

Appendix 5

Sewerage Impact Assessment (SIA)

**PROPOSED SOCIAL WELFARE FACILITIES
(RESIDENTIAL CARE HOME FOR THE
DISABILITIES (RCHD)) IN “VILLAGE TYPE
DEVELOPMENT” ZONE, VARIOUS LOTS IN
D.D. 104 AND ADJOINING GOVERNMENT
LAND, NAM SANG WAI, YUEN LONG**

SEWERAGE IMPACT ASSESSMENT

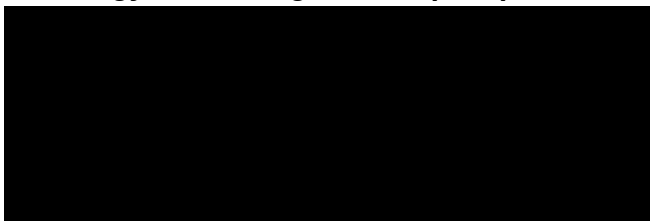
20 May 2025

Report No: RT25285-SIA-02

Prepared By:



BeeXergy Consulting Limited (BXG)



Project:	PROPOSED SOCIAL WELFARE FACILITIES (RESIDENTIAL CARE HOME FOR THE DISABILITIES (RCHD)) IN "VILLAGE TYPE DEVELOPMENT" ZONE, VARIOUS LOTS IN D.D. 104 AND ADJOINING GOVERNMENT LAND, NAM SANG WAI, YUEN LONG SEWERAGE IMPACT ASSESSMENT				
Report No.:	Ref: RT25285-SIA-02				
Revision	Issue Date	Description	Author	Checker	Approver
0	20/05/2025	Issued for Comment	LY	YS	HM

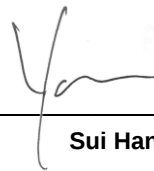
Prepared By:



Leo Yu

Consultant

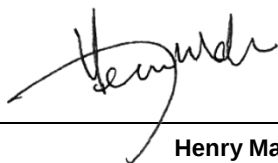
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Sui Hang Yan

Technical Director

Approved by:



Henry Mak

Director

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TABLE OF CONTENTS

1	INTRODUCTION.....	1
1.1	PROJECT BACKGROUND	1
1.2	PROJECT LOCATION.....	1
1.3	DESCRIPTION OF THE SUBJECT SITE AND PROPOSED DEVELOPMENT	1
2	SEWERAGE IMPACT ASSESSMENT	1
2.1	SCOPE OF WORKS	1
2.2	EXISTING SEWERAGE FACILITIES	1
2.3	ASSESSMENT CRITERIA, METHODOLOGY, AND ASSUMPTIONS	2
2.4	RESULTS AND DISCUSSION.....	3
3	CONCLUSION	4

LIST OF FIGURES

FIGURE 1	LOCATION OF THE PROJECT SITE AND ITS SURROUNDING AREA
FIGURE 2	EXISTING SEWERAGE SYSTEM
FIGURE 3	PROPOSED TERMINAL MANHOLE AND CONNECTION

LIST OF APPENDICES

APPENDIX A	MASTER LAYOUT PLAN
APPENDIX B	SEWAGE CALCULATION AND HYDRAULIC CAPACITY CHECK

1 INTRODUCTION

1.1 PROJECT BACKGROUND

- 1.1.1. The Project Proponent proposes to develop a 3-storey Residential Care Home for the Disabilities (RCHD) in various lots in D.D. 104, Nam Sang Wai (hereafter called “the Proposed Development”).
- 1.1.1. BeeXergy Consulting Limited was appointed by DeSPACE (International) Limited (the Town Planner) to conduct a Sewerage Impact Assessment (SIA) for the Proposed Development to support the application under Section 16 of the Town Planning Ordinance. The latest architectural drawings and technical information on the Project Site were largely provided by the Project Architect.

1.2 PROJECT LOCATION

- 1.2.1. The Project Site is approximately 1603m², currently bounded by abandoned fishponds to the north and west, Kam Pok Road East to the south. **Figure 1** shows the location of the Project Site and its surrounding area.

1.3 DESCRIPTION OF THE SUBJECT SITE AND PROPOSED DEVELOPMENT

- 1.3.1. The Project Site area is approximately 1,603m². The Proposed Development is an 3-storey building consisting of RCHD dormitory and communal area. The master layout plan provided by the Project Architect is enclosed in **Appendix A**.

2 SEWERAGE IMPACT ASSESSMENT

2.1 SCOPE OF WORKS

- 2.1.1. The objective of this SIA is to assess whether the capacity of the sewerage networking is sufficient to cope with the peak sewage flow arising from the Proposed Development during its operation stage or not and to recommend appropriate mitigation measures to alleviate unacceptable sewerage impact, if any.

2.2 EXISTING SEWERAGE FACILITIES

- 2.2.1. The existing sewerage record from the Lands Department (LandsD) and Drainage Service Department (DSD) are obtained for this SIA and attached in **Figure 2**. There are no existing manholes located within the Project Site. The public sewerage facility located closest to the Project Site is Nam Sang Wai Sewage Pumping Station which is located approximately 800m away from the boundary of the Project Site.

- 2.2.2. A site survey to identify the existing site condition and surrounding environment was conducted on 06 May 2025. The existing public sewerage system identified along Kam Pok Road East could serve the Project Site. The location of the proposed termination manhole and connection are shown in **Figure 3**.
- 2.2.3. A new terminal manhole (namely S1) will be built to collect the sewage generated from the Proposed Development and connect to the existing sewer via a 225mm diameter sewer pipe. The capacity check of the sewer will start from the proposed terminal manhole S1.

2.3 ASSESSMENT CRITERIA, METHODOLOGY, AND ASSUMPTIONS

- 2.3.1. The Unit Flow Factors and Global Peaking Factor are adopted from the figures in the Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0)¹ (GESF) issued by the Environmental Protection Department (EPD) in March 2005 to estimate the sewage flows generated from the Project Site.
- 2.3.2. The Unit Flow Factors and Catchment Inflow Factors as shown in **Table 2.1** below are adopted in the assessment and the surrounding catchments are shown in **Figure 4**.

Table 2.1 Unit Flow Factors and Catchment Inflow Factors Extracted from GESF

Parameter	Value	Justification
<i>Population</i>		
Residents in Proposed Development	178 people	178 beds
Employees in Proposed Development	90 people	Advised by Project Proponent
<i>Unit Flow Factors</i>		
Residents and Visitors in Proposed Development	0.19m ³ /day	"Institutional and special class" based on EPD's GESF Table T-1.
Employees in Proposed Development	0.28m ³ /day	J11 "Community, Social & Personal Services" based on EPD's GESF Table T-2.
<i>Catchment Inflow Factor (P_{CIF})</i>		
Discharge from the Project Site and all Catchments	1.0	Yuen Long Catchment based on EPD's GESF Table T-4.

¹ http://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/water/guide_ref/files/gesf.pdf

- 2.3.3. With reference to Table T-5 of GESF, a global peaking factor of 8 and 6 (including stormwater allowance) are adopted according to the contributing population.
- 2.3.4. With reference to Table 5 in the Sewerage Manual (Part 1)² issued by the DSD in May 2013, slimed sewer of k_s of 0.6mm under “Poor” condition is assumed for both the sewers from the Subject Site and existing sewerage system in the worst-case scenario. The Colebrook-White Equation will be used to analyse the flow conditions. Equation (ii) for circular pipes flowing partially full is adopted to estimate the sewage flow for the Subject Site and following sewers.

2.4 RESULTS AND DISCUSSION

- 2.4.1. The estimated average flow rate and total peak flow of the Proposed Development are approximately 59.0m³/day and 5.46L/s.
- 2.4.2. Sewage generated from the Proposed Development and surrounding catchment areas will be connected at the downstream of sewage network. The cumulative flow is generally no more than 20% of sewer capacity and no adverse sewerage impacts to the existing sewerage system are identified. Therefore, no upgrading or improvement works of the sewerage system are required. Details of the sewage calculation are included in **Appendix D**.

² http://www.dsd.gov.hk/EN/Files/Technical_Manual/technical_manuals/Sewerage_Manual_1_Eurocodes.pdf

3 CONCLUSION

- 3.1.1. A Social Welfare Facility (Residential Care Home for the Disabilities) is proposed to develop at various lots in D.D. 104, Nam Sang Wai. This is the SIA to support the application under Section 16 of the Town Planning Ordinance.
- 3.1.2. Based on the SIA results, it is found that the existing sewerage system serving the area has sufficient capacity to cater for the sewage generation from the proposed development and the surrounding catchment areas. Adverse sewerage impacts are not anticipated, and thus no upgrading or improvement works are required.

FIGURE 1

**LOCATION OF THE PROJECT SITE AND ITS
SURROUNDING AREA**



LEGEND:

Site Boundary

	Prepared	Checked	Approved
Initial	LY	YS	HM
Date	20250516	20250516	20250516

Project Title

Proposed Social Welfare Facilities (Residential Care Home for the Elderly (RCHE)) in "Village Type Development" Zone, Various Lots in D.D. 104 and Adjoining Government Land, Nam Sang Wai, Yuen Long

DrawingTitle

PROPOSED DEVELOPMENT LOCATION

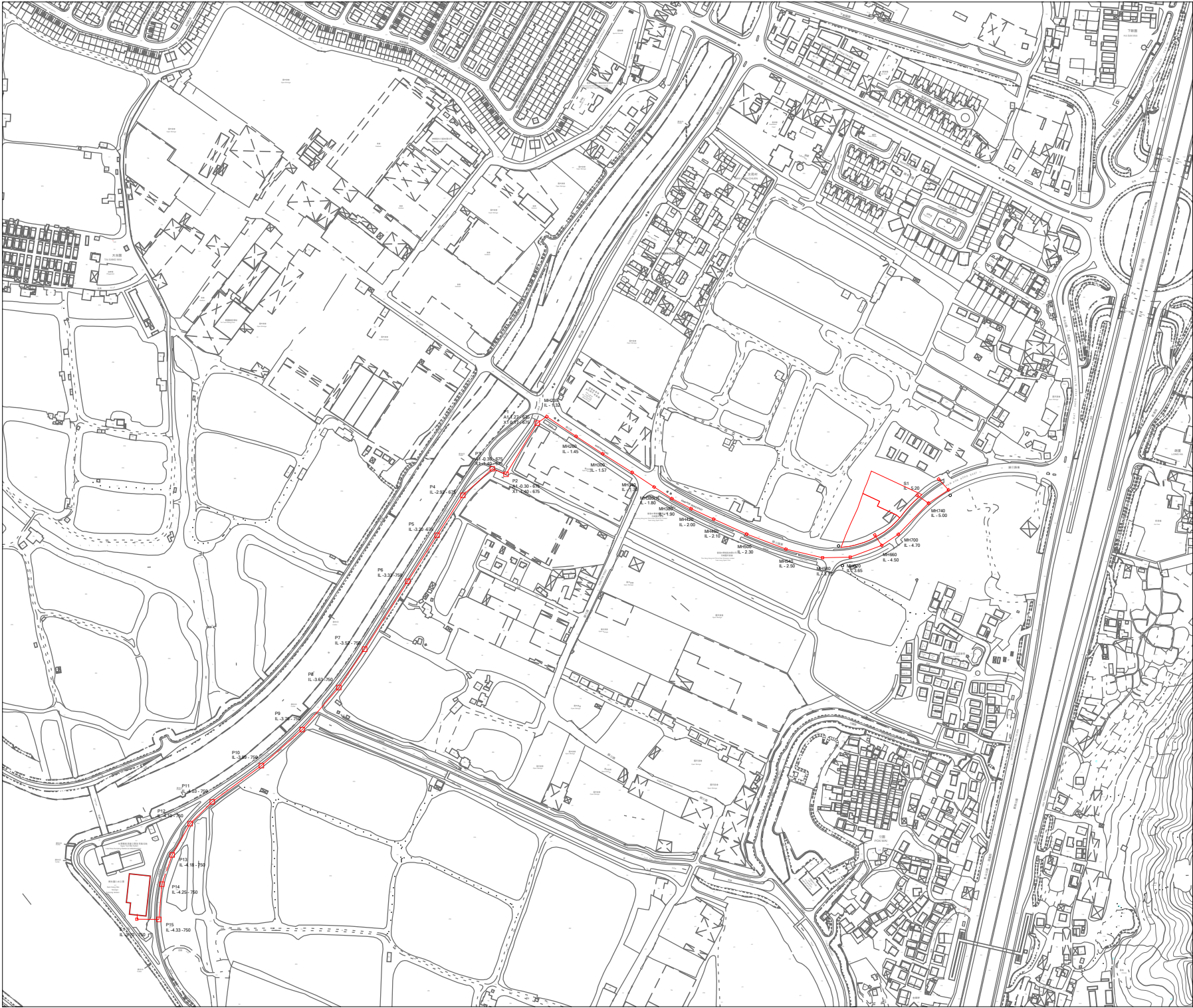
Drawing No.	Rev.
FIGURE 1	0

Scale:

A4 - 1:5500

FIGURE 3

**PROPOSED TERMINAL MANHOLE AND
CONNECTION**



LEGEND:

- Site Boundary
- Manhole

	Prepared	Checked	Approved
Initial	LY	YS	HM
Date	20250516	20250516	20250516

Project Title

Proposed Social Welfare Facilities (Residential Care Home for the Disabilities (RCHD)) in "Village Type Development" Zone, Various Lots in D.D. 104 and Adjoining Government Land, Nam Sang Wai, Yuen Long

DrawingTitle

PROPOSED TERMINAL MANHOLE AND CONNECTION

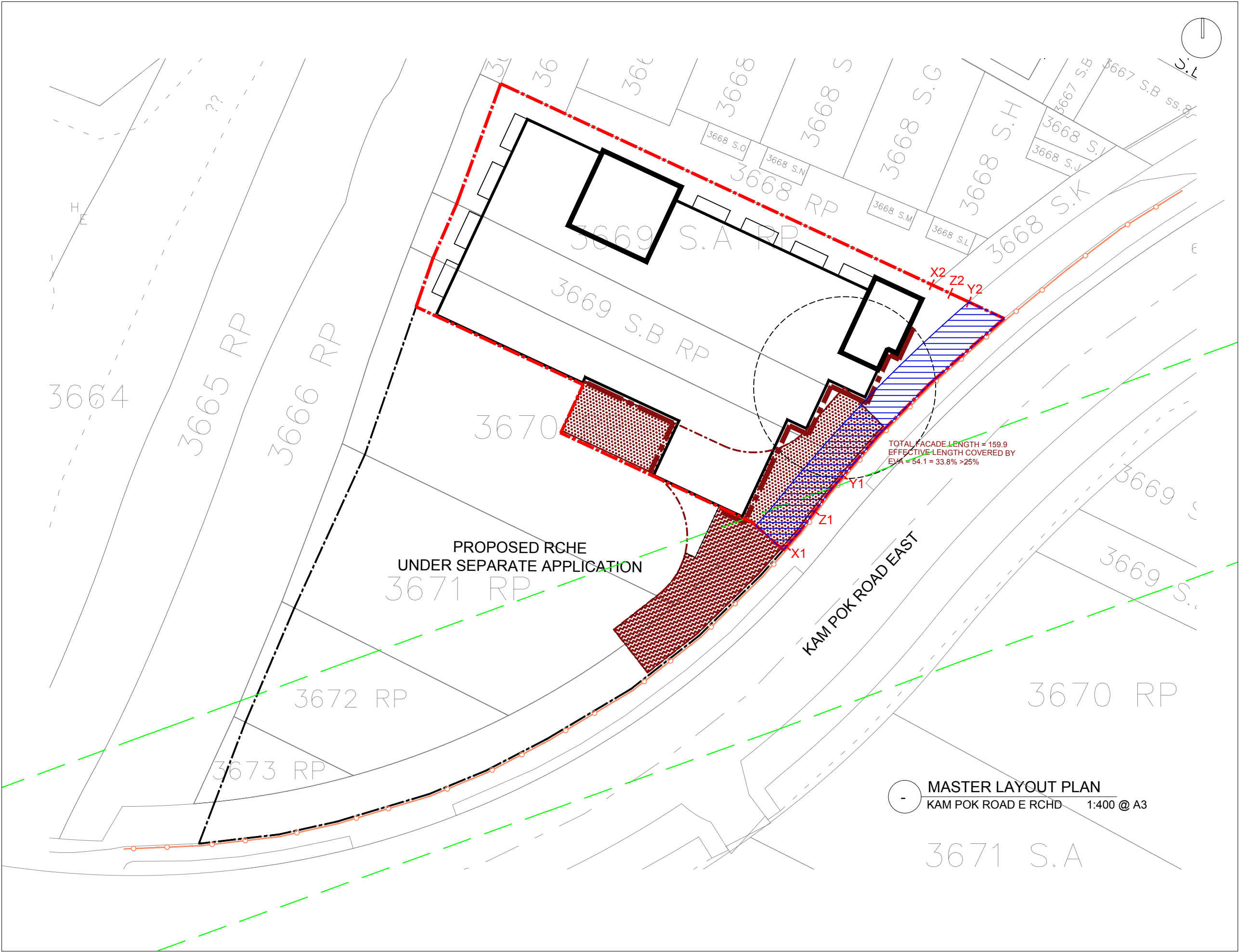
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FIGURE 3	0

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APPENDIX A

MASTER LAYOUT PLAN



MASTER LAYOUT PLAN
KAM POK ROAD E RCHD 1:400 @ A3

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NOTES:

LEGEND:

THE SITE

GOVERNMENT LAND

OVERHEAD LINES

EXISTING NOISE BARRIER

SHARED EVA

REV	DATE	DESCRIPTION	BY	CHKD
1	5.5.2025	CONCEPT DESIGN	KC	PC

Do not scale from drawings. All dimensions must be checked and verified on site before any works are undertaken. Any discrepancies must be reported in writing to Architect.

CLIENT

TOWN PLANNER

DeSPACE (International) Limited

ARCHITECT

Vessel International Limited
Syn Plus Design Limited

Syn Plus

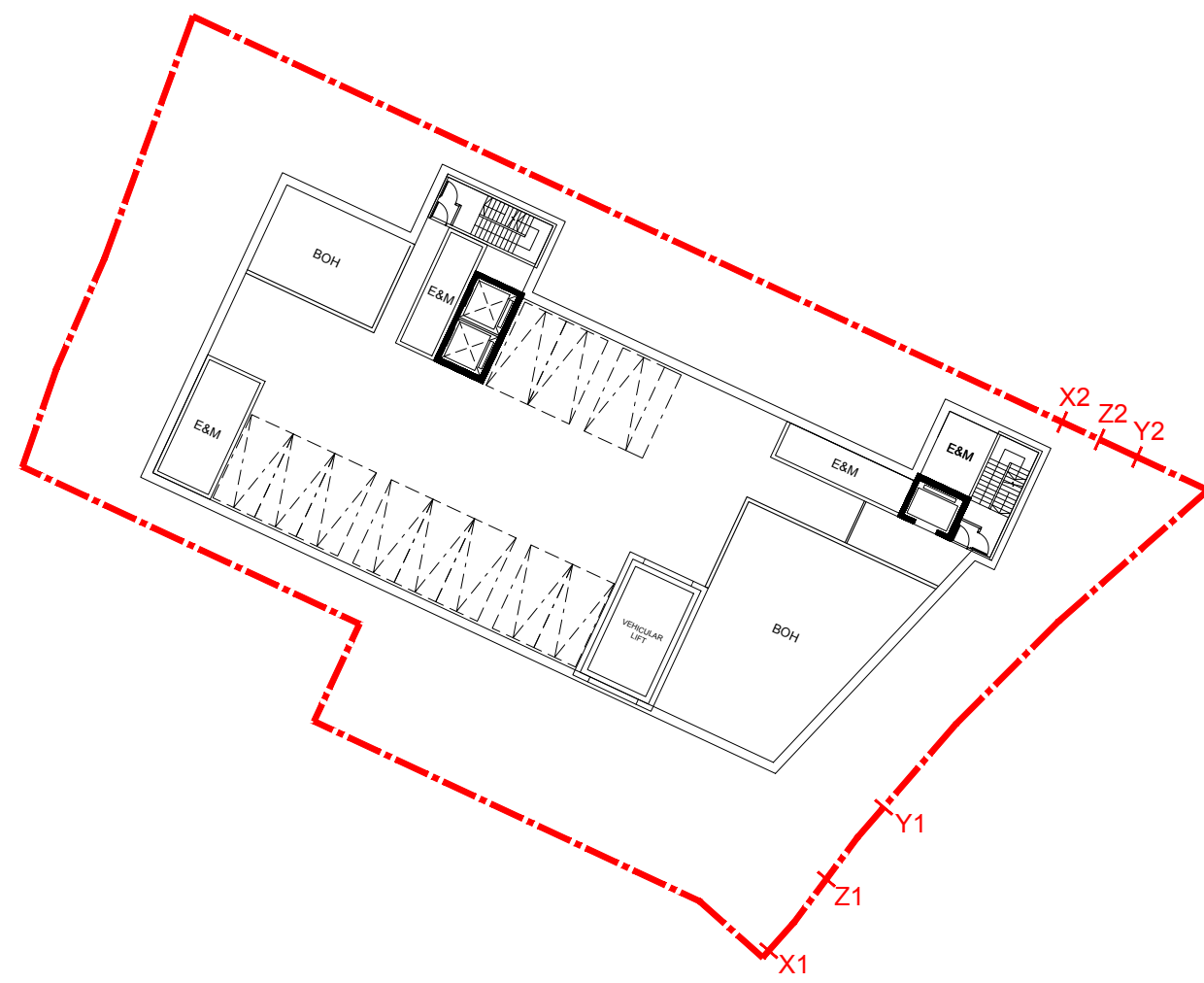
PROJECT : Proposed Social Welfare Facilities (Residential Care Home for Persons with Disabilities (RCHD)) in "Village Type Development" Zone, Various Lots in D.D. 104 and Adjoining Government Land, Nam Sang Wai, Yuen Long

DRAWING : MASTER LAYOUT PLAN

SCALE : 1: 400 @A3
PROJECT NO: 25001_KPR

Drawing No. :
FIGURE 2 MAY 2025

Rev: —
Date:



CP-A102 MAY 2025



MAY 2025

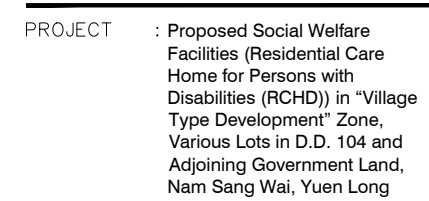


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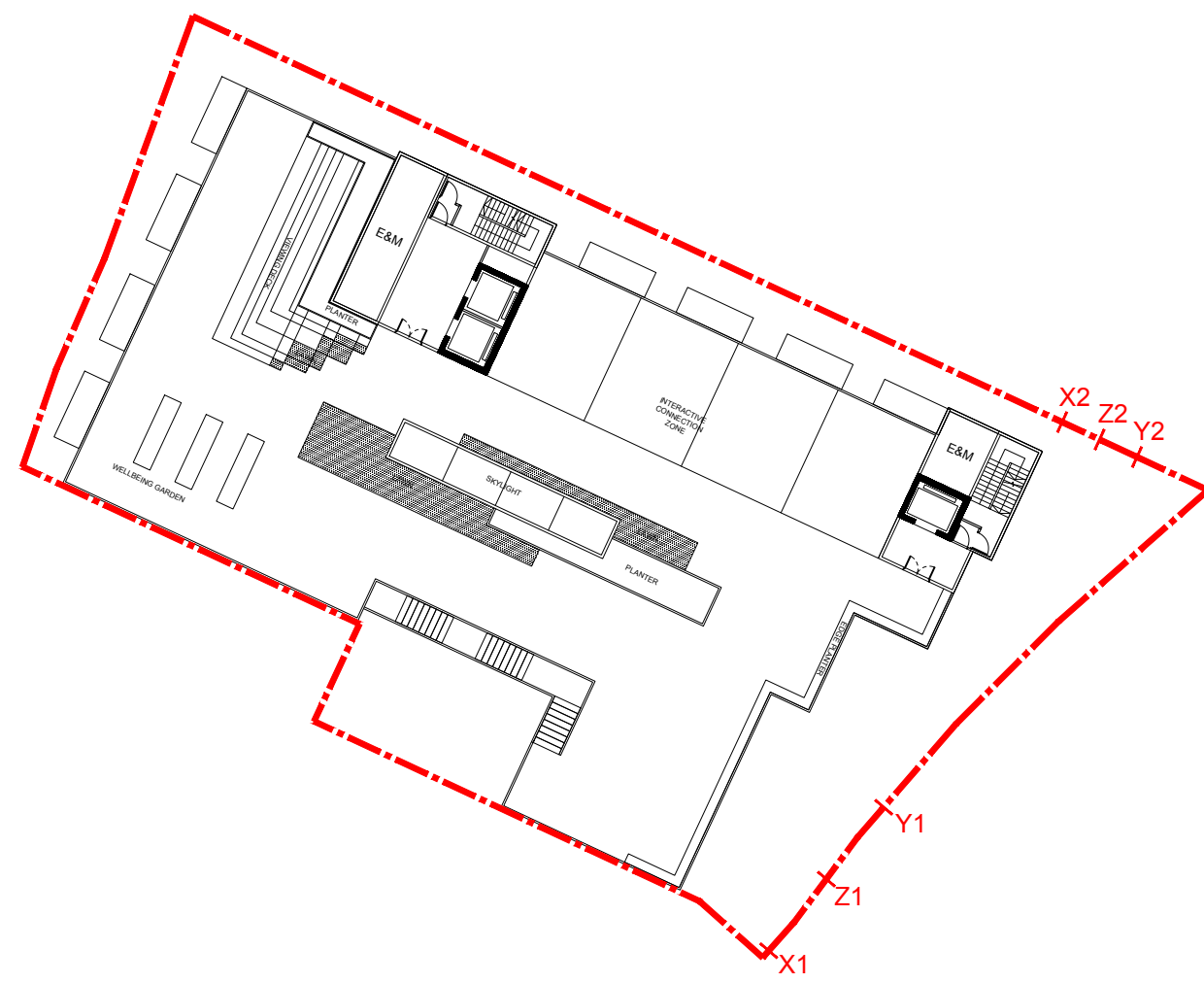
Vessel International Limited



PROJECT NO: 25001_KPR —

CP-A105 MAY 2021



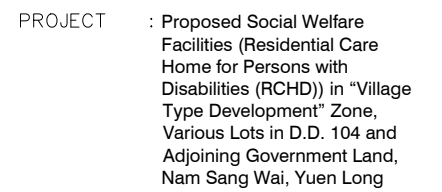


Drawing No. : CP-A106 Date: MAY 2025

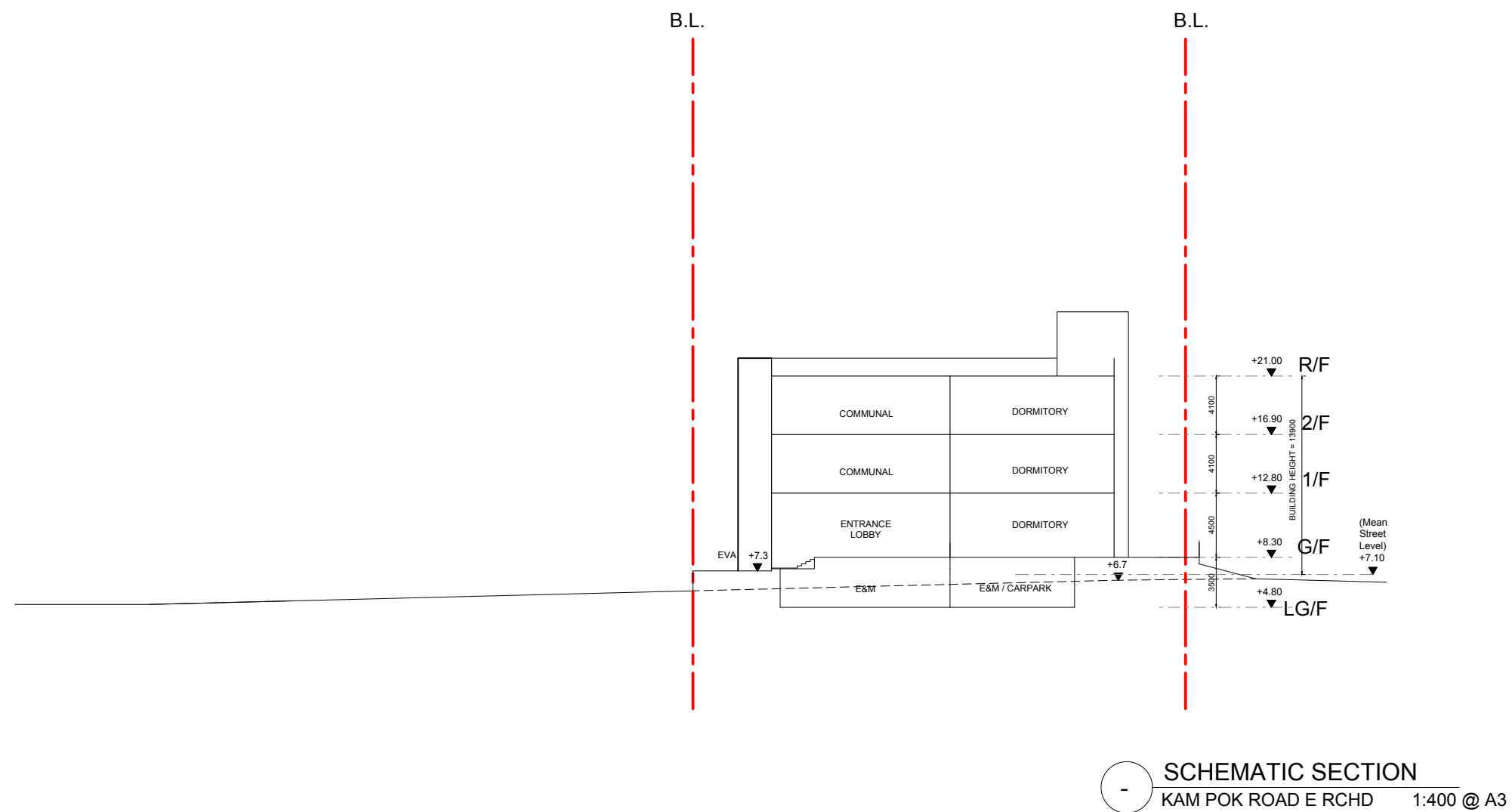


Do not scale from drawings. All dimensions must be checked and verified on site before any works are undertaken. Any discrepancies must be reported in writing to Architect.

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DeSPACE (International)
Limited 

Drawing No. : CP-A201 Date: MAY 2025



APPENDIX B

SEWAGE CALCULATION AND HYDRAULIC CAPACITY CHECK

APPENDIX B - CALCULATION OF SEWAGE FLOW

Development	GFA (m ²)	No. of Flat	Occupancy Density ^{(a), (b)} (Number of Persons) (Workers per GFA in 100m ²)	Estimated Population	Unit Flow Factor (m ³ /day)	Estimated Average Dry Weather Flow (m ³ /day)	Catchment Inflow Factor	Estimated Average Dry Weather Flow X Catchment Inflow Factor (m ³ /day)	Remarks	
1) Proposed Development										
Residents in Proposed Development	3286	-	-	178	0.19	33.820	1.0	33.820	Estimated Population: The proposed development scheme will provide 178 bed spaces. Unit Flow Factor: 0.190m ³ /day for 'Institutional and special class' based on EPD's GESF Table T-1	
Employees in Proposed Development		-	-	90	0.28	25.200		25.200	Estimated Population: Number of staff advised by Project Proponent . Unit Flow Factor: 0.280m ³ /day for 'Institutional and special class' based on EPD's GESF Table T-1	
Total Aaverage Daily Dry Weather Flow of Proposed Development (m ³ /day)									59.020	

Appendix B - Hydraulic Capacity of the Proposed and Downstream Sewers

Manhole Reference	Manhole Reference	Pipe Dia. mm	Pipe Length m	Upstream Invert Level mPD	Downstream Invert Level mPD	g ⁽¹⁾ m/s ²	k _s ^{(1),(3)} m	s ⁽¹⁾	v ⁽¹⁾ m ² /s	v ^{(1),(2)} m/s	A m ²	Q ⁽⁴⁾ m ³ /s	mated Cap. L/s	ADWF m ³ /day	Continu ng Populatio n	Peaking Factor	Peak Flow L/s	Capacity %	Compliance	Remarks
S1	MH740	225	17.0	5.200	5.000	9.81	0.0006	0.0118	1.31E-06	1.4151	0.0398	0.0563	56.27	59.02	268	8	5.46	9.7%	Yes	Project Site
MH740	MH700	225	12.0	5.000	4.700	9.81	0.0006	0.0250	1.31E-06	2.0704	0.0398	0.0823	82.32	59.02	268	8	5.46	6.6%	Yes	Project Site
MH700	MH660	225	27.0	4.700	4.500	9.81	0.0006	0.0074	1.31E-06	1.1196	0.0398	0.0445	44.52	59.02	268	8	5.46	12.3%	Yes	Project Site
MH660	MH620	225	42.0	4.500	3.650	9.81	0.0006	0.0202	1.31E-06	1.8611	0.0398	0.0740	74.00	59.02	268	8	5.46	7.4%	Yes	Project Site
MH620	MH580	225	31.0	3.650	3.150	9.81	0.0006	0.0161	1.31E-06	1.6597	0.0398	0.0660	65.99	59.02	268	8	5.46	8.3%	Yes	Project Site
MH580	MH540	225	38.0	3.150	2.500	9.81	0.0006	0.0171	1.31E-06	1.7097	0.0398	0.0680	67.98	59.02	268	8	5.46	8.0%	Yes	Project Site
MH540	MH500	300	46.0	2.500	2.300	9.81	0.0006	0.0043	1.31E-06	1.0286	0.0707	0.0727	72.71	59.02	268	8	5.46	7.5%	Yes	Project Site
MH500	MH460	300	40.0	2.300	2.100	9.81	0.0006	0.0050	1.31E-06	1.1042	0.0707	0.0781	78.05	59.02	268	8	5.46	7.0%	Yes	Project Site
MH460	MH420	300	27.0	2.100	2.000	9.81	0.0006	0.0037	1.31E-06	0.9482	0.0707	0.0670	67.02	59.02	268	8	5.46	8.2%	Yes	Project Site
MH420	MH380	300	24.0	2.000	1.900	9.81	0.0006	0.0042	1.31E-06	1.0066	0.0707	0.0712	71.16	59.02	268	8	5.46	7.7%	Yes	Project Site
MH380	MH380(1)	300	23.0	1.900	1.800	9.81	0.0006	0.0043	1.31E-06	1.0286	0.0707	0.0727	72.71	59.02	268	8	5.46	7.5%	Yes	Project Site
MH380(1)	MH340	300	29.0	1.800	1.700	9.81	0.0006	0.0034	1.31E-06	0.9144	0.0707	0.0646	64.63	59.02	268	8	5.46	8.5%	Yes	Project Site
MH340	MH300	300	38.0	1.700	1.570	9.81	0.0006	0.0034	1.31E-06	0.9107	0.0707	0.0644	64.37	59.02	268	8	5.46	8.5%	Yes	Project Site
MH300	MH260	300	35.0	1.570	1.450	9.81	0.0006	0.0034	1.31E-06	0.9117	0.0707	0.0644	64.44	59.02	268	8	5.46	8.5%	Yes	Project Site
MH260	MH235	300	39.0	1.450	1.320	9.81	0.0006	0.0033	1.31E-06	0.8987	0.0707	0.0635	63.53	59.02	268	8	5.46	8.6%	Yes	Project Site
MH235	P1	300	13.0	1.320	0.170	9.81	0.0006	0.0885	1.31E-06	4.6970	0.0707	0.3320	332.01	59.02	268	8	5.46	1.6%	Yes	Project Site
P1	P2	675	66.0	0.170	-1.400	9.81	0.0006	0.0238	1.31E-06	4.0451	0.3578	1.4475	1447.52	59.02	268	8	5.46	0.4%	Yes	Project Site
P2	P3	675	16.0	-1.400	-2.610	9.81	0.0006	0.0756	1.31E-06	7.2258	0.3578	2.5857	2585.73	59.02	268	8	5.46	0.2%	Yes	Project Site
P3	P4	675	43.0	-2.610	-2.920	9.81	0.0006	0.0072	1.31E-06	2.2194	0.3578	0.7942	794.19	59.02	268	8	5.46	0.7%	Yes	Project Site
P4	P5	675	52.0	-2.920	-3.200	9.81	0.0006	0.0054	1.31E-06	1.9158	0.3578	0.6856	685.57	59.02	268	8	5.46	0.8%	Yes	Project Site
P5	P6	750	60.0	-3.200	-3.330	9.81	0.0006	0.0022	1.31E-06	1.2920	0.4418	0.5708	570.80	59.02	268	8	5.46	1.0%	Yes	Project Site
P6	P7	750	88.0	-3.330	-3.520	9.81	0.0006	0.0022	1.31E-06	1.2897	0.4418	0.5698	569.79	59.02	268	8	5.46	1.0%	Yes	Project Site
P7	P8	750	50.0	-3.520	-3.630	9.81	0.0006	0.0022	1.31E-06	1.3020	0.4418	0.5752	575.23	59.02	268	8	5.46	1.0%	Yes	Project Site
P8	P9	750	61.0	-3.630	-3.760	9.81	0.0006	0.0021	1.31E-06	1.2813	0.4418	0.5660	566.04	59.02	268	8	5.46	1.0%	Yes	Project Site
P9	P10	750	59.0	-3.760	-3.890	9.81	0.0006	0.0022	1.31E-06	1.3031	0.4418	0.5757	575.68	59.02	268	8	5.46	0.9%	Yes	Project Site
P10	P11	750	67.0	-3.890	-4.030	9.81	0.0006	0.0021	1.31E-06	1.2685	0.4418	0.5604	560.43	59.02	268	8	5.46	1.0%	Yes	Project Site
P11	P12	750	34.0	-4.030	-4.100	9.81	0.0006	0.0021	1.31E-06	1.2591	0.4418	0.5562	556.24	59.02	268	8	5.46	1.0%	Yes	Project Site
P12	P13	750	40.0	-4.100	-4.180	9.81	0.0006	0.0020	1.31E-06	1.2407	0.4418	0.5481	548.13	59.02	268	8	5.46	1.0%	Yes	Project Site
P13	P14	750	34.0	-4.180	-4.250	9.81	0.0006	0.0021	1.31E-06	1.2591	0.4418	0.5562	556.24	59.02	268	8	5.46	1.0%	Yes	Project Site
P14	P15	750	39.0	-4.250	-4.330	9.81	0.0006	0.0021	1.31E-06	1.2567	0.4418	0.5552	555.21	59.02	268	8	5.46	1.0%	Yes	Project Site
P15	E1	750	24.0	-4.330	-4.380	9.81	0.0006	0.0021	1.31E-06	1.2666	0.4418	0.5596	559.58	59.02	268	8	5.46	1.0%	Yes	Project Site

Note:

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

(2) The mean velocity (V) is calculated by the Colebrook-White Equation for circular pipes:

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

where
V = mean velocity (m/s)
g = gravitational acceleration (m/s²)
D = internal pipe diameter (m)
s = slope
k_s = roughness coefficient(m)
v = kinematic viscosity of fluid (m²/s)

(3) The value of k_s = 0.6mm is used for the calculation of existing pipe for conservative approach and 0.6mm for proposed new clayware pipe in poor condition based on DSD's "Sewerage Manual" Table 5: Recommended roughness values

(4) Peak flow (Q) is calculated by Q = V x A