

## **Appendix F:**

# **Drainage and Sewerage Impact Assessment (DSIA)**

Prepared for

**Urban Renewal Authority**

Prepared by

**Ramboll Hong Kong Limited**

**PROPOSED MINOR RELAXATION OF DOMESTIC PLOT RATIO  
AND BUILDING HEIGHT RESTRICTIONS FOR THE PERMITTED  
RESIDENTIAL DEVELOPMENT WITH COMMERCIAL / RETAIL  
USES OF THE URA MA TAU WAI ROAD/ LOK SHAN ROAD  
DEVELOPMENT PROJECT (KC-020), AND PROPOSED PUBLIC  
VEHICLE PARK**

**DRAINAGE & SEWERAGE IMPACT ASSESSMENT**

Date **May 2026**

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## 1. INTRODUCTION

### 1.1 Background and Objectives

- 1.1.1 The Ma Tau Wai Road/ Lok Shan Road Development Project (KC-020) (the Project) was commenced by the Urban Renewal Authority (URA) on 9 August 2024 by way of a development project in accordance to Section 26 of the Urban Renewal Authority Ordinance (URAO). The Secretary for Development (SDEV) has authorised the URA to proceed with the Project without any amendment on 26 August 2025, the decision was subsequently gazetted on 5 September 2025.
- 1.1.2 Under the district-based planning approach, the Project was intended to be holistically planned and designed with the adjoining approved URA Kau Pui Lung Road / Chi Kiang Street Development Scheme (CBS-2:KC) to multiply the planning gains. The two projects may be submitted under the same land grant(s), with possibility of under different phases, for implementation.
- 1.1.3 To tally with the permissible domestic plot ratio (DPR) and building height restriction (BHR) of CBS:2-KC for holistic design and implementation, a Planning Application in accordance to Section 16 of the Town Planning Ordinance (S16 Planning Application) is required to seek Town Planning Board (TPB)'s approval on **minor relaxation of DPR restriction from 7.5 to 8.0** and **BHR from 120 mPD to 140 mPD** for the Application Site (i.e. the area zoned "R(A)" on the OZP within the Project boundary). It is also proposed to **include Public Vehicle Park (PVP) use** to facilitate design flexibility for accommodating the PVP parking spaces required by CBS-2KC<sup>1</sup> in the future combined development, if necessary.
- 1.1.4 The proposed relaxation in the S16 Planning Application can facilitate a more flexible layout across the two sites (i.e. the Application Site and CBS-2:KC) which are under same permissible BHR and PR controls upon this S16 approval. Nevertheless, despite that a combined development will be proposed, the URA undertakes that the portion of the future combined development within the Application Site would not exceed maximum DPR of 8.0 and total PR of 9.0.
- 1.1.5 This S16 Planning Application is a non-scheme-based submission. The notional design and indicative development parameters provided in the application are solely for illustration purpose and for conducting necessary technical assessments. Except for any planning condition(s) to be imposed, the design of the future development will not be bounded by the notional design submitted in the S16 Planning Application.
- 1.1.6 To support the S16 Planning Application, Ramboll Hong Kong Limited has been appointed by Urban Renewal Authority to prepare this Drainage & Sewerage Impact Assessment (DSIA).

### 1.2 Application Site and its Environs

- 1.2.1 The Project is broadly bounded by Ma Tau Wai Road to the east, a back lane to the south, URA's Kau Pui Lung Road / Chi Kiang Street Development Scheme (CBS-2:KC) to the west and Lok Shan Road to the north. The application site of the subject S16

<sup>1</sup> The inclusion of PVP does not necessarily mean there must be certain amount of PVP provision in the Project, but to avoid further S16 planning permission to be sought in case some PVP spaces as required in CBS-2:KC might need to be provided within the Project area due to site constraints and/or integrated design consideration under the combined site development. In any case, the total number of PVP spaces required by Transport Department (TD) in CBS-2:KC would be provided within the combined site of the Project and CBS-2:KC.

Planning Application comprises only the area zoned "Residential (Group A)" ("R(A)") within the Project boundary, excluding the adjoining area shown as "Road" on the Draft Ma Tau Kok Outline Zoning Plan No. S/K10/31 (the Application Site) (**Figure 1.1** refers).

- 1.2.2 The Application Site, with an area of about 1,566 sq.m. It comprises a row of private buildings at Nos. 324 – 354 Ma Tau Wai Road (even nos. only) and part of a government lane at the western boundary. Subject to site survey and detailed design, the Application Site with an area of about 1,566 sq.m. will be the net site area for Plot Ratio (PR) calculation. Please refer to **Figure 1.2** for the location of the Application Site and its environs.

### 1.3 Comparison of OZP Compliant Proposal and the Current S.16 Planning Proposal

- 1.3.1 A comparison between the OZP Compliant Proposal authorized by SDEV in August 2025 (OZP Compliant Proposal) and the Current Indicative Proposal of the S16 Planning Application (Current s16 Planning Proposal) is provided in **Table 1.1** below.

**Table 1.1 Comparison of Development Parameters of the OZP Compliant Proposal and Current S16 Planning Proposal**

Development Parameters	OZP Compliant Proposal <sup>(1)</sup> [A]	Current S16 Planning Proposal [B]	Difference [B]-[A] (% change)
<b>Zoning (Under Approved Ma Tau Kok Outline Zoning Plan No. S/K10/30)</b>	R(A)	R(A)	N/A
<b>Site Area</b> - Application Net Site Area (for PR Calculation) (m <sup>2</sup> )	About 1,578	<b>About 1,566</b> <sup>(2)</sup>	-12 (-0.8%)
<b>Maximum Plot Ratio (PR)</b> - Total PR - Domestic PR	9.0 7.5	<b>9.0</b> <b>8.0</b> <sup>(3)</sup>	No change +0.5 (+6.7%)
<b>GFA</b> Total GFA (m <sup>2</sup> ) Domestic GFA (m <sup>2</sup> )	About 14,202 About 11,835	About 14,094 <sup>(2)</sup> About 12,528 <sup>(2) (3)</sup>	-108 (-0.8%) +693 (+5.9%)
<b>Max. BH (mPD)</b>	120	<b>140</b>	+20 (+16.7%)

#### Remarks

(1) As per the notional design under the URA Ma Tau Wai Road/ Lok Shan Road Development Project (KC-020) authorized by SDEV in August 2025.

(2) According to the latest land boundary survey, the net site area is 1,566m<sup>2</sup> resulting to corresponding adjustment in total GFA, subject to agreement with LandsD in the land grant application stage.

(3) The domestic and non-domestic PR/GFA are for illustrative purpose only. To allow flexibility and optimum use of development potential, development at the Application Site is subject to a maximum domestic PR and total PR. The actual domestic and non-domestic PRs and GFAs would be worked out at detailed design stage.

## 1.4 Notional Design of the Project

1.4.1 This DSIA is prepared based on the Indicative Development Parameters provided in **Table 1.2** and the Notional Design of the Project provided in **Appendix 1.1** (the Notional Design).

1.4.2 The Project is tentatively scheduled for completion by year 2033/34.

**Table 1.2 Indicative Development Parameters under Notional Design**

<b>Zoning (Under Approved Ma Tau Kok Outline Zoning Plan No. S/K10/30)</b>	R(A)
<b>Application Site Area (for PR Calculation) (m<sup>2</sup>)</b>	~1,566
<b>Number of Residential Tower</b>	1
<b>Number of Residential Units</b>	About 279
<b>Number of Storeys</b>	About 31
<b>Number of Podium Storeys*</b>	About 3
<b>Number of Basement Levels*</b>	About 3
<b>Height of Notional Design (mPD)</b>	140
<b>Tentative Completion Year</b>	Year 2033 / 2034

Remarks: \* Notional Design subject to detailed design and changes.

## 1.5 Appraisal of Drainage and Sewerage Impact

1.5.1 The aim of this DSIA is to assess whether the capacity of drainage and sewerage network serving the Project is sufficient to cope with the sewage flow from the Project.

1.5.2 The impact to drainage system serving the Project is discussed in Section 2 and the impact to sewerage system serving the Project is discussed in Section 3.

## 2. DRAINAGE IMPACT ASSESSMENT

### 2.1 Existing Drainage System

- 2.1.1 Based on the currently available Drainage Record Plans (from Lands Department's GeoInfo Map), there are existing stormwater drains and manholes nearby the Application Site (see **Figure 2.1**). The Application Site is currently fully paved, mainly comprising medium-rise domestic buildings.
- 2.1.2 According to the Drainage Services Department (DSD) website, there are no flooding blackspots in the vicinity of the Application Site.

### 2.2 Assessment and Design Criteria

- 2.2.1 As the catchment areas are all fairly small, the Rational Method (as set out in Section 7.5.2 of Drainage Services Department's Stormwater Drainage Manual, "the SDM") has been used for the calculation of runoff. Times of concentration have been calculated from the topography of the various catchment areas, or assumed, based on consideration of the nature of the relevant catchment areas.
- 2.2.2 The existing Application Site has been assumed to be effectively fully paved, i.e. a runoff coefficient, C of 1.0 has been adopted. The upstream catchment areas to the west of the Application Site comprise steep vegetated slopes and a value of C=0.35 has been adopted for these areas. The future development will comprise hard paving (C=1.0) and some flat landscaping, although full paving has been assumed for simplicity and as a conservative approach.
- 2.2.3 The Application Site drains to urban drainage branch systems and a 50 years design return period has therefore been adopted, as set out in Table 10 of the SDM.
- 2.2.4 In accordance with Section 6.8 of the SDM (Corrigendum No. 1/2022), allowances have been included in the runoff calculations for potential increased rainfall intensities to end 21st century plus a further Design Allowance, with the runoff at end 21st century including Design Allowance adopted for design purposes. The Application Site and surrounding areas are not tidally affected, so no consideration has been given to potential future sea level rises.
- 2.2.5 The Colebrook-White Equation has been used for the calculation of pipe capacities, with pipe roughness values taken from Table 14 of the SDM.

### 2.3 Discussion

- 2.3.1 As the existing condition of Application Site consists with several residential buildings and is almost 100% paved under existing conditions. According to APP-152, at least 20% of greenery will be provided after development. The provision of a greenery area of approximately 314 sqm (i.e. approx. 1570sqm net site area x 20%) will further increase filtration of stormwater and minimize surface runoff.
- 2.3.2 As the minor change in permissible development intensity brought by the S16 Planning Application would affect the amount of surface runoff flowing into the existing drainage system. Meanwhile, there is a slight increase in greenery area in the Notional Design, peak runoff from the Application Site will slightly decrease as compared to existing site conditions.
- 2.3.3 Based on the layout of the surrounding existing drainage systems, the drainage for the Application Site will be connected to existing manhole SMH4028827 on Ma Tau Wai Road with ultimate discharge to the existing main drainage routes along Ma Tau Wai

Road, so there will be little overall impact on the drainage regimes as a result of the redevelopment at the Application Site.

- 2.3.4 In views of above, the subject S16 Planning Application at the Application Site itself would not result in any adverse impact to the public drainage system, and drainage upgrade work is not considered necessary. Nevertheless, potential drainage impact arising from any design changes to the combined development with CBS-2:KC will be addressed in subsequent detailed design stage, if required. Overall, no adverse drainage impact is expected as a result of the S16 Planning Application.

### 3. SEWERAGE IMPACT ASSESSMENT

#### 3.1 Introduction

3.1.1 The aim of this section is to assess whether the capacity of the sewerage network serving the Project is sufficient to cope with the sewage flow arise from the subject S16 Planning Application. Practicable sewerage mitigation measures would be recommended, where necessary.

#### 3.2 Assessment Criteria and Methodology

3.2.1 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 planed usage types.

3.2.2 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 estimating the quantity of the sewage generated from the Notional Design of the Project and the existing catchment area. Sewage flow parameters and global peaking factors in this document have been adopted in the sewerage impact assessment.

3.2.3 According to the GESF, the overall unit flow is composed of flows due to employees and the associated activities. The following unit flow factors have been adopted in the SIA calculation in accordance with Tables T-1, T-2 and T-3 of the GESF:

- Domestic Private R2: 0.27 m<sup>3</sup>/person/day
- Domestic Private R3: 0.34 m<sup>3</sup>/person/day
- J1 – Manufacturing – Central Kowloon: 0.63 m<sup>3</sup>/employee/day
- J3 – Transport, Storage & Communication: 0.18 m<sup>3</sup>/employee/day
- J4 – Wholesale & Retail: 0.28 m<sup>3</sup>/employee/day
- J10 – Restaurants & Hotels: 1.58 m<sup>3</sup>/employee/day
- J11 Community, Social & Personal Services: 0.28 m<sup>3</sup>/employee/day
- School student: 0.04 m<sup>3</sup>/person/day

3.2.4 The catchment inflow factor, PCIF of 1.0 (Central Kowloon), is adopted in the catchment calculations.

#### 3.3 Existing and Future Sewerage System

3.3.1 For the existing buildings located within the Project, the sewage generated are discharged through existing manhole FMH4023923 (for Option 1) or and discharged southward to Chi Kiang Street then southeast to To Kwa Wan Preliminary Treatment Works.

3.3.2 As proposed in the SIA report of CBS-2:KC dated February 2023 conducted, which relevant Government Departments expressed no in-principle objection to the SIA , three sewer sections (from FMH4024256 to FMH4025856, named S14-S15, S15-S16 and S16-17) are proposed to be upgraded from existing 600mm diameter to 750mm diameter in addressing the sewerage generated from the proposed development at CBS-2:KC, as shown in **Appendix 3.4**. Although the upgrade works have not been done, but the diameters after upgrading will be adopted in this SIA calculation.

- 3.3.3 The existing sewerage network is shown in **Figure 3.1a to c**.
- 3.3.4 Two sewerage discharge options (Option 1 and 2) are proposed for the Project.
- 3.3.5 For Option 1, the sewage generated in the Notional Design of the Project is discharged to alley of the buildings located at the south of the Project (Mai Lok Building, Kwong Yiu Building, Braemar Court and Lucky Building), then discharge eastward along Kiang Su Street, southward along Ma Tau Wai Road and southeast to To Kwa Wan Preliminary Treatment Works (**Figure 3.2a to b** refers).
- 3.3.6 It is noted that most of the sewers located at the alley of the buildings to the south of the Project are lack of information for invert level as recorded in Geoinfo and Common Spatial Data Infrastructure (CSDI) and are with 150mm diameter width. According to Sewerage Manual issued by Drainage Services Department (DSD), minimum size for public sewers should be 200mm diameter, while the closet available sewer pipe size is 225 diameter. To fulfil DSD requirement on sewer pipe size, upgrading of sewer pipe that smaller than 200mm diameter (i.e. 150mm) are proposed to be upgraded to 225mm diameter and survey shall be conducted to verify the invert level of the sewers located along the sewerage discharge Option 1, subject to agreement with relevant departments and technical feasibility. Nevertheless, it is anticipated that disruption would be caused to the buildings located at the south of the Project during upgrade. Given the uncertainty of the sewers' invert levels and potential disruption caused to residents for Option 1, sewerage discharge Option 2 is also suggested as alternative consideration.
- 3.3.7 For Option 2, the sewage generated in the Notional Design of the Project is discharged to newly constructed sewers along Ma Tau Wai Road, then connect to the existing public sewerage manhole (FMH4099043, S4a) to join the public sewerage system (discharge southward along Ma Tau Wai Road and southeast to To Kwa Wan Preliminary Treatment Works). Underground Utility Survey (UU Survey) shall be conducted to verify the feasibility of the proposed sewerage discharge Option 2 (**Figure 3.3a to b** refers).
- 3.3.8 For both Options (Option 1 and 2), other than sewers that with 150mm diameter and exceed existing sewer capacity, upgrades may also be required for upstream sewers that connecting to subsequent sewers with larger diameter to prevent accumulation of sewage inside the upstream sewer with smaller diameter.

### 3.4 Assessment of the Sewerage Impact

- 3.4.1 Detailed Calculation of sewage generation from the Notional Design of the Project is given in the **Table 3.1** and Table 1 of **Appendix 3.1**. Estimated sewage generation and area breakdown of surrounding catchments is given in Table 2 to 5 of **Appendix 3.1**. The hydraulic capacity for discharge Option 1 is located in **Appendix 3.2** and for discharge Option 2 is located in **Appendix 3.2**.

**Table 3.1 Estimated Peak Flow for the Notional Design of the Project**

<b>Calculation for Sewage Generation Rate for the Notional Design of the Project</b>			
<b>1. Residential Tower</b>			
1a. Total number of residential units	=	279	units
1b. Total number of residents	=	754	people -- (PPF provided by URA - 2.7)
1c. Design flow	=	0.27	m <sup>3</sup> /person/day -- (Private R2 in Table T-1 of GESF)

1d. Sewage Generation rate	=	<b>203.6</b>	m <sup>3</sup> /day
<b>2. Commercial (F&amp;B)</b>			
2a. Assumed Area	=	1570	m <sup>2</sup> (100% of the non-Domestic GFA)
2b. Assumed floor area per employee	=	19.6	m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Restaurants)
2c. Total number of employees [1]	=	81	employees
2d. Design flow for commercial activities and employee	=	1.58	m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J10)
2e. Sewage Generation rate	=	<b>128.0</b>	m <sup>3</sup> /day
<b>3. Clubhouse</b>			
3a. Assumed Area	=	626	m <sup>2</sup>
3b. Assumed floor area per employee	=	30.3	m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
3c. Total number of employees [1]	=	21	employees
3d. Design flow for commercial activities	=	0.28	m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
3e. Sewage Generation rate	=	<b>5.9</b>	m <sup>3</sup> /day
<b>Total Flow from Proposed Development (KC-020), connected to Manhole A1 (FMH4023923) in Option 1 / Proposed Manhole B1 in Option 2</b>			
Flow Rate	=	337.4	m <sup>3</sup> /day
Contributing Population	=	1250	people
Peaking factor	=	6	Refer to Table T-5 of GESF for population 1,000-5,000 incl. stormwater allowance
Peak Flow	=	<b>23.43</b>	litre/sec

Remark:

[1] Total number of employees = Assume Area / Assumed floor area per employee

3.4.2 Sewage generation rate from the Notional Design of the Project is estimated to be 337.4 m<sup>3</sup>/day and 23.4 litre/sec.

3.4.3 Detailed sewage generation rate calculation for the existing catchments is given in **Appendix 3.1**. For the sewage generation estimation from the CBS-2:KC, parameters are based on the notional layout of the approved DSP of the CBS-2:KC and is subject to changes at detailed design stage. The upgrades in both discharge Option 1 and 2 are discussed below.

Option 1 (Discharge through alley of the buildings located at the south of the Project)

3.4.4 One terminal manhole (STMH1) is proposed in Option 1. Sewage generated from the Notional Design of the Project will be discharged to existing manhole A1 (FMH4023923) and southward to existing manhole S1a (FMH4099040), then eastward to existing manhole S4a (FMH4099043), southward to existing manhole S8 (FMH4024266) and southeast to existing manhole S17 (FMH4025856), and to downstream trunk manhole S18 (FMH4025767). For the trunk sewer with diameter 600mm at S17-S18 (FWD4026981), the sewage generation from the Notional Design of the Project is only 0.6% of its capacity. It is considered that the Notional Design of the Project would only

have insignificant impact to the downstream trunk sewers with larger diameter (i.e. 1650mm after existing manhole S18 (FMH4025767)).

- 3.4.5 For the existing sewerage system connection to A14 (FMH4096006) and S14 (FMH4024258) other than route of discharge Option 1, the connection are considered outdated due to the sewage originally connecting A14 (FMH4096006) will be demolished and new building will discharge to sewer system located at Kau Pui Lung Street as mentioned in the previous SIA Report for URA's CBS-2:KC and sewage originally connecting S14 (FMH4024258) will be demolished and new building will discharge to sewer system located at Sung On Street (after manhole S18 (FMH4025767)) as mentioned in the previous SIA Report conducted for URA's Kowloon City Action Area 1 (KCAA1) district study area.
- 3.4.6 There is no available record for invert level for most the of sewers between existing manhole A1 (FMH4023923) to S1a (FMH4099040), thus the unknown invert level of the sewers are estimated proportionally with known upstream and downstream sewer invert level and the invert levels need to be further verified by survey conducted. Upgrade maybe required for sewers with insufficient capacity to cater the sewage generated from the Notional Design of the Project and surrounding catchments after verification.
- 3.4.7 For existing sewer with 150mm diameter that located within sewage discharge Option 1 (i.e. 5 sewers section between existing manhole A1 (FMH4023923) to A6 (FMH4024269) and sewer section S1a-S2a (FWD4123890)), it is proposed to upgrade to 225mm diameter to fulfill DSD's minimum requirement of sewer size of 200mm diameter.
- 3.4.8 For sewer S6a-S7a (FWD4123887), sewage generated from the Notional Design of the Project and surrounding catchments exceed the capacity of the sewer, thus upgrade from 225mm diameter to 300mm diameter is required.
- 3.4.9 As generally upstream sewer shall connect to the downstream sewer with same or larger diameter for smooth operation of the sewerage system. There are some sewers that their capacities are sufficient to cater the sewage generated from the Notional Design of the Project and surrounding catchment, but due to the abovementioned principle, upgrade maybe requested in the future.
- 3.4.10 The sewers mentioned in **Section 3.4.6** to **Section 3.4.9** and newly constructed sewers are listed in **Table 3.2** below.

**Table 3.2 Sewers that (potentially) required upgrade and Newly Constructed (Option 1)**

Sewer Section in Public Sewerage System	Name adopted in SIA calculation	Diameter upgrade / constructed (mm)	Potentially Upgrade /Upgrade Required / Newly Constructed	Reason
--	STMH1-A1	225	Newly Constructed	Connection for the Project to public sewerage system
FWD4025299	A1-A2			

Sewer Section in Public Sewerage System	Name adopted in SIA calculation	Diameter upgrade / constructed (mm)	Potentially Upgrade /Upgrade Required / Newly Constructed	Reason
FWD4120100	A2-A3	From 150 to 225	Upgrade required	DSD's requirement on minimum sewer size is 200mm diameter.
FWD4120101	A3-A4			
FWD4025295	A4-A5			
FWD4120102	A5-A6			
FWD4025296	A6-A7	From 225 to unknown (subject to survey result)	Potentially upgrade	Due to unknown invert level, backwater or reverse flow of sewage may occur, the potential upgrade is subject to survey result to verify the invert level of sewers.
FWD4124595	A7-A8			
FWD4124596	A8-A9			
FWD4120103	A9-A10			
FWD4120104	A10-A11			
FWD4124597	A11-A12			
FWD4120106	A12-A13			
FWD4127550	A13-A14			
FWD4120107	A14-A15	From 150 to 225 or 300	Upgrade required (for upgrade to 225mm diameter) <b>OR</b> Potentially upgrade (For upgrade to 300mm diameter)	Upgrade to 225mm diameter: DSD's requirement on minimum sewer size is 200mm diameter. <b>OR</b> Upgrade to 300mm diameter: Upstream sewer shall connect with downstream sewer with same or larger diameter to prevent sewage accumulation inside the pipe.
FWD4120120	A15-S1a			
FWD4123890	S1a-S2a			
FWD4123891	S2a-S3a			
FWD4123892	S3a-S4a	From 225 to 300	Potentially upgrade	Upstream sewer shall connect with downstream sewer with same
FWD4123889	S4a-S5a			

Sewer Section in Public Sewerage System	Name adopted in SIA calculation	Diameter upgrade / constructed (mm)	Potentially Upgrade /Upgrade Required / Newly Constructed	Reason
FWD4123888	S5a-S6a			or larger diameter to prevent sewage accumulation inside the pipe.
FWD4123887	S6a-S7a	From 225 to 300	Upgrade required	Insufficient Capacity
FWD4123886	S7a-S8	From 225 to 300	Potentially upgrade	Upstream sewer shall connect with downstream sewer with same or larger diameter to prevent sewage accumulation inside the pipe. And upgrade of S6a-S7a is proposed to be upgraded in the Project.

- 3.4.11 With the proposed new sewer and upgrading works in place for discharge Option 1, the sewerage system will have adequate capacity to cater for the Notional Design of the Project and the surrounding catchment.

Option 2 (Discharge through Ma Tau Wai Road)

- 3.4.12 One terminal manhole (STMH2) is proposed in Option 2. Sewage generated from the Notional Design of the Project will be discharged to newly constructed manhole B1 to B4 along Ma Tau Wai Road. Sewer with 225mm diameter is proposed for the newly constructed sewers between proposed manhole B1 to B4 (i.e. B1-B2, B2-B3 and B3-B4). Then sewage generate from the Notional Design of the Project will be discharged through existing manhole S4a (FMH4099043), southward to existing manhole S8 (FMH4024266) and southeast to existing manhole S17 (FMH4025856), and to downstream trunk manhole S18 (FMH4025767). For the trunk sewer with diameter 600mm at S17-S18 (FWD4026981), the sewage generation from the Notional Design of the Project is only 0.6% of its capacity. It is considered that the Notional Design of the Project would only have insignificant impact to the downstream trunk sewers with larger diameter (i.e. 1650mm after existing manhole S18 (FMH4025767)).
- 3.4.13 The feasibility of proposed invert level of newly constructed sewers and manholes in sewage discharge Option 2 is subject to Underground Utility Survey (UU survey) conducted to prevent interruption to existing underground utility.
- 3.4.14 For sewer S6a-S7a (FWD4123887), sewage generated from the Notional Design of the Project and surrounding catchments exceed the capacity of the sewer, thus upgrade from 225mm diameter to 300mm diameter is required.

3.4.15 The sewers that required upgrade and newly constructed sewers are listed in **Table 3.3** below.

**Table 3.3 Sewers that (potentially) required upgrade and Newly Constructed (Option 2)**

Sewer Section in Public Sewerage System	Name adopted in SIA calculation	Diameter upgrade / constructed (mm)	Potentially Upgrade /Upgrade Required / Newly Constructed	Reason
--	STMH1-B1	225	Newly Constructed	Connection for the Project to public sewerage system
--	B1-B2			
--	B2-B3			
--	B3-B4			
--	B4-B5			
FWD4123887	S6a-S7a	From 225 to 300	Upgrade required	Insufficient Capacity
FWD4123886	S7a-S8	From 225 to 300	Potentially upgrade	Upstream sewer shall connect with downstream sewer with same or larger diameter to prevent sewage accumulation inside the pipe. And upgrade of S6a-S7a is proposed to be upgraded in the Project.

3.4.16 With the proposed new sewer and upgrading works in place for discharge Option 2, the sewerage system will have adequate capacity to cater for the Notional Design of the Project and the surrounding catchment.

### 3.5 Conclusion

3.5.1 In view of the condition of existing sewerage system nearby the Project, two potential sewerage discharge options (Option 1 and 2) are proposed. Under Option 1, sewerage generated in the Notional Design of the Project and surrounding catchments are proposed to discharge through existing sewerage system at the alley of the buildings located at the north of the Project. Under Option 2, the sewerage will be discharged through newly constructed sewers at the roadside of Ma Tau Wai Road. Both options (Option 1 and 2) will be discharged at existing manhole S4a (FMH4099043) and then towards southeast to To Kwa Wan Preliminary Treatment Works.

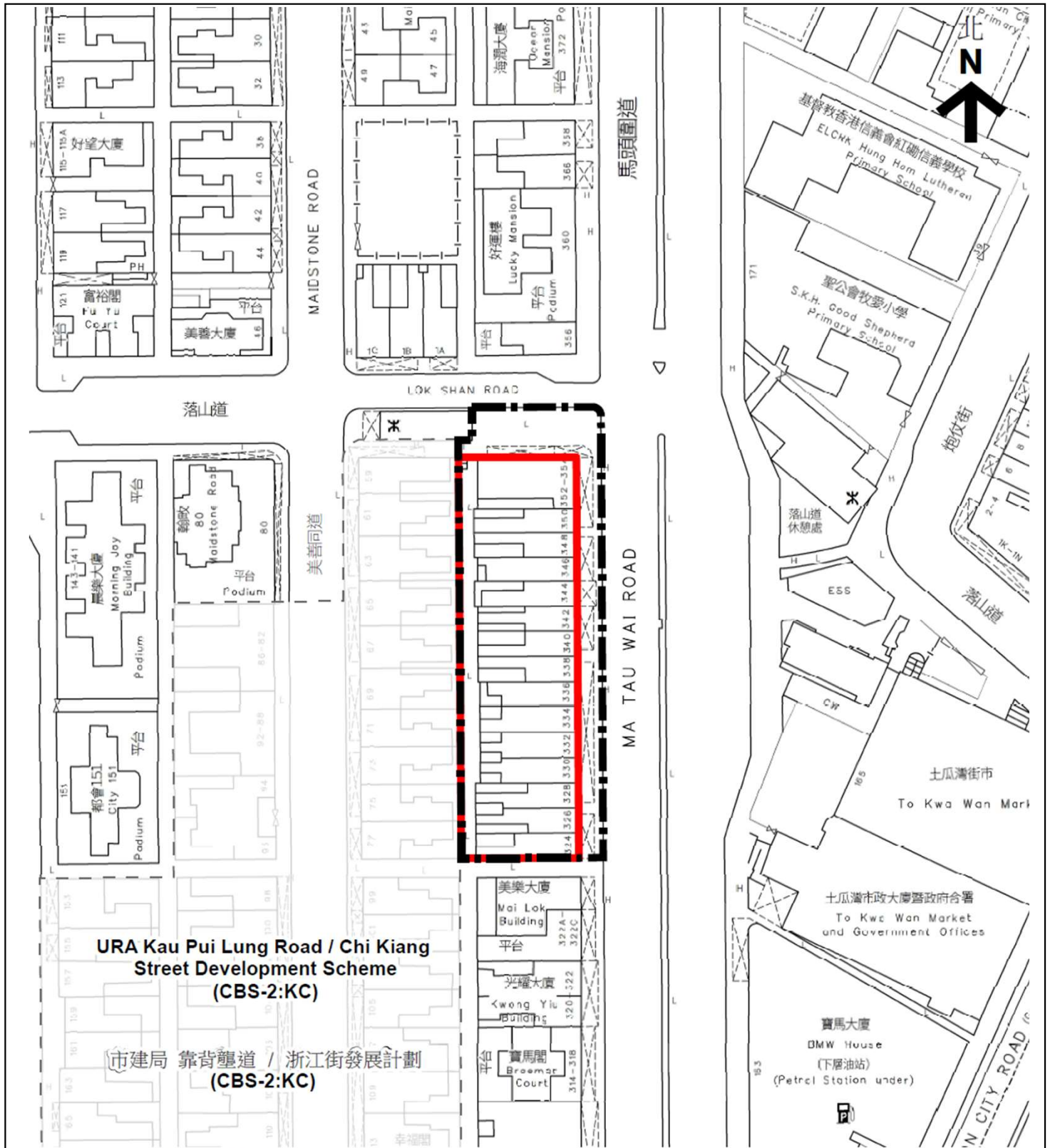
- 3.5.2 Based on the sewerage impact assessment results, with the proposed new and upgrading of sewers, manholes and terminal manholes in both discharge Option 1 and 2, the capacity of the existing sewers serving the area would be sufficient to cater for the sewage generation from the Notional Design of the Project and other related catchment area. The decision on which discharge option will be adopted will be addressed in the subsequent detailed design stage, subject to detailed design and liaison with relevant government departments on technical feasibility and practicability.
- 3.5.3 Overall, the subject S16 Planning Application will have no adverse impact on the existing sewerage system.

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## 4. OVERALL CONCLUSION

- 4.1.1 This DSIA was conducted based on the Notional Design for the subject S16 planning application for minor relaxation of domestic PR and BHR.
- 4.1.2 Based on the drainage impact assessment results, the findings concluded that no adverse impact to the public drainage system is anticipated, no upgrading work is required.
- 4.1.3 Based on the sewerage impact assessment results, which two potential sewerage discharge options (Option 1 and 2) have been proposed for the Project, each with respective new sewers, manholes and terminal manholes. The capacity of the existing sewers serving the area would be sufficient to cater for the sewage generation from the Notional Design of the Project and other related catchment area. The decision on which discharge option will be adopted will be addressed in the subsequent detailed design stage.
- 4.1.4 Overall, the subject S16 Planning Application will have no adverse impact from drainage and sewerage aspects.

## Figures



URA Kau Pui Lung Road / Chi Kiang Street Development Scheme (CBS-2:KC)

市建局 靠背壟道 / 浙江街發展計劃 (CBS-2:KC)

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DP Boundary



Application Site  
(i.e. Area zoned "R(A)")

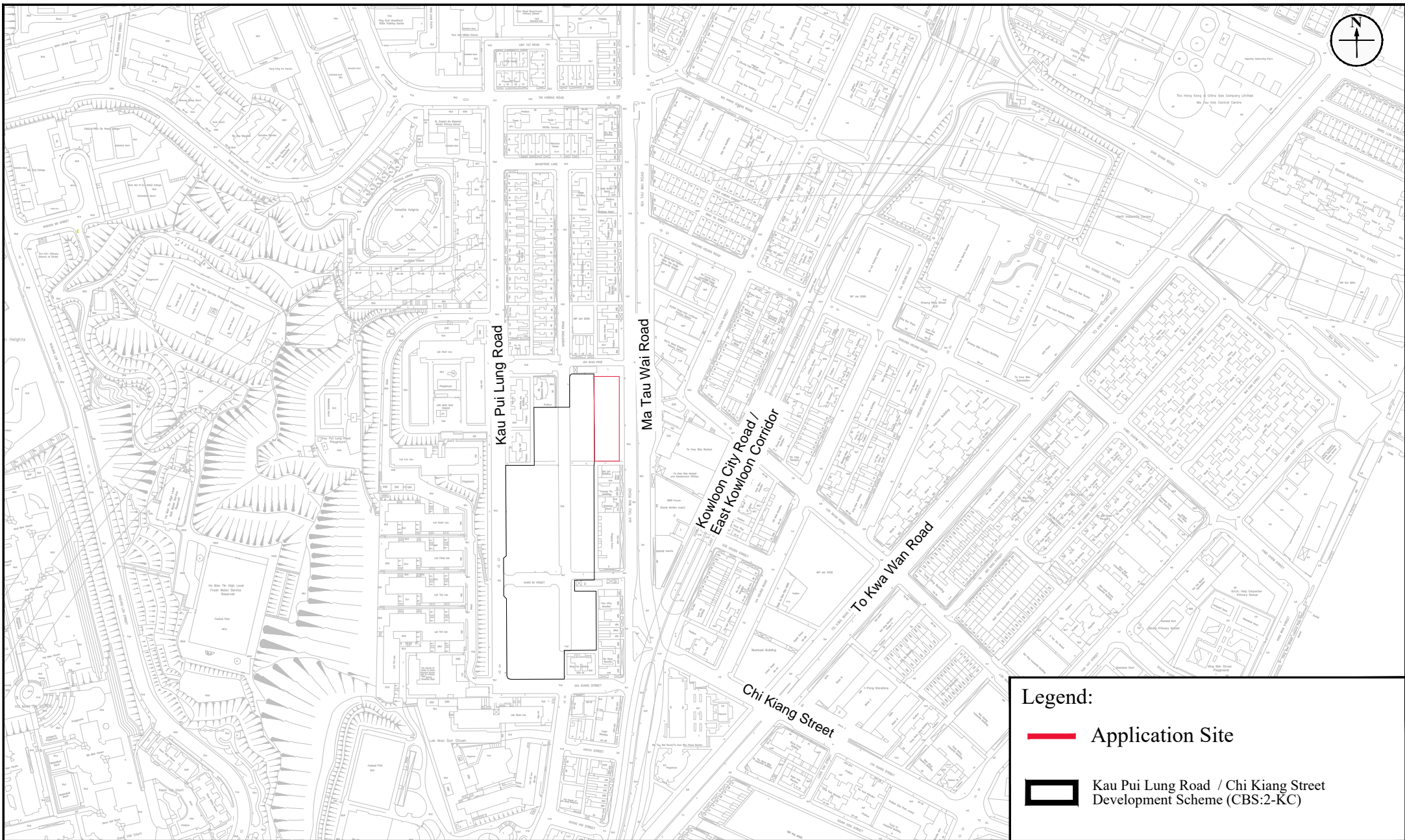
EXTRACT PLAN PREPARED ON 12/06/2024  
BASED ON SURVEY SHEET No.  
11-NW-20B & 11-NW-20D

## SITE PLAN

MA TAU WAI ROAD /  
LOK SHAN ROAD  
DEVELOPMENT PROJECT  
(KC-020)



Figure 1.1



**Figure:** 1.2

**Title:** Location of Application Site and Its Environ

**Project:** Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the Permitted Residential Development with Commercial / Retail uses of the URA Ma Tau Wai Road / Lok Shan Road Development Project (KC-020), and Proposed Public Vehicle Park

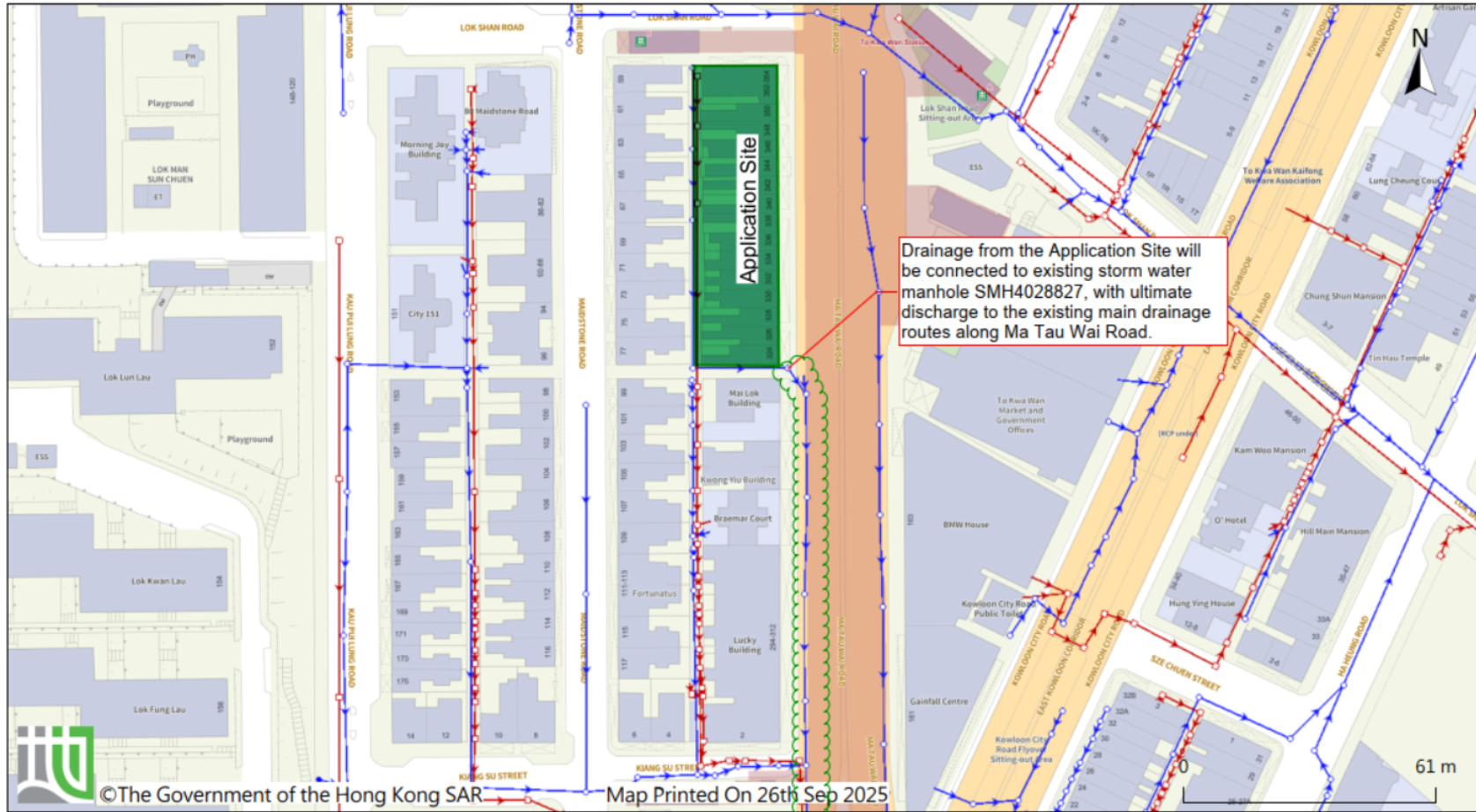
**RAMBOLL**

Drawn by: CL

Checked by: TC

Rev.: 1.0

Date: May 2026



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**Figure:** 2.1

**Title:** Existing Drainage System in the Vicinity of Application Site

**Project:** Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the Permitted Residential Development with Commercial / Retail uses of the URA Ma Tau Wai Road/ Lok Shan Road Development Project (KC-020), and Proposed Public Vehicle Park

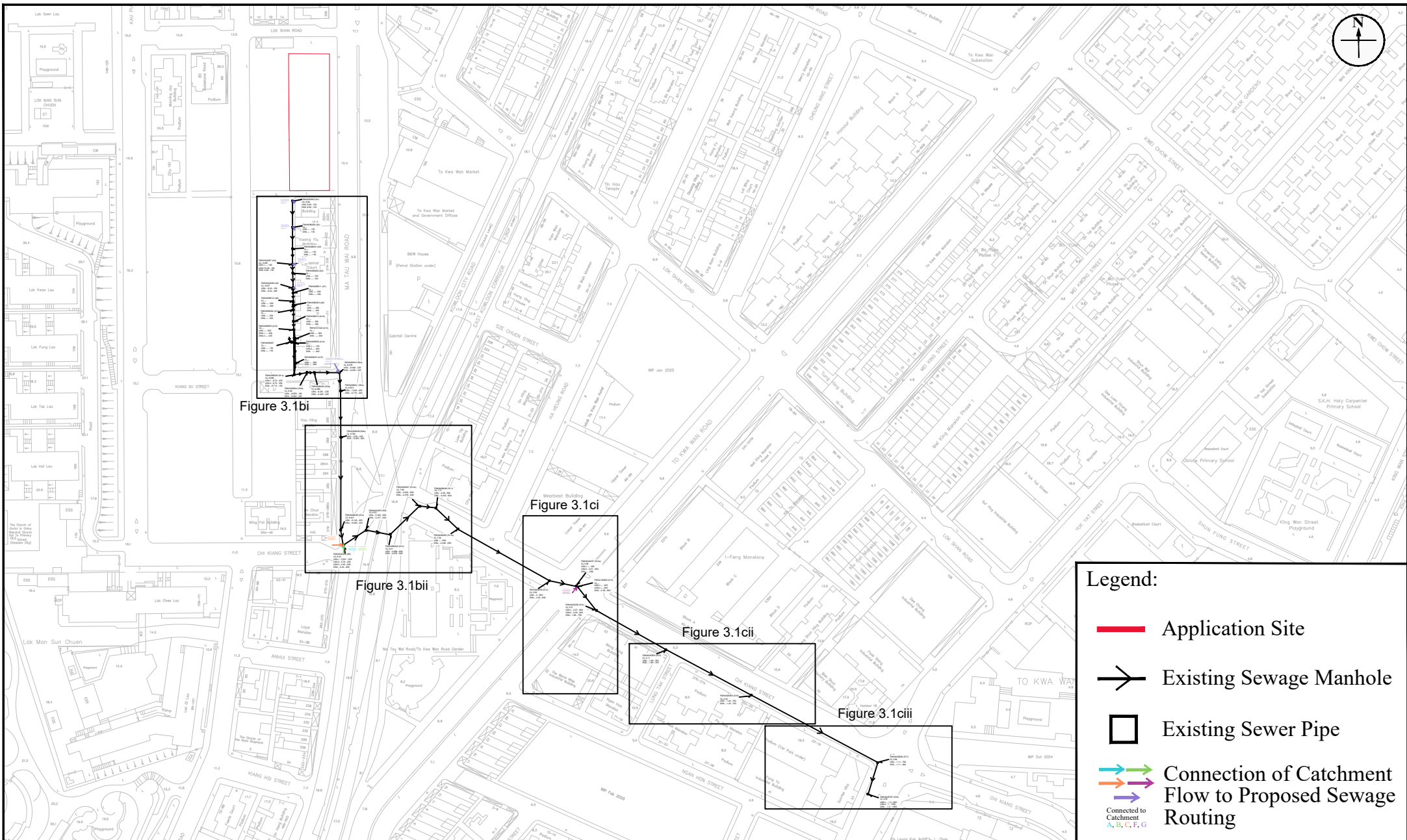
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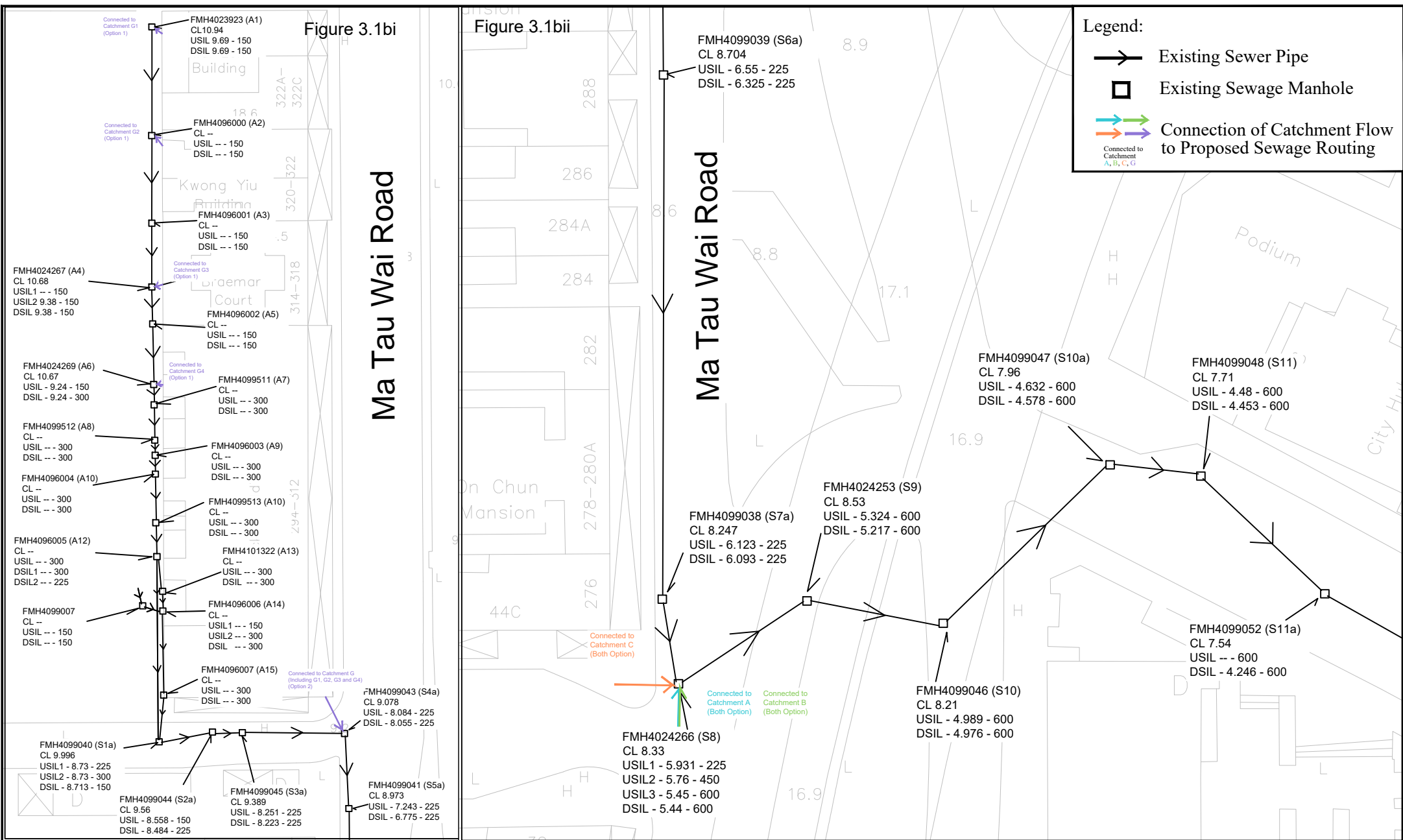
**Figure:** 3.1a

**Title:** Existing Sewerage System in Vicinity of the Project

**Project:** Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the Permitted Residential Development with Commercial / Retail uses of the URA Ma Tau Wai Road / Lok Shan Road Development Project (KC-020), and Proposed Public Vehicle Park

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Date:	May 2026



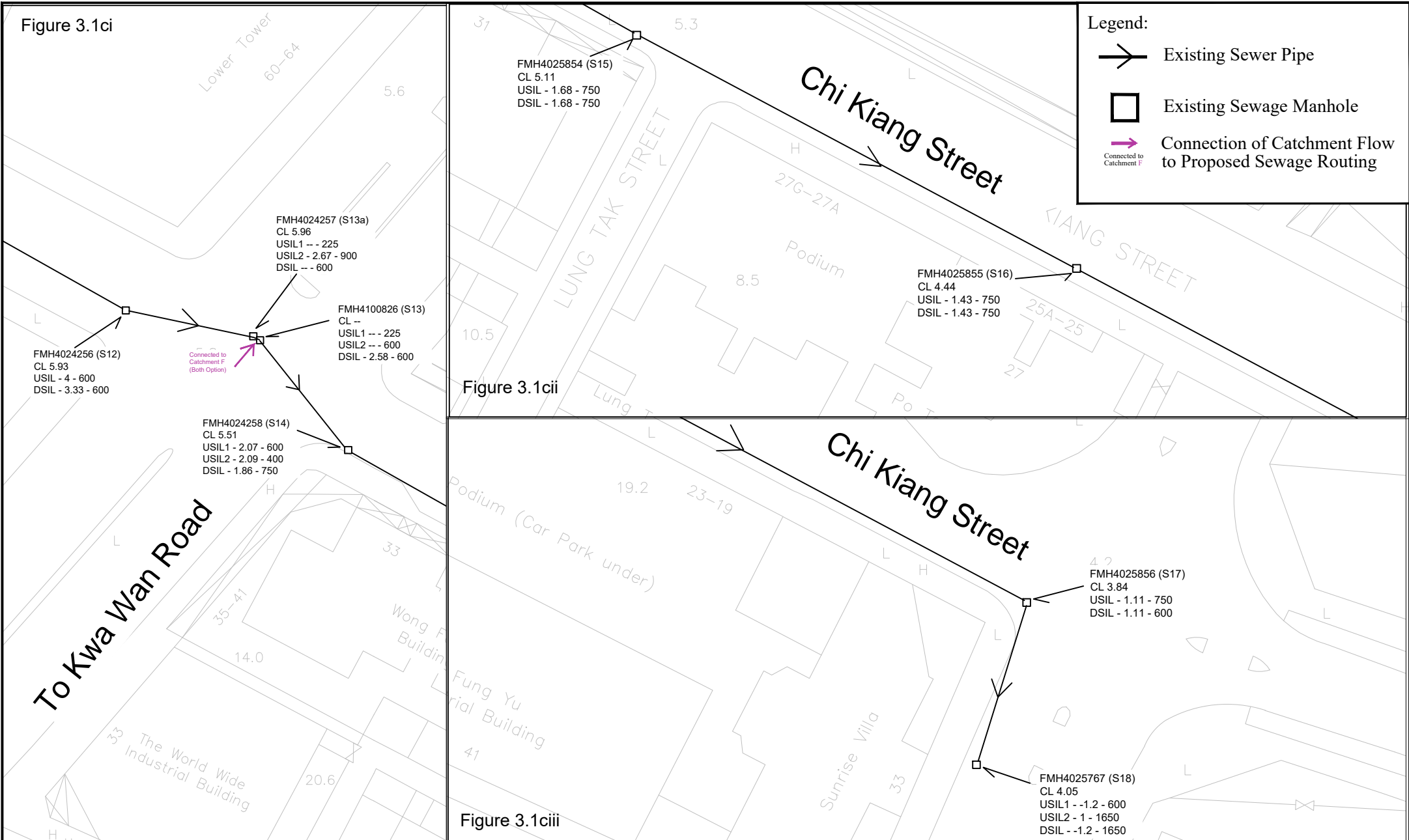
**Figure: 3.1b**

**Title:** Existing Sewerage System in Vicinity of the Project

**Project:** Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the Permitted Residential Development with Commercial / Retail uses of the URA Ma Tau Wai Road / Lok Shan Road Development Project (KC-020), and Proposed Public Vehicle Park

**RAMBOLL**

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 Checked by: TC  
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 Date: May 2026



**Figure: 3.1c**

**Title:** Existing Sewerage System in Vicinity of the Project

**Project:** Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the Permitted Residential Development with Commercial / Retail uses of the URA Ma Tau Wai Road / Lok Shan Road Development Project (KC-020), and Proposed Public Vehicle Park

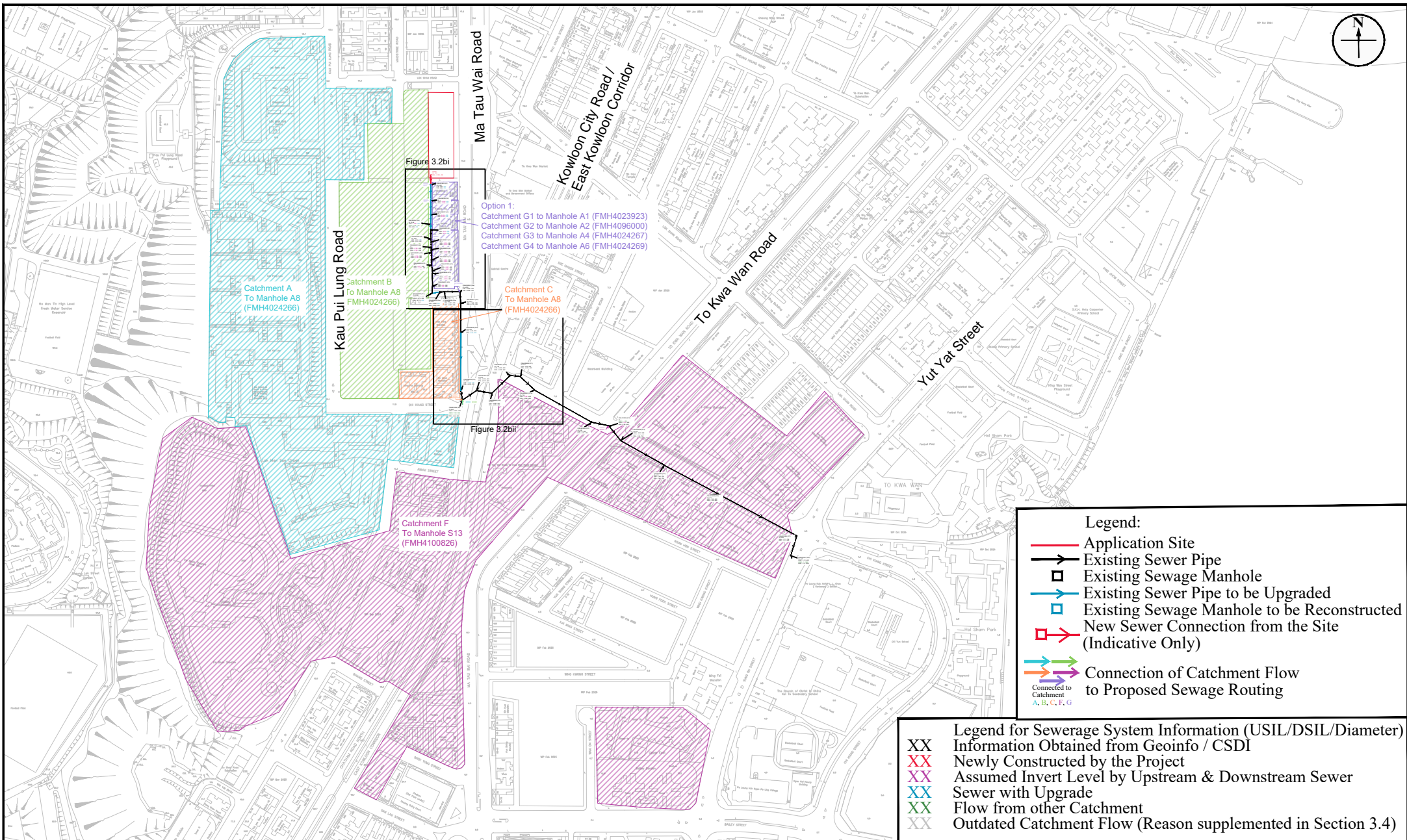


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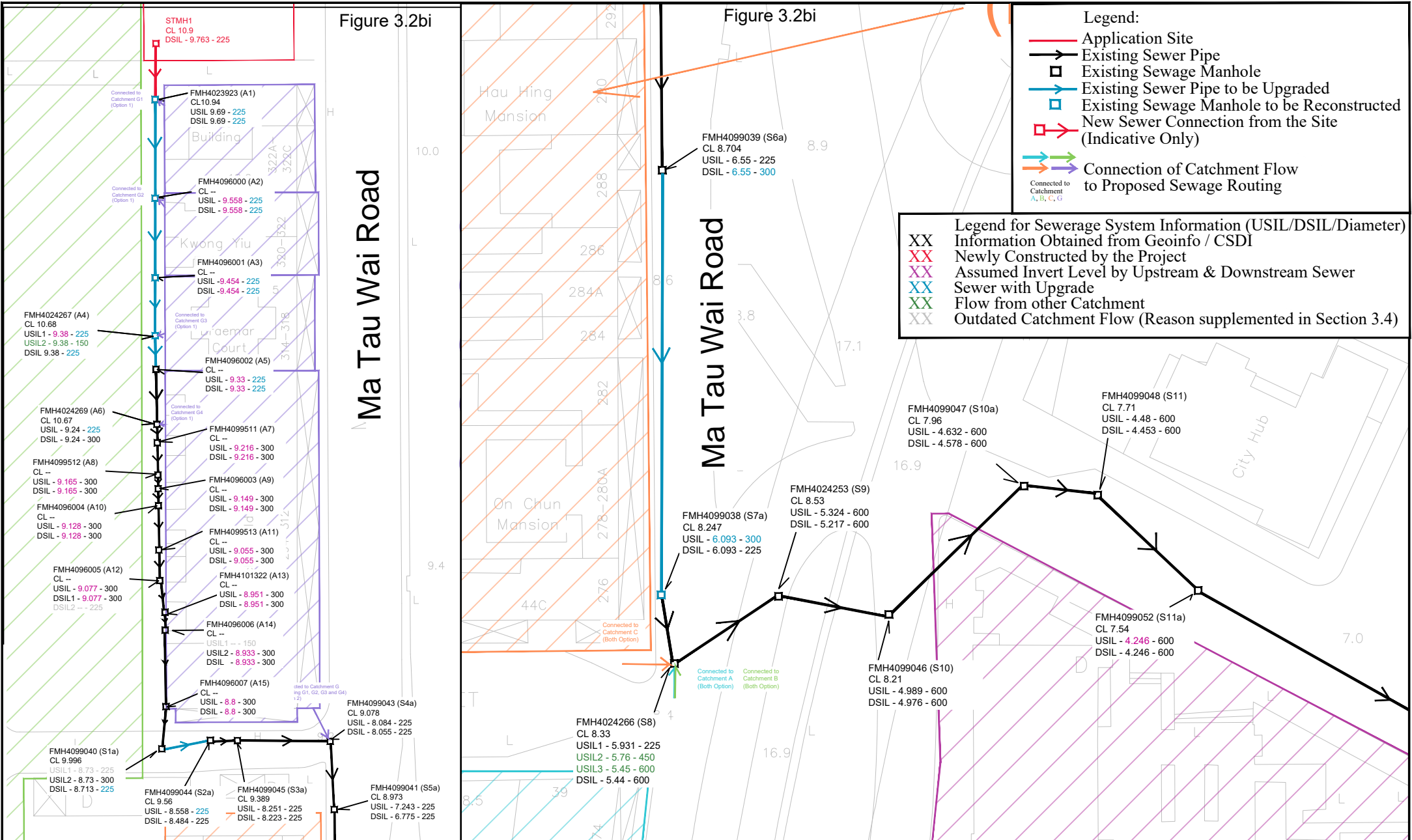
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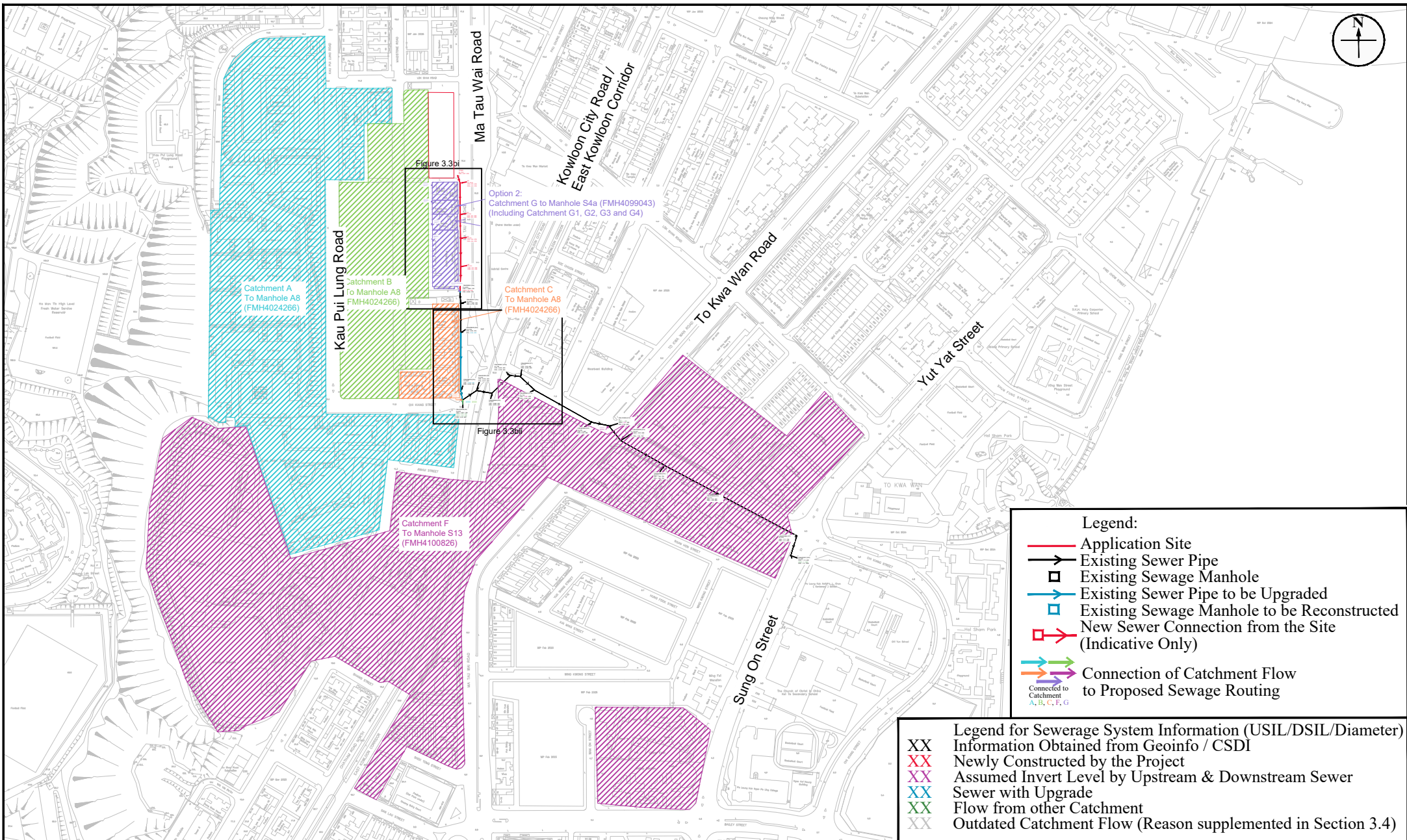
Rev.: 1.0

Date: May 2026

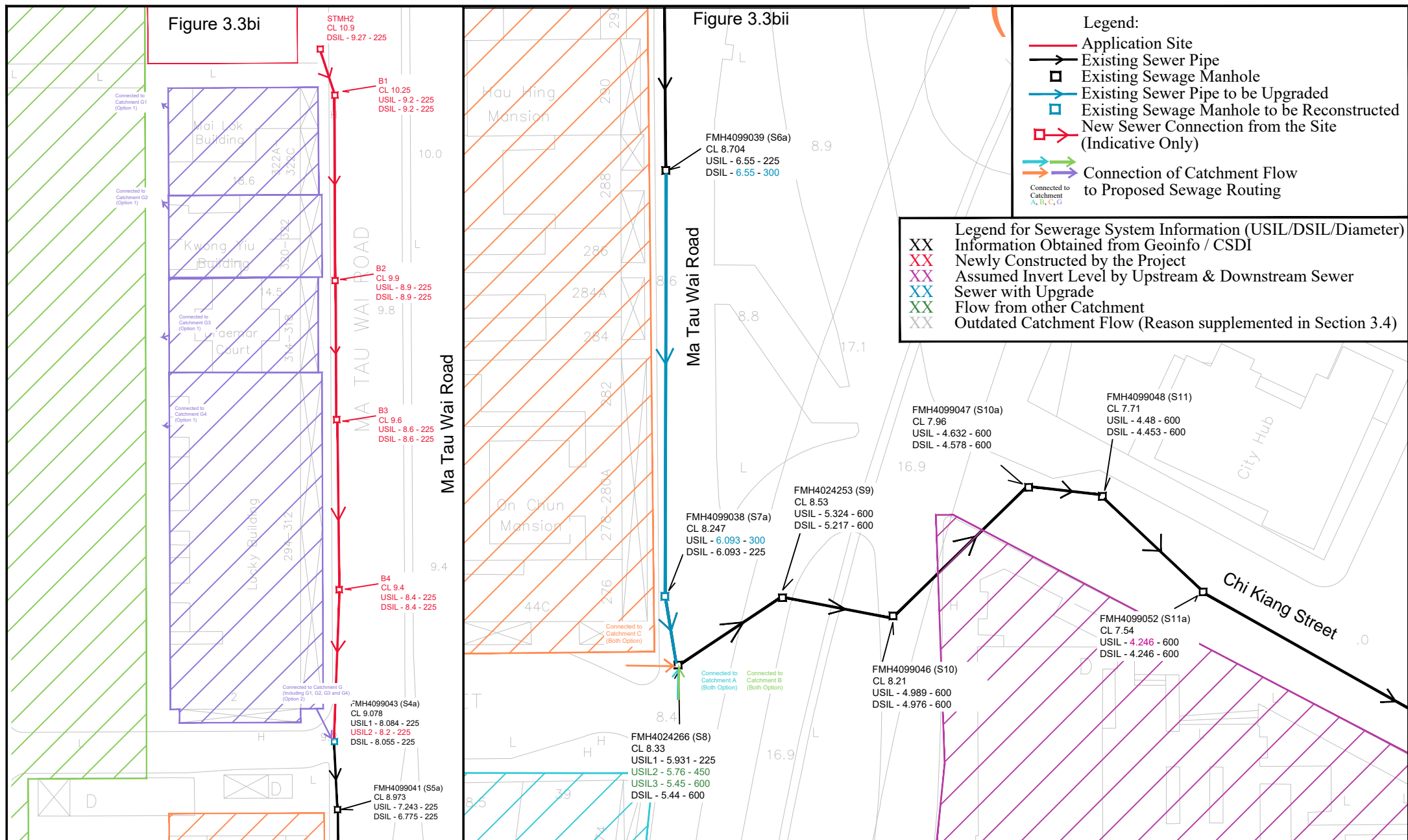


<p><b>Figure:</b> 3.2a</p> <p><b>Title:</b> Proposed Sewerage Discharge Option 1 of the Project</p> <p><b>Project:</b> Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the Permitted Residential Development with Commercial / Retail uses of the URA Ma Tau Wai Road / Lok Shan Road Development Project (KC-020), and Proposed Public Vehicle Park</p>	<b>RAMBOLL</b>
	Drawn by: CL
	Checked by: TC
	Rev.: 1.0
	Date: May 2026





<b>Figure:</b> 3.3a	<b>RAMBOLL</b>	
	<b>Title:</b> Proposed Sewerage Discharge Option 2 of the Project	Drawn by: CL
<b>Project:</b> Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the Permitted Residential Development with Commercial / Retail uses of the URA Ma Tau Wai Road / Lok Shan Road Development Project (KC-020), and Proposed Public Vehicle Park	Checked by: TC	Rev.: 1.0
		Date: Sep 2025



**Figure:** 3.3b

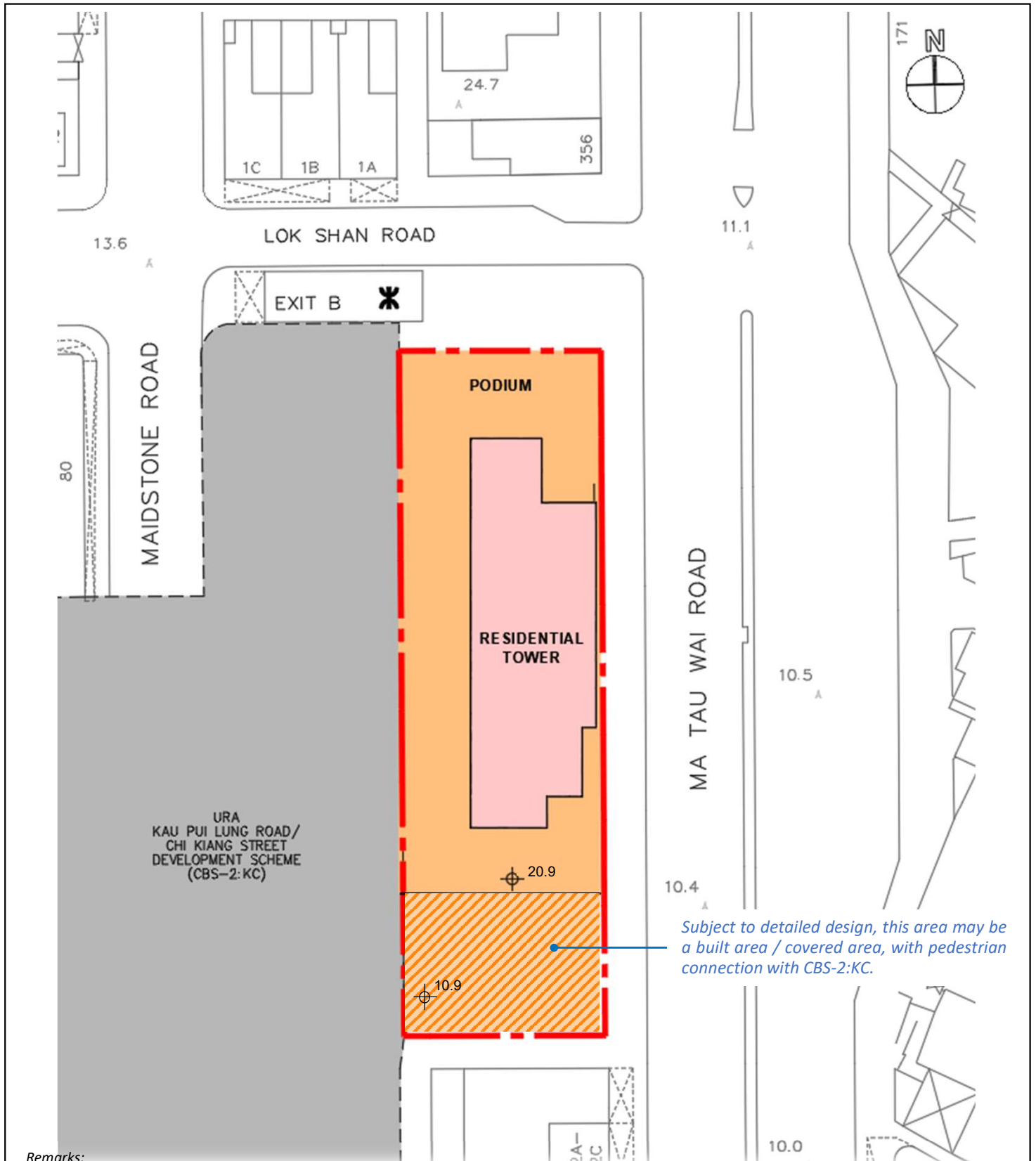
**Title:** Proposed Sewerage Discharge Option 2 of the Project

**Project:** Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the Permitted Residential Development with Commercial / Retail uses of the URA Ma Tau Wai Road / Lok Shan Road Development Project (KC-020), and Proposed Public Vehicle Park



**RAMBOLL**

Drawn by: CL  
Checked by: TC  
Rev.: 1.0  
Date: May 2026

**Appendix 1.1 Notional Design of the KC-020 Project (Ma Tau Wai Road / Lok  
Shan Road Development Project)**



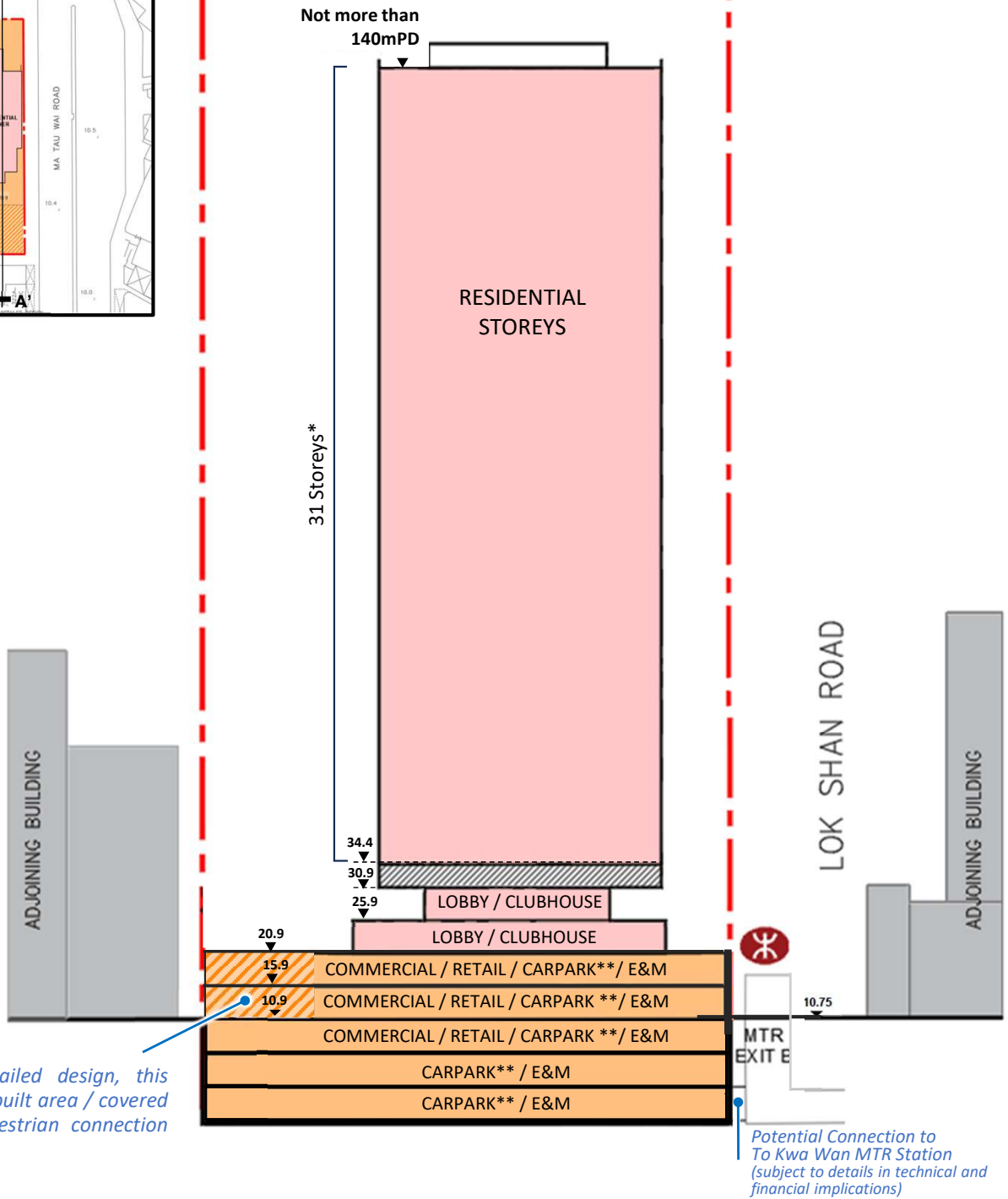
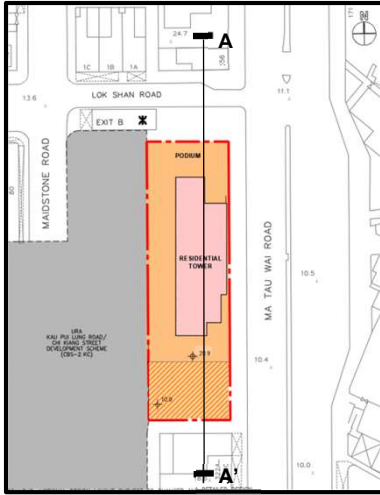
**Remarks:**  
 This S16 Planning Application is a "non-scheme-based" submission. This notional design layout is solely for illustration purpose and for conducting necessary technical assessments. Except for any planning condition(s) to be imposed, the design of the future development will not be bounded by the notional design submitted in the S16 Planning Application.  
 URA undertakes that the portion of the future combined development within the Application Site would not exceed maximum DPR of 8.0 and total PR of 9.0.

 Application Site Boundary	<h2>NOTIONAL BLOCK PLAN</h2> <p>MA TAU WAI ROAD /          LOK SHAN ROAD          DEVELOPMENT PROJECT          (KC-020)</p>	 <p>市區重建局          URBAN RENEWAL          AUTHORITY</p> <p>Figure 3.1</p>
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# Key Plan

APPLICATION SITE BOUNDARY

APPLICATION SITE BOUNDARY



Subject to detailed design, this area may be a built area / covered area, with pedestrian connection with CBS-2:KC.

Potential Connection to To Kwa Wan MTR Station (subject to details in technical and financial implications)

**Remarks:**

This S16 Planning Application is a "non-scheme-based" submission. This notional design layout is solely for illustration purpose and for conducting necessary technical assessments. Except for any planning condition(s) to be imposed, the design of the future development will not be bounded by the notional design submitted in the S16 Planning Application.

URA undertakes that the portion of the future combined development within the Application Site would not exceed maximum DPR of 8.0 and total PR of 9.0.

\* Reference to typical floor-to-floor height of 3.3m to 3.5m adopted in Hong Kong's private residential development.

\*\* The proposed location of the carpark may reference to the latest PNAP APP-2, which permits full GFA exemption for up to two levels of above-ground carparks. Details will be worked out at detailed design stage.

## NOTIONAL SECTION PLAN

MA TAU WAI ROAD /  
LOK SHAN ROAD  
DEVELOPMENT PROJECT  
(KC-020)



Figure 3.2

Application Site Boundary

**Appendix 3.1 Detailed Sewage Generation for the Notional Design of the  
Project and surrounding Catchments**

**Table 1 Calculation for Sewage Generation Rate of the Notion Design of the Project**

**Project (KC-020)**

**1. Residential Tower**

1a. Total number of residential units	=	279 units
1b. Total number of residents	=	754 people -- (PPF provided by URA - 2.7)
1c. Design flow	=	0.27 m <sup>3</sup> /person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	<b>203.6 m<sup>3</sup>/day</b>

**2. Commercial (F&B)**

2a. Assumed Area (all Non-domestic GFA)	=	1570 m <sup>2</sup>
2b. Assumed floor area per employee	=	19.6 m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Restaurants)
2c. Total number of employees	=	81 employees
2d. Design flow for commercial activities and employee	=	1.58 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J10)
2e. Sewage Generation rate	=	<b>128.0 m<sup>3</sup>/day</b>

**3. Clubhouse**

3a. Assumed Area	=	626 m <sup>2</sup>
3b. Assumed floor area per employee	=	30.3 m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
3c. Total number of employees	=	21 employees
3d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
3e. Sewage Generation rate	=	<b>5.9 m<sup>3</sup>/day</b>

**Total Flow from the Notional Design of the Project (KC-020), connected to Manhole A1 (FMH4023923) in Option 1 / Proposed Manhole B1 in Option 2**

Flow Rate	=	337.4 m <sup>3</sup> /day
Contributing Population	=	1250 people
Peaking factor	=	6 Refer to Table T-5 of GESF for population 1,000-5,000 incl. stormwater allowance
Peak Flow	=	<u><b>23.43</b></u> litre/sec

**Table 2a Calculation for Sewage Generation Rate of Surrounding Catchment (Catchment G)**

<b>Catchment G1</b>	
<b>1. Mai Lok Building</b>	
1a. Total number of units	= 27 units (refer to Table 3 for the breakdown of units)
1b. Total number of residents	= 70 people – (average household size of 2.6 from 2021 Population Census - Kowloon)
1c. Design flow	= 0.27 m <sup>3</sup> /person/day – (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	= 18.9 m <sup>3</sup> /day
<b>2. Shops at Mai Lok Building</b>	
2a. Assumed area	= 220 m <sup>2</sup>
2b. Assumed floor area per employee	= 30.3 m <sup>2</sup> per employee – (refer to Table 8 of CIPSUS - Community, Social & Personal Services)
2c. Total number of employees	= 8 employees
2d. Design flow for commercial activities	= 0.28 m <sup>3</sup> /employee/day – (refer to Table T-2 of GESF - J11)
2e. Sewage Generation rate	= 2.2 m <sup>3</sup> /day
<b>Sub Total Catchment G1</b>	= <b>21.1 m<sup>3</sup>/day</b>
<b>Total Flow at Manhole A1 (FMH4023923), including the Notional Design of the Project (KC-020) and Catchment G1</b>	
Flow Rate	= 158.6 m <sup>3</sup> /day
Contributing Population	= 1328 people
Peaking factor	= 6 Refer to Table T-5 of GESF for population 1,000-5,000 incl. stormwater allowance
Peak Flow	= 24.9 litre/sec
<b>Catchment G2</b>	
<b>3. Kwong Via Building</b>	
3a. Total number of units	= 42 units (refer to Table 3 for the breakdown of units)
3b. Total number of residents	= 109 people – (average household size of 2.6 from 2021 Population Census - Kowloon)
3c. Design flow	= 0.27 m <sup>3</sup> /person/day – (Private R2 in Table T-1 of GESF)
3d. Sewage Generation rate	= 29.4 m <sup>3</sup> /day
<b>4. Shops at Kwong Via Building</b>	
4a. Assumed area	= 100 m <sup>2</sup>
4b. Assumed floor area per employee	= 30.3 m <sup>2</sup> per employee – (refer to Table 8 of CIPSUS - Community, Social & Personal Services)
4c. Total number of employees	= 4 employees
4d. Design flow for commercial activities	= 0.28 m <sup>3</sup> /employee/day – (refer to Table T-2 of GESF - J11)
4e. Sewage Generation rate	= 1.1 m <sup>3</sup> /day
<b>Sub Total Catchment G2</b>	= <b>30.6 m<sup>3</sup>/day</b>
<b>Total Flow at Manhole A2 (FMH4096000), including the Notional Design of the Project (KC-020) and Catchment G1, G2</b>	
Flow Rate	= 389.1 m <sup>3</sup> /day
Contributing Population	= 1441 people
Peaking factor	= 6 Refer to Table T-5 of GESF for population 1,000-5,000 incl. stormwater allowance
Peak Flow	= 27.0 litre/sec
<b>Catchment G3</b>	
<b>5. Braemar Court</b>	
5a. Total number of units	= 48 units (refer to Table 3 for the breakdown of units)
5b. Total number of residents	= 125 people – (average household size of 2.6 from 2021 Population Census - Kowloon)
5c. Design flow	= 0.27 m <sup>3</sup> /person/day – (Private R2 in Table T-1 of GESF)
5d. Sewage Generation rate	= 33.8 m <sup>3</sup> /day
<b>6. Shops at Braemar Court</b>	
6a. Assumed area	= 60 m <sup>2</sup>
6b. Assumed floor area per employee	= 30.3 m <sup>2</sup> per employee – (refer to Table 8 of CIPSUS - Community, Social & Personal Services)
6c. Total number of employees	= 2 employees
6d. Design flow for commercial activities	= 0.28 m <sup>3</sup> /employee/day – (refer to Table T-2 of GESF - J11)
6e. Sewage Generation rate	= 0.6 m <sup>3</sup> /day
<b>Sub Total Catchment G3</b>	= <b>34.3 m<sup>3</sup>/day</b>
<b>Total Flow at Manhole A4 (FMH4024267), including the Notional Design of the Project (KC-020) and Catchment G1, G2, G3</b>	
Flow Rate	= 423.4 m <sup>3</sup> /day
Contributing Population	= 1568 people
Peaking factor	= 6 Refer to Table T-5 of GESF for population 1,000-5,000 incl. stormwater allowance
Peak Flow	= 29.4 litre/sec
<b>Catchment G4</b>	
<b>7. Lucky Building</b>	
7a. Total number of units	= 214 units (refer to Table 3 for the breakdown of units)
7b. Total number of residents	= 556 people – (average household size of 2.6 from 2021 Population Census - Kowloon)
7c. Design flow	= 0.27 m <sup>3</sup> /person/day – (Private R2 in Table T-1 of GESF)
7d. Sewage Generation rate	= 150.1 m <sup>3</sup> /day
<b>8. Shops at Lucky Building (Other than restaurants)</b>	
8a. Assumed area	= 580 m <sup>2</sup>
8b. Assumed floor area per employee	= 30.3 m <sup>2</sup> per employee – (refer to Table 8 of CIPSUS - Community, Social & Personal Services)
8c. Total number of employees	= 20 employees
8d. Design flow for commercial activities	= 0.28 m <sup>3</sup> /employee/day – (refer to Table T-2 of GESF - J11)
8e. Sewage Generation rate	= 5.6 m <sup>3</sup> /day
<b>9. Shops at Lucky Building (Restaurants)</b>	
9a. Assumed area	= 90 m <sup>2</sup>
9b. Assumed floor area per employee	= 19.6 m <sup>2</sup> per employee – (refer to Table 8 of CIPSUS - Restaurants)
9c. Total number of employees	= 5 employees
9d. Design flow for commercial activities	= 1.58 m <sup>3</sup> /employee/day – (refer to Table T-2 of GESF - J11)
9e. Sewage Generation rate	= 7.9 m <sup>3</sup> /day
<b>Sub Total Catchment G4</b>	= <b>163.6 m<sup>3</sup>/day</b>
<b>Sub Total Catchment G (G1, G2, G3 and G4)</b>	= <b>249.6 m<sup>3</sup>/day</b>
<b>Option 1</b>	
<b>Total Flow at Manhole A6 (FMH4024269), including the Notional Design of the Project (KC-020) and Catchment G1, G2, G3 and G4</b>	
Flow Rate	= 587.1 m <sup>3</sup> /day
Contributing Population	= 2174 people
Peaking factor	= 6 Refer to Table T-5 of GESF for population 1,000-5,000 incl. stormwater allowance
Peak Flow	= 40.8 litre/sec
<b>Option 2</b>	
<b>Total Flow at Manhole S4a (FMH4099843), including the Notional Design of the Project (KC-020) and Catchment G</b>	
Flow Rate	= 587.1 m <sup>3</sup> /day
Contributing Population	= 2174 people
Peaking factor	= 6 Refer to Table T-5 of GESF for population 1,000-5,000 incl. stormwater allowance
Peak Flow	= 40.8 litre/sec

**Table 2a Calculation for Sewage Generation Rate of Surrounding Catchment (Catchment B)**

**URA's Kau Pui Lung Road / Chi Kiang Street Development Scheme (CBS-2:KC)**

**1. Residential Tower**

1a. Total number of residential units	=	2324 units
1b. Total number of residents	=	6043 people -- (PPF provided by URA - 2.6)
1c. Design flow	=	0.27 m <sup>3</sup> /person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	<b>1631.6 m<sup>3</sup>/day</b>

**2. GIC**

2a. Assumed Area	=	4500 m <sup>2</sup>
2b. Assumed floor area per employee	=	30.3 m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
2c. Total number of employees	=	149 employees
2d. Design flow for commercial activities and employee	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
2e. Sewage Generation rate	=	<b>41.7 m<sup>3</sup>/day</b>

**3. Commercial (F&B)**

3a. Assumed Area (about 1/2 of Non-Domestic GFA)	=	7740 m <sup>2</sup>
3b. Assumed floor area per employee	=	19.6 m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Restaurants)
3c. Total number of employees	=	395 employees
3d. Design flow for commercial activities and employee	=	1.58 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J10)
3e. Sewage Generation rate	=	<b>624.1 m<sup>3</sup>/day</b>

**4. Commercial (Retail)**

4a. Assumed Area (about 1/2 of Non-Domestic GFA)	=	7740 m <sup>2</sup>
4b. Assumed floor area per employee	=	28.6 m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Retail Trade)
4c. Total number of employees	=	271 employees
4d. Design flow for commercial activities and employee	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
4e. Sewage Generation rate	=	<b>75.9 m<sup>3</sup>/day</b>

**5. Clubhouse**

5a. Assumed Area	=	6900 m <sup>2</sup> (According to Approved SIA Report for CBS:2-KC dated February 2023)
5b. Assumed floor area per employee	=	30.3 m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
5c. Total number of employees	=	228 employees
5d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
5e. Sewage Generation rate	=	<b>63.8 m<sup>3</sup>/day</b>

**Sub Total Catchment B**

	=	<b>2437.2 m<sup>3</sup>/day</b>
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**Table 2b Calculation for Sewage Generation Rate of Surrounding Catchment (Catchment A)**

**Catchment A**

**1. Residential (Lok Man Sun Chuen)**

1a. Total number of units	=	3661 units (refer to Table 3 for the breakdown of units)
1b. Total number of residents	=	10251 people -- (average household size of 2.8 from 2021 Population Census (G05 Lok Man))
1c. Design flow	=	0.27 m <sup>3</sup> /person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	<b>2767.8 m<sup>3</sup>/day</b>

**2. Existing Residential Developments within Catchment Area - other than Lok Man Sun Chuen**

2a. Total number of units	=	545 units (refer to Table 3 for the breakdown of units)
2b. Total number of residents	=	1417 people -- (average household size of 2.6 from 2021 Population Census - Kowloon)
2c. Design flow	=	0.27 m <sup>3</sup> /person/day -- (Private R2 in Table T-1 of GESF)
2d. Sewage Generation rate	=	<b>382.6 m<sup>3</sup>/day</b>

**3. C.C.C WanChai Church Kei To Primary School (Kowloon City) (<https://ktkc.edu.hk/>)**

3a. Total number of teachers & staff	=	39 teachers & staff (As of School Report)
3c. Design flow for teachers & staff	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
3b. Total number of students	=	449 students (As of School Report)
3d. Design flow for students	=	0.04 m <sup>3</sup> /person/day (refer to Table T-2, School Student)
3e. Sewage Generation rate	=	<b>28.9 m<sup>3</sup>/day</b>

**4. Kau Pei Lung Elderly Home Limited**

4a. Total number of employees	=	16 employees, according to SWD guideline
4b. Design flow of commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (Job Type J11 in Table T-2 of GESF)
4c. Total number of Residents	=	103 people -- Refer to data extracted from official website of RCHE
4d. Design flow	=	0.34 m <sup>3</sup> /person/day (refer to Table T-2, Private R-3)
4e. Sewage Generation Rate	=	<b>39.5 m<sup>3</sup>/day</b>

**5. Shops (Community Service / Import&Export)**

5a. Assumed area	=	3260 m <sup>2</sup>
5b. Assumed floor area per employee	=	30.3 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
5c. Total number of employees	=	108 employees
5d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
5e. Sewage Generation rate	=	<b>30.2 m<sup>3</sup>/day</b>

**6. Shops (Transport)**

6a. Assumed area	=	90 m <sup>2</sup>
6b. Assumed floor area per employee	=	28.6 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Transport)
6c. Total number of employees	=	4 employees
6d. Design flow for commercial activities	=	0.18 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J3)
6e. Sewage Generation rate	=	<b>0.7 m<sup>3</sup>/day</b>

**7. Shops (Retail)**

7a. Assumed area	=	1510 m <sup>2</sup>
7b. Assumed floor area per employee	=	28.6 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Retail)
7c. Total number of employees	=	53 employees
7d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J4)
7e. Sewage Generation rate	=	<b>14.8 m<sup>3</sup>/day</b>

**8. Shops (Restaurants)**

8a. Assumed area	=	420 m <sup>2</sup>
8b. Assumed floor area per employee	=	19.6 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Restaurants)
8c. Total number of employees	=	22 employees
8d. Design flow for commercial activities	=	1.58 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J10)
8e. Sewage Generation rate	=	<b>34.8 m<sup>3</sup>/day</b>

**Sub Total Catchment A**

= **3299.3 m<sup>3</sup>/day**

**Table 2c Calculation for Sewage Generation Rate of Surrounding Catchment (Catchment C)**

**Catchment C**

**1. Existing Residential Developments within Catchment Area**

1a. Total number of units	=	204 units (refer to Table 3 for the breakdown of units)
1b. Total number of residents	=	530 people -- (average household size of 2.6 from 2021 Population Census - Kowloon)
1c. Design flow	=	0.27 m <sup>3</sup> /person/day -- (Private R2 in Table T-1 of GESF)
1d. Sewage Generation rate	=	<b>143.1 m<sup>3</sup>/day</b>

**2. Shops at Catchment C (Community Service / Import&Export)**

2a. Assumed area	=	570 m <sup>2</sup>
2b. Assumed floor area per employee	=	30.3 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)
2c. Total number of employees	=	19 employees
2d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
2e. Sewage Generation rate	=	<b>5.3 m<sup>3</sup>/day</b>

**3. Shops at Catchment C (Retail)**

3a. Assumed area	=	380 m <sup>2</sup>
3b. Assumed floor area per employee	=	28.6 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Retail)
3c. Total number of employees	=	14 employees
3d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J4)
3e. Sewage Generation rate	=	<b>3.9 m<sup>3</sup>/day</b>

**4. Shops at Catchment C (Restaurants)**

4a. Assumed area	=	360 m <sup>2</sup>
4b. Assumed floor area per employee	=	19.6 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Restaurants)
4c. Total number of employees	=	19 employees
4d. Design flow for commercial activities	=	1.58 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J10)
4e. Sewage Generation rate	=	<b>30.0 m<sup>3</sup>/day</b>

**5. Commercial (Hop Shing Commercial Building)**

5a. Assumed Area	=	2200 m <sup>2</sup> (20 storeys * ~110m <sup>2</sup> per storey)
5b. Assumed floor area per employee	=	28.6 m <sup>2</sup> per worker -- (refer to Table 8 of CIFSUS - Retail Trade)
5c. Total number of employees	=	77 employees
5d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)
5e. Sewage Generation rate	=	<b>21.6 m<sup>3</sup>/day</b>

**Sub Total Catchment C**

= **203.9 m<sup>3</sup>/day**

**Total Flow at Manhole S8 (FMH4024266), including the Notional Design of the Project (KC-020), CBS:02 Development Scheme and Catchment A, B, C and G**

Flow Rate	=	6190.0 m <sup>3</sup> /day
Contributing Population	=	22926 people
Peaking factor	=	4 Refer to Table T-5 of GESF for population 10,000-50,000 incl. stormwater allowance
Peak Flow	=	<b>286.6 litre/sec</b>

**Table 2d Calculation for Sewage Generation Rate of Surrounding Catchment (Catchment F)**

**Catchment F**

**1. Existing Residential Developments within Catchment Area**

1a. Total number of units	=	4180 units (refer to Table 3 for the breakdown of units)	
1b. Total number of residents	=	10868 people -- (average household size of 2.6 from 2021 Population Census - Kowloon)	
1c. Design flow	=	0.27 m <sup>3</sup> /person/day -- (Private R2 in Table T-1 of GESF)	
1d. Sewage Generation rate	=	<b>2934.4 m<sup>3</sup>/day</b>	

**2. Existing Factory / Industrial Buildings**

2a. Assumed Area	=	35070 m <sup>2</sup> (refer to Table 4 for the breakdown)	
2b. Assumed floor area per employee	=	43.5 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Manufacturing)	
2c. Total number of employees	=	807 employees	
2d. Design flow for industrial employee	=	0.63 m <sup>3</sup> /employee/day -- (refer to Table T-3 of GESF - Central Kowloon)	
2e. Sewage Generation rate	=	<b>508.4 m<sup>3</sup>/day</b>	

**3. The Church of the God Shepherd**

3a. Assumed area	=	700 m <sup>2</sup> (2 storeys * ~350m <sup>2</sup> per storey)	
3b. Assumed floor area per employee	=	30.3 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)	
3c. Total number of employees	=	24 employees	
3d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)	
3e. Sewage Generation rate	=	<b>6.7 m<sup>3</sup>/day</b>	

**4. Ko Shan Theatre**

4a. Assumed area	=	18900 m <sup>2</sup> (refer to Table 4 for the breakdown)	
4b. Assumed floor area per employee	=	30.3 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)	
4c. Assumed employees	=	624 employees	
4d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)	
4e. Sewage Generation rate	=	<b>174.7 m<sup>3</sup>/day</b>	

**5. To Kwa Wan Station Public Toilet**

5a. Discharge from Single Urinal with Cistern (K * Qty * DU)	=	3.2 L/s --(refer to LegCo document about public toilet)	Qty
5b. Discharge from WC (K * Qty * DU)	=	7.6 L/s --(refer to LegCo document about public toilet)	8
5c. Discharge from Basin (K * Qty * DU)	=	2.7 L/s --(refer to LegCo document about public toilet)	19
5d. Total discharge from public toilets	=	<b>13.5 L/s</b> --(refer to LegCo document about public toilet)	9

*Frequency of use, K = 1, extracted from Table 4 of Plumbing Engineering Services Design Guide (PESDG)*

*Discharge Unit (DU) of WC = 1.8 L/s; DU of Basin = 0.3 L/s; DU of urinal = 0.4 L/s, extracted from Table 3 of PESDG*

**6. May Moon Happiness Home For the Aged No.1**

5a. Total number of employees	=	7 employees. Refer to data extracted from SWD, <a href="https://www.elderlyinfo.swd.gov.hk/te/content/may-moon-happiness-home-aged-no-1">https://www.elderlyinfo.swd.gov.hk/te/content/may-moon-happiness-home-aged-no-1</a>	
5b. Design flow of commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (Job Type J11 in Table T-2 of GESF)	
5c. Total number of Residents	=	30 people -- Refer to data extracted from SWD, <a href="https://www.elderlyinfo.swd.gov.hk/te/content/may-moon-happiness-home-aged-no-1">https://www.elderlyinfo.swd.gov.hk/te/content/may-moon-happiness-home-aged-no-1</a>	
5d. Design flow	=	0.34 m <sup>3</sup> /person/day (refer to Table T-2, Private R-3)	
5e. Sewage Generation Rate	=	<b>12.2 m<sup>3</sup>/day</b>	

**7. PLK Chan Lai Wai Lin Kindergarten**

7a. Total number of teachers & staff	=	12 teachers & staff	
7c. Design flow for teachers & staff	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)	
7b. Total number of students	=	109 students	
7d. Design flow for students	=	0.04 m <sup>3</sup> /person/day (refer to Table T-2, School Student)	<a href="https://www.schooland.hk/kg/plk-clwl">https://www.schooland.hk/kg/plk-clwl</a>
7e. Sewage Generation rate	=	<b>7.7 m<sup>3</sup>/day</b>	

**8. Shops at Catchment F (Community Service / Import&Export)**

8a. Assumed area	=	4270 m <sup>2</sup>	
8b. Assumed floor area per employee	=	30.3 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Community, Social & Personal Services)	
8c. Total number of employees	=	141 employees	
8d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J11)	
8e. Sewage Generation rate	=	<b>39.5 m<sup>3</sup>/day</b>	

**9. Shops at Catchment F (Retail)**

9a. Assumed area	=	6600 m <sup>2</sup>	
9b. Assumed floor area per employee	=	28.6 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Retail)	
9c. Total number of employees	=	231 employees	
9d. Design flow for commercial activities	=	0.28 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J4)	
9e. Sewage Generation rate	=	<b>64.7 m<sup>3</sup>/day</b>	

**10. Shops at Catchment F (Restaurants)**

10a. Assumed area	=	2010 m <sup>2</sup>	
10b. Assumed floor area per employee	=	19.6 m <sup>2</sup> per employee -- (refer to Table 8 of CIFSUS - Restaurants)	
10c. Total number of employees	=	103 employees	
10d. Design flow for commercial activities	=	1.58 m <sup>3</sup> /employee/day -- (refer to Table T-2 of GESF - J10)	
10e. Sewage Generation rate	=	<b>162.7 m<sup>3</sup>/day</b>	

**Sub Total Catchment F (without Public Toilet)**

= **3911.0 m<sup>3</sup>/day**

**Total Flow at Manhole S13 (FMH4100826), including the Notional Design of the Project (KC-020), CBS:02 Development Scheme and Catchment A, B, C, F and G**

Flow Rate	=	10101.0 m <sup>3</sup> /day
Contributing Population	=	37411 people
Peaking factor	=	4 Refer to Table T-5 of GESF for population 10,000-50,000 incl. stormwater allowance
Peak Flow (Without Toilet)	=	<b>467.6 litre/sec</b>
Peak Flow (With Toilet)	=	<b>481.1 litre/sec</b>

**Table 3 Breakdown for the estimation of residential units within each catchment area**

<b>Catchment A</b>	<b>Units</b>
Lok Man Sun Chuen (Block F and G)	1223
City 151	71
Morning Joy Bldg	166
80 Maidstone Road	92
Lok Man Sun Chuen (Block A to E)	1542
Lok Man Sun Chuen (Block H & I)	896
Ming Fat Building	83
Seng Cheong Building	10
On Chun Mansion	56
282 Ma Tau Wai Road	5
284 Ma Tau Wai Road	3
284A Ma Tau Wai Road	4
286 Ma Tau Wai Road	3
Pak Kin Building	28
Hau Hing Mansion	15
Wah On Court	9
<b>Total</b>	<b>4206</b>

<b>Catchment C</b>	<b>Units</b>
Tai Tung Court	12
Fook Yue Mansion	30
Loyal Mansion	140
Chap On Building	12
4 & 6 Anhui Street	10
<b>Total</b>	<b>204</b>

<b>Catchment G</b>	<b>Units</b>
Mai Lok Building	27
Kwong Yiu Building	42
Braemar Court	48
Lucky Building	214
<b>Total</b>	<b>331</b>

<b>Catchment F</b>	<b>Units</b>
222-236 Ma Tau Wai Road	28
Kar Shun Building	44
90-92 Ko Shan Road	12
Kwun Shan Court	496
Chatham Mansion	23
On Hang Building	35
Faerie Court	156
Chat Ma Mansion	65
204-206 Ma Tau Wai Road	26
Axis	120
Honour Court	36
Morning Ray Mansion	22
Co-tack Building	56
1-9 Shek Tong Street	15
480, 482, 494 Chatham Road North	9
470-478 Chatham Road North	150
Tsun Kit House	20
Upper East	1008
Bailey Garden	432
Wong Fung Building	152
Ngan Hon Mansion	78
Lung Teck Mansion	180
Po Teck Mansion	180
Sunrise Villa	180
I-Feng Mensions	823
Tung Shun Hing Building	182
L-harbour 18	84
<b>Total</b>	<b>4612</b>

*Table 4 Breakdown for the estimation of Area of Industrial Buildings and Ko Shan Theatre within catchment area F*

<b>Catchment F</b>	<b>Estimated Gross Floor Area (m2) / Storey</b>	<b>Storey</b>	<b>Total Estimated Gross Floor Area (m2)</b>
<b>Industrial Buildings</b>			
Gee Chang Industrial Building	1400	9	12600
Fook Shing Industrial Building	700	12	8400
Man Shun Factory Building	315	11	3465
The World Wide Industrial Building	315	12	3780
Fung Yu Industrial Building	525	13	6825
		<b>Total</b>	<b>35070</b>
<b>Ko Shan Theatre</b>			
Ko Shan Theatre	1900	3	5700
Ko Shan Theatre New Wing	2200	6	13200
		<b>Total</b>	<b>18900</b>

### **Appendix 3.2    Hydraulic Capacity Calculations for Discharge Option 1**

Table 1a Hydraulic Capacity of Existing Sewers (Discharge Option 1)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Upstream Invert Level	Downstream Invert Level	g	k <sub>s</sub>	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s <sup>2</sup>	m		m <sup>2</sup> /s	m/s	m <sup>2</sup>	m <sup>3</sup> /s	L/s
STMH1-A1	STMH1	FMH4023923	225	7.10	9.763	9.69	9.81	0.00060	0.010	0.000001	1.33	0.04	0.05	52.7
A1-A2	FMH4023923	FMH4096000	225	13.25	9.69	9.558	9.81	0.00060	0.010	0.000001	1.31	0.04	0.05	51.9
A2-A3	FMH4096000	FMH4096001	225	10.52	9.558	9.454	9.81	0.00060	0.010	0.000001	1.30	0.04	0.05	51.7
A3-A4	FMH4096001	FMH4024267	225	7.46	9.454	9.38	9.81	0.00060	0.010	0.000001	1.30	0.04	0.05	51.8
A4-A5	FMH4024267	FMH4096002	225	4.00	9.38	9.33	9.81	0.00060	0.013	0.000001	1.46	0.04	0.06	58.2
A5-A6	FMH4096002	FMH4024269	225	7.10	9.33	9.24	9.81	0.00060	0.013	0.000001	1.47	0.04	0.06	58.6
A6-A7	FMH4024269	FMH4099511	300	1.81	9.24	9.216	9.81	0.00060	0.013	0.000001	1.81	0.07	0.13	128.2
A7-A8	FMH4099511	FMH4099512	300	3.85	9.216	9.165	9.81	0.00060	0.013	0.000001	1.81	0.07	0.13	128.1
A8-A9	FMH4099512	FMH4096003	300	1.19	9.165	9.149	9.81	0.00060	0.013	0.000001	1.83	0.07	0.13	129.2
A9-A10	FMH4096003	FMH4096004	300	1.63	9.149	9.128	9.81	0.00060	0.013	0.000001	1.79	0.07	0.13	126.4
A10-A11	FMH4096004	FMH4099513	300	5.50	9.128	9.055	9.81	0.00060	0.013	0.000001	1.81	0.07	0.13	128.2
A11-A12	FMH4099513	FMH4096005	300	3.64	9.055	9.007	9.81	0.00060	0.013	0.000001	1.81	0.07	0.13	127.8
A12-A13	FMH4096005	FMH4101322	300	4.25	9.007	8.951	9.81	0.00060	0.013	0.000001	1.81	0.07	0.13	127.7
A13-A14	FMH4101322	FMH4096006	300	1.30	8.951	8.933	9.81	0.00060	0.014	0.000001	1.85	0.07	0.13	130.8
A14-A15	FMH4096006	FMH4096007	300	10.15	8.933	8.8	9.81	0.00060	0.013	0.000001	1.80	0.07	0.13	127.4
A15-S1a	FMH4096007	FMH4099040	300	5.26	8.8	8.73	9.81	0.00060	0.013	0.000001	1.82	0.07	0.13	128.4
S1a-S2a	FMH4099040	FMH4099044	225	6.32	8.713	8.558	9.81	0.00060	0.025	0.000001	2.06	0.04	0.08	81.7
S2a-S3a	FMH4099044	FMH4099045	225	3.08	8.484	8.251	9.81	0.00060	0.076	0.000001	3.62	0.04	0.14	143.8
S3a-S4a	FMH4099045	FMH4099043	225	12.46	8.223	8.084	9.81	0.00060	0.011	0.000001	1.38	0.04	0.05	54.9
S4a-S5a	FMH4099043	FMH4099041	225	9.02	8.055	7.243	9.81	0.00060	0.090	0.000001	3.95	0.04	0.16	157.0
S5a-S6a	FMH4099041	FMH4099039	225	23.79	6.775	6.55	9.81	0.00060	0.009	0.000001	1.27	0.04	0.05	50.5
S6a-S7a	FMH4099039	FMH4099038	225	48.43	6.325	6.123	9.81	0.00300	0.004	0.000001	0.66	0.04	0.03	26.3
S7a-S8	FMH4099038	FMH4024266	225	7.49	6.093	5.931	9.81	0.00060	0.022	0.000001	1.93	0.04	0.08	76.7
S8-S9	FMH4024266	FMH4024253	600	13.66	5.44	5.32	9.81	0.00060	0.008	0.000001	2.24	0.28	0.63	634.4
S9-S10	FMH4024253	FMH4099046	600	12.28	5.22	4.99	9.81	0.00060	0.019	0.000001	3.32	0.28	0.94	939.8
S10-S10a	FMH4099046	FMH4099047	600	20.84	4.98	4.63	9.81	0.00060	0.017	0.000001	3.13	0.28	0.89	885.8
S10a-S11	FMH4099047	FMH4099048	600	7.68	4.58	4.48	9.81	0.00060	0.013	0.000001	2.75	0.28	0.78	778.6
S11-S11a	FMH4099048	FMH4099052	600	15.29	4.45	4.25	9.81	0.00060	0.014	0.000001	2.84	0.28	0.80	801.9
S11a-S12	FMH4099052	FMH4024256	600	54.87	4.25	4.00	9.81	0.00060	0.004	0.000001	1.63	0.28	0.46	459.9
S12-S13	FMH4024256	FMH4024826	600	15.64	3.33	2.58	9.81	0.00060	0.048	0.000001	5.35	0.28	1.51	1512.2
S13-S14	FMH4100826	FMH4024258	600	13.66	2.58	2.07	9.81	0.00060	0.037	0.000001	4.72	0.28	1.33	1334.0
S14-S15	FMH4024258	FMH4025854	750	41.34	1.86	1.68	9.81	0.00060	0.004	0.000001	1.84	0.44	0.81	813.9
S15-S16	FMH4025854	FMH4025855	750	50.56	1.68	1.43	9.81	0.00060	0.005	0.000001	1.96	0.44	0.87	867.8
S16-S17	FMH4025855	FMH4025856	750	75.28	1.43	1.11	9.81	0.00060	0.004	0.000001	1.82	0.44	0.80	804.2
S17-S18	FMH4025856	FMH4025767	600	16.80	1.11	-1.20	9.81	0.00060	0.138	0.000001	9.07	0.28	2.56	2563.4

- Remarks: (1) g=gravitational acceleration; k<sub>s</sub>=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity  
 (2a) The value of ks = 0.6mm is adopted for slimed clayware sewer with V of approximately 1.2m/s, poor condition (based on Table 3: Recommended roughness values in Sewerage Manual)  
 (2b) The value of ks = 3.0mm is adopted for slimed clayware sewer with V of approximately 0.75m/s, poor condition (based on Table 3: Recommended roughness values in Sewerage Manual)  
 (3) The value of velocity (V) is referred to the Tables for the hydraulic design of pipes, sewers and channels (8th edition)  
 (4) Equation used: 
$$v = \frac{1.49}{D^{0.047}} \sqrt{\frac{8gDs}{3.7D + D_v(2gDs)}}$$

For sewer STMH1-A1, proposed upstream invert level is adopted for STMH1.  
 As DSD minimum requirement on public sewer diameter is 200mm, thus the existing sewer with 150mm diameter (i.e. sewer A1 to A6) which the sewage generated by the proposed development will discharge through are upgraded to 225mm diameter and project proponent shall be responsible for relevant upgrade arrangement.  
 For sewer A3-A4 and S11-S11a, as no available information on downstream invert level of the manhole, thus the downstream invert level is assumed with upstream invert level of the same manhole.  
 For sewer S14 to S17, upgrade of sewer from 600mm to 750mm diameter is proposed and committed in approved SIA Report for CBS:02 Development Scheme and adopted in this assessment.  
 No available information for invert levels, thus invert level are assumed based on available upstream and downstream invert level in a proportional basis.  
 As sewer shall connect with downstream sewer with same or larger diameter, thus there will be potential upgrade for sewer S1a to S8 and shown in Table 2b  
 As there are a manhole locate between S12 and S13 (FMH4024257, named S13a in figure) and a 600mm sewer which no available upstream and downstream invert level, thus S12 is assumed directly connected with S13 in calculation

Table 1b Hydraulic Capacity of Proposed Upgraded Sewers (Insufficient Sewer Capacity) (Discharge Option 1)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Upstream Invert Level	Downstream Invert Level	g	k <sub>s</sub>	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s <sup>2</sup>	m		m <sup>2</sup> /s	m/s	m <sup>2</sup>	m <sup>3</sup> /s	L/s
S6a-S7a	FMH4099039	FMH4099038	300	48.43	6.55	6.093	9.81	0.00060	0.009	0.000001	1.53	0.07	0.11	107.9

Table 1c Hydraulic Capacity of Proposed Upgraded Sewers (For sewers connecting with downstream sewer with smaller diameter within the discharge Option 1)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Upstream Invert Level	Downstream Invert Level	g	k <sub>s</sub>	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s <sup>2</sup>	m		m <sup>2</sup> /s	m/s	m <sup>2</sup>	m <sup>3</sup> /s	L/s
S1a-S2a	FMH4099040	FMH4099044	300	6.32	8.713	8.55	9.81	0.00060	0.026	0.000001	2.53	0.07	0.18	179.1
S2a-S3a	FMH4099044	FMH4099045	300	3.08	8.55	8.48	9.81	0.00060	0.023	0.000001	2.38	0.07	0.17	167.9
S3a-S4a	FMH4099045	FMH4099043	300	12.46	8.48	8.2	9.81	0.00060	0.022	0.000001	2.36	0.07	0.17	167.1
S4a-S5a	FMH4099043	FMH4099041	300	9.02	8.2	7.95	9.81	0.00060	0.028	0.000001	2.63	0.07	0.19	185.6
S5a-S6a	FMH4099041	FMH4099039	300	23.79	7.95	7.15	9.81	0.00060	0.034	0.000001	2.89	0.07	0.20	204.6
S6a-S7a	FMH4099039	FMH4099038	300	48.43	7.15	6.08	9.81	0.00060	0.022	0.000001	2.34	0.07	0.17	165.6
S7a-S8	FMH4099038	FMH4024266	300	7.49	6.08	5.931	9.81	0.00060	0.020	0.000001	2.22	0.07	0.16	157.2

Table 2 Hydraulic Capacity of Existing Sewers for Sewerage generated from the Proposed Development and Surrounding Catchment Areas (Discharge Option 1)

Segment	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	Flow from the Existing Buildings with the Site Boundary (m3/day)	Included Catchment Area	Total Flow Rate from the Existing Buildings with the Site Boundary and Catchment Areas (m3/day)	Contribution Population [1]	Peaking Factor [2]	Peak Flow from the Existing Buildings with the Site Boundary and Catchment Areas (L/s)	Contribution of Proposed Development (%)	Contribution of Catchments (%)	Contribution of Proposed Development and Catchments (%)
STMH1-A1	225	7.1	0.010	52.7	337.44	--	337.4	1250	6	23.43	44.4%	0.0%	44.4%
A1-A2	225	13.2	0.010	51.9	337.44	G1	358.58	1328	6	24.90	45.2%	2.8%	48.0%
A2-A3	225	10.5	0.010	51.7	337.44	G1+G2	389.13	1441	6	27.02	45.3%	6.9%	52.3%
A3-A4	225	7.5	0.010	51.8	337.44	G1+G2	389.13	1441	6	27.02	45.2%	6.9%	52.2%
A4-A5	225	4.0	0.013	58.2	337.44	G1+G2+G3	423.44	1568	6	29.41	40.3%	10.3%	50.5%
A5-A6	225	7.1	0.013	58.6	337.44	G1+G2+G3	423.44	1568	6	29.41	40.0%	10.2%	50.2%
A6-A7	300	1.8	0.013	128.2	337.44	G	587.06	2174	6	40.77	18.3%	13.5%	31.8%
A7-A8	300	3.8	0.013	128.1	337.44	G	587.06	2174	6	40.77	18.3%	13.5%	31.8%
A8-A9	300	1.2	0.013	129.2	337.44	G	587.06	2174	6	40.77	18.1%	13.4%	31.5%
A9-A10	300	1.6	0.013	126.4	337.44	G	587.06	2174	6	40.77	18.5%	13.7%	32.2%
A10-A11	300	5.5	0.013	128.2	337.44	G	587.06	2174	6	40.77	18.3%	13.5%	31.8%
A11-A12	300	3.6	0.013	127.8	337.44	G	587.06	2174	6	40.77	18.3%	13.6%	31.9%
A12-A13	300	4.3	0.013	127.7	337.44	G	587.06	2174	6	40.77	18.3%	13.6%	31.9%
A13-A14	300	1.3	0.014	130.8	337.44	G	587.06	2174	6	40.77	17.9%	13.3%	31.2%
A14-A15	300	10.1	0.013	127.4	337.44	G	587.06	2174	6	40.77	18.4%	13.6%	32.0%
A15-S1a	300	5.3	0.013	128.4	337.44	G	587.06	2174	6	40.77	18.3%	13.5%	31.8%
S1a-S2a	225	6.3	0.025	81.7	337.44	G	587.06	2174	6	40.77	28.7%	21.2%	49.9%
S2a-S3a	225	3.1	0.076	143.8	337.44	G	587.06	2174	6	40.77	16.3%	12.1%	28.4%
S3a-S4a	225	12.5	0.011	54.9	337.44	G	587.06	2174	6	40.77	42.7%	31.6%	74.2%
S4a-S5a	225	9.0	0.090	157.0	337.44	G	587.06	2174	6	40.77	14.9%	11.0%	26.0%
S5a-S6a	225	23.8	0.009	50.5	337.44	G	587.06	2174	6	40.77	46.4%	34.3%	80.7%
S6a-S7a	225	48.4	0.004	26.3	337.44	G	587.06	2174	6	40.77	89.2%	66.0%	155.3%
S7a-S8	225	7.5	0.022	76.7	337.44	G	587.06	2174	6	40.77	30.5%	22.6%	53.1%
S8-S9	600	13.7	0.008	634.4	337.44	A+B+C+G	6527.43	24176	4	302.20	2.5%	45.2%	47.6%
S9-S10	600	12.3	0.019	939.8	337.44	A+B+C+G	6527.43	24176	4	302.20	1.7%	30.5%	32.2%
S10-S10a	600	20.8	0.017	885.8	337.44	A+B+C+G	6527.43	24176	4	302.20	1.8%	32.4%	34.1%
S10a-S11	600	7.7	0.013	778.6	337.44	A+B+C+G	6527.43	24176	4	302.20	2.0%	36.8%	38.8%
S11-S11a	600	15.3	0.014	801.9	337.44	A+B+C+G	6527.43	24176	4	302.20	1.9%	35.7%	37.7%
S11a-S12	600	54.9	0.004	459.9	337.44	A+B+C+G	6527.43	24176	4	302.20	3.4%	62.3%	65.7%
S12-S13	600	15.6	0.048	1512.2	337.44	A+B+C+G	6527.43	24176	4	302.20	1.0%	19.0%	20.0%
S13-S14	600	13.7	0.037	1334.0	337.44	A+B+C+F+G	10438.42	38661	4	496.76	1.2%	35.1%	37.2%
S14-S15	750	41.3	0.004	813.9	337.44	A+B+C+F+G	10438.42	38661	4	496.76	1.9%	57.5%	61.0%
S15-S16	750	50.6	0.005	867.8	337.44	A+B+C+F+G	10438.42	38661	4	496.76	1.8%	53.9%	57.2%
S16-S17	750	75.3	0.004	804.2	337.44	A+B+C+F+G	10438.42	38661	4	496.76	1.9%	58.2%	61.8%
S17-S18	600	16.8	0.138	2563.4	337.44	A+B+C+F+G	10438.42	38661	4	496.76	0.6%	18.2%	19.4%

After Pipe Size Upgrading Work for Sewer Pipes S6a-S7a and S7a-S8

S6a-S7a	300	48.4	0.009	107.9	337.44	G	587.06	2174	6	40.77	21.7%	16.1%	37.8%
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After Pipe Size Upgrading Work for Sewer Pipes S1a to S8 (Potentially Upgrade Required)

S1a-S2a	300	6.3	0.026	179.1	337.44	G	587.06	2174	6	40.77	13.1%	9.7%	22.8%
S2a-S3a	300	3.1	0.023	167.9	337.44	G	587.06	2174	6	40.77	14.0%	10.3%	24.3%
S3a-S4a	300	12.5	0.022	167.1	337.44	G	587.06	2174	6	40.77	14.0%	10.4%	24.4%
S4a-S5a	300	9.0	0.028	185.6	337.44	G	587.06	2174	6	40.77	12.6%	9.3%	22.0%
S5a-S6a	300	23.8	0.034	204.6	337.44	G	587.06	2174	6	40.77	11.5%	8.5%	19.9%
S6a-S7a	300	48.4	0.022	165.6	337.44	G	587.06	2174	6	40.77	14.1%	10.5%	24.6%
S7a-S8	300	7.5	0.020	157.2	337.44	G	587.06	2174	6	40.77	14.9%	11.0%	25.9%

### **Appendix 3.3    Hydraulic Capacity Calculations for Discharge Option 2**

Table 1a Hydraulic Capacity of Existing Sewers (Discharge Option 2)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Upstream Invert Level	Downstream Invert Level	g	k <sub>s</sub>	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s <sup>2</sup>	m		m <sup>2</sup> /s	m/s	m <sup>2</sup>	m <sup>3</sup> /s	L/s
STMH2-B1	STMH2	B1	225	6.11	9.27	9.2	9.81	0.00060	0.011	0.000001	1.40	0.04	0.06	55.7
B1-B2	B1	B2	225	25.64	9.2	8.9	9.81	0.00060	0.012	0.000001	1.42	0.04	0.06	56.3
B2-B3	B2	B3	225	19.20	8.9	8.6	9.81	0.00060	0.016	0.000001	1.64	0.04	0.07	65.1
B3-B4	B3	B4	225	10.52	8.6	8.4	9.81	0.00060	0.019	0.000001	1.81	0.04	0.07	71.9
B4-S4a	B4	FMH4099043	225	10.52	8.4	8.2	9.81	0.00060	0.019	0.000001	1.81	0.04	0.07	71.9
S4a-S5a	FMH4099043	FMH4099041	225	9.02	8.055	7.243	9.81	0.00060	0.090	0.000001	3.95	0.04	0.16	157.0
S5a-S6a	FMH4099041	FMH4099039	225	23.79	6.775	6.55	9.81	0.00060	0.009	0.000001	1.27	0.04	0.05	50.5
S6a-S7a	FMH4099039	FMH4099038	225	48.43	6.325	6.123	9.81	0.00300	0.004	0.000001	0.66	0.04	0.03	26.3
S7a-S8	FMH4099038	FMH4024266	225	7.49	6.093	5.931	9.81	0.00060	0.022	0.000001	1.93	0.04	0.08	76.7
S8-S9	FMH4024266	FMH4024253	600	13.66	5.44	5.32	9.81	0.00060	0.008	0.000001	2.24	0.28	0.63	634.4
S9-S10	FMH4024253	FMH4099046	600	12.28	5.22	4.99	9.81	0.00060	0.019	0.000001	3.32	0.28	0.94	939.8
S10-S10a	FMH4099046	FMH4099047	600	20.84	4.98	4.63	9.81	0.00060	0.017	0.000001	3.13	0.28	0.89	885.8
S10a-S11	FMH4099047	FMH4099048	600	7.68	4.58	4.48	9.81	0.00060	0.013	0.000001	2.75	0.28	0.78	778.6
S11-S11a	FMH4099048	FMH4099052	600	15.29	4.45	4.25	9.81	0.00060	0.014	0.000001	2.84	0.28	0.80	801.9
S11a-S12	FMH4099052	FMH4024256	600	54.87	4.25	4.00	9.81	0.00060	0.004	0.000001	1.63	0.28	0.46	459.9
S12-S13	FMH4024256	FMH4024826	600	15.64	3.33	2.58	9.81	0.00060	0.048	0.000001	5.35	0.28	1.51	1512.2
S13-S14	FMH4100826	FMH4024258	600	13.66	2.58	2.07	9.81	0.00060	0.037	0.000001	4.72	0.28	1.33	1334.0
S14-S15	FMH4024258	FMH4025854	750	41.34	1.86	1.68	9.81	0.00060	0.004	0.000001	1.84	0.44	0.81	813.9
S15-S16	FMH4025854	FMH4025855	750	50.56	1.68	1.43	9.81	0.00060	0.005	0.000001	1.96	0.44	0.87	867.8
S16-S17	FMH4025855	FMH4025856	750	75.28	1.43	1.11	9.81	0.00060	0.004	0.000001	1.82	0.44	0.80	804.2
S17-S18	FMH4025856	FMH4025767	600	16.80	1.11	-1.20	9.81	0.00060	0.138	0.000001	9.07	0.28	2.56	2563.4

- Remarks: (1) g=gravitational acceleration; k<sub>s</sub>=equivalent sand roughness; s=gradient; v=kinematic viscosity of water; V=mean velocity  
(2a) The value of k<sub>s</sub> = 0.6mm is adopted for slimed clayware sewer with V of approximately 1.2m/s, poor condition (based on Table 3: Recommended roughness values in Sewerage Manual)  
(2b) The value of k<sub>s</sub> = 3.0mm is adopted for slimed clayware sewer with V of approximately 0.75m/s, poor condition (based on Table 3: Recommended roughness values in Sewerage Manual)  
(3) The value of velocity (V) is referred to the Tables for the hydraulic design of pipes, sewers and channels (8th edition)  
(4) Equation used: 
$$V = \frac{1.49}{C} R^{2/3} S^{1/2}$$
 where  $C = \frac{1.49}{\sqrt{(8gDs) \log(\frac{k_s}{3.7D} + \frac{2.51v}{D\sqrt{(2gDs)}})}}$

- For sewer STMH2 to B4, invert levels are proposed.
- For sewer S11-S11a, as no available information on downstream invert level of the manhole, thus the downstream invert level is assumed with upstream invert level of the same manhole.
- For sewer S14 to S17, upgrade of sewer from 600mm to 750mm diameter is proposed and committed in approved SIA Report for CBS:02 Development Scheme and adopted in this assessment.
- As there are a manhole locate between S12 and S13 (FMH4024257, named S13a in figure) and a 600mm sewer which no available upstream and downstream invert level, thus S12 is assumed directly connected with S13 in calculation

Table 1b Hydraulic Capacity of Proposed Upgraded Sewers (Discharge Option 2)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Upstream Invert Level	Downstream Invert Level	g	k <sub>s</sub>	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s <sup>2</sup>	m		m <sup>2</sup> /s	m/s	m <sup>2</sup>	m <sup>3</sup> /s	L/s
S6a-S7a	FMH4099039	FMH4099038	300	48.43	6.55	6.093	9.81	0.00060	0.009	0.000001	1.53	0.07	0.11	107.9

Table 1c Hydraulic Capacity of Proposed Upgraded Sewers (For sewers connecting with downstream sewer with smaller diameter within the discharge Option 2)

Segment	Manhole Reference	Manhole Reference	Pipe Dia.	Pipe Length	Upstream Invert Level	Downstream Invert Level	g	k <sub>s</sub>	s	v	V	Area	Q	Estimated Capacity
			mm	m	mPD	mPD	m/s <sup>2</sup>	m		m <sup>2</sup> /s	m/s	m <sup>2</sup>	m <sup>3</sup> /s	L/s
S6a-S7a	FMH4099039	FMH4099038	300	48.43	6.55	6.093	9.81	0.00060	0.009	0.000001	1.53	0.07	0.11	107.9
S7a-S8	FMH4099038	FMH4024266	300	7.49	6.08	5.931	9.81	0.00060	0.020	0.000001	2.22	0.07	0.16	157.2

Table 2 Hydraulic Capacity of Existing Sewers for Sewerage generated from the Proposed Development and Surrounding Catchment Areas (Discharge Option 2)

Segment	Pipe Dia. (mm)	Pipe Length (m)	Gradient	Estimated Capacity (L/s)	Flow from the Existing Buildings with the Site Boundary (m3/day)	Included Catchment Area	Total Flow Rate from the Existing Buildings with the Site Boundary and Catchment Areas (m3/day)	Contribution Population [1]	Peaking Factor [2]	Peak Flow from the Existing Buildings with the Site Boundary and Catchment Areas (L/s) [3]	Contribution of Proposed Development (%)	Contribution of Catchments (%)	Contribution of Proposed Development and Catchments (%)
STMH2-B1	225	6.1	0.011	55.7	337.44	--	337.44	1250	6	23.43	42.1%	0.0%	42.1%
B1-B2	225	25.6	0.012	56.3	337.44	--	337.44	1250	6	23.43	41.6%	0.0%	41.6%
B2-B3	225	19.2	0.016	65.1	337.44	--	337.44	1250	6	23.43	36.0%	0.0%	36.0%
B3-B4	225	10.5	0.019	71.9	337.44	--	337.44	1250	6	23.43	32.6%	0.0%	32.6%
B4-S4a	225	10.5	0.019	71.9	337.44	--	337.44	1250	6	23.43	32.6%	0.0%	32.6%
S4a-S5a	225	9.0	0.090	157.0	337.44	G	587.06	2174	6	40.77	14.9%	11.0%	26.0%
S5a-S6a	225	23.8	0.009	50.5	337.44	G	587.06	2174	6	40.77	46.4%	34.3%	80.7%
S6a-S7a	225	48.4	0.004	26.3	337.44	G	587.06	2174	6	40.77	89.2%	66.0%	155.3%
S7a-S8	225	7.5	0.022	76.7	337.44	G	587.06	2174	6	40.77	30.5%	22.6%	53.1%
S8-S9	600	13.7	0.008	634.4	337.44	A+B+C+G	6527.43	24176	4	302.20	2.5%	45.2%	47.6%
S9-S10	600	12.3	0.019	939.8	337.44	A+B+C+G	6527.43	24176	4	302.20	1.7%	30.5%	32.2%
S10-S10a	600	20.8	0.017	885.8	337.44	A+B+C+G	6527.43	24176	4	302.20	1.8%	32.4%	34.1%
S10a-S11	600	7.7	0.013	778.6	337.44	A+B+C+G	6527.43	24176	4	302.20	2.0%	36.8%	38.8%
S11-S11a	600	15.3	0.014	801.9	337.44	A+B+C+G	6527.43	24176	4	302.20	1.9%	35.7%	37.7%
S11a-S12	600	54.9	0.004	459.9	337.44	A+B+C+G	6527.43	24176	4	302.20	3.4%	62.3%	65.7%
S12-S13	600	15.6	0.048	1512.2	337.44	A+B+C+G	6527.43	24176	4	302.20	1.0%	19.0%	20.0%
S13-S14	600	13.7	0.037	1334.0	337.44	A+B+C+F+G	10438.42	38661	4	496.76	1.2%	35.1%	37.2%
S14-S15	750	41.3	0.004	813.9	337.44	A+B+C+F+G	10438.42	38661	4	496.76	1.9%	57.5%	61.0%
S15-S16	750	50.6	0.005	867.8	337.44	A+B+C+F+G	10438.42	38661	4	496.76	1.8%	53.9%	57.2%
S16-S17	750	75.3	0.004	804.2	337.44	A+B+C+F+G	10438.42	38661	4	496.76	1.9%	58.2%	61.8%
S17-S18	600	16.8	0.138	2563.4	337.44	A+B+C+F+G	10438.42	38661	4	496.76	0.6%	18.2%	19.4%

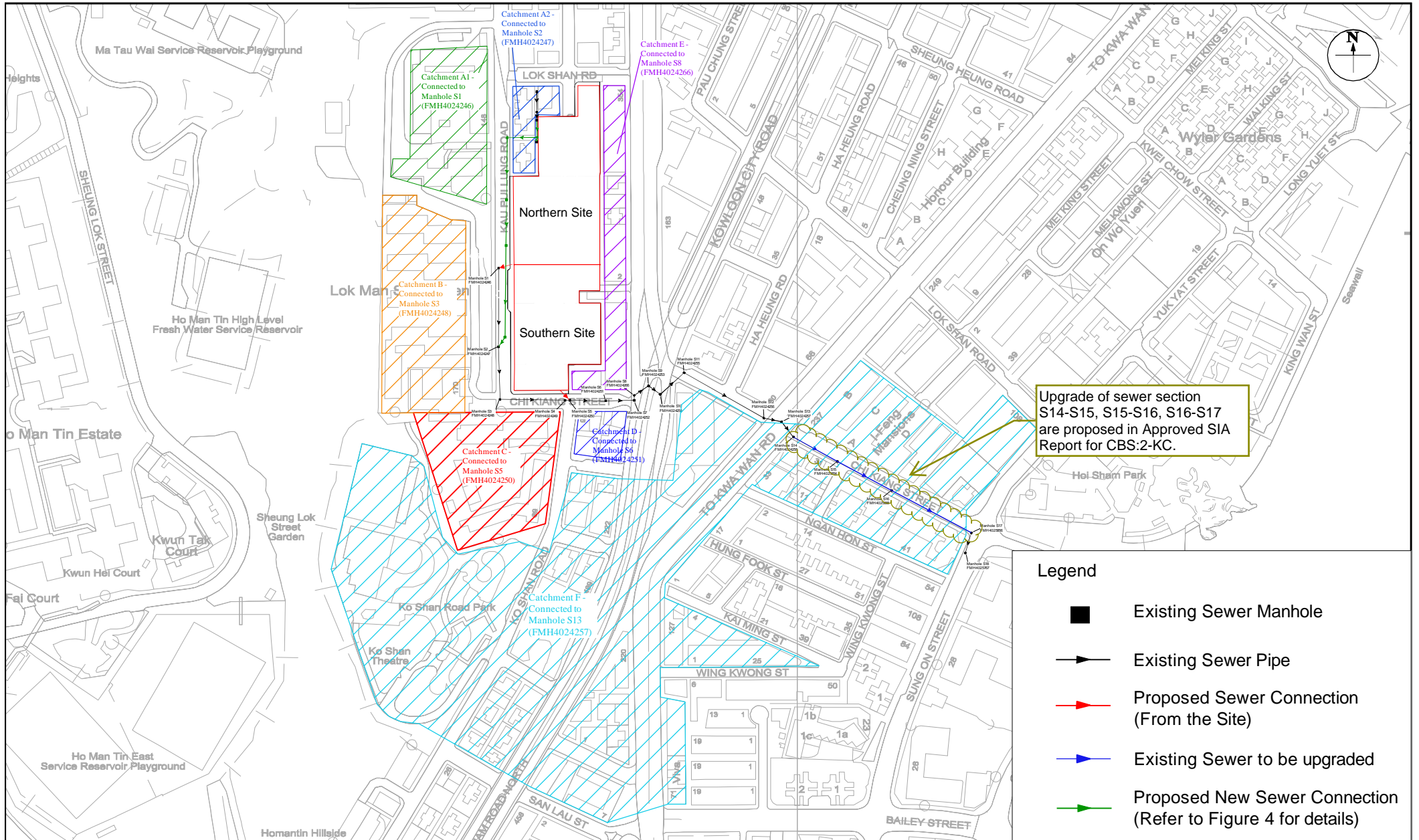
After Pipe Size Upgrading Work for Sewer Pipes S6a-S7a

S6a-S7a	300	48.4	0.009	107.9	337.44	G	587.06	2174	6	40.77	21.7%	16.1%	37.8%
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After Pipe Size Upgrading Work for Sewer Pipes S6a to S8 (Potentially Upgrade Required)

S6a-S7a	300	48.4	0.009	107.9	337.44	G	587.06	2174	6	40.77	21.7%	16.1%	37.8%
S7a-S8	300	7.5	0.020	157.2	337.44	G	587.06	2174	6	40.77	14.9%	11.0%	25.9%

**Appendix 3.4    Extracted Pages of Approved SIA Report for CBS:2-KC on  
Proposed Sewerage Upgrading Works**



**Figure:** 3

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

**Project:** Kau Pui Lung Road / Chi Kiang Street Development Scheme (CBS-2:KC)

**RAMBOLL**

Drawn by: KW

Checked by: TC

Rev.: 2.0

Date: Sep 2022