

Appendix 12

Sewerage Impact Assessment

Rezoning from “Residential (Group C)2” and “Open Space” zones to “Residential (Group C)4” zone for a Proposed Residential Development at Lot Nos. 519 RP (part) and 520 RP in D.D. 110 and the Adjoining Government land, Shek Kong, Yuen Long, N.T.

Sewerage Impact Assessment (Rev. A2)

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(Group C)2” and “Open
Space” zones to “Residential
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Proposed Residential
Development at Lot Nos. 519
RP (part) and 520 RP in D.D.
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Government land, Shek Kong,
Yuen Long, N.T.**

Sewerage Impact Assessment (Rev. A2)

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1 Introduction

1.1 Background

- 1.1.1 The Applicant is planning to develop a residential development in Shek Kong, Kam Tin (the Site). The Development Site covers a total site area of about 8,580 m² and is located in Kam Tin North. The Site abuts Kam Tin Road to its immediate south. A low-rise, low-density residential developments, namely Seasons Villa, are located to the immediate north-east. It is currently zoned as “Residential (Group C)” and “Open Space” under the approved Kam Tin North Outline Zoning Plan (OZP) No. S/YL-KTN/11. The location of the Site is shown in **Appendix A**. This report serves as a supportive document for the Section 12A Application to rezone the Site from “Residential (Group C)2” and “Open Space” to “Residential (Group C)4” zone to enable the proposed residential development at the Site.

1.2 Key Development Parameters

- 1.2.1 The layout of the proposed residential development is provided in **Appendix B** and the development data is given in **Table 1.1** below:-

Table 1.1: Data of the proposed residential development

Items	Details
Development Site Area	About 8,580 m ²
Development	Residential Development
No. of Units	240
Estimated Year of Population Intake	2031

1.3 Objectives of Report

- 1.3.1 This Sewerage Impact Assessment (SIA) focuses on the potential sewerage impacts caused by the implementation of the proposed residential development. The objective of the SIA is to identify, assess and mitigate potential adverse sewerage impacts which may arise from the development in the vicinity of the Site.

1.4 Structure of the Report

- 1.4.1 This SIA contains the following sections in addition to this introduction (Section 1):-
- Section 2** – Methodology and Design Parameters for Sewerage Impact Assessment
Discussing the methodology and design parameters used in the sewerage impact assessment.
 - Section 3** – Estimation of Sewage Flow for the Existing Site
Estimating the sewage flow generated from the Existing Site.
 - Section 4** – Estimation of Sewage Flow for the Proposed Residential Development
Estimating the sewage flow generated from the proposed residential development.

Section 5 – Proposed Sewage Disposal Arrangement

Discussing the proposed sewage disposal arrangement for the proposed residential development.

Section 6 – Conclusion

Summarising the findings and conclusions of the Sewerage Impact Assessment.

2 Methodology and Design Parameters for Sewerage Impact Assessment

2.1 General Approach

- 2.1.1 This SIA is carried out to identify, assess, and propose mitigation measure to any potential adverse sewerage impacts due to the proposed residential development.

2.2 Methodology

Assessment Methodology

- 2.2.1 The following approach and methodology have been adopted in this sewerage impact assessment:-
- Carry out a desktop study to collect the relevant information for assessment;
 - Estimate the potential sewage generated from the proposed residential development; and
 - Propose option(s) to mitigate the sewerage impacts.

Collected Information

- 2.2.2 Desktop study has been undertaken to collect the relevant information for the assessment. The relevant information collected is summarised below:-
- Drainage record plans in vicinity of the development site; and
 - Sewerage Impact Assessment Report attached in Rural and New Town Planning Committee (RNTPC) Paper No. 8/17 – Proposed Amendments to the Approved Kam Tin South Outline Zoning Plan No. S/YL-KTS/13.

Design Standards, Guidelines and Reference

- 2.2.3 The sewage flow generated from the proposed residential development is estimated based on the following standards, guidelines, and reference for the sewerage and sewage treatment design:-
- Sewerage Manual published by Drainage Services Department (DSD);
 - Guidelines for Estimating Sewage Flow (GESF) for Sewerage Infrastructure Planning (EPD);
 - Guidelines for the Design of Small Sewage Treatment Plants (EPD);
 - Hong Kong Planning Standards and Guidelines (HKPSG); and
 - Technical Memorandum on Effluent Standards, Water Pollution Control Ordinance Cap. 358 Section 21 (EPD).

2.3 Design Parameter and Assumptions

Design Population and Employee Data

2.3.1 The design population of the proposed residential development is shown as **Table 2.1**.

Table 2.1: Population data for the proposed residential development

Proposed Development	No. of Unit	Population ⁽ⁱ⁾
Residential (R3)	240	648
Remark:- i. It is assumed that there are 2.7 persons per unit as per the average household size of Kam Tin in the 2021 Population Census published by the Census and Statistics Department.		

2.3.2 The employee data of the proposed residential development is shown in **Table 2.2**.

Table 2.2: Estimated employee number for the development

Category	Type	No. of Employee
J11 – Community, Social and Personal Services	Staff for Property Management	15
Remark:- i. It is assumed there will be 15 staff serving the proposed development.		

UFF Flow Factors

2.3.3 The Unit Flow Factors (UFFs) for Domestic Flow and Commercial Flow are adopted in accordance with Table T-1 and T-2 of the GESF. The category of the components and the UFFs adopted in the assessment are indicated in **Table 2.3**.

Table 2.3: Unit flow factors

Component	Category Use	Unit Flow Factors (m ³ /d/p)
Domestic Flow	Residential (R3)	0.37
Commercial Flow	J11 – Community, Social and Personal Services	0.28
Remark:- i. The UFFs are based on Table T-1 and T-2 of the GESF.		

3 Estimation of Sewage Flow for the Existing Site

3.1 Estimated Sewage Flow from the Existing Site

- 3.1.1 In accordance with the SIA report attached in RNTPC Paper No. 8/17 - Proposed Amendments to the Approved Kam Tin South Outline Zoning Plan No. S/YL-KTS/13, there is proposed sewerage system provided for Kam Tin South (KTS) Development to convey the sewage flow to the existing Kam Tin Sewage Pumping Station (KTSPS) and then discharge to YLSTW ultimately. The sewerage system is expected to serve a total sewage flow of 13,900 m³/day to the KTSPS which is approximately 81% of the design capacity of KTSPS (i.e. 17,133 m³/day). Also, based on the SIA report under approved Planning Application No. A/YL-KTN/698, the existing flow to KTPS is 1,600m³/d and the reserved flow for other planned developments is 15,500m³/d (i.e. existing and committed flow to KTSPS is about 17,100m³/d). The existing KTSPS is reaching its limits for the existing developments and reserved sewage flow for planned development. Although there is proposed sewerage system provided for KTS, there is currently no existing public sewerage system in the vicinity of the proposed development.
- 3.1.2 Based on site inspection and information available on base map, no commercial activities nor residential development is identified within the existing site. Thus, it is anticipated no sewage is expected to be generated from the existing site.

4 Estimation of Sewage Flow for the Proposed Residential Development

4.1 Estimated Sewage Flow from the Proposed Residential Development

- 4.1.1 Based on the design population for the proposed residential development and sewage unit flow factors as mentioned in **Section 2**, the estimated Average Dry Weather Flow (ADWF) for the proposed residential development is approximately 247.5 m³/d (2.86 l/s). There will be an increase of about 247.5 m³/d sewage flow generated compared to the existing situation.

Table 4.1: Estimated sewage flow for the proposed residential development

Type of Sewage Flow	Population	UFF (m ³ /d/p)	ADWF (m ³ /d)
Domestic (R3)	648	0.37	239.76
Commercial (J11)	15	0.28	4.20
Estimated ADWF in m ³ /day			243.96
Estimated average design flow for swimming pool in m ³ /day			3.54
Estimated total ADWF in m ³ /day			247.50
Estimated total ADWF in l/s			2.86
Remark:-			
i. Estimation of sewage flow from swimming pool refers to Appendix D .			

- 4.1.2 Further to the SIA report attached in RNTPC Paper No. 8/17 - Proposed Amendments to the Approved Kam Tin South Outline Zoning Plan No. S/YL-KTS/13, there is proposed sewerage system provided for Kam Tin South (KTS) Development to convey the sewage flow to the existing Kam Tin Sewage Pumping Station (KTSPS) and then discharge to YLSTW ultimately. The sewerage system is expected to serve a total sewage flow of 13,900 m³/day to the KTSPS which is approximately 81% of the design capacity of KTSPS (i.e. 17,133 m³/day). Also, based on the SIA report under approved Planning Application No. A/YL-KTN/698, the existing flow to KTPS is 1,600m³/d and the reserved flow for other planned developments is 15,500m³/d (i.e. existing and committed flow to KTSPS is about 17,100m³/d). As the Development Site is far away from the existing public sewage network, a sewage treatment plant will be proposed as the sewerage disposal scheme for the proposed residential development and will be discussed in **Section 5**.

5 Proposed Sewage Disposal Arrangement

5.1 Proposed Sewage Treatment Plant

- 5.1.1 As discussed in **Section 4.1.2**, the Development Site is far away from the existing public sewage network, therefore, an on-site sewage treatment plant (STP) (with plan area of about 350 m²) should be adopted for the Site to treat the sewage flow of 247.5m³/day generated from the proposed development and then discharging it to the nearby stormwater drainage system. The STP will be designed to treat sewage generated from the proposed residential development, as a sewerage disposal measure until public sewer and capacity of downstream sewerage are available for discharge. The internal facilities of the STP will also be designed to cater for a peak flow of 8.59 l/s (a peaking factor of 3). Membrane Bioreactor (MBR) technology with ultra-filtration will be used for the proposed sewage treatment plant for meeting EPD's effluent treatment standard. The proposed STP should provide tertiary effluent treatment standard as shown in **Table 5.1**. The proposed sewage treatment plant for the development is located at the northeast of the Site. The location is shown in the layout plan in **Appendix B**. The sludge from the STP as a by-product from the MBR treatment process will be removed off-site by licensed sludge collection vehicles. A discharge license under WPCO will be obtained for the operation of the STP.

Table 5.1: Tertiary Effluent Standard for Proposed Sewage Treatment Plant

Parameter	Tertiary Effluent Standards (Upper Limit)
SS (mg/l)	10
Total Nitrogen (TN) (mg/l)	20
BOD (mg/l)	10
Ammonia Nitrogen (NH ₃ N) (mg/l)	2
<i>E. Coli</i> (count/100ml)	100
Total Phosphorous (TP) (mg/l)	2

- 5.1.2 An equalization tank with a storage capacity of 65 m³ that is able to provide equalization volume of excess flow over 3 ADWF for a period of 2 hours will be provided.
- 5.1.3 Dual source electricity supply as an emergency measure of STP will be provided to prevent power failure. Standby pumps, in addition to the duty pumps will be provided as backup solution during operation when the duty pump is failure to be operated or for maintenance inspection. The pump may also be used to recycle the plant effluent to maintain the STP in a working condition when incoming flow is low. In view that the risk of these two emergency measures failure at the same time is extremely low. The emergency measures as mentioned in **Table 5.2** is considered appropriate for the proposed STP for the Site.

Table 5.2 Proposed emergency measures for sewage treatment plant

Failure	Emergency Measures
Power Failure	Dual source electricity supply
Pump Failure	Duty and standby pumps
System Failure	Immediate repairment of the STP with spare parts stored on-site

- 5.1.4 Apart from the provision of standby pump and dual power supply, an emergency storage tank with storage capacity of 65 m³ (about storage capacity for 6 hours of ADWF) will be provided to store the overflow of raw sewage during maintenance or the plant failure. In case of necessary and emergency, provision of tanker service to tank away the excessive raw sewage by licensed collector will be arranged and mobilized. The emergency response plan will be further developed in detailed design stage.
- 5.1.5 As the sewage generated from the proposed development would be adequately treated by the on-site tertiary sewage treatment plant before discharge, no unacceptable adverse residual water quality impact is anticipated during operation phase of the proposed residential development.

5.2 Maintenance Responsibility

- 5.2.1 The management company of the proposed residential development will maintain the internal sewerage system including the STP and associated sewers.
- 5.2.2 Should public sewer be available for connection and discharge in the future, the sewage treatment plant will be decommissioned and removed, and the sewage will be disposed to public sewer via sewage terminal manhole at the boundary of the Site. The owners of the proposed residential development will be responsible for removal of the proposed sewage treatment plant and associated sewers if public sewer is available for connection in the future.

6 Conclusion

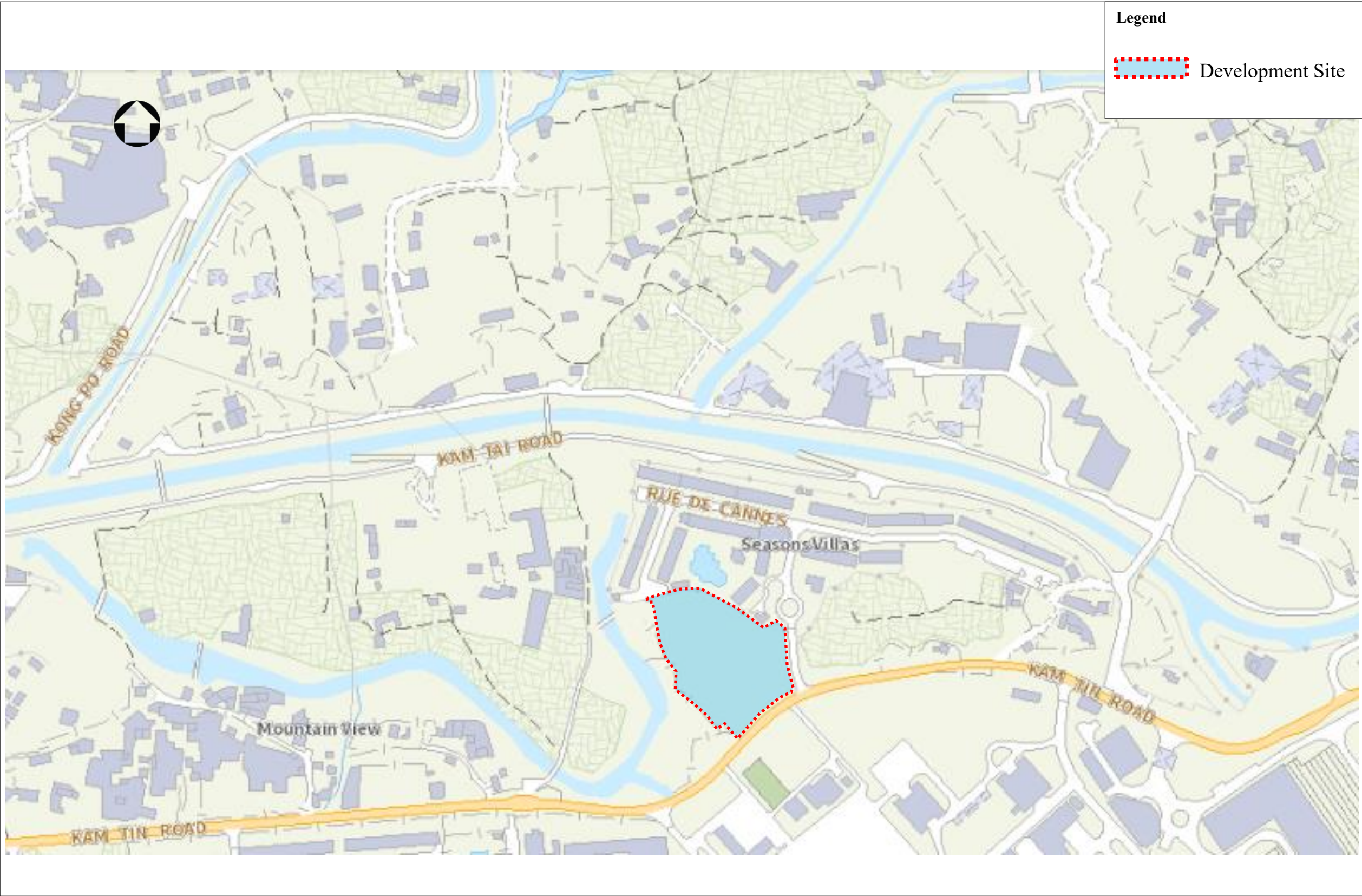
- 6.1.1 The estimated ADWF for the proposed residential development approximately 247.5 m³/d (2.86 l/s).
- 6.1.2 Since there are no existing public sewers in vicinity of the site, an on-site sewage treatment plant (plan area of about 350 m²) will be adopted for the Site to treat the sewage flow (247.5 m³/d) generated from the proposed development and the treated effluent will be discharged to the nearby stormwater drainage system. The proposed sewage treatment plant will adopt Membrane Bioreactor (MBR) technology with ultra-filtration to meet EPD's effluent discharge standard. As the sewage generated from the proposed development would be adequately treated by the on-site tertiary sewage treatment plant before discharge, no unacceptable adverse residual water quality impact is anticipated during operation phase of the proposed residential development.
- 6.1.3 The management company of the residential development will be responsible for maintaining the internal sewerage system including STP and associated sewers.

7 Appendices

Appendix A	Location Plan of the Proposed Residential Development
Appendix B	Layout Plan for the Proposed Development
Appendix C	Schematic Layout Plan of the Proposed Tertiary Sewage Treatment Plant
Appendix D	Sewage Flow Estimation for Swimming Pool

Appendix A

Location Plan of the Proposed Residential Development



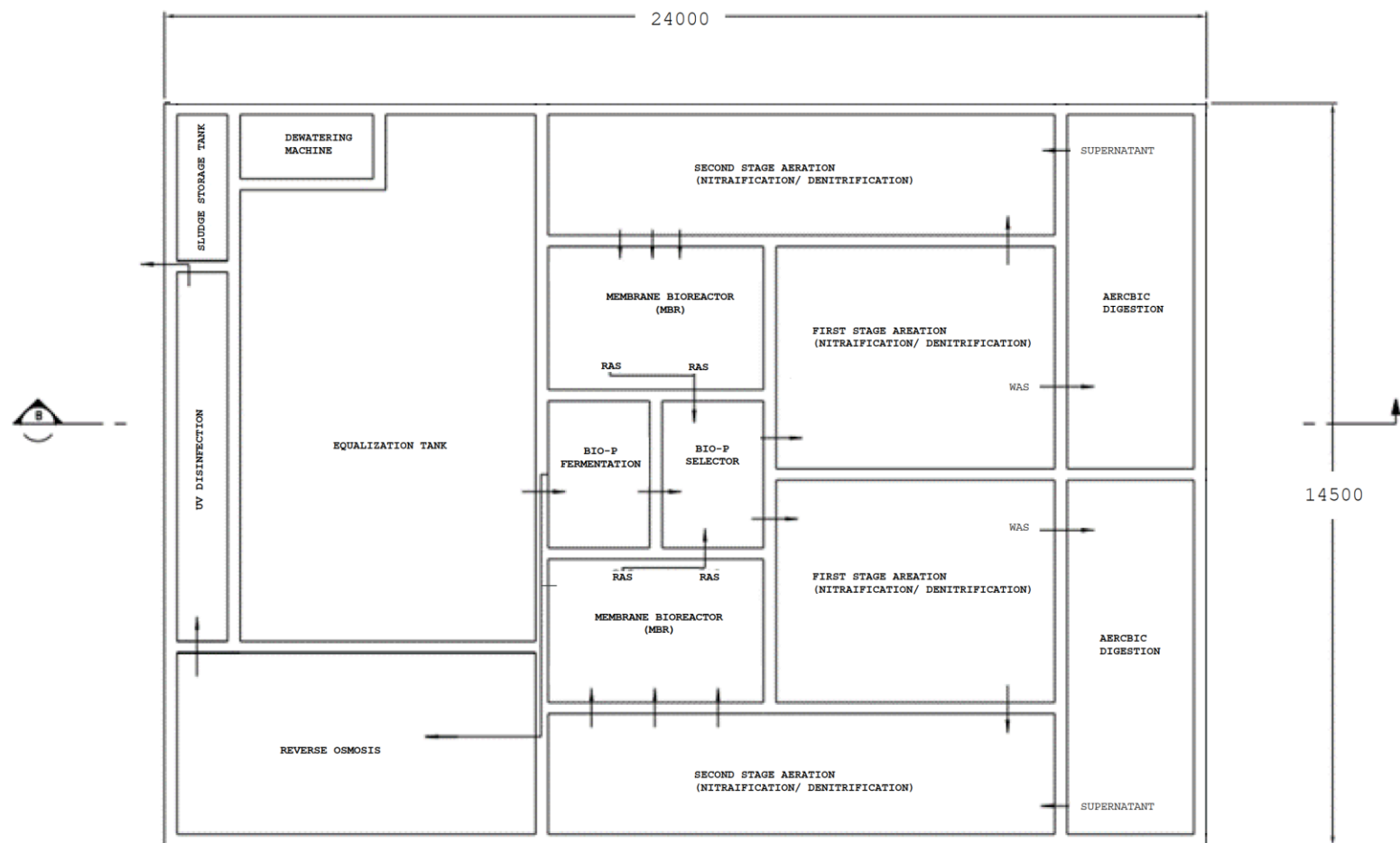
Project Rezoning from “Residential (Group C)2” and “Open Space” zones to “Residential (Group C)4” zone for a Proposed Residential Development at Lot Nos. 519 RP (part) and 520 RP in D.D. 110 and the Adjoining Government land, Shek Kong, Yuen Long, N.T.			M M MOTT MACDONALD	
Title Location Plan			Appendix A	
Date	Oct 2025	Scale	N.T.S.	File

Appendix B

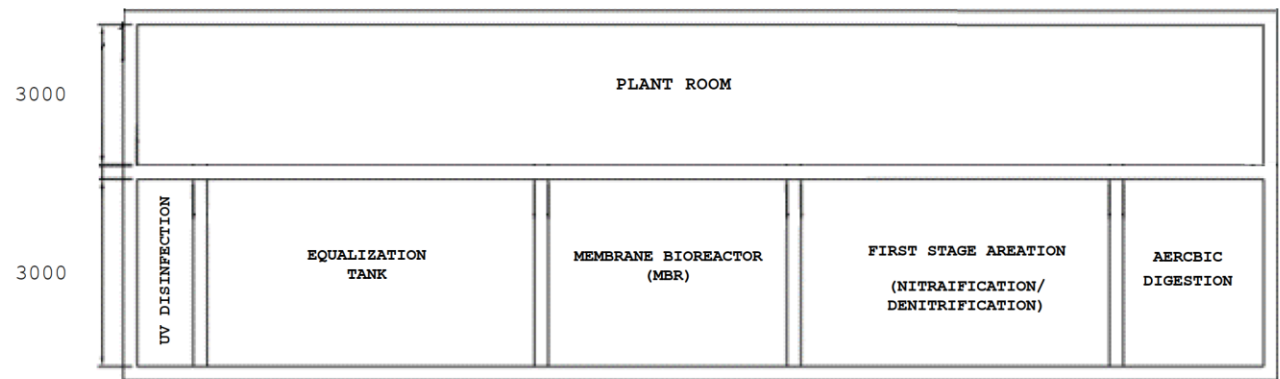
Layout Plan for the Proposed Development

Appendix C

Schematic Layout Plan of the Proposed Tertiary Sewage Treatment Plant



SEWAGE TREATMENT PLANT UNDERGROUND TANK LAYOUT



SECTION B-B

Project	Rezoning from “Residential (Group C)2” and “Open Space” zones to “Residential (Group C)4” zone for a Proposed Residential Development at Lot Nos. 519 RP (part) and 520 RP in D.D. 110 and the Adjoining Government land, Shek Kong, Yuen Long, N.T.	Appendix C
Title	Schematic Layout Plan of the Proposed Tertiary Sewage Treatment Plant	
Date Oct 2025	Scale N.T.S.	
File		

Appendix D

Sewage Flow Estimation for Swimming Pool

Appendix D - Sewage Flow for Swimming Pool

Swimming Pool			Reference/ Assumption
Pool Volume =	454	m ³	Chapter 132 – Swimming Pools Bylaws Subsidiary Legislation Filtration Rate =48 m3/m2/h
Turnover Rate =	4	hrs	
Surface Loading Rate of Filter =	48	m ³ /m ² /hr	
Filter Areas Required =	2.36	m ²	
Backwash Duration =	3	min/day	
Backwash Flow Rate =	30	m ³ /m ² /hr	
Average Design Flow for swimming pool backwashing =	3.54	m ³ /day	
	0.04	l/s	
Instant peak flow =	70.90	m ³ /hr	
	19.69	l/s	