

## ***Annex B***

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### **Replacement Pages of the Revised Sewerage Impact Assessment**

Prepared for

**Wing Mau Tea House Limited**

Prepared by

**Ramboll Hong Kong Limited**

**PROPOSED REZONING FROM "RESIDENTIAL (GROUP B)1" ZONE TO "RESIDENTIAL (GROUP B)4" ZONE FOR MEDIUM-DENSITY HOUSING DEVELOPMENT TO INCLUDE A FOOTPATH FOR PUBLIC USE AT VARIOUS LOTS AND ADJACENT GOVERNMENT LAND IN DD130, LAM TEI, TUEN MUN**  
**SEWERAGE IMPACT ASSESSMENT**

Date **14 March 2024**

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Signed



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Signed



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## CHAPTERS

	Page
<b>1. INTRODUCTION.....</b>	<b>1-1</b>
1.1 Background and Objectives.....	1-1
1.2 Application Site and its Environ .....	1-1
1.3 Proposed Development.....	1-1
<b>2. SEWERAGE IMPACT ASSESSMENT.....</b>	<b>2-1</b>
2.1 Scope of Work.....	2-1
2.2 Assessment Criteria and Methodology .....	2-1
2.3 Existing Condition.....	2-1
2.4 Future Estimated Flow.....	2-1
2.5 Proposed Sewage Treatment Facility .....	2-3
<b>3. CONCLUSION .....</b>	<b>3-1</b>

## TABLES

Table 2.1	Estimated Sewage Flow from the Proposed Development.....	2-1
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## FIGURES

Figure 1.1	Location of Application Site and its Environ
Figure 2.1	Indicative Location of Proposed Sewage Treatment Plant

## APPENDICES

Appendix 1.1	Detailed Layout Plans of the Proposed Development
Appendix 2.1	Detailed Sewerage Impact Assessment Calculations
Appendix 2.2	Sample of Membrane Bioreactor

## 1. INTRODUCTION

### 1.1 Background and Objectives

- 1.1.1 The Application Site is located at various lots and adjoining government land in D.D.130, Lam Tei, Tuen Mun.
- 1.1.2 In order to confirm the environmental feasibility of the Proposed Development, Ramboll Hong Kong Limited is commissioned to conduct the Sewerage Impact Assessment based on the information of the Proposed Development.

### 1.2 Application Site and its Environ

- 1.2.1 With a development area of 8,896m<sup>2</sup> and zoned as Residential (Group B) 1" (R(B)1) zone, the Application Site is currently a vacant site situated at D.D. 130, Lam Tei bounded by the Castel Peak Road - Lam Tei to the east separated by the Tuen Ma Line viaduct and LRT tracks. Existing residential development, Lingrade Garden, is located to the north of the Application Site. Some temporary carpark, open storage and village houses are located to the west of the site separated by a nullah.
- 1.2.2 **Figure 1.1** shows the location of the Application Site and its environ.

### 1.3 Proposed Development

- 1.3.1 The Proposed Development consists of 5 residential towers ranging from 14 storeys to 27 storeys. A clubhouse is situated below Tower 1 and Tower 3. The number of storeys and building height information of the residential towers are as follow:
- Tower 1: 27 storeys (+107.8 mPD)
  - Tower 2: 27 storeys (+107.8 mPD)
  - Tower 3: 16 storeys (+66.8 mPD)
  - Tower 4: 14 storeys (+59.8 mPD)
  - Tower 5: 24 storeys (+94.8 mPD)
- 1.3.2 The total numbers of units are 1,385 units with a proposed domestic GFA of 44,480m<sup>2</sup> (PR5.0) and the tentative population intake year is 2030. Detailed plans of the Proposed Development are presented in **Appendix 1.1**.

## 2. SEWERAGE IMPACT ASSESSMENT

### 2.1 Scope of Work

- 2.1.1 The Application site is currently vacant and there is no public sewer network serving the Application Site and the surrounding environment due to the isolation by a nullah.
- 2.1.2 The aim of this study is to evaluate the sewage flow generated from the Proposed Development and assess whether there is adverse sewerage impacts to the surrounding environment.

### 2.2 Assessment Criteria and Methodology

- 2.2.1 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.
- 2.2.2 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 Proposed Development and the existing development. Sewage flow parameters and global peaking factors in this document are adopted.
- 2.2.3 According to the Table T-1 of the said EPD Guideline, the unit flow factor (UFF) of resident (Private R2) is 0.27 m<sup>3</sup>/day, while the UFF for employees for the clubhouse is 0.28m<sup>3</sup>/day.

### 2.3 Existing Condition

- 2.3.1 Currently, there are no public sewerage facilities in the vicinity of the Application Site and the extension of the public sewerage system to Application Site is unlikely as the Application Site is separated from the nearest sewerage manhole by a nullah. It will therefore be necessary to provide on-site treatment facilities before discharging the treated effluent into the nearby nullah.

### 2.4 Future Estimated Flow

- 2.4.1 Under the current scheme, the Proposed Development will consist of 1,385 residential units, a clubhouse with a size of 2,002 m<sup>2</sup> and two swimming pools with an area of 48m<sup>2</sup> and 108m<sup>2</sup> respectively. Based on such design parameters, the Average Dry Weather Flow (ADWF) excluding the backwash of the swimming pools is estimated to be 1,028.3 m<sup>3</sup>/day, as tabulated in **Table 2.1** below and **Appendix 2.1**.

**Table 2.1 Estimated Sewage Flow from the Proposed Development**

		Remarks
<b>Residential Use</b>		
Total number of residential units	= 1,385	
Total number of residents	= 3,740	people (average household size of 2.7 is assumed)
Design flow	= 270	litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage Generation Rate	= 1009.8	m <sup>3</sup> /day
<b>Clubhouse</b>		

			Remarks
Total GFA	=	2,002	m <sup>2</sup>
Assumed floor area per employee	=	30.3	m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees		66	employees
Design flow	=	280	litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social & Personal Services)
Sewage Generation Rate	=	18.5	m <sup>3</sup> /day
<b>Proposed Adult Swimming Pool</b>			
Assumed area of swimming pool	=	108	m <sup>2</sup>
Average depth of water		1.2	m
Volume of swimming pool	=	129.6	m <sup>3</sup>
Turnover rate	=	6	hr
Surface loading rate of filter	=	50	m <sup>3</sup> /m <sup>2</sup> /hr
Filter areas required		0.4	m <sup>2</sup> (Volume of Swimming Pool/Turnover Rate/ Surface Loading Rate of Filter)
Backwash duration	=	5	min/d
Backwash flow rate	=	30	m <sup>3</sup> /m <sup>2</sup> /hr
Design flow for swimming pool backwashing	=	1.1	m <sup>3</sup> /day (Backwash flow rate x Filter areas required x Backwash duration)
Design flow for swimming pool backwashing	=	3.6	litre/sec (Backwash flow rate x 1000 / (Backwash duration x 60))
<b>Proposed Children Swimming Pool</b>			
Assumed area of swimming pool	=	48	m <sup>2</sup>
Average depth of water		1.2	m
Volume of swimming pool	=	57.6	m <sup>3</sup>
Turnover rate	=	6	hr
Surface loading rate of filter	=	50	m <sup>3</sup> /m <sup>2</sup> /hr
Filter areas required		0.2	m <sup>2</sup>

		Remarks
		(Volume of Swimming Pool/Turnover Rate/ Surface Loading Rate of Filter)
Backwash duration	= 5	min/d
Backwash flow rate	= 30	m <sup>3</sup> /m <sup>2</sup> /hr
Design flow for swimming pool backwashing	= 0.5	m <sup>3</sup> /day (Backwash flow rate x Filter areas required x Backwash duration)
Design flow for swimming pool backwashing	= 1.6	litre/sec (Backwash flow rate x 1000 / (Backwash duration x 60))
<b>Total Flow from the Proposed Development</b>		
Flow Rate	= 1,028.3	m <sup>3</sup> /day
Flow Rate with P <sub>CF</sub> (Tuen Mun - 1.1)	= 1131.1	m <sup>3</sup> /day (refer to Table T-4 of GESF - Tuen Mun - 1.1)
Contributing Population	= 4189	people
Peaking factor	= 4.0	(refer to Table T-5 of GESF for a population of <10,000 incl. stormwater allowance)
Peak flow (excluding backwash of all pools)	= 52.4	litre/sec
Peak flow (including backwash of all pools)	= 57.6	litre/sec

## 2.5 Proposed Sewage Treatment Facility

- 2.5.1 As the Application Site is not served by public sewerage system currently, it is proposed to provide on-site sewage treatment to ensure sewage can be discharged in a proper manner. Once public sewerage system is connected to the Application Site, the sewage flow from the proposed development may be discharged to the public sewerage system in the future.
- 2.5.2 The use of Sewage Treatment Plant (STP) is recommended for the Proposed Development. The "Guidelines for the Design of Small Sewage Treatment Plants" published by the EPD for the design, construction, operation and maintenance of STP should be followed. The effluent should be treated to acceptable standards as stated in "Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage systems, Inland and Coastal waters". As the proposed development have a population of more than 2,000, the Applicant will approach EPD to discuss the design of the STP during detailed design stage.
- 2.5.3 Suitable treatment for the sewage generated by the proposed development could practically be provided by a package treatment unit, i.e. treatment facilities which are supplied and installed as complete units, including all treatment stages. For example, one appropriate technology would be Membrane Bioreactor (MBR) units, followed by disinfection to achieve the required effluent standards. The treated effluent can then be discharged of into the drainage system. A sample of the MBR unit is enclosed in **Appendix 2.2**.

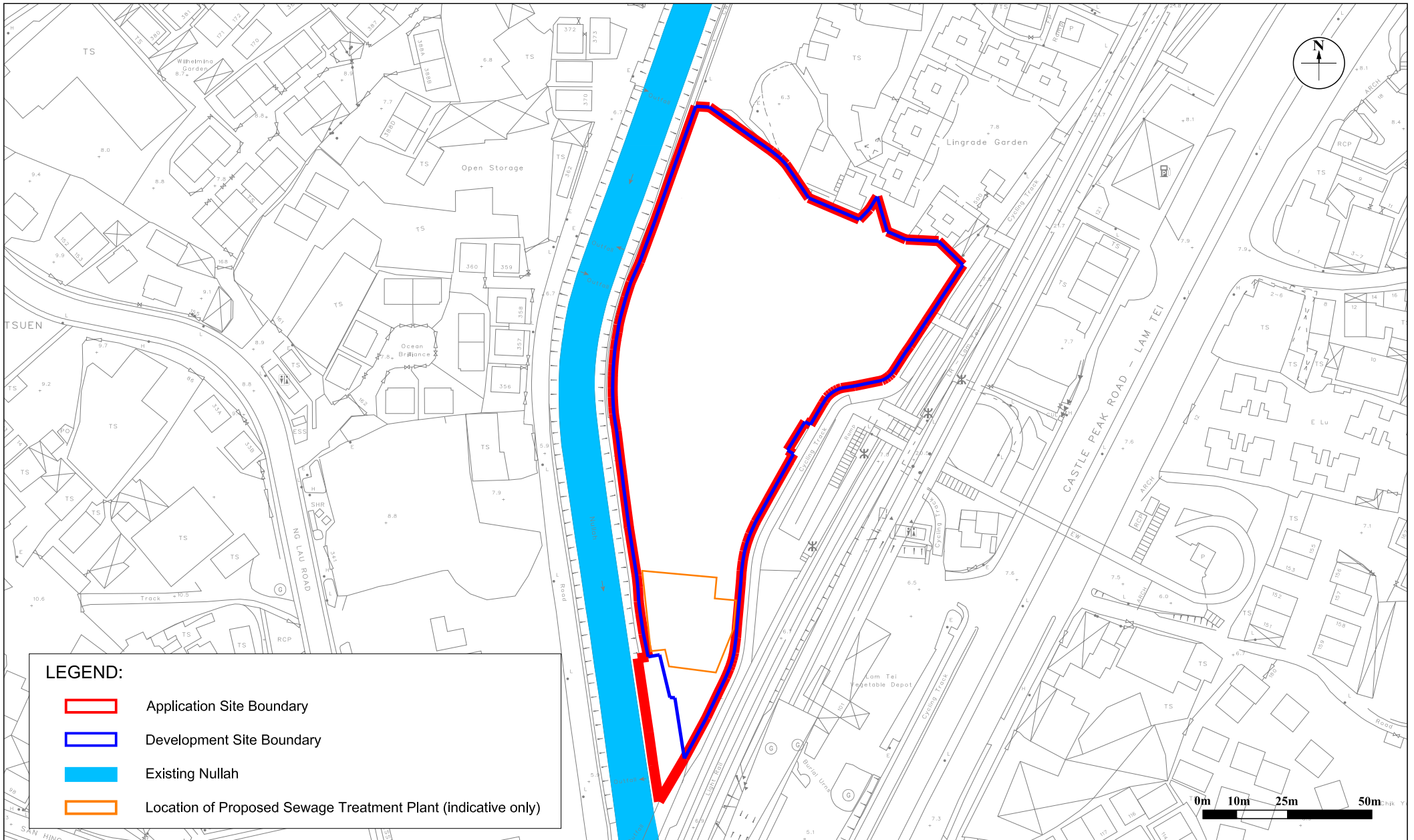


- 2.5.4 The design and operation of the STP will be in accordance with the "Guidelines for Design of Small Sewage Treatment Plants" published by the EPD, with adequate capacity to handle three times of ADWF. The area of the STP will be approximately 1,254m<sup>2</sup> occupying two basement floors. The treated effluent would then be temporary stored in the stormwater storage tank before discharging into the existing nullah to the west of the Application Site. **Figure 2.1** shows the indicative location of the on-site treatment plant. The exact discharge location and pipe design will be subject to further study and agreed with **DSD** during detailed design stage.
- 2.5.5 The effluent generated from the Proposed Development will go through the process of disinfection to achieve the necessary discharge standards as set out in EPD's Technical Memorandum – Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (**Table 6 – Standards for Effluents Discharged into Group D Inland Waters**).
- 2.5.6 As a good practice for sewage treatment facilities, measures will be incorporated into the design to minimise the risk of emergency overflow from the treatment plant. These measures include standby pumps, secure power supplies, appropriate alarms, as well as comprehensive Operation and Maintenance procedures in order to keep the facilities in good working order.
- 2.5.7 The proposed on-site MBR will be fully enclosed with deodorising system, so that the noise and odour emitted from the plant will not have adverse impact upon the surrounding residents.
- 2.5.8 The project proponent will be responsible for the **planning, design**, implementation and maintenance of the proposed STP and arrangement of the sludge from the proposed STP.
- 2.5.9 The detailed design and size of the MBR unit will be provided in later stage for EPD's approval.

### 3. CONCLUSION

- 3.1.1 A residential development is proposed for the Application Site at D.D.130 Lam Tei, Tuen Mun. The potential sewerage impact has been quantitatively addressed.
- 3.1.2 Since there is no public sewerage system available for the Proposed Development, on-site treatment will be required. Connection to the public sewer will be a long-term option after availability of trunk sewer connecting to the Application Site.
- 3.1.3 An on-site treatment with Membrane Bioreactor (MBR) will be used to treat effluent from the Proposed Development, the treated effluent would be temporary stored in a proposed stormwater storage tank before discharging into the nearby nullah. Relevant statutory guidelines and regulations will be followed and detail design of the MBR unit will be provided in later stage.
- 3.1.4 With the sewage treatment plant and proper maintenance in place, it is concluded that the Proposed Development will not have any unacceptable adverse sewerage impact to the surrounding.

## Figures



**Figure: 2.1**

**Title:** Indicative Location of Proposed Sewage Treatment Plant

**Project:** Proposed Rezoning from “Residential (Group B)1” Zone to “Residential (Group B)4” Zone for Medium-Density Housing Development to Include a Footpath for Public use at Various Lots and Adjacent Government Land in DD130, Lam Tei, Tuen Mun



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## **Appendix 2.1**

### **Detailed Sewerage Impact Assessment Calculations**

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

Residential Units		
Total number of residential units	=	1,385 units
Total number of residents	=	3740 residents (2.7 people per flat is assumed)
Design flow	=	270 litre/person/day -- (Private R2 in Table T-1 of GESF)
Sewage generation rate	=	1,009.8 m <sup>3</sup> /day
Clubhouse		
Total GFA	=	2,002 m <sup>2</sup>
Assumed floor area per employee	=	30.3 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
Total number of employees	=	66 employees
Design flow for employees	=	280 litre/employee/day -- (refer to Table T-2 of GESF - J11 Community, Social & Personal Services)
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Filter areas required	=	0.4 m <sup>2</sup>
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Backwash flow rate	=	30 m <sup>3</sup> /m <sup>2</sup> /hr
Design flow for swimming pool backwashing	=	1.1 m <sup>3</sup> /day
Design flow for swimming pool backwashing	=	3.6 litre/sec
Proposed Children Swimming Pool		
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Volume of swimming pool	=	57.6 m <sup>3</sup>
Turnover rate	=	6 hr
Surface loading rate of filter	=	50 m <sup>3</sup> /m <sup>2</sup> /hr
Filter areas required	=	0.2 m <sup>2</sup>
Backwash duration	=	5 min/d
Backwash flow rate	=	30 m <sup>3</sup> /m <sup>2</sup> /hr
Design flow for swimming pool backwashing	=	0.5 m <sup>3</sup> /day
Design flow for swimming pool backwashing	=	1.6 litre/sec
Total Flow from the Proposed Development		
Flow rate (excluding backwash of all pools)	=	1,028.3 m <sup>3</sup> /day
Flow rate with P <sub>CF</sub> (Tuen Mun - 1.1)	=	1131.1 m <sup>3</sup> /day (refer to Table T-4 of GESF - Tuen Mun - 1.1)
Contributing population	=	4189 people
Peaking factor	=	4.0 (refer to Table T-5 of GESF for a population of <10,000 incl. stormwater allowance)
Peak flow (excluding backwash of all pools)	=	52.4 litre/sec
Peak flow (including backwash of all pools)	=	<u>57.6</u> litre/sec

## Remarks:

(1) For job type J11, the "per-employee" unit flow factor takes into account the flows of customers and tenants.