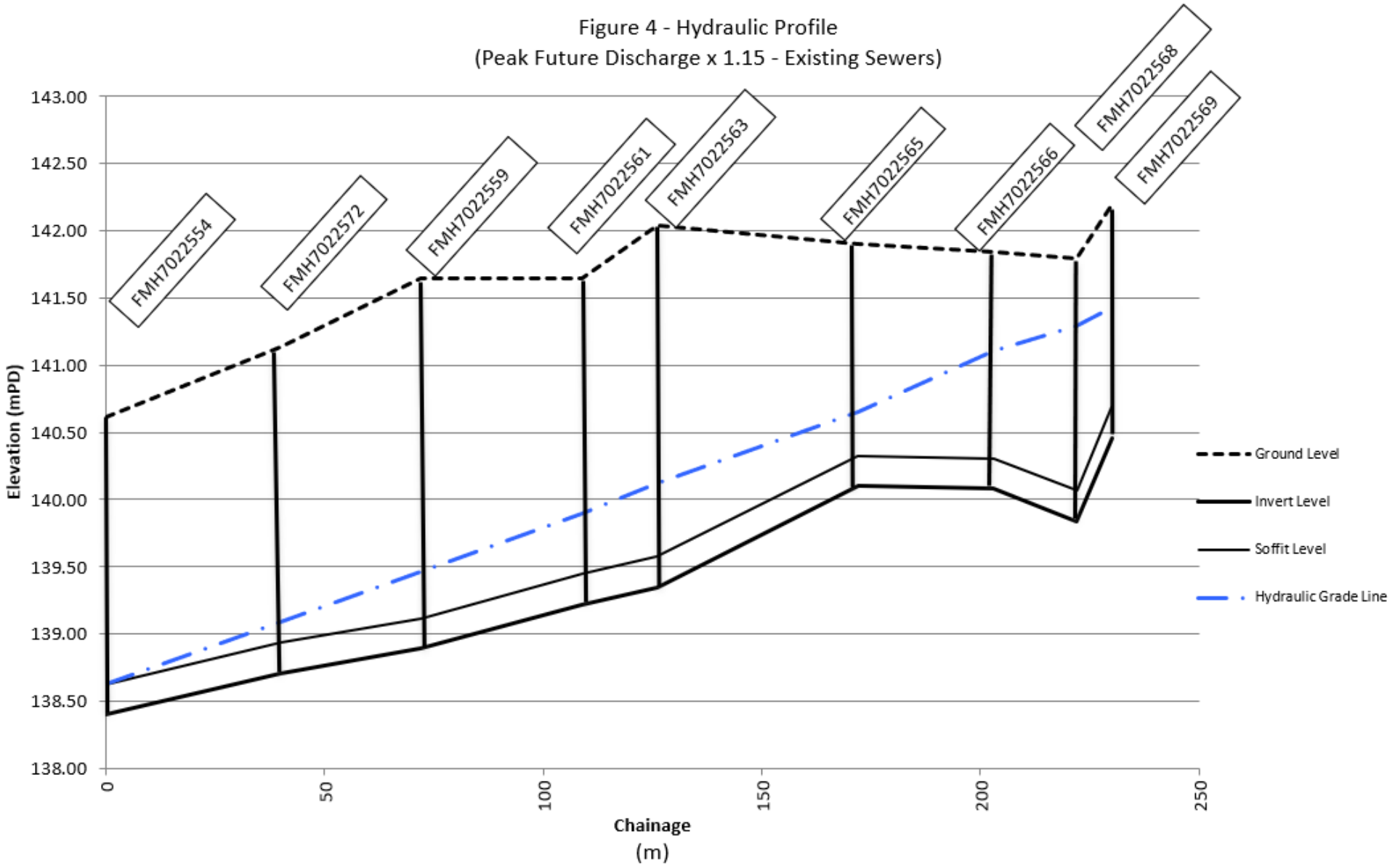

Figure: 4	RAMBOLL
Title: Hydraulic Profile (Peak Future Discharge x 1.15)	Drawn by: KC
	Checked by: YH
Project: Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road, Pok Fu Lam, R.B.L. No. 925	Rev.: 4.0
	Date: Apr 2023

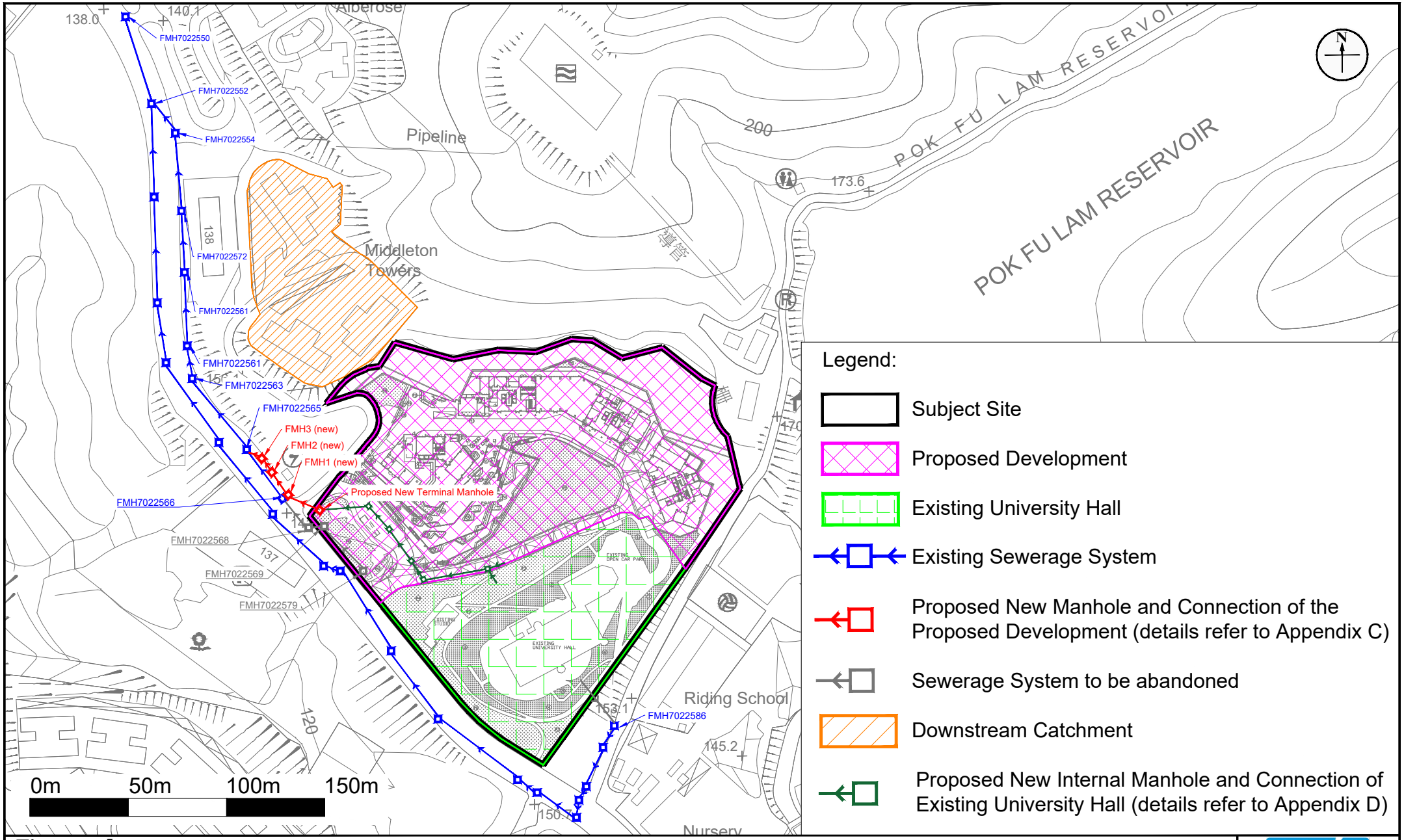

Figure: 5

Title: Proposed Improvement Works

Project: Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road, Pok Fu Lam, R.B.L.No. 925

RAMBOLL

Drawn by:	KW
Checked by:	TC
Rev.:	4.0
Date:	Apr 2023

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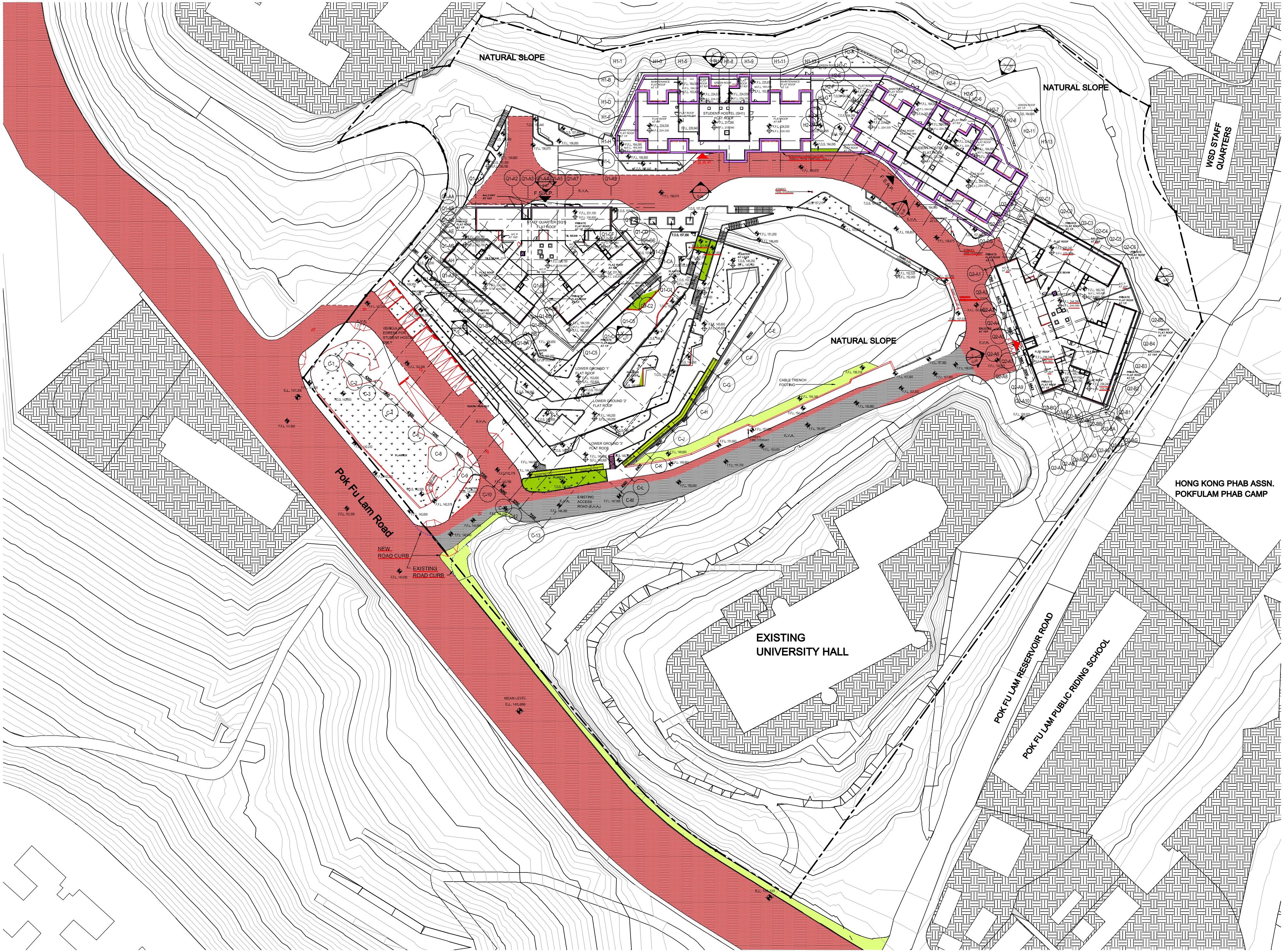
Appendix A Layout Plans Provided by ALKF



1 MASTER LAYOUT PLAN
1 : 300

B.D. REF NO. BD 2/2023/20
F.S.D. REF NO. FS 8/24668

AMENDMENT PLAN

Rev	Date	Description	Drawn	App.
C	22/08/2022	GENERAL REVISION		
B	20/04/2022	GENERAL REVISION		
A	06/12/2021	GENERAL REVISION		
-	23/02/2021	RE- SUBMISSION		
-	30/09/2020	FIRST SUBMISSION		

Architect

ANDREW LEE KING FUN & ASSOCIATES ARCHITECTS LTD

Job No. A-2009

Project: STUDENT RESIDENCES AND RESIDENTIAL DEVELOPMENT FOR THE UNIVERSITY OF HONG KONG AT 142 POK FU LAM ROAD, POK FU LAM, R.B.L. No. 925

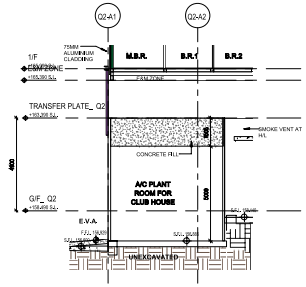
Drawing Title: MASTER LAYOUT PLAN (ROOF FLOOR)

	Name	Signed	Date
Drawn	-		22/08/2022
Check	SHIRLEY C.		22/08/2022
Approved	PM TANG		22/08/2022

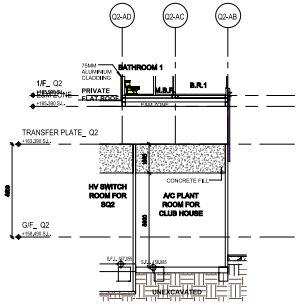
Scale 1 : 300@ A0

Drawing No. G-04

Revision C



5 SECTION A OF A/C PLANT ROOM FOR CLUB HOUSE AT G/F (SQ2)
1 : 100



6 SECTION B OF A/C PLANT ROOM FOR CLUB HOUSE AT G/F (SQ2)
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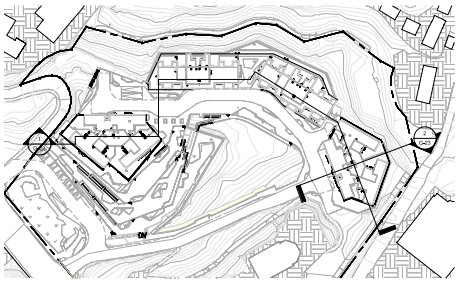

KEY PLAN
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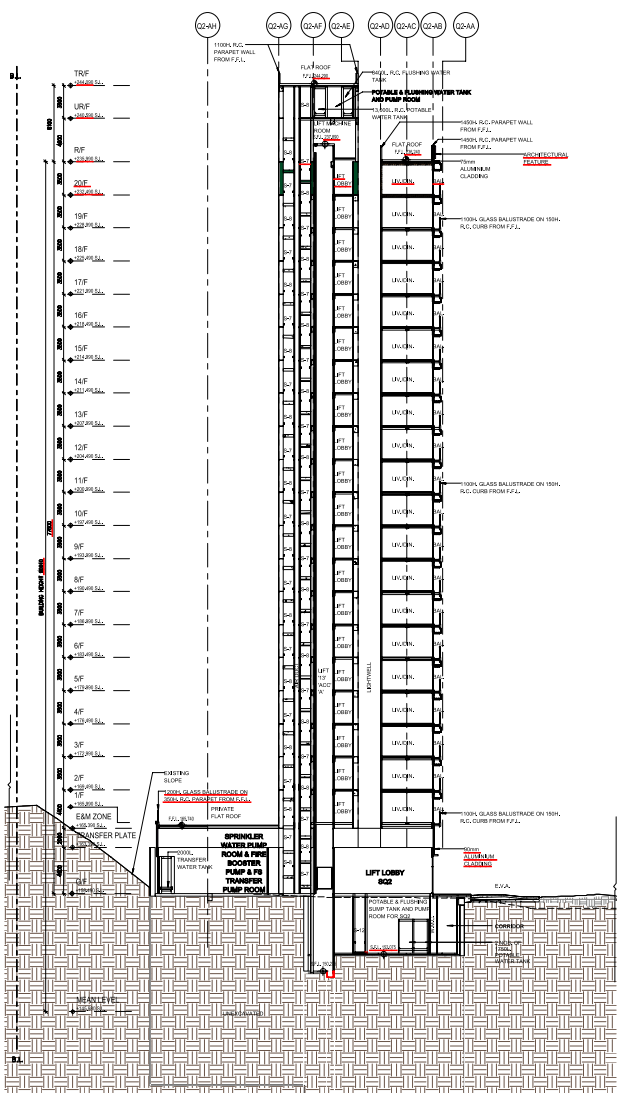
STUDENT HOSTEL 2

STAFF QUARTER 2

1 SECTION B-B(CONT)
1 : 200



2 SECTION C-C
1 : 200

AMENDMENT PLAN

No	Date	Description	Drawn	App.
G	22/08/2022	GENERAL REVISION		
F	08/04/2022	GENERAL REVISION		
E	06/12/2021	GENERAL REVISION		
D	25/05/2021	RE-SUBMISSION		
C	23/09/2019	FIRST SUBMISSION		

Architect

ANDREW LEE KING FUN & ASSOCIATES (ARCHITECTS) LTD

Job No. A-2009

Project
STUDENT RESIDENCES AND RESIDENTIAL DEVELOPMENT FOR THE UNIVERSITY OF HONG KONG AT 142 POK FU LAM ROAD, POK FU LAM, R.B.L. No. 925

Drawing Title
SECTION (2)

	Name	Signed	Date
Drawn	-		22/08/2022
Check	SHIRLEY G.		22/08/2022
Approved	PM TANG		22/08/2022

Scale As indicated@ A0

Drawing No. G-23

Revision C

Appendix B Detailed Sewerage Impact Assessment Calculations

C187 The University of Hong Kong Accommodation - High West
Table 1 - Populations and Sewage Flows

Sewage Flows

Refer EPD Guidelines for the Estimation of Sewage Flows for Sewage Infrastructure Planning

See Centadata and Property websites for data

Population	Category	Population	Unit Flow (m^3/h/d)	Daily Flow (m^3/d)	Remarks
The Site (Proposed Development)					
Student Hostels	Institutional	984	0.190	187.0	Population from Project Data
Staff Quarters 1 & 2	R2	819	0.270	221.1	273 Units x 3PPF
Student Canteen	J10	31	1.580	49.0	603m^2 x 19.6m^2 per Employee (CIFSUS Data)
Support Facilities, office and meeting rooms	J11	35	0.280	9.8	1041m^2 x 30.3m^2 per Employee (CIFSUS Data)
University Hall (Existing)					New internal sewers connection
Resident Students	Institutional	110	0.190	20.9	
Staff	J11	20	0.280	5.6	
Total				493.4	
Average Flow (l/s)				5.71	
Contributing Population			0.270	1,827	Population 1,000 - 5,000
Peaking Factor - Gravity (Including Stormwater Allowance)				6	GESF Table T-5
Peak Flow (l/s)				**34.3**	
Downstream Sewer					
Flow from the Site				493.4	
Middleton Towers					
Residents	R2	274	0.270	73.9	72 Units. Average occupancy 3.8 PPF (2016 By-Census)
Management Staff, etc. @ 5% of resident population	J11	14	0.280	3.8	
Total Flow				571.1	Inflow Factor = 1.00 (GESF Table T-4)
Average Flow (l/s)				6.61	
Contributing Population			0.270	2,115	Population 1,000 - 5,000
Peaking Factor - Gravity (Including Stormwater Allowance)				6	GESF Table T-5
Peak Flow (l/s)				**39.7**	
Flows to Adjacent 225mm-300mm Diameter Sewer System					Population Data mostly from previous SIA Report for the Project
Country Park Pok Fu Lam Management Centre	J11	5	0.280	1.4	
Staff Quarters of Water Supplies Department	Institutional	36	0.190	6.8	
Hong Kong Phab Association Pok Fu Lam Phab Camp					
Campers	Institutional	160	0.190	30.4	
Staff	J11	20	0.280	5.6	
Swimming Pool Backwash					Add to Peak Flow (below)
Pokfulam Public Riding School					
Public Users	Student	20	0.040	0.8	
Staff	J11	20	0.280	5.6	
University Hall (Existing)					The existing sewers connected to Manhole FMH7022586 will be abandoned
Resident Students	Institutional	0	0.190	0.0	
Staff	J11	0	0.280	0.0	
Pokfulam Transit Nursery	J7	20	0.080	1.6	
Bethanie					
Tour Guides	J11	5	0.280	1.4	
HKAPA Students	Student	100	0.040	4.0	
HKAPA Staff	J11	10	0.280	2.8	
Woodbury Court (137 Pokfulam Road)					30 Units from Centadata. Average occupancy 3.8 PPF (2016 By-census)
Residents	R2	114	0.270	30.8	
Management Staff, etc. @ 5% of resident population	J11	6	0.280	1.6	
Swimming Pool Backwash					Add to Peak Flow (below)
138 Pokfulam Road					
Residents	R3	11	0.370	4.2	3 Houses under development. Average occupancy 3.8 PPF (2016 By-census)
Flow from the Site and Middelton Towers				571.1	
Total Flow				668.1	Inflow Factor = 1.00 (GESF Table T-4)
Average Flow (l/s)				7.73	
Contributing Population			0.270	2,474	Population 1,000 - 5,000
Peaking Factor - Gravity (Including Stormwater Allowance)				6	GESF Table T-5
Peak Flow (l/s)				**46.4**	
Swimming Pool Backwash					
Pool at Pok Fu Lam PHAB Camp (l/s)				**18.2**	Measured 505m^2 pool, say 1.3m deep = 657m^3. With a 10-hour turnover, pump rate = 65.7m^3/hr = 18.2l/s
Pool at Woodbury Court (l/s)				**3.6**	Measured 100m^2 pool, say 1.3m deep = 130m^3. With a 10-hour turnover, pump rate = 13.0m^3/hr = 3.6l/s
Peak Flow including Swimming Pool Backwash (l/s)				**68.2**	

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Table 2 - Existing Sewerage Capacity

Refer LandsD GeoInfo Map

Check capacity of existing sewers from connection in Pokfulam Road

Roughness Factor, k_s = 3.0mm throughout (Assumed. All pipes are 225mm diameter, so very likely to be Clayware)

Manhole Ref.	CL (mPD)	IL (mPD)	Pipe No.	Distance (m)	Diameter (mm)	Gradient (1 in)	Capacity (m^3/s)	Future Peak Discharge (m^3/s)	Peak as % of Capacity Future (%)	Remarks
Existing Sewers in Pokfulam Road										
FMH7022579	141.87	140.40	-	29	225	-	-	-	-	Not in used, to be abandoned (information from GeoInfo Map)
FMH7022569	142.20	140.46								Existing Connection Point from the Site. Surveyed IL
		140.46	1	8	225	13	0.114	0.0343	**30.0**	
FMH7022568	141.79	139.84								Surveyed IL
		139.84	2	19	225	-79	0.004	0.0343	**860.8**	**Reverse gradient**. Shallow gradient assumed for calculation purposes
FMH7022566	141.84	140.08								Connection from Middleton Towers. Surveyed IL
		140.08	3	31	225	-1550	0.004	0.0397	**996.4**	**Reverse gradient**. Shallow gradient assumed for calculation purposes
FMH7022565	141.90	140.10								Surveyed IL
		140.10	4	46	225	64	0.051	0.0397	**77.5**	
FMH7022563	142.04	139.38								
		139.35	5	17	225	155	0.033	0.0397	**120.7**	**Under-capacity**
FMH7022561	141.65	139.24								
		139.22	6	37	225	132	0.036	0.0397	**111.6**	**Under-capacity**
FMH7022559	141.65	138.94								
		138.89	7	32	225	178	0.031	0.0397	**129.5**	**Under-capacity**
FMH7022572	-	138.71								
		138.71	8	40	225	129	0.036	0.0397	**110.3**	**Under-capacity**
FMH7022554	140.61	138.40								
		138.40	9	19	225	43	0.062	0.0397	**63.7**	
FMH7022552	139.76	137.96								Connection to 300mm diameter sewer and adjacent sewerage system
		137.96	10	47	300	96	0.090	0.0682	**75.6**	
FMH7022550	139.22	137.47								

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Table 3 - Sewerage Hydraulic Profile at Peak Flow

Refer LandsD GeoInfo Map

Check capacity of existing sewers from connection in Pokfulam Road

Roughness Factor, k_s = 3.0mm throughout (Assumed. All pipes are 225mm diameter, so assume Clayware)

Manhole Ref.	CL (mPD)	IL (mPD)	Pipe No.	Distance (m)	Diameter (mm)	Future Peak Discharge (m^3/s)	Water Level at Manhole (mPD)	Freeboard (m)	Remarks
Existing Sewers in Pokfulam Road									
FMH7022579	141.87	140.40	-	29	225	-	-	-	Not in used, to be abandoned (information from GeoInfo Map)
FMH7022569	142.20	140.46					**140.849**	**1.351**	Existing Connection Point from the Site. Surveyed IL
		140.46	1	8	225	0.0343			
FMH7022568	141.79	139.84					**140.742**	**1.048**	Surveyed IL
		139.84	2	19	225	0.0343			Reverse gradient.
FMH7022566	141.84	140.08					**140.603**	**1.237**	Connection from Middleton Towers. Surveyed IL
		140.08	3	31	225	0.0397			Reverse gradient.
FMH7022565	141.90	140.10					**140.151**	**1.749**	Surveyed IL
		140.10	4	46	225	0.0397			
FMH7022563	142.04	139.38					**139.750**	**2.290**	
		139.35	5	17	225	0.0397			
FMH7022561	141.65	139.24					**139.579**	**2.071**	
		139.22	6	37	225	0.0397			
FMH7022559	141.65	138.94					**139.256**	**2.394**	
		138.89	7	32	225	0.0397			
FMH7022572	*141.13*	138.71					**138.975**	**2.155**	
		138.71	8	40	225	0.0397			
FMH7022554	140.61	138.40					**138.625**	**1.985**	Assume Pipe-full conditions
		138.40							

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Table 4 - Sewerage Hydraulic Profile at Peak Flows x 1.15

Refer LandsD GeoInfo Map

Check capacity of existing sewers from connection in Pokfulam Road

Roughness Factor, k_s = 3.0mm throughout (Assumed. All pipes are 225mm diameter, so very likely to be Clayware)

Manhole Ref.	CL (mPD)	IL (mPD)	Pipe No.	Distance (m)	Diameter (mm)	Future Peak Discharge x 1.15 (m^3/s)	Water Level at Manhole (mPD)	Depth from Ground Level to Water Level (m)	Remarks
Existing Sewers in Pokfulam Road									
FMH7022579	141.87	140.40	-	29	225	-	-	-	Not in used, to be abandoned (information from GeoInfo Map)
FMH7022569	142.20	140.46 140.46					**141.432**	**0.768**	Existing Connection Point from the Site. Surveyed IL
			1	8	225	0.0394			
FMH7022568	141.79	139.84 139.84					**141.290**	**0.500**	Surveyed IL
			2	19	225	0.0394			Reverse gradient.
FMH7022566	141.84	140.08 140.08					**141.106**	**0.734**	Connection from Middleton Towers. Surveyed IL
			3	31	225	0.0457			Reverse gradient.
FMH7022565	141.90	140.10 140.10					**140.653**	**1.247**	Surveyed IL
			4	46	225	0.0457			
FMH7022563	142.04	139.38 139.35					**140.121**	**1.919**	
			5	17	225	0.0457			
FMH7022561	141.65	139.24 139.22					**139.894**	**1.756**	
			6	37	225	0.0457			
FMH7022559	141.65	138.94 138.89					**139.463**	**2.187**	
			7	32	225	0.0457			
FMH7022572	*141.13*	138.71 138.71					**139.090**	**2.040**	
			8	40	225	0.0457			
FMH7022554	140.61	138.40 138.40					**138.625**	**1.985**	

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Table 5 - Sewerage Capacity - Revised Arrangement with New Terminal Manhole

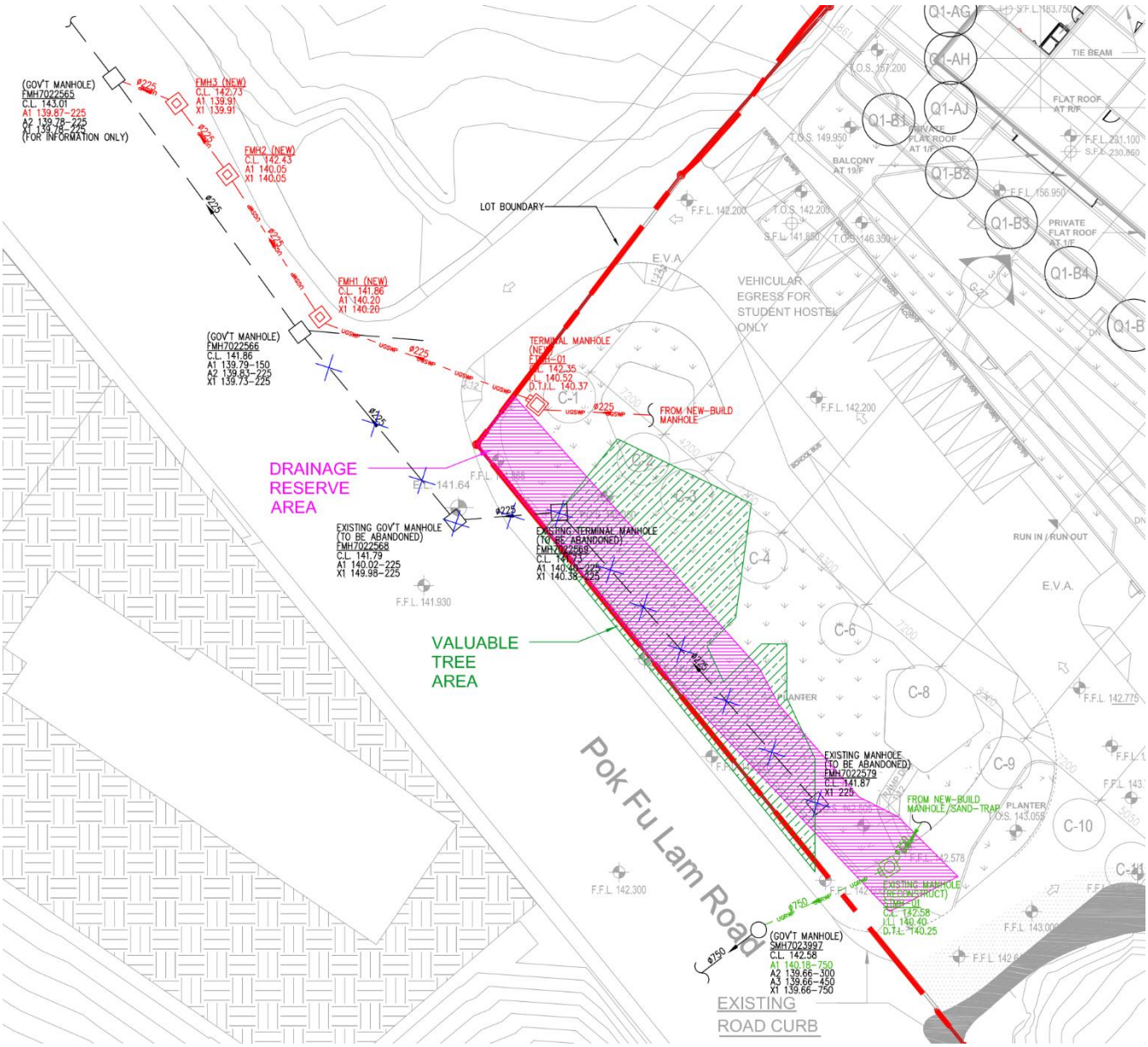
Refer LandsD GeoInfo Map

Check capacity of sewers from new connection in Pokfulam Road

Roughness Factor, k_s = 3.0mm throughout (Assumed. All pipes are 225mm diameter, so very likely to be Clayware)

Manhole Ref.	CL (mPD)	IL (mPD)	Pipe No.	Distance (m)	Diameter (mm)	Gradient (1 in)	Capacity (m^3/s)	Future Peak Discharge (m^3/s)	Peak as % of Capacity Future (%)	Remarks
Existing Sewers in Pokfulam Road										
FMH7022579			-							Not in used, to be abandoned
FMH7022569										Manhole to be abandoned
FWD7024627			1							Sewer to be abandoned
FMH7022568										Manhole to be abandoned
FWD7024626			2							Sewer to be abandoned
FMH7022565	141.90	139.87								**To be connected with the New Manholes and Sewers**
		139.87	4	46	225	94	0.042	0.0397	**94.0**	
FMH7022563	142.04	139.38								
		139.35	5	17	225	155	0.033	0.0397	**120.7**	**Minor Under-capacity**
FMH7022561	141.65	139.24								
		139.22	6	37	225	132	0.036	0.0397	**111.6**	**Minor Under-capacity**
FMH7022559	141.65	138.94								
		138.89	7	32	225	178	0.031	0.0397	**129.5**	**Minor Under-capacity**
FMH7022572	-	138.71								
		138.71	8	40	225	129	0.036	0.0397	**110.3**	**Minor Under-capacity**
FMH7022554	140.61	138.40								
		138.40	9	19	225	43	0.062	0.0397	**63.7**	
FMH7022552	139.76	137.96								Connection to 300mm diameter sewer and adjacent sewerage system
		137.96	10	47	300	96	0.090	0.0682	**75.6**	
FMH7022550	139.22	137.47								

Appendix C
New connection from the proposed development to the existing sewer



Foul Water Pipe Size of 225 mm diameter

By Manning Formula:

3/4 Full bore Area of flow, = 0.805 x A

= 0.805 x $1/4*3.14*(0.225)^2$

= 0.0320 m^2

3/4 Full bore velocity, $V = \frac{HMD^{2/3}s^{1/2}}{n}$ = 1.51357 m/s

D = 0.225 = Pipe Diameter in metre (m)

s = 1 : 100 = Gradient (slope)

n = 0.011 = Manning Friction Coefficient (Refer DSD Sewer Manual Part 1)

HMD = Hydraulic Mean Depth (m)

$= \frac{Af}{\text{Wetted perimeter}} = \frac{Af}{2.094 \times D} = \frac{0.0320}{0.47115} = 0.0679$

3/4 Full bore flowrate, Q_1 = V x A_f

= 1.514 x 0.0320

= 0.0484 m^3/s

= 48.4 l/s

Appendix D
New Internal Sewer Connection from the Existing University Hall (Extracted from University Hall Drainage Submission)

BD REFERENCE: 4/2001/22

NOTES:

1. THE BEND OF SOIL, WASTE AND RAIN WATER PIPE SHALL HAVE AN OBTUSE ANGLE AND HAVE LARGEST PRACTICAL RADIUS OF CURVATURE, AND NOT CHANGE IN ANY WAY CROSS SECTION OF THE PIPE AND TO PROVIDE WITH A CLEANING EYE AT SIDE OF THE BEND.
2. PRIOR TO SATISFACTORY TEST:
   A. NO PIPE SHALL BE PAINTED.
   B. NO UNDERGROUND PIPE SHALL BE SURROUNDED WITH CONCRETE.
3. ALL G.I. PIPES WHICH ARE BURIED UNDERGROUND OR COME INTO DIRECT CONTACT WITH CONCRETE SHALL BE WRAPPED W/HESSIAN AND COATED W/BITUMEN.
4. MINIMUM FALL OF PIPES:
   100mm AND BELOW FALL 1 : 40
   150mm FALL 1 : 70
   200mm TO 250mm FALL 1 : 100
5. ALL MANHOLE COVERS SHALL BE DOUBLE-SEALED CAST IRON AIRTIGHT TYPE.
6. ALL MANHOLE COVERS ON DRIVEWAY SHALL BE OF CAST IRON HEAVY DUTY COVER.
7. ALL DRAINAGE WORKS SHALL BE CONSTRUCTED TO CURRENT GOVERNMENT STANDARD.
8. THE JUNCTION OF BRANCH DRAIN TO ANOTHER DRAIN IN A MANHOLE SHALL BE NOT MORE THAN 60° IN THE DIRECTION OF FLOW & C/W PROPERLY MADE BEND CONSTRUCTED WITHIN THE BENCHING OF THE MANHOLE.
9. ALL EXISTING MANHOLE SHALL BE RETAINED W/ THE EXISTING OUTLET PIPE DIRECTION TO BE CHANGED AS SHOWN IN THE LAYOUT PLAN W/O CHANGING THE ORIGINAL INVERT LV. OF THE MANHOLE
10. ALL DISMANTLED DRAINAGE PIPE SHALL BE FULLY REMOVE FROM THE ROAD W/ THE MANHOLE OPENING TO BE FILLED W/ THE SAME MATERIAL OF THE MANHOLE STRUCTURE.

DRAWING LIST

DRG. No.	REV.	TITLE
ME2233-U-D0-01	S2	DRAINAGE SERVICES – LEGEND, ABBREVIATIONS, DRAWING LIST, GENERAL NOTES, PIPE MATERIAL SCHEDULE, MANHOLE SCHEDULE, INSTALLATION DETAIL AND BLOCK PLAN
ME2233-U-D1-01	S2	DRAINAGE SERVICES – SITE LAYOUT PLAN (SHEET 1 OF 2)
ME2233-U-D1-02	S2	DRAINAGE SERVICES – SITE LAYOUT PLAN (SHEET 2 OF 2)

PIPE MATERIAL SCHEDULE

TYPE OF PIPE	DIAMETER OF PIPE (mm)	MATERIAL OF PIPE
RAINWATER/ VENT/ WASTE/ SOIL/ KITCHEN WASTE/ SOIL AND WASTE PIPES (ABOVE & UNDERGROUND)	100 TO 225	. CAST IRON PIPES AND FITTINGS TO BS 437 WITH FLEXIBLE JOINT

GENERAL ABBREVIATION

S	SEWAGE / SOIL
MH	MANHOLE
DI	DUCTILE IRON
IL	INVERT LEVEL
CL	COVER LEVEL
FFL	FINISH FLOOR LEVEL
TSL	TOP OF SOIL LEVEL
SWP	SOIL & WASTE PIPE
M/L	MID LEVEL
L/L	LOW LEVEL
U/G	UNDERGROUND
H/L	HIGH LEVEL
BL	BOTTOM LEVEL
UC	U-CHANNEL
CP	CATCH PIT

LEGENDS

SOIL AND WASTE DRAINAGE WORKS TO BE DISMANTLE

FOUL WATER MANHOLE

PIPING

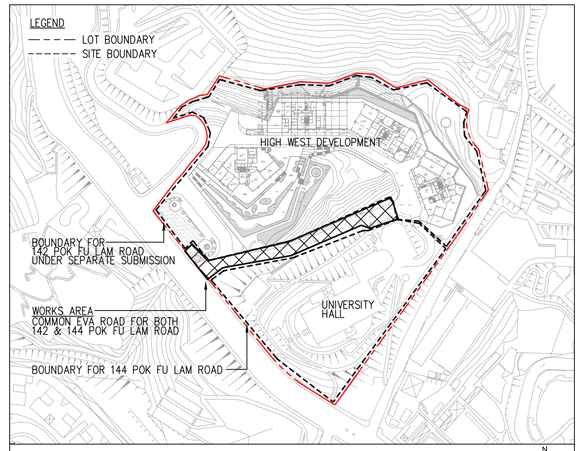
SOIL PIPE / SOIL & WASTE PIPE

UGSWP UGSWP — UNDERGROUND SOIL & WASTE PIPE

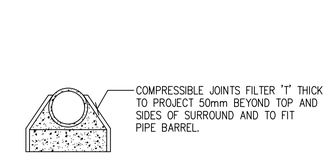
EX EX EX EX — EXISTING DRAINAGE SOIL AND WASTE PIPE

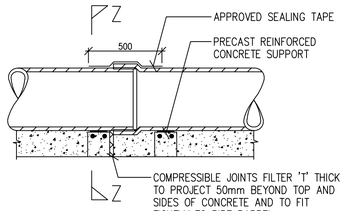
FOUL WATER MANHOLE SCHEDULE

LOACTION	MANHOLE NO.	TYPE	OUTLET PIPE DIA. (mm)	MANHOLE COVER		INVERT LEVEL (mPD)	DEPTH TO INVERT (m)	COVER LEVEL (mPD)	INTERNAL DIMENSION (mm)	
				MED./HEAVY DUTY	SINGLE/DOUBLE SEALED				LENGTH	WIDTH
SITE	F-02	C1	100	MED	DOUBLE	166.14	0.92	167.06	675	675
SITE	F-03	C1	100	MED	DOUBLE	160.08	1.92	162.00	1350	1350
~~SITE~~	~~F-04~~	~~C1~~	~~100~~	~~MED~~	~~DOUBLE~~	~~161.65~~	~~0.85~~	~~162.50~~	~~675~~	~~675~~
~~SITE~~	~~F-05~~	~~C1~~	~~100~~	~~MED~~	~~DOUBLE~~	~~157.49~~	~~0.78~~	~~158.27~~	~~675~~	~~675~~
~~SITE~~	~~F-06~~	~~E1~~	~~100~~	~~MED~~	~~DOUBLE~~	~~155.46~~	~~1.84~~	~~157.30~~	~~1350~~	~~950~~
SITE	F-12	C1	100	MED	DOUBLE	149.70	0.64	150.34	675	675
SITE	FMH-U01	D1	225	HEAVY	DOUBLE	148.90	1.10	150.00	875	875
SITE	FMH-U02	C1	225	HEAVY	DOUBLE	144.66	0.80	145.46	675	675
SITE	FMH-U03	C1	225	HEAVY	DOUBLE	142.82	0.80	143.62	675	675
SITE	FMH-U04	C1	225	HEAVY	DOUBLE	141.60	0.60	142.20	675	675
~~SITE~~	~~FMH-U05~~	~~E1~~	~~225~~	~~HEAVY~~	~~DOUBLE~~	~~144.15~~	~~2.20~~	~~146.35~~	~~1350~~	~~975~~
SITE	FMH-U06	C1	150	MED	DOUBLE	157.01	0.90	157.91	675	675



BLOCK PLAN – 1:2000

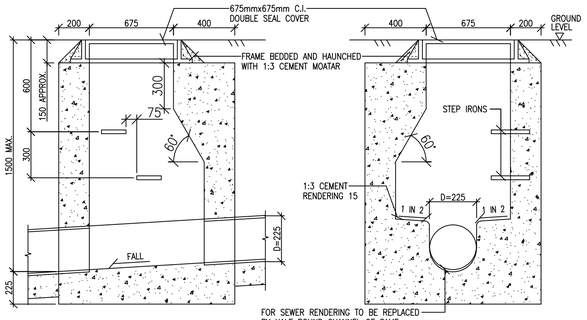




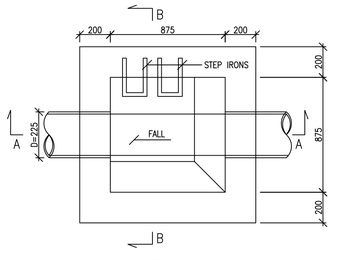
SECTION Z–Z

NOTES:
1) 20/40 GRADE CONCRETE TO BE USED.
2) 'T' DENOTES WALL THICKNESS OF PIPE.

CONCRETE SURROUNDED PIPE DETAIL



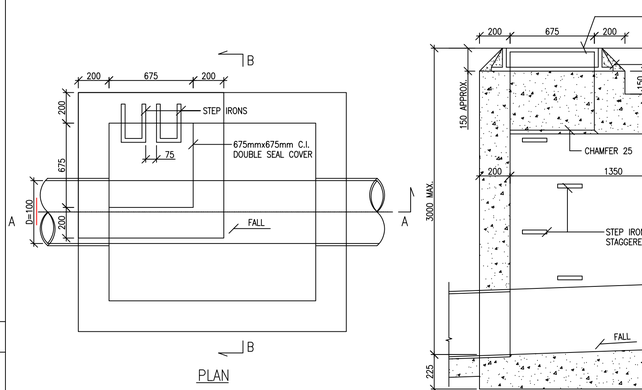
SECTION A–A SECTION B–B



NOTES :
PIPE DIAMETER : 225
NORMAL RANGE OF DEPTH : 1000 TO 1500mm (FROM ROAD LEVEL TO LOWEST INVERT)
USED IN : SEWER
JUNCTION : POSITION OF JUNCTION TO BE DETERMINED IN EACH INDIVIDUAL CASE. CHANNELS IMMEDIATELY UNDER ACCESS TO MANHOLE SHOULD BE AVOIDED.
FOUNDATION : FOUNDATION OF MANHOLE VARIES WITH SITE CONDITION. THEREFORE, IT SHOULD BE DETERMINED ON SITE BY THE ENGINEER.
CONCRETE : GRADE 30D

NB: R.C. REINFORCEMENT TO BE SUBMITTED BY SEPARATE SUBMISSION

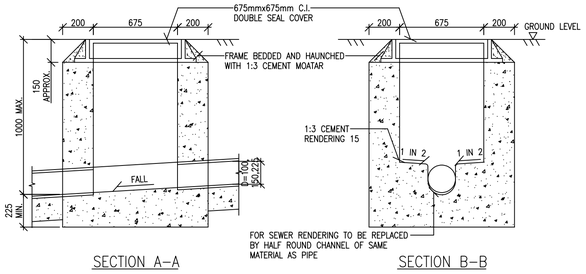
MANHOLE TYPE D1 (1000mm < DEPTH < 1500mm)



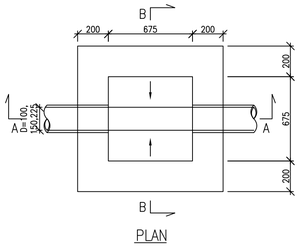
NOTES :
PIPE DIAMETER : 100
NORMAL RANGE OF DEPTH : 1500 TO 3000mm (MEASURED FROM ROAD LEVEL TO LOWEST INVERT)
USED IN : SEWER
JUNCTION : POSITION OF JUNCTION TO BE DETERMINED IN EACH INDIVIDUAL CASE. CHANNELS IMMEDIATELY UNDER ACCESS TO MANHOLE SHOULD BE AVOIDED.
FOUNDATION : FOUNDATION OF MANHOLE VARIES WITH SITE CONDITION. THEREFORE, IT SHOULD BE DETERMINED ON SITE BY THE ENGINEER.
CONCRETE : GRADE 30D

NB: R.C. REINFORCEMENT TO BE SUBMITTED BY SEPARATE SUBMISSION

MANHOLE TYPE E1 (1500mm < DEPTH < 3000mm)



SECTION A–A SECTION B–B



NOTES :
PIPE DIAMETER : 100,150,225
NORMAL RANGE OF DEPTH : MAX. 1000mm (FROM ROAD LEVEL TO LOWEST INVERT)
USED IN : SEWER
JUNCTION : POSITION OF JUNCTION TO BE DETERMINED IN EACH INDIVIDUAL CASE. CHANNELS IMMEDIATELY UNDER ACCESS TO MANHOLE SHOULD BE AVOIDED.
FOUNDATION : FOUNDATION OF MANHOLE VARIES WITH SITE CONDITION. THEREFORE, IT SHOULD BE DETERMINED ON SITE BY THE ENGINEER.
CONCRETE : GRADE 30D

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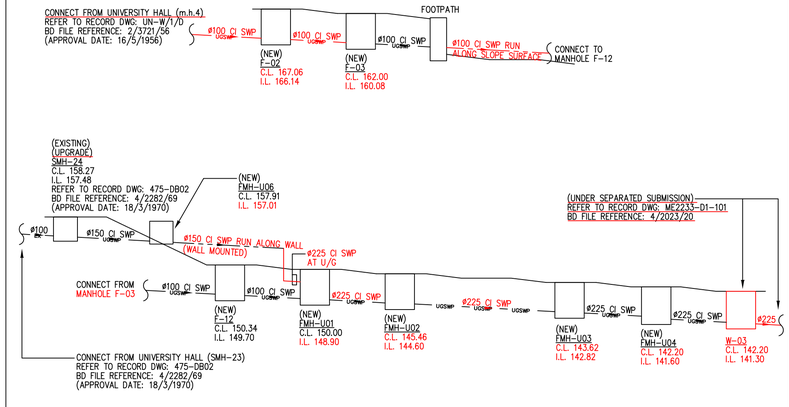
MANHOLE TYPE C1 (DEPTH ⩽ 1000mm)



SCHEMATIC FOR MANHOLE CONNECTION

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PROJECT
DRAINAGE WORKS OF UNIVERSITY HALL
FOR THE UNIVERSITY OF HONG KONG
AT 144 POK FU LAM ROAD, PO FU LAM, R.B.L. NO.1192

TITLE
DRAINAGE SERVICE –
LEGEND, ABBREVIATIONS, DRAWING LIST, GENERAL NOTES, PIPE MATERIAL SCHEDULE, MANHOLE SCHEDULE, INSTALLATION DETAILS AND BLOCK PLAN

	NAME	INITIAL	DATE
DESIGNED BY	S.C		04/23
DRAWN BY	S.C		04/23
CHECKED BY	G.L		04/23
APPROVED BY	T.K. CHAN		04/23

NORTH

DRAWING NO. ME2233-U-D0-01 DATE 04/23 REV. S2
CAD REFERENCE SCALE N.T.S @A1
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BD REFERENCE: 4/2001/22

F.F.L. 145.800
S.F.L. 145.600

S. 146.400

C-E

C-F

C-G

C-H

EX. ø225 SWP (DISMANTLED)

MATCH LINE A-A

CONTINUE TO PART PLAN 01

CONNECT TO EXISTING WASTE WATER NETWORK (SMH-28)
REFER TO RECORD DWG: 475-DB02
BD FILE REFERENCE: 4/2282/69
(APPROVAL DATE: 18/3/1970)

NATURAL SLOPE

CABLE TRENCH
FOOTING

ELEVATION D-D

ø150 CI SWP RUN ALONG WALL
(WALL MOUNTED)

C.E.

F.F.L. 154.187

F.F.L. 154.487

F.F.L. 154.447

F.F.L. 153.027

F.F.L. 151.764

F.F.L. 153.033

F.F.L. 151.776

REFER TO DRAWING NO. ME2233-U-D1-02

STREET
FIRE HYDRANT

E.V.A.

CONTINUE TO PART PLAN 01

EX. ø225 SWP (DISMANTLED)

(EXISTING) (DISMANTLED)
SMH 25
C.L. 157.00
I.L. 155.45
REFER TO RECORD DWG: 475-DB02
BD FILE REFERENCE: 4/2282/69
(APPROVAL DATE: 18/3/1970)

MATCH LINE B-B

MATCH LINE E-E

CONTINUE TO PART PLAN 01

EX. ø100 SWP (DISMANTLED)

ø150 SWP AT U/G TO MANHOLE

ø150 CI SWP (WALL MOUNTED)

(NEW)
FMH-U06
C.L. 157.91
I.L. 157.01

F.F.L. 156.318

F.F.L. 157.083

CONNECT TO CP39

CONNECT TO CP29

F.F.L. 158.500

F.F.L. 157.393

F.F.L. 157.900

(EXISTING)
(UPGRADE)
SMH 24
C.L. 158.274
I.L. 157.025
REFER TO RECORD DWG: 475-DB02
BD FILE REFERENCE: 4/2282/69
(APPROVAL DATE: 18/3/1970)

P-375 UC

ø150 CI SWP AT U/G

P-450 UC

CONNECT TO CP30

F.F.L. 157.400

CP29A
CL:+157.72
IL:+156.27

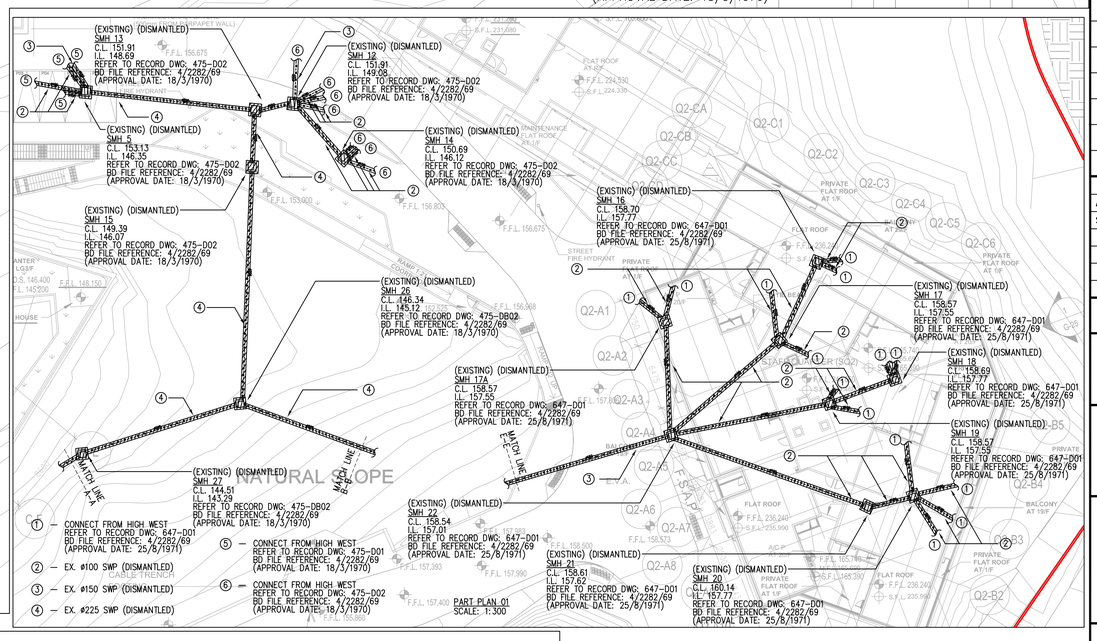
F.F.L. 155.860

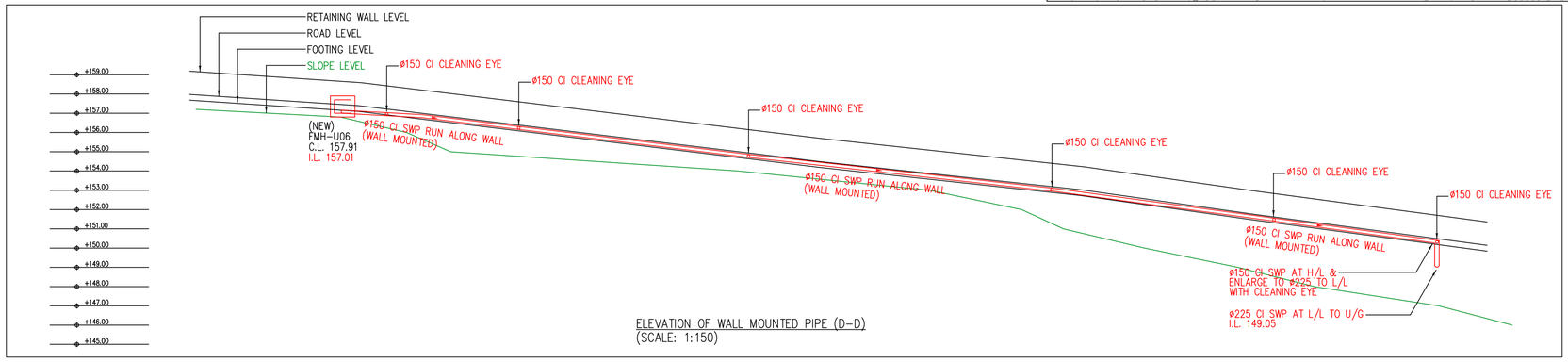
ALL CHANNEL & CP ARE
FOR INFORMATION ONLY
REFER TO RECORD DWG: SF-05
BD FILE REFERENCE: 6/2023/60
(APPROVAL DATE: 6/8/2021)

CP40
CL:+155.05
IL:+152.84

CONNECT TO CP41

CONNECT FROM UNIVERSITY HALL (SMH 23)
REFER TO RECORD DWG: 475-DB02
BD FILE REFERENCE: 4/2282/69
(APPROVAL DATE: 18/3/1970)





ELEVATION OF WALL MOUNTED PIPE (D-D)
(SCALE: 1:150)

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Telephone: 2858 0738
2859 0100
Facsimile: 2559 1613

PROJECT
DRAINAGE WORKS OF UNIVERSITY HALL
FOR THE UNIVERSITY OF HONG KONG
AT 144 POK FU LAM ROAD, PO FU LAM, R.B.L. NO.1192

TITLE
DRAINAGE SERVICE –
SITE LAYOUT PLAN (SHEET 1 OF 2)

	NAME	INITIAL	DATE
DESIGNED BY	S.C		04/23
DRAWN BY	S.C		04/23
CHECKED BY	G.L		04/23
APPROVED BY	T.K. CHAN		04/23

NORTH

DRAWING NO.	DATE	REV.
ME2233-U-D1-01	04/23	S2
CAD REFERENCE	SCALE 1:100 @A1	
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BD REFERENCE: 4/2001/22

ø100 CI SWP AT SLOPE SURFACE TO U/G

MATCH LINE C-C

ø100 CI SWP RUN ALONG SLOPE SURFACE

ø100 CI SWP U/G TO SLOPE SURFACE

(NEW) F-03 C.L. 162.00 I.L. 160.08

ø100 CI SWP AT U/G

(NEW) F-02 C.L. 167.06 I.L. 166.14

ø100 CI SWP AT U/G

(EXISTING) m.h.4 C.L. 167.29 I.L. 166.57 REFER TO RECORD DWG: UN-W/1/D BD FILE REFERENCE: 2/3721/56 (APPROVAL DATE: 16/5/1956)

PART PLAN 02
SCALE: 1:100

(UNDER SEPARATED SUBMISSION) REFER TO RECORD DWG: ME2233-D1-101 BD FILE REFERENCE: 4/2023/20 W-03 C.L. 142.20 I.L. 141.30

ø225 ø100

ø225 CI SWP AT U/G

F.F.L. 142.200

SCHOOL BUS

F.F.L. 142.350

RUN IN / RUN OUT

(NEW) FMH-U04 C.L. 142.20 I.L. 141.60

ø225 CI SWP AT U/G

T.O.S. 150.000

T.O.S. 153.600
S.F.L. 152.400

RAMP DN 1:12

LOWER GROUND '2'
FLAT ROOF
F.F.L. 149.400
S.F.L. 149.200

(EXISTING) (DISMANTLED) SMH 28 C.L. 143.90 I.L. 142.07 REFER TO RECORD DWG: 475-DB02 BD FILE REFERENCE: 4/2282/69 (APPROVAL DATE: 18/3/1970)

EX. ø225 SWP (DISMANTLED)

CONNECT TO EXISTING WASTE WATER NETWORK REFER TO RECORD DWG: 475-DB03 BD FILE REFERENCE: 4/2282/69 (APPROVAL DATE: 18/3/1970)

E.V.A.

STREET FIRE HYDRANT

T.O.S. 146.400

S-16 UP

LOWER GROUND '3'
FLAT ROOF
F.F.L. 145.800
S.F.L. 145.600

F.F.L. 143.438

T.O.S. 143.988
S-17 DN

RAMP DN 1:12

F.F.L. 148.219
F.F.L. 148.140

PLANTER

T.O.S. 145.045

ELEVATION D-D

ø150 CI SWP (WALL MOUNTED)

ø150 CI SWP AT H/L & ENLARGE TO ø225 TO L/L WITH CLEANING EYE

REFER TO DRAWING NO. ME2233-U-D1-01

ø225 CI SWP AT U/G

CONNECT TO CP31A

(NEW) FMH-U01 C.L. 150.00 I.L. 148.90

ø225 CI SWP AT U/G

ø100 CI SWP AT U/G

(NEW) F-12 C.L. 150.34 I.L. 148.70

MATCH LINE C-C

ø100 CI SWP AT SLOPE SURFACE TO U/G

CONTINUE TO PART PLAN 02

ALL CHANNEL & CP ARE FOR INFORMATION ONLY REFER TO RECORD DWG: SF-05 BD FILE REFERENCE: 6/2023/60 (APPROVAL DATE: 6/8/2023)

ACCESS ROAD (E.V.A.)

F.F.L. 148.295

P=450 UC

CP32 CL:+146.87 IL:+144.57

(NEW) FMH-U02 C.L. 145.46 I.L. 144.66

ø225 CI SWP AT U/G

CONNECT TO CP33

F.F.L. 146.080

F.F.L. 142.350

F.F.L. 142.200

F.F.L. 142.900

F.F.L. 143.200

F.F.L. 143.394

(NEW) FMH-U03 C.L. 143.62 I.L. 142.82

F.F.L. 143.768

F.F.L. 142.350

(EXISTING) SMH 29 C.L. 141.79 I.L. 140.65 REFER TO RECORD DWG: 475-DB03 BD FILE REFERENCE: 4/2282/69 (APPROVAL DATE: 18/3/1970)

T.O.S. 142.505

F.F.L. 142.578

F.F.L. 142.600

F.F.L. 144.200

F.F.L. 143.000

PLANTER

T.O.S. 143.055

C-6 C-8 C-9 C-10 C-11 C-12 C-L C-M C-J C-K

8300 7200 8300 7200 5050 3250 7200 6900 4000 8600

1:12

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CONSULTANT
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Telephone: 2858 0738 2859 0100
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PROJECT
DRAINAGE WORKS OF UNIVERSITY HALL
FOR THE UNIVERSITY OF HONG KONG
AT 144 POK FU LAM ROAD, PO FU LAM, R.B.L. NO.1192

TITLE
DRAINAGE SERVICE –
SITE LAYOUT PLAN (SHEET 2 OF 2)

	NAME	INITIAL	DATE
DESIGNED BY	S.C		04/23
DRAWN BY	S.C		04/23
CHECKED BY	G.L		04/23
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Prepared by

Ramboll Hong Kong Limited

PROPOSED RESIDENTIAL INSTITUTION (STUDENT HOSTEL) AT MIDDLETON TOWERS, 140 POK FU LAM ROAD

DRAINAGE AND SEWERAGE IMPACT ASSESSMENT

Appendix IV

Drainage and Sewerage Impact Assessment

RESRESIDENTIAL

Date	July 2026
Prepared by	Sally Chiu Assistant Environmental Consultant
Signed	
Approved by	Tony Cheng Senior Manager
Signed	
Project Reference	AECHUMT_EI00
Document No.	R10049_v1.2

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CHAPTERS

TABLES

FIGURES

APPENDICES

Appendix 2.2 Detailed Sewerage Impact Assessment Calculations_ Existing Development

1. INTRODUCTION

1.1 Project Background

1.1.1 The Subject Site is mainly zoned as “Residential (Group C)” (“R(C)”) with minor portion zoned as “Green Belt” (“GB”) under the Approved Pok Fu Lam Outline Zoning Plan (OZP) (No. S/H10/23). It is generally surrounded by University Hall to the Southeast, Woodbury Court to the southwest, and Alberose to the northwest.

1.1.2 Figure 1.1 shows the location of the Subject Site and its environment.

1.1.3 Ramboll Hong Kong Limited has been appointed to conduct the sewerage impact assessment for the Subject Site.

1.2 Proposed use

1.2.1 It consists of student hostel. Development Parameters for the Proposed use is summarised in Table 1.1.

Table 1.1 Development Parameters of the Proposed use

	Parameters
Site Area (m^2)	About 8,900
No. of Student Hostel (Rooms)	900

1.2.2 The typical floor plans of the planning statement of the Proposed use are shown in Appendix 1.1.

1.2.3 The tentative completion year for the Proposed use is 2028.

1.3 Sewerage Impact

1.3.1 The potential sewerage impact arising from the operation phase should be assessed and mitigated to fulfil the requirements under the relevant legislations and guidelines. The details will be discussed in Section2.

1.4 Drainage Impact

1.4.1 The potential drainage impact arising from the operation phase should be assessed and mitigated to fulfil the requirements under the relevant legislations and guidelines. The details will be discussed in Section 3.

2. SEWERAGE IMPACT ASSESSMENT

2.1 Scope of Work

2.1.1 The aim of this study is to compare the sewage flow generated from the Subject Site with the sewage flow from the existing usage, and to determine whether adverse sewerage impact is anticipated.

2.2 Assessment Criteria and Methodology

2.2.1 According to the Drainage Record obtained from the Geoinfo map and the approved SIA report of Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road prepared by Ramboll (Report No. R7842_v4.0), there is public sewer network serving the Subject Site and the surrounding environment. Figure 2.1 shows the location of the sewer sections concerned.

2.2.2 The Environmental Protection Department's (EPD's) Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, Version 1 (GESF) is referred to estimate the quantity of the sewage generated from the Subject Site and the existing development. Sewage flow parameters and global peaking factors in this document are adopted.

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

2.2.4 In order to represent worst-case scenario, the sewerage impact assessment was conducted based on the assumption that all phases of the Subject Site have been completed.

2.2.5 Based on the designed use, the sewage flow from the proposed hostel development is determined and compared with the capacity of the existing sewerage system in order to investigate the necessity of sewerage system upgrading work.

2.3 Sewerage System

2.3.1 With reference to the approved SIA report of Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road prepared by Ramboll (Report No. R7842_v4.0) and the sewerage system shown in Geoinfo Map, the sewage generated from the Proposed use will be discharged to the manhole FMH1.

2.3.2 The sewerage system is shown in Figure 2.1.

2.4 Wastewater Generated by the Existing Use and the Proposed Development

2.4.1 The sewage generated by the Existing use is given in Table 2.1 shown below. Detailed Calculation refers to Appendix 2.2.

Table 2.1 Estimated Peak Flow Generated by Existing Use

Calculation for Sewage Generation Rate of the Existing Development				
1a. Staff Quarters				
Number of residents	=	274	people	
Unit Flow Factors	=	0.27	m^3/day	(R2 in Table T-1 of GESF)
Sewage generation rate	=	74.0	m^3/day	
Total Flow from Existing Development				
Total ADWF in Catchment A1	=	74.0	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		(Refer to Table T-4 of GESF - Sandy Bay)
Total ADWF with Catchment Inflow Factor PCIF	=	74.0	m^3/day	

Contributing Population	=	274	people	(Refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees) (Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance)
Peaking factor	=	8		
Peak Flow	=	6.9	L/s	

2.4.2 The sewage generated by the Proposed use is given in Table 2.2 shown below. Detailed Calculation refers to Appendix 2.1.

Table 2.2 Estimated Peak Flow from Proposed Use

Calculation for Sewage Generation Rate of the Proposed use				
1a. Dormitory for Student and staff				
Number of residents	=	900	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	171	m^3/day	
Total Flow from Proposed Development				
Total ADWF in Catchment A1	=	171.0	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		(Refer to Table T-4 of GESF - Sandy Bay)
Total ADWF with Catchment Inflow Factor PCIF	=	171.0	m^3/day	
Contributing Population	=	633	people	(Refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees) (Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance)
Peaking factor	=	8		
Peak Flow	=	15.8	L/s	

2.4.3 For the Proposed Development, the total number of residents will increase from 274 to 900, leading to an increase in sewage discharge of approximately 97.0m^3/day. The hydraulic capacity of the affected existing and future sewerage system, including the contribution from the Application Site, has been estimated and is shown in Appendix 2.1 for reference.

2.5 Assessment of Sewerage Impact

2.5.1 With reference to the approved SIA report for the Student Residences and Residential Development for the University of Hong Kong at 142 Pok Fu Lam Road, terminal manholes FMH1, FMH2, and FMH3 were constructed under that project and ultimately connect to public manhole FMH7022565 along Pok Fu Lam Road. Consequently, sewage generated from the Proposed Development will discharge from the site's manhole (FMH7002765) into these established terminal manholes.

2.5.2 The invert levels and pipe sizes of the terminal manholes and sewers are shown in Figure 2.1.

2.5.3 Detailed calculation is presented in Appendix 2.1 as follows:

- Table 1: Calculation for Sewage Generation Rate of the Proposed Development
- Tables 2- 12: Estimated Sewage Flow for Catchment Areas
- Tables 13: Estimated Sewage Flow from Swimming Pool
- Table 14: Hydraulic Capacity of Existing Sewers
- Table 15: Summary of Sewage Flow from Proposed Development and Catchment Areas
- Table 16a: Hydraulic Capacity of the Sewerage System (FMH7022565 to FMH7020223) with Estimated Sewage Flow – Scenario 1
- Table 17a- b: Hydraulic Capacity of the Sewerage System (FMH7022550 to FMH7020223) under Surcharged Condition – Scenario 2

2.5.4 Based on the calculations in Table 15 of Appendix 2.1, it is found that the existing sewerage system could be under-capacity in certain segments (S4-S9, and S11-S17). The backwater profile of the concerned sewers under surcharge condition is included as part of the Sewerage Calculations. Details are discussed in Section 2.6 below.

2.5.5 Detailed calculation is presented in Appendix 2.2 as follows:

- Table 1:Calculation for Sewage Generation Rate of the Existing Development

2.6 Backwater Profile and Conclusions

2.6.1 Further calculations under surcharge condition are conducted. By comparing the cover levels and foul water levels at the concerned manholes, the freeboards are >1m under surcharge conditions and >0m under surcharge condition with 1.15 safety factor.

2.6.2 Regarding the Scenario 1 calculations in Table 16a of Appendix 2.1, the results show that the hydraulic water level is lower than the invert levels of the sewerage pipes across segments S11 to S32 (i.e., FMH7022550 to FMH7020222) due to the significant changes in invert levels. This drop also causes a larger variance in the freeboard calculation when the foul water level at FMH7020222 is assumed to be:117.41 (IL) + 300 (pipe dia.)/1000 = 117.71mPD. Consequently, the Scenario 2 calculations in Table 17a of Appendix 2.1 were performed based on the assumption that the upstream water levels are equal to the upstream pipe invert levels.

2.6.3 The results of the backwater profile for Peak Flow conditions are set out in Table 17a of Appendix 2.1. At all manholes, the freeboard between cover/ground level and the expected water level is greater than 1.72m at segments S4-S9, and 1.05m at segments S12-S18, i.e. substantially more than the minimum requirement of 1m.

2.6.4 The results of the backwater profile for Peak Flow x 1.15 conditions are set out in Table 17b of Appendix 2.1. It is evident that, even with the 1.15 safety factor, there would still be substantial freeboard (minimum freeboard of 1.05m for segments S4-S9, and 0.89m for segments S12-S18), so there would be no risk of overflow under the Peak Flow x 1.15 conditions. (i.e., freeboard≥ 0m)

2.6.5 The proposed development intends to be an interim stage under the overall planning by the University to achieve soonest provision of student hostel supply, and further redevelopment is already under planning by the University as the building has already reached 60 years of age.

2.6.6 The applicant commits to further liaise with DSD and submit a revised SIA based on the finalized design of the Middleton Development at redevelopment stage. Should upgrading of underground sewers from manholes FMH7022565 to FMH7022552 (i.e., S4- S10) be identified as necessary based on the revised SIA at the redevelopment stage, the applicant will consider to undertake the necessary upgrading works if entrusted by the Authority.

3. DRAINAGE IMPACT ASSESSMENT

3.1 Discussion

3.1.1 Surface runoff is mainly from rainfall and it will be directed to existing public storm drains. As the existing site is currently on hard-paved ground, it is anticipated that the proposed development will not affect the drainage path or lead to any changes in the runoff behaviour.

3.1.2 There is no change or abandonment of existing drains and hence no extra stormwater discharge is imposed. Therefore, adverse impact on the existing drainage system is not anticipated and a detailed drainage impact assessment is therefore unnecessary.

3.1.3 An existing stormwater manhole (SLH7017621) is located within the Subject Site and serves the existing building. There will be no changes to its current configuration under the Proposed Development. The surrounding existing stormwater network is illustrated in Figure 3.1, and the location of the drainage reserve area is shown in Figure 3.2.

4. CONCLUSION

4.1.1 The Subject Site is mainly zoned as “R(C)” with minor portion zoned as “GB” on the Approved Pok Fu Lam Outline Zoning Plan (OZP) (No. S/H10/23).

4.1.2 The Proposed use consists of student hostel. The estimated sewage generation rate of the Proposed use has been quantitatively addressed.

4.1.3 The estimated peak sewage generation from the Proposed use is about 15.8 litre/sec.

4.1.4 Based on the calculations in Appendix 2.1, for the backwater profile under peak flow conditions (including a 1.15 safety factor), the freeboard between the cover/ground level and the hydraulic grade line (HGL) at all manholes is greater than 1.05m for segments S4-S9, and 0.89m for segments S12-S18. This is substantially more than the minimum DSD requirement of ≥0m.

4.1.5 The proposed development intends to be an interim stage under the overall planning by the University to achieve soonest provision of student hostel supply, and further redevelopment is already under planning by the University as the building has already reached 60 years of age.

4.1.6 The applicant commits to further liaise with DSD and submit a revised SIA based on the finalized design of the Middleton Development at redevelopment stage. Should upgrading of underground sewers from manholes FMH7022565 to FMH7022552 (i.e., S4- S10) be identified as necessary based on the revised SIA at the redevelopment stage, the applicant will consider to undertake the necessary upgrading works if entrusted by the Authority.

4.1.7 Surface runoff is mainly from rainfall and it will be directed to existing public storm drains. As the existing site is currently on hard-paved ground, it is anticipated that the proposed development will not affect the drainage path or lead to any changes in the runoff behaviour.

4.1.8 There is no change or abandonment of existing drains and hence no extra stormwater discharge is imposed. Therefore, adverse impact on the existing drainage system is not anticipated and a detailed drainage impact assessment is therefore unnecessary.

Figures

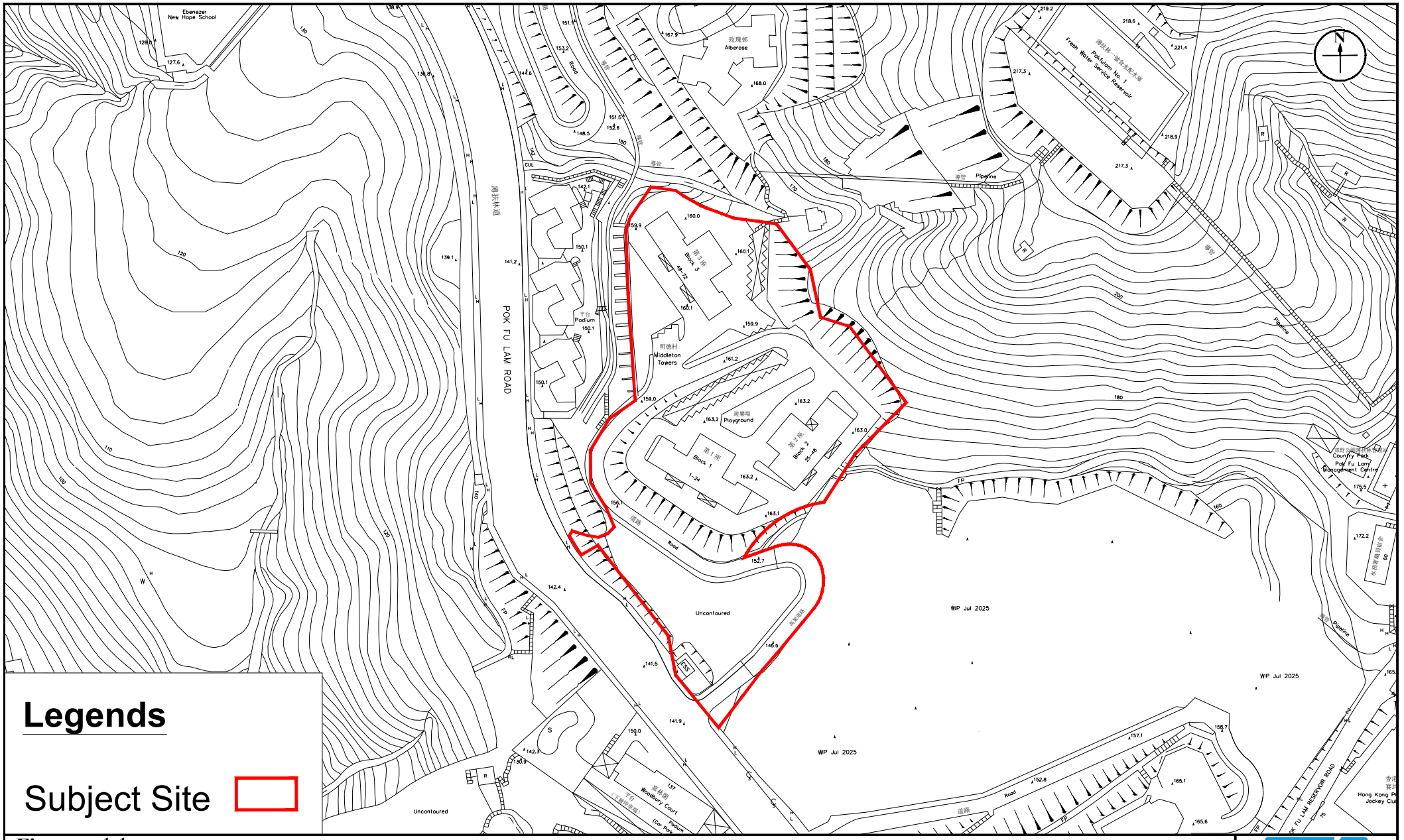

Figure: 1.1

Title: Location of Subject Site and its Environs

Project: Proposed Residential Institution (Student Hostel) at Middleton Towers, 140 Pok Fu Lam Road

RAMBOLL

Drawn by:	SC
Checked by:	TC
Rev.:	1.0
Date:	Feb 2026

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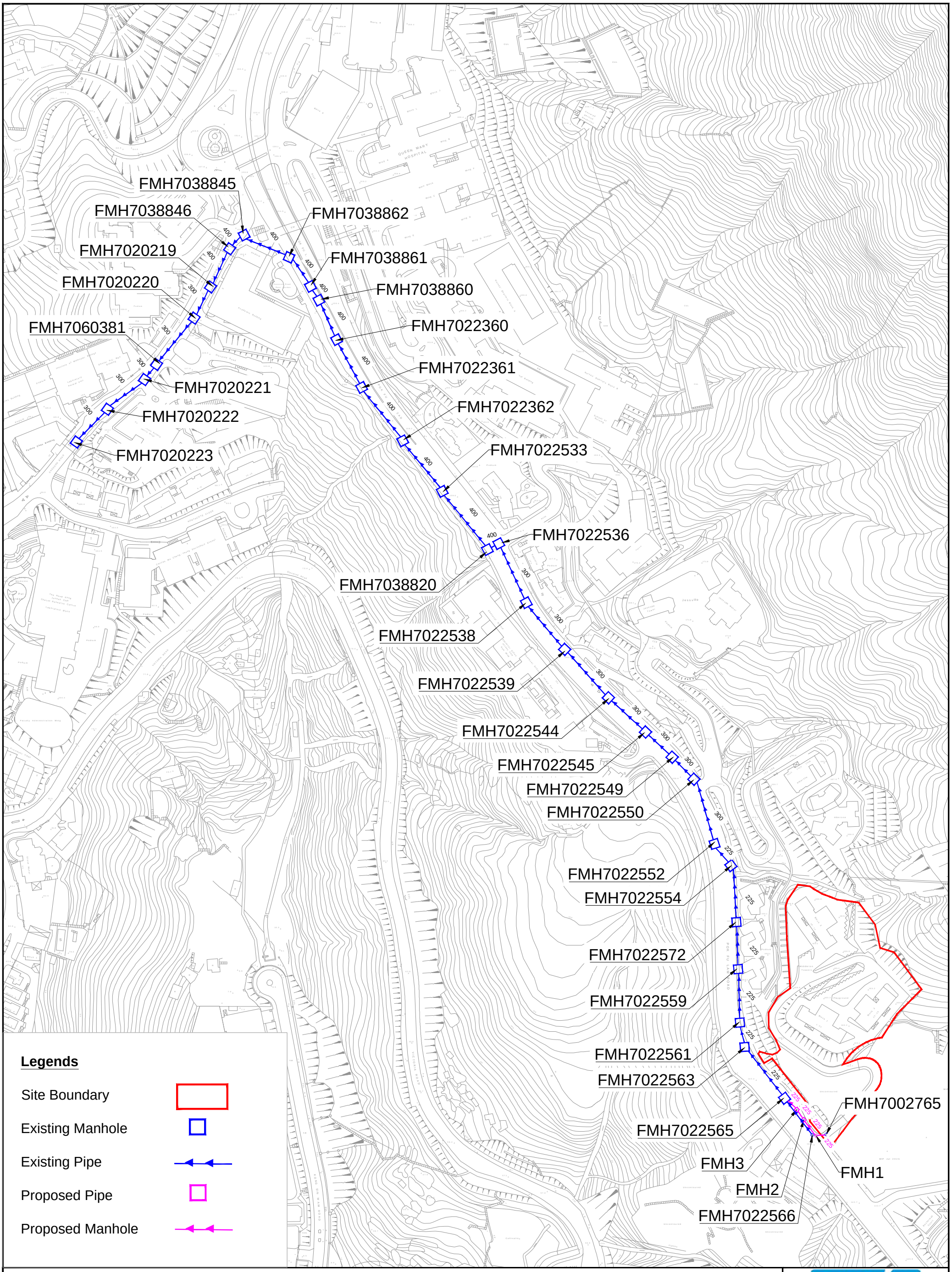

Figure: 2.1	RAMBOLL
Title: Existing Sewerage System in the Vicinity of the Subject Site	Drawn by: SC Checked by: TC
Project: Proposed Residential Institution (Student Hostel) at Middleton Towers, 140 Pok Fu Lam Road	Rev.: 1.2 Date: Jul 2026

\\aphkfps3\Drive Q\Projects\AECHUMT_EI00\05 Assessments\04 SIA\Sewers.dwg

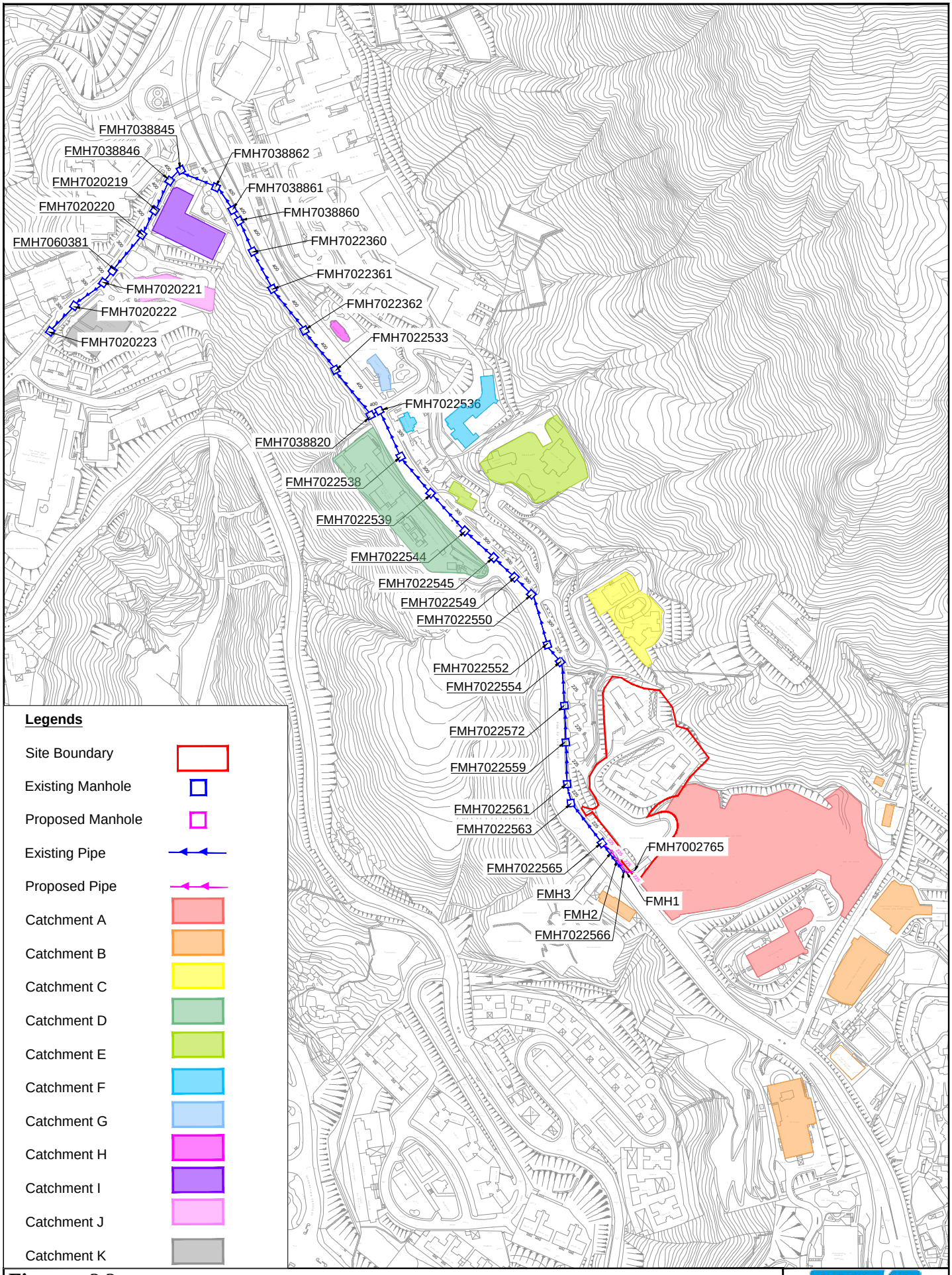

Figure: 2.2

Title: Existing Sewerage System and Catchment Areas in the Vicinity of the Subject Site

Project: Proposed Residential Institution (Student Hostel) at Middleton Towers, 140 Pok Fu Lam Road

RAMBOLL

Drawn by:	SC
Checked by:	TC
Rev.:	1.1
Date:	Jun 2026

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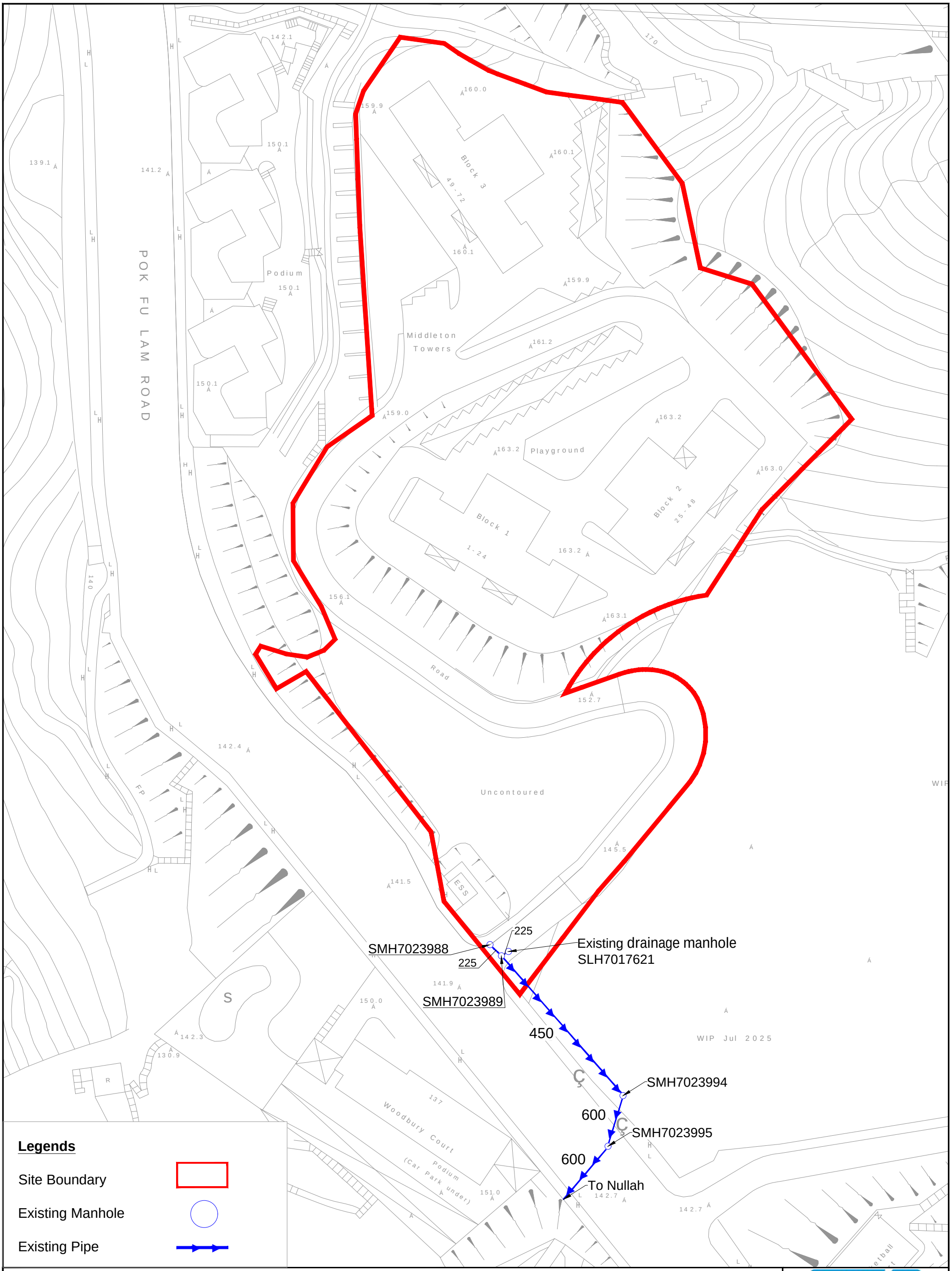

Figure: 3.1	RAMBOLL
Title: Existing Storm Water System in the Vicinity of the Subject Site	Drawn by: SC Checked by: TC
Project: Proposed Residential Institution (Student Hostel) at Middleton Towers, 140 Pok Fu Lam Road	Rev.: 1.2 Date: Jul 2026

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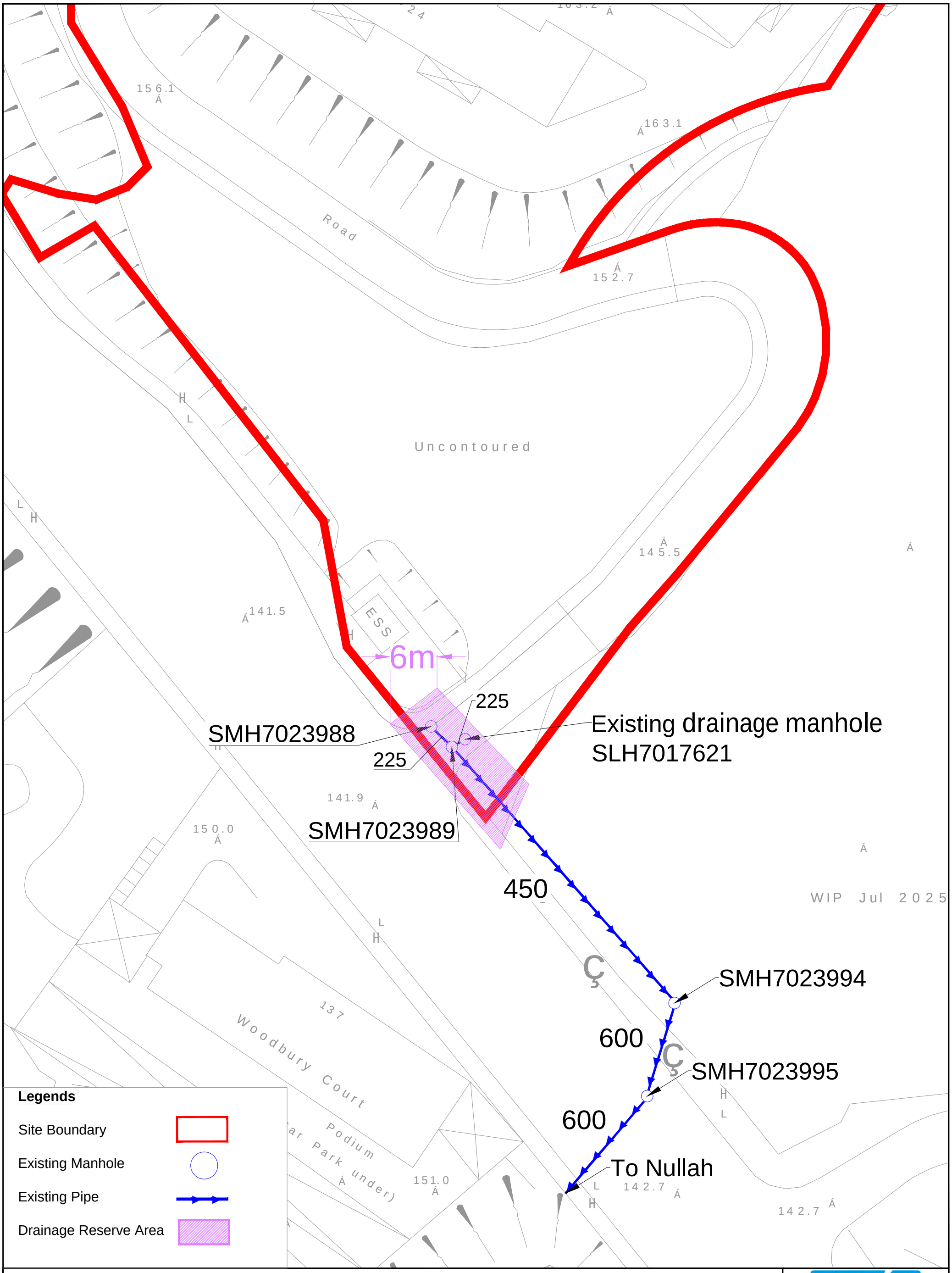

Figure: 3.2	RAMBOLL
Title: The Location of the Drainage Reserve Area	Drawn by: SC Checked by: TC
Project: Proposed Residential Institution (Student Hostel) at Middleton Towers, 140 Pok Fu Lam Road	Rev.: 1.2 Date: Jul 2026

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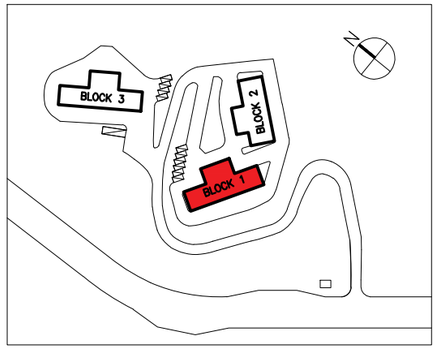
Appendix 1.1 The Typical Floor Plans of the Planning Statement



REFUSE STORAGE
AND MATERIAL
RECOVERY CHAMBER

COMMON
AREA

UP

M/E

COMMON AREA /
ANCILLARY FACILITIES

MAIN
LOBBY

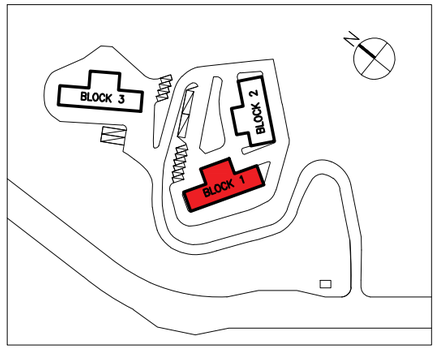
UP

COMMON AREA /
ANCILLARY FACILITIES

M/E = MECHANICAL & ELECTRICAL ROOM

BLOCK 1 – G/F LAYOUT

SCALE 1:100



B = BATH ROOM / SHARED BATH ROOM

BLOCK 1 TYPICAL (1/F – 12/F ; 12 STOREYS)

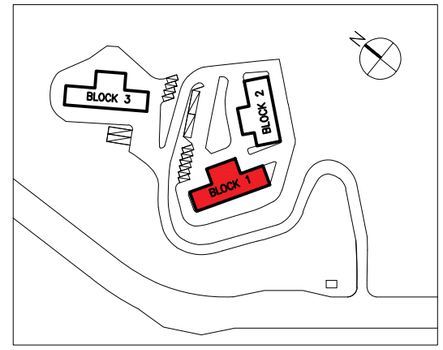
SCALE 1:100

BLOCK A TYPICAL FLOOR = 26 UNITS APPROX.

BLOCK 1 TO 3

TOTAL PROPOSED UNITS	=	900 UNITS
BLOCK 1 TYP	=	26 APPROX.
BLOCK 2 TYP	=	23 APPROX.
BLOCK 3 TYP	=	26 APPROX.

SUBJECT TO FUTURE DETAIL DESIGN



B = BATH ROOM / SHARED BATH ROOM

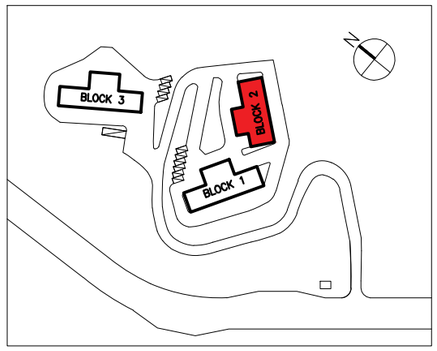
BLOCK 1 WITH ACCESSIBLE ROOM

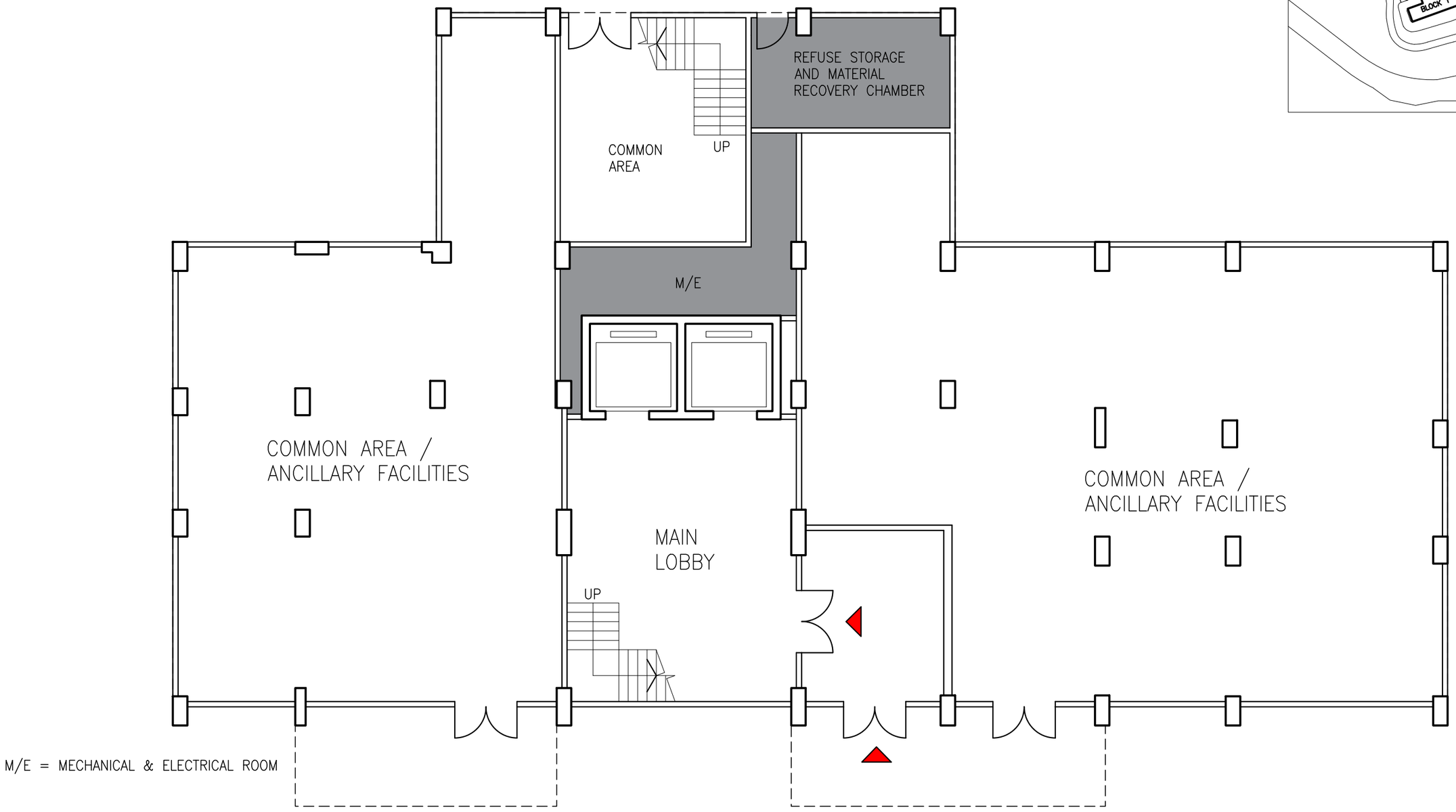
SCALE 1:100

BLOCK A TYPICAL FLOOR = 26 UNITS APPROX.

BLOCK 1 TO 3

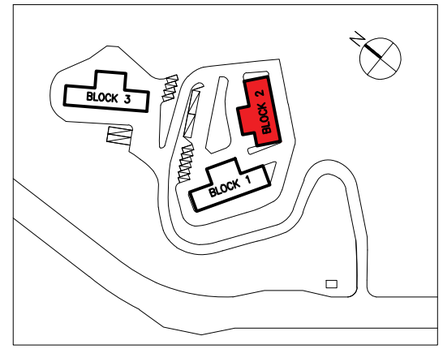
TOTAL PROPOSED UNITS = 900 UNITS
BLOCK 1 TYP = 26 APPROX.
BLOCK 2 TYP = 23 APPROX.
BLOCK 3 TYP = 26 APPROX.
SUBJECT TO FUTURE DETAIL DESIGN





BLOCK 2 – G/F LAYOUT

SCALE 1:100



BLOCK 2 TYPICAL (1/F – 12/F ; 12 STOREYS)

SCALE 1:100

BLOCK B TYPICAL FLOOR = 23 UNITS APPROX.

BLOCK 1 TO 3

TOTAL PROPOSED UNITS	=	900 UNITS
BLOCK 1 TYP	=	26 APPROX.
BLOCK 2 TYP	=	23 APPROX.
BLOCK 3 TYP	=	26 APPROX.

SUBJECT TO FUTURE DETAIL DESIGN

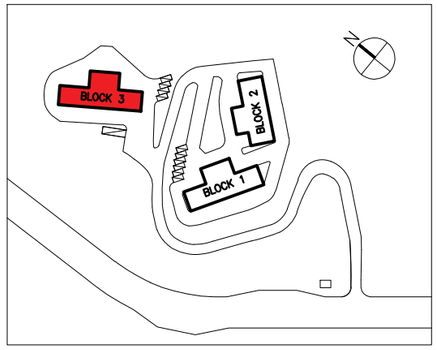
BLOCK 2 WITH ACCESSIBLE ROOM

SCALE 1:100

BLOCK B TYPICAL FLOOR = 23 UNITS APPROX.

BLOCK 1 TO 3

TOTAL PROPOSED UNITS = 900 UNITS
BLOCK 1 TYP = 26 APPROX.
BLOCK 2 TYP = 23 APPROX.
BLOCK 3 TYP = 26 APPROX.
SUBJECT TO FUTURE DETAIL DESIGN



REFUSE STORAGE
AND MATERIAL
RECOVERY CHAMBER

COMMON
AREA

UP

M/E

COMMON AREA /
ANCILLARY FACILITIES

MAIN
LOBBY

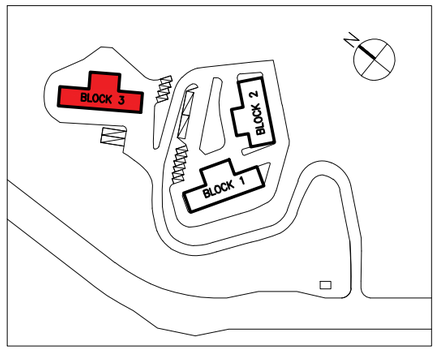
UP

COMMON AREA /
ANCILLARY FACILITIES

M/E = MECHANICAL & ELECTRICAL ROOM

BLOCK 3 – G/F LAYOUT

SCALE 1:100



B = BATH ROOM / SHARED BATH ROOM

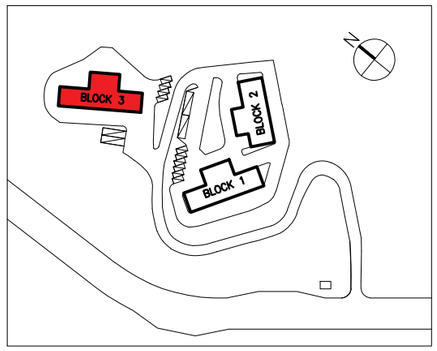
BLOCK 3 TYP (1/F – 12/F ; 12 STOREYS)

SCALE 1:100

BLOCK C TYPICAL FLOOR = 26 UNITS APPROX.

BLOCK 1 TO 3

TOTAL PROPOSED UNITS = 900 UNITS
BLOCK 1 TYP = 26 APPROX.
BLOCK 2 TYP = 23 APPROX.
BLOCK 3 TYP = 26 APPROX.
SUBJECT TO FUTURE DETAIL DESIGN



B = BATH ROOM / SHARED BATH ROOM

BLOCK 3 WITH ACCESSIBLE ROOM

SCALE 1:100

BLOCK C TYPICAL FLOOR = 26 UNITS APPROX.

BLOCK 1 TO 3

TOTAL PROPOSED UNITS = 900 UNITS
BLOCK 1 TYP = 26 APPROX.
BLOCK 2 TYP = 23 APPROX.
BLOCK 3 TYP = 26 APPROX.
SUBJECT TO FUTURE DETAIL DESIGN

Appendix 2.1 Detailed Sewerage Impact Assessment Calculations_ Proposed Development

Table 1 Calculation for Sewage Generation Rate of the Proposed Development

Estimated Sewage Flow from Proposed Development				
1a. Dormitory for Student and Staff				
Number of residents	=	900	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	171	m^3/day	
Total Flow from Proposed Development				
Total ADWF in Proposed Developemt	=	171.0	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	171.0	m^3/day	
				(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus
Contributing Population	=	633	people	employees)
Peaking factor	=	8		Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance
Peak Flow	=	15.8	L/s	

Table 2 - Estimated Sewage Flow for Catchment Areas (Catchment A)

Catchment A -				
1a. Unviveraity Hall				
Number of residents	=	110	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	20.9	m^3/day	
1b. Unviveraity Hall				
Total number of staff	=	20	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	5.6	m^3/day	
2a. High West- Students Hostels				
Number of residents	=	984	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	187.0	m^3/day	
2b. High West- Staff Quarters 1&2				
Number of residents	=	819	people	
Unit Flow Factors	=	0.27	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	221.1	m^3/day	
2c. High West- Student Canteen				
Total number of staff	=	31	people	
Design flow for staff	=	1.58	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	49.0	m^3/day	
2d. High West- Student Canteen				
Total number of staff	=	35	people	
Design flow for staff	=	0.28	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	9.8	m^3/day	
Estimated Sewage Flow from Catchment A				
Catchment A				
Total ADWF in Catchment A	=	493.4	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	493.4	m^3/day	
Contributing Population	=	1827	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment A	=	34.3	L/s	
Total Flow from the Proposed Development and Catchment A				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	664.4	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	664.4	m^3/day	
Contributing population	=	2461		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus emp
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	46.1	litre/sec	

Table 3 - Estimated Sewage Flow for Catchment Areas (Catchment B)

Catchment B				
1. Bethanie				
Number of residents	=	50	people	
Unit Flow Factors	=	0.28	m^3/day	(R2 in Table T-1 of GESF)
Sewage generation rate	=	14.0	m^3/day	
2a. Po Fu Lam Transit Nursery				
Total number of staff	=	10	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	2.8	m^3/day	
3a.Country Park Pok Fu Lam Management Centre				
Number of residents	=	5	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	1.0	m^3/day	
4. Woodbury Court				
Number of residents	=	110	people	
Unit Flow Factors	=	0.27	m^3/day	
Sewage generation rate	=	29.7	m^3/day	
5. WSD Staff Quarters				
Number of residents	=	24	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate		4.6	m^3/day	
6a.Hong Kong PHAB Association Jockey Club PHAB Camp				
Number of residents	=	160	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	30.4	m^3/day	
6b.Hong Kong PHAB Association Jockey Club PHAB Camp				
Number of residents	=	20	people	
Unit Flow Factors	=	0.28	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	5.6	m^3/day	
7.Pokfulam Public Riding School				
Number of residents	=	170	people	
Unit Flow Factors	=	0.28	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	47.6	m^3/day	
Estimated Sewage Flow from Catchment B				
Total ADWF in Catchment B	=	135.6	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	135.6	m^3/day	
Contributing Population	=	502	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment B	=	12.6	L/s	
Total Flow from the Proposed Development and Catchment A and B				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	800.0	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	800.0	m^3/day	
Contributing population	=	2963		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	55.6	litre/sec	

Table 4 - Estimated Sewage Flow for Catchment Areas (Catchment C)

Catchment C				
1. Alberose				
Number of residents	=	8	people	
Unit Flow Factors	=	0.37	m^3/day	(R3 in Table T-1 of GESF)
Sewage generation rate	=	3.0	m^3/day	
Estimated Sewage Flow from Catchment C				
Total ADWF in Catchment C	=	3.0	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	3.0	m^3/day	
Contributing Population	=	11	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment C	=	0.3	L/s	
Total Flow from the Proposed Development and Catchment A, B and C				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	803.0	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	803.0	m^3/day	
Contributing population	=	2974		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	55.8	litre/sec	

Table 5 - Estimated Sewage Flow for Catchment Areas (Catchment D)

Catchment D				
1a. Ebenezer School & Home for the Visually imparier (Residents)				
Number of residents	=	259	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	49.2	m^3/day	
1b. Ebenezer School & Home for the Visually imparier (Staff)				
Total number of staff	=	8	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	2.2	m^3/day	
2a. Ebenezer New Hope School (Student)				
Number of Student	=	65	people	
Unit Flow Factors	=	0.04	m^3/day	(Student in Table T-2 of GESF)
Sewage generation rate	=	2.6	m^3/day	
2b. Ebenezer New Hope School (Teacher)				
Number of Staffs	=	39	people	
Unit Flow Factors	=	0.28	m^3/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	10.9	m^3/day	
Estimated Sewage Flow from Catchment D				
Total ADWF in Catchment D	=	64.9	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	64.9	m^3/day	
Contributing Population	=	240	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment D	=	6.0	L/s	

Total Flow from the Proposed Development and Catchment A, B, C and D				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	867.9	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	867.9	m^3/day	
Contributing population	=	3214		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	60.3	litre/sec	

Table 6 - Estimated Sewage Flow for Catchment Areas (Catchment E)

Catchment E				
1a. Dor Fook Mansion (Residents)				
Number of residents	=	93	people	
Unit Flow Factors	=	0.27	m^3/day	(R2 in Table T-1 of GESF)
Sewage generation rate	=	25.1	m^3/day	
1b. Dor Fook Mansion (Staff)				
Total number of staff	=	3	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	0.8	m^3/day	
2a. Jessville Manor (Residents)				
Number of residents	=	15	people	
Unit Flow Factors	=	0.27	m^3/day	(R2 in Table T-1 of GESF)
Sewage generation rate	=	4.1	m^3/day	
2b. Jessville Manor (Staff)				
Total number of staff	=	5	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	1.4	m^3/day	
3a. Jessville Tower (Residents)				
Number of residents	=	104	people	
Unit Flow Factors	=	0.27	m^3/day	
Sewage generation rate	=	28.1	m^3/day	
3b. Jessville Manor (Staff)				
Total number of staff	=	5	people	
Design flow for staff	=	0.28	m^3/person/day	
Sewage generation rate	=	1.4	m^3/day	
Estimated Sewage Flow from Catchment E				
Total ADWF in Catchment E	=	60.9	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	60.9	m^3/day	
Contributing Population	=	225	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment E	=	5.6	L/s	
Total Flow from the Proposed Development and Catchment A, B, C, D and E				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	928.8	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	928.8	m^3/day	
Contributing population	=	3440		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	64.5	litre/sec	

Table 7 - Estimated Sewage Flow for Catchment Areas (Catchment F)

Catchment F				
1a. Radcliffe (Residents)				
Number of residents	=	37	people	
Unit Flow Factors	=	0.27	m^3/day	(R2 in Table T-1 of GESF)
Sewage generation rate	=	10.0	m^3/day	
1b. Radcliffe (Staff)				
Total number of staff	=	2	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	0.6	m^3/day	
2a. Government Quarters (Residents)				
Number of residents	=	320	people	
Unit Flow Factors	=	0.19	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	60.8	m^3/day	
2b. Government Quarters (Staff)				
Total number of staff	=	30	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	8.4	m^3/day	
3. Hospital Authority				
Total number of staff	=	126	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	35.3	m^3/day	
Estimated Sewage Flow from Catchment F				
Total ADWF in Catchment F	=	115.0	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	115.0	m^3/day	
Contributing Population	=	426	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment F	=	10.7	L/s	
Total Flow from the Proposed Development and Catchment A, B, C, D, E and F				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	1043.8	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	1043.8	m^3/day	
Contributing population	=	3866		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	72.5	litre/sec	

Table 8 - Estimated Sewage Flow for Catchment Areas (Catchment G)

Catchment G				
1a. Roytalton (Residents)				
Number of residents	=	111	people	
Unit Flow Factors	=	0.27	m^3/day	(R2 in Table T-1 of GESF)
Sewage generation rate	=	30.0	m^3/day	
1b. Royalton (Staff)				
Total number of staff	=	6	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	1.7	m^3/day	
Estimated Sewage Flow from Catchment G				
Total ADWF in Catchment G	=	31.7	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	31.7	m^3/day	
Contributing Population	=	117	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment G	=	2.9	L/s	
Total Flow from the Proposed Development and Catchment A, B, C, D, E, F and G				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	1075.5	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	1075.5	m^3/day	
Contributing population	=	3983		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	74.7	litre/sec	

Table 9 - Estimated Sewage Flow for Catchment Areas (Catchment H)

Catchment H				
1a. Roytalton II (Residents)				
Number of residents	=	63	people	
Unit Flow Factors	=	0.27	m^3/day	(R2 in Table T-1 of GESF)
Sewage generation rate	=	17.0	m^3/day	
1b. Royalton II (Staff)				
Total number of staff	=	3	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	0.8	m^3/day	
Estimated Sewage Flow from Catchment H				
Total ADWF in Catchment H	=	17.9	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	17.9	m^3/day	
Contributing Population	=	66	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment H	=	1.7	L/s	
Total Flow from the Proposed Development and Catchment A, B, C, D, E, F, G and H				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	1093.3	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	1093.3	m^3/day	
Contributing population	=	4049		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	75.9	litre/sec	

Table 10 - Estimated Sewage Flow for Catchment Areas (Catchment I)

Catchment I				
1a. HKU Med Academic Building				
Total number of staff	=	40	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	11.2	m^3/day	
Estimated Sewage Flow from Catchment I				
Total ADWF in Catchment I	=	11.2	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	11.2	m^3/day	
Contributing Population	=	41	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment I	=	1.0	L/s	
Total Flow from the Proposed Development and Catchment A, B, C, D, E, F, G, H and I				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	1104.5	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	1104.5	m^3/day	
Contributing population	=	4091		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	76.7	litre/sec	

Table 11 - Estimated Sewage Flow for Catchment Areas (Catchment J)

Catchment J				
1a. HKU Hong Kong Jockey Club Building for Interdisciplinary Research				
Total number of staff	=	20	people	
Design flow for staff	=	0.28	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	5.6	m^3/day	
Estimated Sewage Flow from Catchment J				
Total ADWF in Catchment J	=	5.6	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	5.6	m^3/day	
Contributing Population	=	21	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	8		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment J	=	0.5	L/s	
Total Flow from the Proposed Development and Catchment A, B, C, D, E, F, G, H, I and J				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	1110.1	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	1110.1	m^3/day	
Contributing population	=	4112		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	77.1	litre/sec	

Table 12 - Estimated Sewage Flow for Catchment Areas (Catchment K)

Catchment K				
1a. Development at No.7 Sassoon				
Number of Employee	=	933	people	
Unit Flow Factors	=	0.28	m^3/day	(Institutional and Special Class in Table T-1 of GESF)
Sewage generation rate	=	261.2	m^3/day	
1b. Development at No.7 Sassoon				
Total number of staff	=	1400	people	
Design flow for staff	=	0.04	m^3/person/day	(refer to Table T-2 of GESF , Community, Social & Personal Services)
Sewage generation rate	=	56.0	m^3/day	
Estimated Sewage Flow from Catchment K				
Total ADWF in Catchment K	=	317.2	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	317.2	m^3/day	
Contributing Population	=	1175	people	Refer to S12.1 of GESF, Contributing Population = Calculated total average flow/ UFF
Peaking factor	=	6		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak Flow in Catchment K	=	22.0	L/s	
Total Flow from the Proposed Development and Catchment A, B, C, D, E, F, G, H, I, J and K				
Total ADWF with Catchment Inflow Factor P_{CIF}	=	1427.4	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Flow rate with P_{CIF}	=	1427.4	m^3/day	
Contributing population	=	5287		(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷
Peaking factor	=	5		Refer to Table T-5 of GESF for population 1,000 - 5,000 incl. stormwater allowance
Peak flow	=	82.6	litre/sec	

Table 13 - Estimated Sewage Flow from Swimming Pools

PHAB

Assumed area	=	500	m^2
Assumed depth of water	=	1.5	m
Volume of water	=	750.0	m^3
Turnover Rate	=	6.0	hr (CAP132CA, Section 9 Swimming Pools Regulation (open air pool))
Surface loading rate of filter	=	50.0	$m^3/m^2/hr$
Filter areas required	=	2.5	m^2
Backwashing flow rate	=	30.0	$m^3/m^2/hr$
Design flow for backwashing	=	75.0	m^3/hr
Backwash duration	=	7.0	min/day
Backwash generation rate	=	8.75	m^3/day
Backwash generation rate	=	**20.8**	litre/sec

Woodbury Court

Assumed area	=	105	m^2
Assumed depth of water	=	1.5	m
Volume of water	=	157.5	m^3
Turnover Rate	=	6.0	hr (CAP132CA, Section 9 Swimming Pools Regulation (open air pool))
Surface loading rate of filter	=	50.0	$m^3/m^2/hr$
Filter areas required	=	0.5	m^2
Backwashing flow rate	=	30.0	$m^3/m^2/hr$
Design flow for backwashing	=	15.8	m^3/hr
Backwash duration	=	7.0	min/day
Backwash generation rate	=	1.84	m^3/day
Backwash generation rate	=	**4.4**	litre/sec

131 PFL Road

Assumed area	=	150	m^2
Assumed depth of water	=	1.5	m
Volume of water	=	225.0	m^3
Turnover Rate	=	6.0	hr (CAP132CA, Section 9 Swimming Pools Regulation (open air pool))
Surface loading rate of filter	=	50.0	$m^3/m^2/hr$
Filter areas required	=	0.8	m^2
Backwashing flow rate	=	30.0	$m^3/m^2/hr$
Design flow for backwashing	=	22.5	m^3/hr
Backwash duration	=	7.0	min/day
Backwash generation rate	=	2.63	m^3/day
Backwash generation rate	=	**6.3**	litre/sec

Royalton II

Assumed area	=	105	m^2
Assumed depth of water	=	1.5	m
Volume of water	=	157.5	m^3
Turnover Rate	=	6.0	hr (CAP132CA, Section 9 Swimming Pools Regulation (open air pool))
Surface loading rate of filter	=	50.0	$m^3/m^2/hr$
Filter areas required	=	0.5	m^2
Backwashing flow rate	=	30.0	$m^3/m^2/hr$
Design flow for backwashing	=	15.8	m^3/hr
Backwash duration	=	7.0	min/day
Backwash generation rate	=	1.84	m^3/day
Backwash generation rate	=	**4.4**	litre/sec

Jessville Tower

Assumed area	=	240	m^2
Assumed depth of water	=	1.5	m
Volume of water	=	360.0	m^3
Turnover Rate	=	6.0	hr (CAP132CA, Section 9 Swimming Pools Regulation (open air pool))
Surface loading rate of filter	=	50.0	$m^3/m^2/hr$
Filter areas required	=	1.2	m^2
Backwashing flow rate	=	30.0	$m^3/m^2/hr$
Design flow for backwashing	=	36.0	m^3/hr
Backwash duration	=	7.0	min/day
Backwash generation rate	=	4.20	m^3/day
Backwash generation rate	=	**10.0**	litre/sec

Radcliffe

Assumed area	=	290	m^2
Assumed depth of water	=	1.5	m
Volume of water	=	435.0	m^3
Turnover Rate	=	6.0	hr (CAP132CA, Section 9 Swimming Pools Regulation (open air pool))
Surface loading rate of filter	=	50.0	$m^3/m^2/hr$
Filter areas required	=	1.5	m^2
Backwashing flow rate	=	30.0	$m^3/m^2/hr$
Design flow for backwashing	=	43.5	m^3/hr
Backwash duration	=	7.0	min/day
Backwash generation rate	=	5.08	m^3/day
Backwash generation rate	=	**12.1**	litre/sec

Royalton

Assumed area	=	70	m^2
Assumed depth of water	=	1.5	m
Volume of water	=	105.0	m^3
Turnover Rate	=	6.0	hr (CAP132CA, Section 9 Swimming Pools Regulation (open air pool))
Surface loading rate of filter	=	50.0	$m^3/m^2/hr$
Filter areas required	=	0.4	m^2
Backwashing flow rate	=	30.0	$m^3/m^2/hr$
Design flow for backwashing	=	10.5	m^3/hr
Backwash duration	=	7.0	min/day
Backwash generation rate	=	1.23	m^3/day
Backwash generation rate	=	**2.9**	litre/sec

Table 14 Hydraulic Capacity of Existing Sewers

Manhole Reference	Manhole Reference	Pipe Dia. (mm)	Pipe Length (m)	Invert Level 1 (mPD)	Invert Level 2 (mPD)	g (m/s^2)	k_s (m)	s	v (m^2/s)	V (m/s)	Area (m^2)	Q (m^3/s)	Estimated Capacity (L/s)
FMH1	FMH2	225	15.0	140.20	140.05	9.81	0.0003	0.0100	0.000001	1.42	0.040	0.1	57
FMH2	FMH3	225	14.0	140.05	139.91	9.81	0.0003	0.0100	0.000001	1.42	0.040	0.1	57
FMH3	FMH7022565	225	4.0	139.91	139.87	9.81	0.0003	0.0100	0.000001	1.42	0.040	0.1	57
FMH7022565	FMH7022563	225	44.9	139.73	139.38	9.81	0.0006	0.0078	0.000001	1.15	0.040	0.0	46
FMH7022563	FMH7022561	225	16.3	139.35	139.24	9.81	0.0006	0.0068	0.000001	1.07	0.040	0.0	43
FMH7022561	FMH7022559	225	36.2	139.22	138.94	9.81	0.0006	0.0077	0.000001	1.15	0.040	0.0	46
FMH7022559	FMH7022572	225	31.8	138.89	138.71	9.81	0.0030	0.0057	0.000001	0.77	0.040	0.0	31
FMH7022572	FMH7022554	225	38.8	138.71	138.40	9.81	0.0006	0.0080	0.000001	1.17	0.040	0.0	46
FMH7022554	FMH7022552	225	18.2	138.40	137.96	9.81	0.0006	0.0242	0.000001	2.04	0.040	0.1	81
FMH7022552	FMH7022550	300	45.9	137.96	137.47	9.81	0.0006	0.0107	0.000001	1.63	0.071	0.1	115
FMH7022550	FMH7022549	300	20.9	137.32	137.23	9.81	0.0006	0.0043	0.000001	1.03	0.071	0.1	73
FMH7022549	FMH7022545	300	24.8	137.22	137.07	9.81	0.0006	0.0060	0.000001	1.22	0.071	0.1	86
FMH7022545	FMH7022544	300	34.1	137.07	136.89	9.81	0.0030	0.0053	0.000001	0.90	0.071	0.1	64
FMH7022544	FMH7022539	300	44.3	136.89	136.74	9.81	0.0030	0.0034	0.000001	0.72	0.071	0.1	51
FMH7022539	FMH7022538	300	41.2	136.74	136.52	9.81	0.0030	0.0053	0.000001	0.91	0.071	0.1	64
FMH7022538	FMH7022536	300	44.1	136.52	136.35	9.81	0.0030	0.0039	0.000001	0.77	0.071	0.1	55
FMH7022536	FMH7038820	400	7.4	136.33	136.26	9.81	0.0006	0.0095	0.000001	1.84	0.126	0.2	231
FMH7038820	FMH7022533	400	50.2	136.26	135.91	9.81	0.0006	0.0070	0.000001	1.57	0.126	0.2	198
FMH7022533	FMH7022362	400	44.0	135.89	135.55	9.81	0.0006	0.0077	0.000001	1.66	0.126	0.2	208
FMH7022362	FMH7022361	400	46.0	135.54	135.26	9.81	0.0006	0.0061	0.000001	1.47	0.126	0.2	185
FMH7022361	FMH7022360	400	38.0	135.54	134.65	9.81	0.0006	0.0234	0.000001	2.90	0.126	0.4	364
FMH7022360	FMH7038860	400	31.0	134.65	134.11	9.81	0.0006	0.0174	0.000001	2.50	0.126	0.3	314
FMH7038860	FMH7038861	400	11.0	134.11	133.63	9.81	0.0006	0.0436	0.000001	3.96	0.126	0.5	497
FMH7038861	FMH7038862	400	24.2	133.63	133.00	9.81	0.0006	0.0260	0.000001	3.05	0.126	0.4	384
FMH7038862	FMH7038845	400	35.0	133.00	132.50	9.81	0.0006	0.0143	0.000001	2.26	0.126	0.3	284
FMH7038845	FMH7038846	400	14.0	132.50	131.60	9.81	0.0006	0.0643	0.000001	4.81	0.126	0.6	604
FMH7038846	FMH7020219	400	30.0	131.76	129.79	9.81	0.0006	0.0657	0.000001	4.86	0.126	0.6	610
FMH7020219	FMH7020220	300	24.0	129.79	128.35	9.81	0.0006	0.0600	0.000001	3.87	0.071	0.3	274
FMH7020220	FMH7060381	300	42.0	128.35	124.46	9.81	0.0006	0.0926	0.000001	4.81	0.071	0.3	340
FMH7060381	FMH7020221	300	13.0	124.46	122.68	9.81	0.0006	0.1369	0.000001	5.85	0.071	0.4	414
FMH7020221	FMH7020222	300	33.0	122.68	117.41	9.81	0.0006	0.1597	0.000001	6.32	0.071	0.4	447
FMH7020222	FMH7020223	300	32.0	117.41	112.89	9.81	0.0006	0.1413	0.000001	5.94	0.071	0.4	420

Notes:

[1] Clayware (Clay) Pipe, reference to slimed clayware in poor condition in Sewerage Design Manual (SDM) Part 1, assumed Ks of 3mm (<0.75m/s) and Ks of 0.6mm(>1.2m/s)

[2] Proposed Polyethylene (PE) Pipe, reference to slimed uPVC in poor condition in Sewerage Design Manual (SDM) Part 1, assumed Ks of 0.3mm

[3] Catchment Inflow Factor of 1.0 applied to existing catchments

Table 15 Summary of Sewage Flow from Proposed Development and Catchment Areas

Sewer Pipe ID	Manhole Reference	Manhole Reference	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	Peak Flow from the Proposed Development and Surrounding Catchment (L/s)	Swimming Pool	Peak Flow from the Proposed Development and Surrounding Catchment (with Swimming Pool) (L/s)	Contribution from the Proposed Development and Surrounding Catchment (%)	Status	Catchment included/ to be included
S1- S2	FMH1	FMH2	225	15.0	0.010	56.5	46.1		46.1	82%	OK	Subject Site, Catchment A
S2- S3	FMH2	FMH3	225	14.0	0.010	56.5	46.1		46.1	82%	OK	Subject Site, Catchment A
S3- S4	FMH3	FMH7022565	225	4.0	0.010	56.5	46.1		46.1	82%	OK	Subject Site, Catchment A
S4-S5	FMH7022565	FMH7022563	225	44.9	0.008	45.8	46.1		46.1	101%	Spill	Subject Site, Catchment A
S5-S6	FMH7022563	FMH7022561	225	16.3	0.007	42.7	46.1		46.1	108%	Spill	Subject Site, Catchment A
S6-S7	FMH7022561	FMH7022559	225	36.2	0.008	45.7	46.1		46.1	101%	Spill	Subject Site, Catchment A
S7-S8	FMH7022559	FMH7022572	225	31.8	0.006	30.6	46.1		46.1	151%	Spill	Subject Site, Catchment A
S8-S9	FMH7022572	FMH7022554	225	38.8	0.008	46.4	46.1		46.1	99%	Spill	Subject Site, Catchment A
S9-S10	FMH7022554	FMH7022552	225	18.2	0.024	81.2	46.1		46.1	57%	OK	Subject Site, Catchment A
S10-S11	FMH7022552	FMH7022550	300	45.9	0.011	114.9	55.6	25.2	80.8	70%	OK	Subject Site, Catchment A, B, C, D & Swimming pool in PHAB, and Woodbury Court
S11-S12	FMH7022550	FMH7022549	300	20.9	0.004	72.6	55.6	25.2	80.8	111%	Spill	Subject Site, Catchment A, B, C, D & Swimming pool in PHAB, and Woodbury Court
S12-S13	FMH7022549	FMH7022545	300	24.8	0.006	86.2	60.3	25.2	85.5	99%	Spill	Subject Site, Catchment A, B, C, D & Swimming pool in PHAB, and Woodbury Court
S13-S14	FMH7022545	FMH7022544	300	34.1	0.005	63.8	60.3	31.5	91.8	144%	Spill	Subject Site, Catchment A, B, C, D & Swimming pool in PHAB, Woodbury Court, and 131 PFL Road
S14-S15	FMH7022544	FMH7022539	300	44.3	0.003	51.1	64.5	31.5	96.0	188%	Spill	Subject Site, Catchment A, B, C, D, E & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, and Jessville Tower
S15-S16	FMH7022539	FMH7022538	300	41.2	0.005	64.2	64.5	31.5	96.0	150%	Spill	Subject Site, Catchment A, B, C, D, E & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, and Jessville Tower
S16-S17	FMH7022538	FMH7022536	300	44.1	0.004	54.5	72.5	31.5	104.0	191%	Spill	Subject Site, Catchment A, B, C, D, E, F & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, and Jessville Tower
S17-S18	FMH7022536	FMH7038820	400	7.4	0.009	230.6	72.5	53.6	126.1	55%	OK	Subject Site, Catchment A, B, C, D, E, F & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower,and Radcliffe
S18-S19	FMH7038820	FMH7022533	400	50.2	0.007	197.8	74.7	56.5	131.2	66%	OK	Subject Site, Catchment A, B, C, D, E, F, G & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower,Radcliffe and Royalton
S19-S20	FMH7022533	FMH7022362	400	44.0	0.008	208.3	75.9	60.9	136.8	66%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S20-S21	FMH7022362	FMH7022361	400	46.0	0.006	184.7	75.9	60.9	136.8	74%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S21-S22	FMH7022361	FMH7022360	400	38.0	0.023	363.8	75.9	60.9	136.8	38%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S22-S23	FMH7022360	FMH7038860	400	31.0	0.017	313.6	75.9	60.9	136.8	44%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S23-S24	FMH7038860	FMH7038861	400	11.0	0.044	497.2	75.9	60.9	136.8	28%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S24-S25	FMH7038861	FMH7038862	400	24.2	0.026	383.7	75.9	60.9	136.8	36%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S25-S26	FMH7038862	FMH7038845	400	35.0	0.014	283.8	75.9	60.9	136.8	48%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S26-S27	FMH7038845	FMH7038846	400	14.0	0.064	603.9	75.9	60.9	136.8	23%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S27-S28	FMH7038846	FMH7020219	400	30.0	0.066	610.3	75.9	60.9	136.8	22%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S28-S29	FMH7020219	FMH7020220	300	24.0	0.060	273.5	76.7	60.9	137.6	50%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H, I & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S29-S30	FMH7020220	FMH7060381	300	42.0	0.093	340.1	77.1	60.9	138.0	41%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H, I, J & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S30-S31	FMH7060381	FMH7020221	300	13.0	0.137	413.7	82.6	60.9	143.5	35%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H, I, J, K & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S31-S32	FMH7020221	FMH7020222	300	33.0	0.160	446.9	82.6	60.9	143.5	32%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H, I, J, K & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II
S32-S33	FMH7020222	FMH7020223	300	32.0	0.141	420.2	82.6	60.9	143.5	34%	OK	Subject Site, Catchment A, B, C, D, E, F, G, H, I, J, K & Swimming pool in PHAB, Woodbury Court, 131 PFL Road, Jessville Tower, Radcliffe, Royalton, and Royalton II

Table 16a Hydraulic Capacity of the Sewerage System (FMH7022565 to FMH7020223) with Estimated Sewage Flow- Scenario 1

A. Hydraulic Capacity of Sewers and Comparison of Sewer Capacity to Sewage Generated from Proposed Development under Surcharge Contidion with Safety Factor = 1.0

Sewer Pipe ID	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	US CL	DS CL	US IL	DS IL	Gradient	g	k_s	s	v	V	Area	Area	Perimeter	R=A/P (Full Bore Radius)	Q (Full)	Estimated Capacity	Remarks on Material Assumption	Catchment Carried												Sewage from Catchment (ADWF in m^3/day) including Catchment Inflow Factor (Cif) [2]												Total ADWF	Safety Factor [2]	Contributing Population	Peaking	Swimming Pool	Peak Flow (L/s)	% Capacity Occupied
			mm	m	mPD	mPD	mPD	mPD	1 in	m/s^2	m		m^2/s	m/s	m^2	m^2	m	m	m^3/s	L/s		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	m^3/day	1		Factor			
S4-S5	FMH7022565	FMH7022563	225	44.9	143.01	142.04	139.73	139.38	128	9.81	0.0006	0.008	1.00E-06	1.15	0.04	0.04	0.71	0.06	0.05	46	Clay [1]	S	A										171	493										664.4	664.4	2460.7	6		46.1	101%
S5-S6	FMH7022563	FMH7022561	225	16.3	142.04	141.65	139.35	139.24	148	9.81	0.0006	0.007	1.00E-06	1.07	0.04	0.04	0.71	0.06	0.04	43	Clay [1]	S	A										171	493										664.4	664.4	2460.7	6		46.1	108%
S6-S7	FMH7022561	FMH7022559	225	36.2	141.65	141.65	139.22	138.94	129	9.81	0.0006	0.008	1.00E-06	1.15	0.04	0.04	0.71	0.06	0.05	46	Clay [1]	S	A										171	493										664.4	664.4	2460.7	6		46.1	101%
S7-S8	FMH7022559	FMH7022572	225	31.8	141.65	141.00	138.89	138.71	177	9.81	0.003	0.006	1.00E-06	0.77	0.04	0.04	0.71	0.06	0.03	31	Clay [1]	S	A										171	493										664.4	664.4	2460.7	6		46.1	151%
S8-S9	FMH7022572	FMH7022554	225	38.8	141.00	140.61	138.71	138.40	125	9.81	0.003	0.008	1.00E-06	0.92	0.04	0.04	0.71	0.06	0.04	36	Clay [1]	S	A										171	493										664.4	664.4	2460.7	6		46.1	127%
S9-S10	FMH7022554	FMH7022552	225	18.2	140.61	139.76	138.40	137.96	41	9.81	0.0006	0.024	1.00E-06	2.04	0.04	0.04	0.71	0.06	0.08	81	Clay [1]	S	A										171	493										664.4	664.4	2460.7	6		46.1	57%
S10-S11	FMH7022552	FMH7022550	300	45.9	139.76	139.22	137.96	137.47	94	9.81	0.0006	0.011	1.00E-06	1.63	0.07	0.07	0.94	0.08	0.11	115	Clay [1]	S	A										171	493										664.4	664.4	2460.7	6		80.8	70%
S11-S12	FMH7022550	FMH7022549	300	20.9	139.22	138.78	137.32	137.23	232	9.81	0.003	0.004	1.00E-06	0.82	0.07	0.07	0.94	0.08	0.06	58	Clay [1]	S	A	B2	C								171	493	136	3								803.0	803.0	2974.1	6	25.2	80.8	140%
S12-S13	FMH7022549	FMH7022545	300	24.8	138.78	138.62	137.22	137.07	165	9.81	0.0006	0.006	1.00E-06	1.22	0.07	0.07	0.94	0.08	0.09	86	Clay [1]	S	A	B2	C	D							171	493	136	3	65							867.9	867.9	3214.4	6	25.2	85.5	99%
S13-S14	FMH7022545	FMH7022544	300	34.1	138.62	138.74	137.07	136.89	189	9.81	0.003	0.005	1.00E-06	0.90	0.07	0.07	0.94	0.08	0.06	64	Clay [1]	S	A	B2	C	D							171	493	136	3	65							867.9	867.9	3214.4	6	25.2	91.8	144%
S14-S15	FMH7022544	FMH7022539	300	44.3	138.74	138.89	136.89	136.74	295	9.81	0.003	0.003	1.00E-06	0.72	0.07	0.07	0.94	0.08	0.05	51	Clay [1]	S	A	B2	C	D	E						171	493	136	3	65	61						928.8	928.8	3440.0	6	31.5	96.0	188%
S15-S16	FMH7022539	FMH7022538	300	41.2	138.89	139.02	136.74	136.52	187	9.81	0.003	0.005	1.00E-06	0.91	0.07	0.07	0.94	0.08	0.06	64	Clay [1]	S	A	B2	C	D	E						171	493	136	3	65	61						928.8	928.8	3440.0	6	31.5	96.0	150%
S16-S17	FMH7022538	FMH7022536	300	44.1	139.02	138.98	136.52	136.35	259	9.81	0.003	0.004	1.00E-06	0.77	0.07	0.07	0.94	0.08	0.05	55	Clay [1]	S	A	B2	C	D	E	F					171	493	136	3	65	61	115					1043.8	1043.8	3865.9	6	31.5	104.0	191%
S17-S18	FMH7022536	FMH7038820	400	7.4	138.98	138.71	136.33	136.26	106	9.81	0.0006	0.009	1.00E-06	1.84	0.13	0.13	1.26	0.10	0.23	231	Clay [1]	S	A	B2	C	D	E	F					171	493	136	3	65	61	115					1043.8	1043.8	3865.9	6	31.5	126.1	55%
S18-S19	FMH7038820	FMH7022533	400	50.2	138.71	138.37	136.26	135.91	143	9.81	0.0006	0.007	1.00E-06	1.57	0.13	0.13	1.26	0.10	0.20	198	Clay [1]	S	A	B2	C	D	E	F	G				171	493	136	3	65	61	115	32				1075.5	1075.5	3983.3	6	53.6	131.2	66%
S19-S20	FMH7022533	FMH7022362	400	44.0	138.37	138.00	135.89	135.55	129	9.81	0.0006	0.008	1.00E-06	1.66	0.13	0.13	1.26	0.10	0.21	208	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	56.5	136.8	66%
S20-S21	FMH7022362	FMH7022361	400	46.0	138.00	138.40	135.54	135.26	164	9.81	0.0006	0.006	1.00E-06	1.47	0.13	0.13	1.26	0.10	0.18	185	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	60.9	136.8	74%
S21-S22	FMH7022361	FMH7022360	400	38.0	138.40	138.43	135.54	134.65	43	9.81	0.0006	0.023	1.00E-06	2.90	0.13	0.13	1.26	0.10	0.36	364	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	60.9	136.8	38%
S22-S23	FMH7022360	FMH7038860	400	31.0	138.43	138.24	134.65	134.11	57	9.81	0.0006	0.017	1.00E-06	2.50	0.13	0.13	1.26	0.10	0.31	314	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	60.9	136.8	44%
S23-S24	FMH7038860	FMH7038861	400	11.0	138.24	137.63	134.11	133.63	23	9.81	0.0006	0.044	1.00E-06	3.96	0.13	0.13	1.26	0.10	0.50	497	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	60.9	136.8	28%
S24-S25	FMH7038861	FMH7038862	400	24.2	137.63	135.42	133.63	133.00	38	9.81	0.0006	0.026	1.00E-06	3.05	0.13	0.13	1.26	0.10	0.38	384	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	60.9	136.8	36%
S25-S26	FMH7038862	FMH7038845	400	35.0	135.42	135.34	133.00	132.50	70	9.81	0.0006	0.014	1.00E-06	2.26	0.13	0.13	1.26	0.10	0.28	284	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	60.9	136.8	48%
S26-S27	FMH7038845	FMH7038846	400	14.0	135.34	134.18	132.50	131.60	16	9.81	0.0006	0.064	1.00E-06	4.81	0.13	0.13	1.26	0.10	0.60	604	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	60.9	136.8	23%
S27-S28	FMH7038846	FMH7020219	400	30.0	134.18	131.89	131.76	129.79	15	9.81	0.0006	0.066	1.00E-06	4.86	0.13	0.13	1.26	0.10	0.61	610	Clay [1]	S	A	B2	C	D	E	F	G	H			171	493	136	3	65	61	115	32	18			1093.3	1093.3	4049.3	6	60.9	136.8	22%
S28-S29	FMH7020219	FMH7020220	300	24.0	131.89	130.45	129.79	128.35	17	9.81	0.0006	0.060	1.00E-06	3.87	0.07	0.07	0.94	0.08	0.27	274	Clay [1]	S	A	B2	C	D	E	F	G	H	I		171	493	136	3	65	61	115	32	18	11		1104.5	1104.5	4090.7	6	60.9	137.6	50%
S29-S30	FMH7020220	FMH7060381	300	42.0	130.45	126.53	128.35	124.46	11	9.81	0.0006	0.093	1.00E-06	4.81	0.07	0.07	0.94	0.08	0.34	340	Clay [1]	S	A	B2	C	D	E	F	G	H	I	J	K	171	493	136	3	65	61	115	32	18	11	6	317	1427.4	1427.4	5286.7	5	60.9	138.0	41%
S30-S31	FMH7060381	FMH7020221	300	13.0	126.53	124.48	124.46	122.68	7	9.81	0.0006	0.137	1.00E-06	5.85	0.07	0.07	0.94	0.08	0.41	414	Clay [1]	S	A	B2	C	D	E	F	G	H	I	J	K	171	493	136	3	65	61	115	32	18	11	6	317	1427.4	1427.4	5286.7	5	60.9	143.5	35%
S31-S32	FMH7020221	FMH7020222	300	33.0	124.48	119.51	122.68	117.41	6	9.81	0.0006	0.160	1.00E-06	6.32	0.07	0.07	0.94	0.08	0.45	447	Clay [1]	S	A	B2	C	D	E	F	G	H	I	J	K	171	493	136	3	65	61	115	32	18	11	6	317	1427.4	1427.4	5286.7	5	60.9	143.5	32%
S32-S33	FMH7020222	FMH7020223	300	32.0	119.51	115.59	117.41	112.89	7	9.81	0.0006	0.141	1.00E-06	5.94	0.07	0.07	0.94	0.08	0.42	420	Clay [1]	S	A	B2	C	D	E	F	G	H	I	J	K	171	493	136	3	65	61	115	32	18	11	6	317	1427.4	1427.4	5286.7	5	60.9	143.5	34%

Notes:

[1] Clayware (Clay) Pipe, reference to slimed clayware in poor condition in Sewerage Design Manual (SDM) Part 1, assumed Ks 3 mm (v<0.75m/s) and 0.6mm (v>1.2m/s).

[2] Catchment Inflow Factor of 1.0 applied to existing catchments

Confidential

Table 16a Hydraulic Capacity of the Sewerage System (FMH7022565 to FMH7020223) with Estimated Sewage Flow- Scenario 1

B. Backwater Analysis for Surcharged Sections

Sewer Sections	Flow Under the Assumed Hydraullic Gradient							Peak Flow w/ SF		Water Level		FreeBoard		Crown Level	
	Friction Loss	Local Loss	Headloss Loss	Velocty	Hydrallic Gradient S	Q		Q with Safety Factor	ΔQ	Up Stream	Down Stream	Up Stream	Down Stream	Up Stream	Down Stream
	m	m	m	m/s		m^3/s	L/s	1	L/s	mPD	mPD	m	m	mPD	mPD
FMH7022565 ~ FMH7022563	0.35	0.10	0.46	1.16	8E-03	0.05	46.1	46.1	0.0	140.37	140.14	2.64	1.90	139.96	139.61
FMH7022563 ~ FMH7022561	0.13	0.10	0.23	1.16	8E-03	0.05	46.1	46.1	0.0	140.14	139.75	1.90	1.90	139.58	139.47
FMH7022561 ~ FMH7022559	0.29	0.10	0.39	1.16	8E-03	0.05	46.1	46.1	0.0	139.75	139.24	1.90	2.41	139.45	139.17
FMH7022559 ~ FMH7022572	0.41	0.10	0.51	1.16	1E-02	0.05	46.1	46.1	0.0	139.24	138.87	2.41	2.13	139.12	138.94
FMH7022572 ~ FMH7022554	0.31	0.06	0.37	0.91	8E-03	0.04	36.1	46.1	10.0	138.87	138.63	2.13	1.99	138.94	138.63
FMH7022554 ~ FMH7022552	0.14	0.10	0.25	1.16	8E-03	0.05	46.1	46.1	0.0	138.63				138.70	138.26
FMH7022552 ~ FMH7022550	0.24	0.10	0.34	1.14	5E-03	0.08	80.8	80.8	0.0					138.26	137.77
FMH7022550 ~ FMH7022549	0.18	0.10	0.28	1.14	8E-03	0.08	80.8	80.8	0.0	126.46	126.20	12.76	12.58	137.62	137.53
FMH7022549 ~ FMH7022545	0.15	0.11	0.26	1.21	6E-03	0.09	85.5	85.5	0.0	126.20	125.70	12.58	12.92	137.52	137.37
FMH7022545 ~ FMH7022544	0.37	0.13	0.50	1.30	1E-02	0.09	91.8	91.8	0.0	125.70	125.03	12.92	13.71	137.37	137.19
FMH7022544 ~ FMH7022539	0.53	0.14	0.67	1.36	1E-02	0.10	96.0	96.0	0.0	125.03	124.40	13.71	14.49	137.19	137.04
FMH7022539 ~ FMH7022538	0.49	0.14	0.63	1.36	1E-02	0.10	96.0	96.0	0.0	124.40	123.61	14.49	15.41	137.04	136.82
FMH7022538 ~ FMH7022536	0.62	0.17	0.78	1.47	1E-02	0.10	104.0	104.0	0.0	123.61	123.52	15.41	15.46	136.92	136.75
FMH7022536 ~ FMH7038820	0.02	0.08	0.10	1.00	3E-03	0.13	126.1	126.1	0.0	123.52	123.28	15.46	15.43	136.73	136.66
FMH7038820 ~ FMH7022533	0.16	0.08	0.24	1.04	3E-03	0.13	131.2	131.2	0.0	123.28	123.04	15.43	15.33	136.66	136.31
FMH7022533 ~ FMH7022362	0.15	0.09	0.24	1.09	3E-03	0.14	136.8	136.8	0.0	123.04	122.79	15.33	15.21	136.29	135.95
FMH7022362 ~ FMH7022361	0.15	0.09	0.25	1.09	3E-03	0.14	136.8	136.8	0.0	122.79	122.58	15.21	15.82	135.94	135.66
FMH7022361 ~ FMH7022360	0.13	0.09	0.22	1.09	3E-03	0.14	136.8	136.8	0.0	122.58	122.38	15.82	16.05	135.94	135.05
FMH7022360 ~ FMH7038860	0.10	0.09	0.19	1.09	3E-03	0.14	136.8	136.8	0.0	122.38	122.25	16.05	15.99	135.05	134.51
FMH7038860 ~ FMH7038861	0.04	0.09	0.13	1.09	3E-03	0.14	136.8	136.8	0.0	122.25	122.08	15.99	15.55	134.51	134.03
FMH7038861 ~ FMH7038862	0.08	0.09	0.17	1.09	3E-03	0.14	136.8	136.8	0.0	122.08	121.87	15.55	13.55	134.03	133.40
FMH7038862 ~ FMH7038845	0.12	0.09	0.21	1.09	3E-03	0.14	136.8	136.8	0.0	121.87	121.74	13.55	13.60	133.40	132.90
FMH7038845 ~ FMH7038846	0.05	0.09	0.14	1.09	3E-03	0.14	136.8	136.8	0.0	121.74	121.54	13.60	12.64	132.90	132.00
FMH7038846 ~ FMH7020219	0.10	0.09	0.19	1.09	3E-03	0.14	136.8	136.8	0.0	121.54	120.89	12.64	11.00	132.06	130.09
FMH7020219 ~ FMH7020220	0.37	0.29	0.66	1.95	2E-02	0.14	137.6	137.6	0.0	120.89	119.95	11.00	10.50	130.09	128.65
FMH7020220 ~ FMH7060381	0.65	0.29	0.94	1.95	2E-02	0.14	138.0	138.0	0.0	119.95	119.42	10.50	7.11	128.65	124.76
FMH7060381 ~ FMH7020221	0.22	0.32	0.53	2.03	2E-02	0.14	143.5	143.5	0.0	119.42	118.56	7.11	5.92	124.76	122.98
FMH7020221 ~ FMH7020222	0.55	0.32	0.86	2.03	2E-02	0.14	143.5	143.5	0.0	118.56	117.71	5.92	1.80	122.98	117.71
FMH7020222 ~ FMH7020223	0.53	0.32	0.85	2.03	2E-02	0.14	143.5	143.5	0.0	117.71		1.80		117.41	112.89
											Min FreeBoard	*1.80*	*1.80*		

1 There's sufficient capacity in FMH702254 and FMH7020222. Therefore, Backwater calculation is conducted from manhole FMH7022554 and FMH7020222 to upstream as conservative assumption.
2 Foulwater level at FMH7022554 is assumed to be: 138.4(IL) + 225 (pipe dia.)/1000 = 138.63mPD as a conservative approach
3 Foulwater level at FMH7020222 is assumed to be: 117.41 (IL) + 300 (pipe dia.)/1000 = 117.71mPD as a conservative approach
3 For this assessment, the Colebrook-White Equation has been used to calculate the friction loss. (Sewerage Mannual section 5.2.1)
4 According to DSD'sSewerage Manual (Part 1) section 5.2.2, local losses are usually small in relation to the pipeline head losses and are not normally considered. However, as a conservative approach, further allowances have been included for local losses at pipe entry (K=0.5) and exit (K = 1), with a total local loss coefficient of 1.5

Comparing the Cover levels and foulwater levels at each manhole, the freeboards are found sufficient (>1m). Therefore, no unacceptable adverse sewerage impacts are identified.

5 Friction loss is deduced by required hydraulic gradient x pipe length, while the local loss is deduced by the equation:

$$h_f = K\frac{V^2}{2g}$$

Table 17a Hydraulic Capacity of the Sewerage System (FMH7022565 to FMH7020223) with Estimated Sewage Flow - Scenario 2

A. Hydraulic Capacity of Sewers and Comparison of Sewer Capacity to Sewage Generated from Proposed Development under Surcharge Contidion with Safety Factor = 1.0

Sewer Pipe ID	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	US CL	DS CL	US IL	DS IL	Gradient	g	k_s	s	v	V	Area	Area	Perimeter	R=A/P (Full Bore Radius)	Q (Full)	Estimated Capacity	Remarks on Material Assumption
			mm	m	mPD	mPD	mPD	mPD	1 in	m/s^2	m		m^2/s	m/s	m^2	m^2	m	m	m^3/s	L/s	
S4-S5	FMH7022565	FMH7022563	225	44.9	143.01	142.04	139.73	139.38	128	9.81	0.0006	0.008	1.00E-06	1.15	0.04	0.04	0.71	0.06	0.05	46	Clay [1]
S5-S6	FMH7022563	FMH7022561	225	16.3	142.04	141.65	139.35	139.24	148	9.81	0.0006	0.007	1.00E-06	1.07	0.04	0.04	0.71	0.06	0.04	43	Clay [1]
S6-S7	FMH7022561	FMH7022559	225	36.2	141.65	141.65	139.22	138.94	129	9.81	0.0006	0.008	1.00E-06	1.15	0.04	0.04	0.71	0.06	0.05	46	Clay [1]
S7-S8	FMH7022559	FMH7022572	225	31.8	141.65	141.00	138.89	138.71	177	9.81	0.003	0.006	1.00E-06	0.77	0.04	0.04	0.71	0.06	0.03	31	Clay [1]
S8-S9	FMH7022572	FMH7022554	225	38.8	141.00	140.61	138.71	138.40	125	9.81	0.003	0.008	1.00E-06	0.92	0.04	0.04	0.71	0.06	0.04	36	Clay [1]
S9-S10	FMH7022554	FMH7022552	225	18.2	140.61	139.76	138.40	137.96	41	9.81	0.0006	0.024	1.00E-06	2.04	0.04	0.04	0.71	0.06	0.08	81	Clay [1]
S10-S11	FMH7022552	FMH7022550	300	45.9	139.76	139.22	137.96	137.47	94	9.81	0.0006	0.011	1.00E-06	1.63	0.07	0.07	0.94	0.08	0.11	115	Clay [1]
S11-S12	FMH7022550	FMH7022549	300	20.9	139.22	138.78	137.32	137.23	232	9.81	0.003	0.004	1.00E-06	0.82	0.07	0.07	0.94	0.08	0.06	58	Clay [1]
S12-S13	FMH7022549	FMH7022545	300	24.8	138.78	138.62	137.22	137.07	165	9.81	0.0006	0.006	1.00E-06	1.22	0.07	0.07	0.94	0.08	0.09	86	Clay [1]
S13-S14	FMH7022545	FMH7022544	300	34.1	138.62	138.74	137.07	136.89	189	9.81	0.003	0.005	1.00E-06	0.90	0.07	0.07	0.94	0.08	0.06	64	Clay [1]
S14-S15	FMH7022544	FMH7022539	300	44.3	138.74	138.89	136.89	136.74	295	9.81	0.003	0.003	1.00E-06	0.72	0.07	0.07	0.94	0.08	0.05	51	Clay [1]
S15-S16	FMH7022539	FMH7022538	300	41.2	138.89	139.02	136.74	136.52	187	9.81	0.003	0.005	1.00E-06	0.91	0.07	0.07	0.94	0.08	0.06	64	Clay [1]
S16-S17	FMH7022538	FMH7022536	300	44.1	139.02	138.98	136.52	136.35	259	9.81	0.003	0.004	1.00E-06	0.77	0.07	0.07	0.94	0.08	0.05	55	Clay [1]
S17-S18	FMH7022536	FMH7038820	400	7.4	138.98	138.71	136.33	136.26	106	9.81	0.0006	0.009	1.00E-06	1.84	0.13	0.13	1.26	0.10	0.23	231	Clay [1]
S18-S19	FMH7038820	FMH7022533	400	50.2	138.71	138.37	136.26	135.91	143	9.81	0.0006	0.007	1.00E-06	1.57	0.13	0.13	1.26	0.10	0.20	198	Clay [1]
S19-S20	FMH7022533	FMH7022362	400	44.0	138.37	138.00	135.89	135.55	129	9.81	0.0006	0.008	1.00E-06	1.66	0.13	0.13	1.26	0.10	0.21	208	Clay [1]
S20-S21	FMH7022362	FMH7022361	400	46.0	138.00	138.40	135.54	135.26	164	9.81	0.0006	0.006	1.00E-06	1.47	0.13	0.13	1.26	0.10	0.18	185	Clay [1]
S21-S22	FMH7022361	FMH7022360	400	38.0	138.40	138.43	135.54	134.65	43	9.81	0.0006	0.023	1.00E-06	2.90	0.13	0.13	1.26	0.10	0.36	364	Clay [1]
S22-S23	FMH7022360	FMH7038860	400	31.0	138.43	138.24	134.65	134.11	57	9.81	0.0006	0.017	1.00E-06	2.50	0.13	0.13	1.26	0.10	0.31	314	Clay [1]
S23-S24	FMH7038860	FMH7038861	400	11.0	138.24	137.63	134.11	133.63	23	9.81	0.0006	0.044	1.00E-06	3.96	0.13	0.13	1.26	0.10	0.50	497	Clay [1]
S24-S25	FMH7038861	FMH7038862	400	24.2	137.63	135.42	133.63	133.00	38	9.81	0.0006	0.026	1.00E-06	3.05	0.13	0.13	1.26	0.10	0.38	384	Clay [1]
S25-S26	FMH7038862	FMH7038845	400	35.0	135.42	135.34	133.00	132.50	70	9.81	0.0006	0.014	1.00E-06	2.26	0.13	0.13	1.26	0.10	0.28	284	Clay [1]
S26-S27	FMH7038845	FMH7038846	400	14.0	135.34	134.18	132.50	131.60	16	9.81	0.0006	0.064	1.00E-06	4.81	0.13	0.13	1.26	0.10	0.60	604	Clay [1]
S27-S28	FMH7038846	FMH7020219	400	30.0	134.18	131.89	131.76	129.79	15	9.81	0.0006	0.066	1.00E-06	4.86	0.13	0.13	1.26	0.10	0.61	610	Clay [1]
S28-S29	FMH7020219	FMH7020220	300	24.0	131.89	130.45	129.79	128.35	17	9.81	0.0006	0.060	1.00E-06	3.87	0.07	0.07	0.94	0.08	0.27	274	Clay [1]
S29-S30	FMH7020220	FMH7060381	300	42.0	130.45	126.53	128.35	124.46	11	9.81	0.0006	0.093	1.00E-06	4.81	0.07	0.07	0.94	0.08	0.34	340	Clay [1]
S30-S31	FMH7060381	FMH7020221	300	13.0	126.53	124.48	124.46	122.68	7	9.81	0.0006	0.137	1.00E-06	5.85	0.07	0.07	0.94	0.08	0.41	414	Clay [1]
S31-S32	FMH7020221	FMH7020222	300	33.0	124.48	119.51	122.68	117.41	6	9.81	0.0006	0.160	1.00E-06	6.32	0.07	0.07	0.94	0.08	0.45	447	Clay [1]
S32-S33	FMH7020222	FMH7020223	300	32.0	119.51	115.59	117.41	112.89	7	9.81	0.0006	0.141	1.00E-06	5.94	0.07	0.07	0.94	0.08	0.42	420	Clay [1]

Catchment Carried													
1	2	3	4	5	6	7	8	9	10	11	12	13
S	A											
S	A											
S	A											
S	A											
S	A											
S	A											
S	A	B2	C									
S	A	B2	C									
S	A	B2	C	D								
S	A	B2	C	D								L
S	A	B2	C	D	E							L
S	A	B2	C	D	E							L
S	A	B2	C	D	E	F						L
S	A	B2	C	D	E	F						L
S	A	B2	C	D	E	F	G					L
S	A	B2	C	D	E	F	G	H				L
S	A	B2	C	D	E	F	G	H				L
S	A	B2	C	D	E	F	G	H				
S	A	B2	C	D	E	F	G	H				
S	A	B2	C	D	E	F	G	H				
S	A	B2	C	D	E	F	G	H				
S	A	B2	C	D	E	F	G	H				
S	A	B2	C	D	E	F	G	H				
S	A	B2	C	D	E	F	G	H				
S	A	B2	C	D	E	F	G	H				
S	A	B2	C	D	E	F	G	H	I			
S	A	B2	C	D	E	F	G	H	I	J	K	
S	A	B2	C	D	E	F	G	H	I	J	K	
S	A	B2	C	D	E	F	G	H	I	J	K	
S	A	B2	C	D	E	F	G	H	I	J	K	

Sewage from Catchment (ADWF in m^3/day) including Catchment Inflow Factor (CIF) [2]											
1	2	3	4	5	6	7	8	9	10	11	12
171	493										
171	493										
171	493										
171	493										
171	493										
171	493										
171	493	136	3								
171	493	136	3								
171	493	136	3	65							
171	493	136	3	65							
171	493	136	3	65	61						
171	493	136	3	65	61						
171	493	136	3	65	61	115					
171	493	136	3	65	61	115					
171	493	136	3	65	61	115	32				
171	493	136	3	65	61	115	32	18			
171	493	136	3	65	61	115	32	18			
171	493	136	3	65	61	115	32	18			
171	493	136	3	65	61	115	32	18			
171	493	136	3	65	61	115	32	18			
171	493	136	3	65	61	115	32	18			
171	493	136	3	65	61	115	32	18	11		
171	493	136	3	65	61	115	32	18	11	6	317
171	493	136	3	65	61	115	32	18	11	6	317
171	493	136	3	65	61	115	32	18	11	6	317
171	493	136	3	65	61	115	32	18	11	6	317

Total ADWF	Safety Factor [2]	Contributing Population	Peaking	Swimming Pool	Peak Flow (L/s)	% Capacity Occupied
m^3/day	1		Factor			
664.4	664.4	2460.7	6		46.1	101%
664.4	664.4	2460.7	6		46.1	108%
664.4	664.4	2460.7	6		46.1	101%
664.4	664.4	2460.7	6		46.1	151%
664.4	664.4	2460.7	6		46.1	127%
664.4	664.4	2460.7	6		46.1	57%
800.0	800.0	2963.0	6	25.2	80.8	70%
800.0	800.0	2963.0	6	25.2	80.8	140%
867.9	867.9	3214.5	6	25.2	85.5	99%
867.9	867.9	3214.5	6	31.5	91.8	144%
928.8	928.8	3440.0	6	31.5	96.0	188%
928.8	928.8	3440.0	6	31.5	96.0	150%
1043.8	1043.8	3866.0	6	31.5	104.0	191%
1043.8	1043.8	3866.0	6	53.6	126.1	55%
1075.5	1075.5	3983.2	6	56.5	131.2	66%
1093.3	1093.3	4049.3	6	60.9	136.8	66%
1093.3	1093.3	4049.3	6	60.9	136.8	74%
1093.3	1093.3	4049.3	6	60.9	136.8	38%
1093.3	1093.3	4049.3	6	60.9	136.8	44%
1093.3	1093.3	4049.3	6	60.9	136.8	28%
1093.3	1093.3	4049.3	6	60.9	136.8	36%
1093.3	1093.3	4049.3	6	60.9	136.8	48%
1093.3	1093.3	4049.3	6	60.9	136.8	23%
1093.3	1093.3	4049.3	6	60.9	136.8	22%
1104.5	1104.5	4090.8	6	60.9	137.6	50%
1110.1	1110.1	4111.6	6	60.9	138.0	41%
1427.4	1427.4	5286.5	5	60.9	143.5	35%
1427.4	1427.4	5286.5	5	60.9	143.5	32%
1427.4	1427.4	5286.5	5	60.9	143.5	34%

Notes:

[1] Clayware (Clay) Pipe, reference to slimed clayware in poor condition in Sewerage Design Manual (SDM) Part 1, assumed Ks 3 mm (v<0.75m/s) and 0.6mm (v>1.2m/s).

[2] Catchment Inflow Factor of 1.0 applied to existing catchments

Table 17a Hydraulic Capacity of the Sewerage System (FMH7022565 to FMH7020223) with Estimated Sewage Flow - Scenario 2

B. Backwater Analysis for Surcharged Sections

Sewer Sections	Flow Under the Assumed Hydraullic Gradient							Peak Flow w/ SF		Water Level		FreeBoard		Crown Level	
	Friction Loss	Local Loss	Headloss Loss	Velocty	Hydrallic Gradient S	Q		Q with Safety Factor	ΔQ	Up Stream	Down Stream	Up Stream	Down Stream	Up Stream	Down Stream
	m	m	m	m/s		m^3/s	L/s	1	L/s	mPD	mPD	m	m	mPD	mPD
FMH7022565 ~ FMH7022563	0.35	0.10	0.46	1.16	8E-03	0.05	46.1	46.1	0.0	140.81	140.35	2.20	1.69	139.96	139.61
FMH7022563 ~ FMH7022561	0.13	0.10	0.23	1.16	8E-03	0.05	46.1	46.1	0.0	140.35	140.12	1.69	1.53	139.58	139.47
FMH7022561 ~ FMH7022559	0.29	0.10	0.39	1.16	8E-03	0.05	46.1	46.1	0.0	140.12	139.74	1.53	1.91	139.45	139.17
FMH7022559 ~ FMH7022572	0.41	0.10	0.51	1.16	1E-02	0.05	46.1	46.1	0.0	139.74	139.22	1.91	1.78	139.12	138.94
FMH7022572 ~ FMH7022554	0.50	0.10	0.60	1.16	1E-02	0.05	46.1	46.1	0.0	139.22	138.63	1.78	1.99	138.94	138.63
FMH7022554 ~ FMH7022552	0.14	0.10	0.25	1.16	8E-03	0.05	46.1	46.1	0.0	138.63		1.99		138.70	138.26
FMH7022552 ~ FMH7022550	0.24	0.10	0.34	1.14	5E-03	0.08	80.8	80.8	0.0					138.26	137.77
FMH7022550 ~ FMH7022549	0.18	0.10	0.28	1.14	8E-03	0.08	80.8	80.8	0.0					137.62	137.53
FMH7022549 ~ FMH7022545	0.15	0.11	0.26	1.21	6E-03	0.09	85.5	85.5	0.0	137.22	137.57	1.56	1.05	137.52	137.37
FMH7022545 ~ FMH7022544	0.37	0.13	0.50	1.30	1E-02	0.09	91.8	91.8	0.0	137.07	137.56	1.55	1.18	137.37	137.19
FMH7022544 ~ FMH7022539	0.53	0.14	0.67	1.36	1E-02	0.10	96.0	96.0	0.0	136.89	137.37	1.85	1.52	137.19	137.04
FMH7022539 ~ FMH7022538	0.49	0.14	0.63	1.36	1E-02	0.10	96.0	96.0	0.0	136.74	137.30	2.15	1.72	137.04	136.82
FMH7022538 ~ FMH7022536	0.62	0.17	0.78	1.47	1E-02	0.10	104.0	104.0	0.0	136.52	136.83	2.50	2.15	136.92	136.75
FMH7022536 ~ FMH7038820	0.02	0.08	0.10	1.00	3E-03	0.13	126.1	126.1	0.0	136.73		2.25		136.73	136.66
FMH7038820 ~ FMH7022533	0.16	0.08	0.24	1.04	3E-03	0.13	131.2	131.2	0.0					136.66	136.31
FMH7022533 ~ FMH7022362	0.15	0.09	0.24	1.09	3E-03	0.14	136.8	136.8	0.0					136.29	135.95
FMH7022362 ~ FMH7022361	0.15	0.09	0.25	1.09	3E-03	0.14	136.8	136.8	0.0					135.94	135.66
FMH7022361 ~ FMH7022360	0.13	0.09	0.22	1.09	3E-03	0.14	136.8	136.8	0.0					135.94	135.05
FMH7022360 ~ FMH7038860	0.10	0.09	0.19	1.09	3E-03	0.14	136.8	136.8	0.0					135.05	134.51
FMH7038860 ~ FMH7038861	0.04	0.09	0.13	1.09	3E-03	0.14	136.8	136.8	0.0					134.51	134.03
FMH7038861 ~ FMH7038862	0.08	0.09	0.17	1.09	3E-03	0.14	136.8	136.8	0.0					134.03	133.40
FMH7038862 ~ FMH7038845	0.12	0.09	0.21	1.09	3E-03	0.14	136.8	136.8	0.0					133.40	132.90
FMH7038845 ~ FMH7038846	0.05	0.09	0.14	1.09	3E-03	0.14	136.8	136.8	0.0					132.90	132.00
FMH7038846 ~ FMH7020219	0.10	0.09	0.19	1.09	3E-03	0.14	136.8	136.8	0.0					132.06	130.09
FMH7020219 ~ FMH7020220	0.37	0.29	0.66	1.95	2E-02	0.14	137.6	137.6	0.0					130.09	128.65
FMH7020220 ~ FMH7060381	0.65	0.29	0.94	1.95	2E-02	0.14	138.0	138.0	0.0					128.65	124.76
FMH7060381 ~ FMH7020221	0.22	0.32	0.53	2.03	2E-02	0.14	143.5	143.5	0.0					124.76	122.98
FMH7020221 ~ FMH7020222	0.55	0.32	0.86	2.03	2E-02	0.14	143.5	143.5	0.0					122.98	117.71
FMH7020222 ~ FMH7020223	0.53	0.32	0.85	2.03	2E-02	0.14	143.5	143.5	0.0					117.41	112.89
											Min FreeBoard	*1.53*	*1.05*		

1 There's sufficient capacity in FMH702254 and FMH70202538. Therefore, Backwater calculation is conducted from manhole FMH7022554 and FMH70202538 to upstream as conservative assumption.

2 Foulwater level at FMH7022554 is assumed to be: 138.4(IL) + 225 (pipe dia.)/1000 = 138.63mPD as a conservative approach

3 Foulwater level at FMH70202538 is assumed to be: 136.33 (IL) + 400 (pipe dia.)/1000 = 136.73 mPD as a conservative approach

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

4 According to DSD'sSewerage Manual (Part 1) section 5.2.2, local losses are usually small in relation to the pipeline head losses and are not normally considered. However, as a conservative approach, further Comparing the Cover levels and foulwater levels at each manhole, the freeboards are found sufficient (>1m). Therefore, no unaccepta` ` ` age impacts are identified.

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

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Table 17b Hydraulic Capacity of the Sewerage System (FMH7022565 to FMH7022552) with Estimated Sewage Flow - Scenario 2

A. Hydraulic Capacity of Sewers and Comparison of Sewer Capacity to Sewage Generated from Proposed Development under Surcharge Contidion with Safety Factor = 1.15

Sewer Pipe ID	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	US CL	DS CL	US IL	DS IL	Gradient	g	k_s	s	v	V	Area	Area	Perimeter	R=A/P (Full Bore Radius)	Q (Full)	Estimated Capacity	Remarks on Material Assumption
			mm	m	mPD	mPD	mPD	mPD	1 in	m/s^2	m		m^2/s	m/s	m^2	m^2	m	m	m^3/s	L/s	
S4-S5	FMH7022565	FMH7022563	225	44.9	143.01	142.04	139.73	139.38	128	9.81	0.0006	0.008	1.00E-06	1.15	0.04	0.04	0.71	0.06	0.05	46	Clay [1]
S5-S6	FMH7022563	FMH7022561	225	16.3	142.04	141.65	139.35	139.24	148	9.81	0.0006	0.007	1.00E-06	1.07	0.04	0.04	0.71	0.06	0.04	43	Clay [1]
S6-S7	FMH7022561	FMH7022559	225	36.2	141.65	141.65	139.22	138.94	129	9.81	0.0006	0.008	1.00E-06	1.15	0.04	0.04	0.71	0.06	0.05	46	Clay [1]
S7-S8	FMH7022559	FMH7022572	225	31.8	141.65	141.00	138.89	138.71	177	9.81	0.003	0.006	1.00E-06	0.77	0.04	0.04	0.71	0.06	0.03	31	Clay [1]
S8-S9	FMH7022572	FMH7022554	225	38.8	141.00	140.61	138.71	138.40	125	9.81	0.003	0.008	1.00E-06	0.92	0.04	0.04	0.71	0.06	0.04	36	Clay [1]
S9-S10	FMH7022554	FMH7022552	225	18.2	140.61	139.76	138.40	137.96	41	9.81	0.0006	0.024	1.00E-06	2.04	0.04	0.04	0.71	0.06	0.08	81	Clay [1]
S10-S11	FMH7022552	FMH7022550	300	45.9	139.76	139.22	137.96	137.47	94	9.81	0.0006	0.011	1.00E-06	1.63	0.07	0.07	0.94	0.08	0.11	115	Clay [1]
S11-S12	FMH7022550	FMH7022549	300	20.9	139.22	138.78	137.32	137.23	232	9.81	0.003	0.004	1.00E-06	0.82	0.07	0.07	0.94	0.08	0.06	58	Clay [1]
S12-S13	FMH7022549	FMH7022545	300	24.8	138.78	138.62	137.22	137.07	165	9.81	0.0006	0.006	1.00E-06	1.22	0.07	0.07	0.94	0.08	0.09	86	Clay [1]
S13-S14	FMH7022545	FMH7022544	300	34.1	138.62	138.74	137.07	136.89	189	9.81	0.003	0.005	1.00E-06	0.90	0.07	0.07	0.94	0.08	0.06	64	Clay [1]
S14-S15	FMH7022544	FMH7022539	300	44.3	138.74	138.89	136.89	136.74	295	9.81	0.003	0.003	1.00E-06	0.72	0.07	0.07	0.94	0.08	0.05	51	Clay [1]
S15-S16	FMH7022539	FMH7022538	300	41.2	138.89	139.02	136.74	136.52	187	9.81	0.003	0.005	1.00E-06	0.91	0.07	0.07	0.94	0.08	0.06	64	Clay [1]
S16-S17	FMH7022538	FMH7022536	300	44.1	139.02	138.98	136.52	136.35	259	9.81	0.003	0.004	1.00E-06	0.77	0.07	0.07	0.94	0.08	0.05	55	Clay [1]
S17-S18	FMH7022536	FMH7038820	400	7.4	138.98	138.71	136.33	136.26	106	9.81	0.0006	0.009	1.00E-06	1.84	0.13	0.13	1.26	0.10	0.23	231	Clay [1]
S18-S19	FMH7038820	FMH7022533	400	50.2	138.71	138.37	136.26	135.91	143	9.81	0.0006	0.007	1.00E-06	1.57	0.13	0.13	1.26	0.10	0.20	198	Clay [1]
S19-S20	FMH7022533	FMH7022362	400	44.0	138.37	138.00	135.89	135.55	129	9.81	0.0006	0.008	1.00E-06	1.66	0.13	0.13	1.26	0.10	0.21	208	Clay [1]
S20-S21	FMH7022362	FMH7022361	400	46.0	138.00	138.40	135.54	135.26	164	9.81	0.0006	0.006	1.00E-06	1.47	0.13	0.13	1.26	0.10	0.18	185	Clay [1]
S21-S22	FMH7022361	FMH7022360	400	38.0	138.40	138.43	135.54	134.65	43	9.81	0.0006	0.023	1.00E-06	2.90	0.13	0.13	1.26	0.10	0.36	364	Clay [1]
S22-S23	FMH7022360	FMH7038860	400	31.0	138.43	138.24	134.65	134.11	57	9.81	0.0006	0.017	1.00E-06	2.50	0.13	0.13	1.26	0.10	0.31	314	Clay [1]
S23-S24	FMH7038860	FMH7038861	400	11.0	138.24	137.63	134.11	133.63	23	9.81	0.0006	0.044	1.00E-06	3.96	0.13	0.13	1.26	0.10	0.50	497	Clay [1]
S24-S25	FMH7038861	FMH7038862	400	24.2	137.63	135.42	133.63	133.00	38	9.81	0.0006	0.026	1.00E-06	3.05	0.13	0.13	1.26	0.10	0.38	384	Clay [1]
S25-S26	FMH7038862	FMH7038845	400	35.0	135.42	135.34	133.00	132.50	70	9.81	0.0006	0.014	1.00E-06	2.26	0.13	0.13	1.26	0.10	0.28	284	Clay [1]
S26-S27	FMH7038845	FMH7038846	400	14.0	135.34	134.18	132.50	131.60	16	9.81	0.0006	0.064	1.00E-06	4.81	0.13	0.13	1.26	0.10	0.60	604	Clay [1]
S27-S28	FMH7038846	FMH7020219	400	30.0	134.18	131.89	131.76	129.79	15	9.81	0.0006	0.066	1.00E-06	4.86	0.13	0.13	1.26	0.10	0.61	610	Clay [1]
S28-S29	FMH7020219	FMH7020220	300	24.0	131.89	130.45	129.79	128.35	17	9.81	0.0006	0.060	1.00E-06	3.87	0.07	0.07	0.94	0.08	0.27	274	Clay [1]
S29-S30	FMH7020220	FMH7060381	300	42.0	130.45	126.53	128.35	124.46	11	9.81	0.0006	0.093	1.00E-06	4.81	0.07	0.07	0.94	0.08	0.34	340	Clay [1]
S30-S31	FMH7060381	FMH7020221	300	13.0	126.53	124.48	124.46	122.68	7	9.81	0.0006	0.137	1.00E-06	5.85	0.07	0.07	0.94	0.08	0.41	414	Clay [1]
S31-S32	FMH7020221	FMH7020222	300	33.0	124.48	119.51	122.68	117.41	6	9.81	0.0006	0.160	1.00E-06	6.32	0.07	0.07	0.94	0.08	0.45	447	Clay [1]
S32-S33	FMH7020222	FMH7020223	300	32.0	119.51	115.59	117.41	112.89	7	9.81	0.0006	0.141	1.00E-06	5.94	0.07	0.07	0.94	0.08	0.42	420	Clay [1]

Notes:

[1] Clayware (Clay) Pipe, reference to slimed clayware in poor condition in Sewerage Design Manual (SDM) Part 1, assumed Ks 3 mm (v<0.75m/s) and 0.6mm (v>1.2m/s).

[2] Catchment Inflow Factor of 1.0 applied to existing catchments

Table 17b Hydraulic Capacity of the Sewerage System (FMH7022565 to FMH7022552) with Estimated Sewage Flow - Scenario 2

B. Backwater Analysis for Surcharged Sections

Sewer Sections	Flow Under the Assumed Hydraullic Gradient							Peak Flow w/ SF		Water Level		FreeBoard		Crown Level	
	Friction Loss	Local Loss	Headloss Loss	Velocty	Hydrallic Gradient S	Q		Q with Safety Factor	ΔQ	Up Stream	Down Stream	Up Stream	Down Stream	Up Stream	Down Stream
	m	m	m	m/s		m^3/s	L/s	1.15	L/s	mPD	mPD	m	m	mPD	mPD
FMH7022565 ~ FMH7022563	0.47	0.14	0.60	1.33	1E-02	0.05	53.0	53.0	0.0	141.51	140.91	1.50	1.13	139.96	139.61
FMH7022563 ~ FMH7022561	0.17	0.14	0.30	1.33	1E-02	0.05	53.0	53.0	0.0	140.91	140.60	1.13	1.05	139.58	139.47
FMH7022561 ~ FMH7022559	0.38	0.14	0.51	1.33	1E-02	0.05	53.0	53.0	0.0	140.60	140.09	1.05	1.56	139.45	139.17
FMH7022559 ~ FMH7022572	0.54	0.14	0.67	1.33	2E-02	0.05	53.0	53.0	0.0	140.09	139.42	1.56	1.58	139.12	138.94
FMH7022572 ~ FMH7022554	0.66	0.14	0.79	1.33	2E-02	0.05	53.0	53.0	0.0	139.42	138.63	1.58	1.99	138.94	138.63
FMH7022554 ~ FMH7022552	0.19	0.14	0.32	1.33	1E-02	0.05	53.0	53.0	0.0	138.63		1.99		138.70	138.26
FMH7022552 ~ FMH7022550	0.32	0.13	0.45	1.31	7E-03	0.09	92.9	92.9	0.0					138.26	137.77
FMH7022550 ~ FMH7022549	0.23	0.13	0.37	1.31	1E-02	0.09	92.9	92.9	0.0					137.62	137.53
FMH7022549 ~ FMH7022545	0.19	0.15	0.34	1.39	8E-03	0.10	98.3	98.3	0.0	137.22	137.73	1.56	0.89	137.52	137.37
FMH7022545 ~ FMH7022544	0.49	0.17	0.66	1.49	1E-02	0.11	105.6	105.6	0.0	137.07	137.77	1.55	0.97	137.37	137.19
FMH7022544 ~ FMH7022539	0.70	0.19	0.88	1.56	2E-02	0.11	110.4	110.4	0.0	136.89	137.58	1.85	1.31	137.19	137.04
FMH7022539 ~ FMH7022538	0.65	0.19	0.84	1.56	2E-02	0.11	110.4	110.4	0.0	136.74	137.55	2.15	1.47	137.04	136.82
FMH7022538 ~ FMH7022536	0.82	0.22	1.03	1.69	2E-02	0.12	119.6	119.6	0.0	136.52	136.86	2.50	2.12	136.92	136.75
FMH7022536 ~ FMH7038820	0.03	0.10	0.13	1.15	4E-03	0.15	145.0	145.0	0.0	136.73		2.25		136.73	136.66
FMH7038820 ~ FMH7022533	0.20	0.11	0.31	1.20	4E-03	0.15	150.9	150.9	0.0					136.66	136.31
FMH7022533 ~ FMH7022362	0.19	0.12	0.31	1.25	4E-03	0.16	157.3	157.3	0.0					136.29	135.95
FMH7022362 ~ FMH7022361	0.20	0.12	0.32	1.25	4E-03	0.16	157.3	157.3	0.0					135.94	135.66
FMH7022361 ~ FMH7022360	0.17	0.12	0.29	1.25	4E-03	0.16	157.3	157.3	0.0					135.94	135.05
FMH7022360 ~ FMH7038860	0.14	0.12	0.26	1.25	4E-03	0.16	157.3	157.3	0.0					135.05	134.51
FMH7038860 ~ FMH7038861	0.05	0.12	0.17	1.25	4E-03	0.16	157.3	157.3	0.0					134.51	134.03
FMH7038861 ~ FMH7038862	0.11	0.12	0.23	1.25	4E-03	0.16	157.3	157.3	0.0					134.03	133.40
FMH7038862 ~ FMH7038845	0.16	0.12	0.27	1.25	4E-03	0.16	157.3	157.3	0.0					133.40	132.90
FMH7038845 ~ FMH7038846	0.06	0.12	0.18	1.25	4E-03	0.16	157.3	157.3	0.0					132.90	132.00
FMH7038846 ~ FMH7020219	0.13	0.12	0.25	1.25	4E-03	0.16	157.3	157.3	0.0					132.06	130.09
FMH7020219 ~ FMH7020220	0.48	0.38	0.87	2.24	2E-02	0.16	158.2	158.2	0.0					130.09	128.65
FMH7020220 ~ FMH7060381	0.85	0.39	1.24	2.25	2E-02	0.16	158.7	158.7	0.0					128.65	124.76
FMH7060381 ~ FMH7020221	0.29	0.42	0.70	2.33	2E-02	0.17	165.0	165.0	0.0					124.76	122.98
FMH7020221 ~ FMH7020222	0.72	0.42	1.14	2.33	2E-02	0.17	165.0	165.0	0.0					122.98	117.71
FMH7020222 ~ FMH7020223	0.70	0.42	1.12	2.33	2E-02	0.17	165.0	165.0	0.0					117.41	112.89
											Min FreeBoard	*1.05*	*0.89*		

1 There's sufficient capacity in FMH702254 and FMH70202538. Therefore, Backwater calculation is conducted from manhole FMH7022554 and FMH70202538 to upstream as conservative assumption.

2 Foulwater level at FMH7022554 is assumed to be: 138.4(IL) + 225 (pipe dia.)/1000 = 138.63mPD as a conservative approach

3 Foulwater level at FMH70202538 is assumed to be: 136.33 (IL) + 400 (pipe dia.)/1000 = 136.73 mPD as a conservative approach

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

4 According to DSD'sSewerage Manual (Part 1) section 5.2.2, local losses are usually small in relation to the pipeline head losses and are not normally considered. However, as a conservative approach, Comparing the Cover levels and foulwater levels at each manhole, the freeboards are found sufficient (>1m). Therefore, no unacceptable sewerage impacts are identified.

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

Appendix 2.2 Detailed Sewerage Impact Assessment Calculations_ Existing Development

Table 1 Calculation for Sewage Generation Rate of the Existing Development

Estimated Sewage Flow from Existing Development				
1a. Staff Quarters				
Number of residents	=	274	people	
Unit Flow Factors	=	0.27	m^3/day	(R2 in Table T-1 of GESF)
Sewage generation rate	=	74.0	m^3/day	
Total Flow from Existing Development				
Total ADWF in Catchment A1	=	74.0	m^3/day	
Catchment Inflow Factor PCIF	=	1.0		Refer to Table T-4 of GESF - Sandy Bay
Total ADWF with Catchment Inflow Factor PCIF	=	74.0	m^3/day	
				(refer to Section 12 of GESF -- Contributing population is the Flow rate with PCIF ÷ 0.27, while 0.27 is the average unit flow factor of all typical residents plus employees)
Contributing Population	=	274	people	
Peaking factor	=	8		Refer to Table T-5 of GESF for population <1,000 incl. stormwater allowance
Peak Flow	=	6.9	L/s	