
Appendix G
Revised Sewerage Impact Assessment

**Proposed Land Sharing Pilot Scheme for a Site at
Various Lots in D.D. 115, Tung Shing Lei, Yuen Long**

**Sewerage Impact Assessment
April 2024**

AECOM Asia Co. Ltd.

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1. INTRODUCTION

1.1 Background

- 1.1.1 The Application Site is located at various lots in D.D. 115, Tung Shing Lei, Yuen Long. The Application Site is currently zoned “Residential (Group D)” “R(D)” on the approved Nam Sang Wai Outline Zoning Plan No. S/YL-NSW/8 and covers a site area of approximately 57,055m².
- 1.1.2 The site location plan for the Proposed Development is shown in **Figure 1**. AECOM Asia Co. Ltd. (AECOM) has been commissioned to carry out a Sewerage Impact Assessment (SIA) to appraise the likely sewerage impact generated by the Proposed Development and provide mitigation measures, if necessary.

1.2 Objective of this Submission

- 1.2.1 This SIA report aims to assess the existing sewerage system, estimate the sewage flow generated from the Proposed Development, and suggest mitigation measures required to the existing sewerage network.
- 1.2.2 The main objectives of this assessment include the followings:
- Identify the scope of the development
 - Identify the existing and planned sewerage network in the vicinity of the development
 - Outline the methodology adopted in this assessment
 - Determine the sewage flow of the development
 - Recommend mitigation measures or upgrade works where appropriate due to the development.

2. DEVELOPMENT PROPOSAL

2.1 The Proposed Development

- 2.1.1 The Application Site has an area of approximately 45,676m² with a Domestic Floor Area (GFA) of about 143,579m². The indicative development schedule is summarized in **Table 1** below. For assessment purpose, person-per-flat is taken as 2.8 for Public Housing and 2.5 for Private Housing. The design year of population intake for both Public Housing and Private Housing is 2031.

Table 1 – Development Schedule

Site Area (m ²)	~ 45,676
Proposed Domestic GFA (m ²)	~ 143,579
Public Housing Portion (m ²)	~ 93,400
Private Housing Portion (m ²)	~ 50,179
No. of Units	3,129
Public Housing Portion ⁽¹⁾	1,868
Private Housing Portion	1,261
Person-per-flat Ratio	
Public Housing Portion	2.8
Private Housing Portion	2.5
Residential Population	8,384
Public Housing Portion ⁽¹⁾	5,231
Private Housing Portion	3,153
GIC GFA (m ²)	~ 4,670
GIC Employee Density (Person/m ²) ⁽²⁾	0.033
GIC Employees	155
Clubhouse GFA (m ²)	~ 2,250
Clubhouse F&B Employee Density (Person/m ²) ⁽³⁾	0.051
Clubhouse F&B Employees	23
Clubhouse Personal Service Employee Density (Person/m ²) ⁽²⁾	0.033
Clubhouse Personal Service Employees	60
Retail GFA (m ²)	~ 2,445
Public Housing Portion (m ²)	~ 1,200
Private Housing Portion (m ²)	~ 1,245
Retail Employee Density (person/m ²) ⁽³⁾	0.051
Retail Employees	125
Kindergarten GFA (m ²) ⁽⁴⁾	1,000
No. of Student	160
No. of Staff and Teacher	11

Remark for Table 1:

- (1) As per Housing Department's comment, for Public Housing, 10% increase in the number of units (2,055) and population (5,755) will be included for assessment purpose.
- (2) A density of 3.3 employees per 100 m² GFA (for Community, Social & Personal Services) is adopted in accordance with the results of the "Commercial and Industrial Floor Space Utilization Survey" conducted by the Planning Department in 2004/2005.
- (3) A density of 5.1 employees per 100 m² GFA (for Restaurants, Private Commercial) is adopted in accordance with the results of the "Commercial and Industrial Floor Space Utilization Survey" conducted by the Planning Department in 2004/2005.
- (4) It is anticipated that the kindergarten area is 1,000 m². For assessment purpose, 8 classes are assumed in the kindergarten. A maximum of 160 students (max class size 20) and 11 staff and teacher (Staff and teacher to student ratio 1:15) are adopted in accordance with Operation Manual for Pre-primary Institutions published by Education Bureau and Social Welfare Department.

3. SEWERAGE SYSTEM OF THE APPLICATION SITE

3.1 Existing Sewerage System

- 3.1.1 The Application Site is presently unsewered. The nearest public sewerage network is at Castle Peak Road – Yuen Long collecting sewage from the Au Tau and Shap Pat Heung areas to a sewage pumping station to the south of Pok Oi Hospital namely “Au Tau Sewage Pumping Station” (ATSPS).
- 3.1.2 The ATSPS currently has a design capacity of approximately 10,700 m³/day. Sewage collected by the ATSPS will be ultimately discharged to the San Wai Sewage Treatment Works (SWSTW) for treatment and disposal.

4. SEWERAGE IMPACT ASSESSMENT

4.1 Design Assumption

- 4.1.1 10% increase in design numbers of population had been assumed in the sewage generation estimation for the proposed Public Housing development.
- 4.1.2 This SIA had been carried out following the assumptions and criteria set out in the “EPD/TP1/05 Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Version 1.0” (GESF), published by Environmental Protection Department (EPD).

4.2 Sewage Flow of Proposed Development

- 4.2.1 The volume of sewage that will be generated by the Proposed Development is approximately 2,708.4m³/day (ADWF) upon full occupation including 10% increase in design numbers of population. The sewage discharge is anticipated to be discharge at year 2031 which is same as the population intake year. The design assumptions are presented in **Table 2** below. The detailed estimation is presented in **Appendix A**.

Table 2 - Estimated Sewage Flow

Unit Flow Factor (m ³ /head/day) ⁽²⁾	
Domestic – Public Housing Portion	0.27
Domestic – Private Housing Portion	0.27
GIC	0.28
Clubhouse F&B ⁽³⁾	1.58
Clubhouse Personal Service	0.28
Retail ⁽³⁾	1.58
Kindergarten Student	0.04
Kindergarten Staff and Teacher	0.28
Child Care Centre Employees	0.28
Average Dry Weather Flow (ADWF) (m ³ /day)	
Domestic – Public Housing Portion	1,553.58
Domestic – Private Housing Portion	851.31
GIC	43.4
Clubhouse	53.1
Retail	197.5
Kindergarten Student	6.4
Kindergarten Staff and Teacher	3.08
Child Care Centre Employees	0
Total ADWF	2,708.41
Peak Flow	
Peaking Factor ⁽⁴⁾	4
Backwash Flow for Swimming Pool	0.0158
Peak Flow (m ³ /sec)	0.141

Remark for Table 2:

- (1) Refer to Table 1 for the design population calculation.
- (2) Unit Flow Factors are extracted from GESF, according to each type of flow.
- (3) 20% Clubhouse GFA and 100% Retail GFA are assumed to be for Food & Beverage (F&B) purpose.
- (4) According to GESF Table T-5, peaking factor of 4 is appropriate for contributing population ranging from 5,000 – 10,000.

4.3 Proposed Sewerage System

- 4.3.1 It is proposed that sewage generated from the Proposed Development will be discharged to the ATSPS. The estimated sewage generated from the Proposed Development is 2,708.4m³/day (ADWF), or a peak flow of 0.141m³/s with a peaking factor of 4 (for sewer design with population 10,000 – 50,000) including 10% increase in design numbers of population. Assessment of proposed sewerage system is shown in **Appendix B**. The flow is equal to approximately 25.43% of the current capacity of ATSPS. It is envisaged that this small increase will not lead to overloading the ATSPS and the subsequent sewerage network. The assessment on the capacity of Au Tau SPS is including in **Appendix C**.
- 4.3.2 Sewage generated from the public and private housing site will be discharged to the proposed sewage pumping station by gravity PE sewer sizing DN375. The sewage flow will then be pumped from the proposed pumping station to ATSPS through the proposed 2 nos. of rising mains of Proposed Development (See **Appendix B** for the hydraulic calculations for rising mains). The proposed DN375 gravity PE sewer will be handed over to government for maintenance upon connection of sewer from the public housing site. The design capacity of the proposed sewage pumping station is 2,708.4m³/day.

4.4 Consideration of Avoiding Emergency Discharge

- 4.4.1 In the event of emergency, such as power outage or equipment failure, it is essential to provide measures to prevent flooding and deploy tankers to transport away the sewage from proposed SPS to nearby existing sewerage to further increase the buffer time for emergency storage.
- 4.4.2 In order to minimize the risk of emergency discharge of sewage into the receiving water body, a number of precautionary measures have been taken into account in the design of the SPS. These measures include:
- Provision of dual power supply;
 - Provision of standby equipment; and
 - Provision of onsite storage of raw sewage.

4.5 Dual Power Supply to Eliminate the Risk of Power Failure

- 4.5.1 The electrical system of the proposed sewage pumping station is proposed to receive two incoming supplies. Such dual supply configuration is to achieve a reliable power supply for continuous operation of the pumps and auxiliary equipment. Also, the arrangement for the two power sources to be fed by two different ring circuits is desirable.

4.6 Provision of onsite storage and tanker away of raw sewage

- 4.6.1 An equalization tank will be provided in case of failure of the sewage pumping station or power failure as it is expected that the plant operation could normally be resumed. An emergency response procedure will be prepared during detailed design stage. The emergency storage in sewage pumping station will store the sewage. In case power shortage occurs at the SPS, tanker would be deployed to transport the sewage away from SPS to the nearby existing sewerage system. The detailed design will investigate and incorporate all practicable precautionary measures to minimize the likelihood of such an event.
- 4.6.2 As a result, precautionary measures such as routine/ regular checking of equipment, provision of dual power supply, provision of standby equipment, 24-hour monitoring on the operation of the sewage pumping station, installing remote control and monitoring system (SCADA) to allow off-site monitoring and provision of emergency storage will be provided. Hence, with the implementation of above preventive measures, the possibility of sewage overflow from sewage pumping station will be extremely low.

5. EVALUATION OF THE SEWAGE DISPOSAL SCHEME AND RECOMMENDATIONS

5.1 Regional sewerage strategy

- 5.1.1 The Application Site falls within the catchment of proposed SPS. Discharge of sewage via the rising main to the Au Tau SPS, which will lead to Lung Tin SPS, Ha Tsuen SPS and subsequently to San Wai STW, is a feasible option and is in line with Government's sewage disposal strategies.

5.2 Maintenance

- 5.2.1 The proposed pumping station and 2 nos. of rising mains with 250 mm diameter would serve the Proposed Development under subject application. The proposed works is recommended to be handed over to government for maintenance subject to the agreement from DSD for the maintenance matrix at the detailed design stage. Prior to successful handover, the Applicant shall be responsible for the implementation of the required sewerage works and taking up the maintenance responsibility of the proposed works up to the Testing and Commissioning Stage. Details design of the proposed works and the maintenance matrix will be submitted to relevant departments for agreement at the detailed design stage.
- 5.2.2 The proposed sewerage system will be handed over to government for maintenance. The detailed design of the proposed sewerage system will be submitted to relevant government departments for approval before the commencement of the construction works.

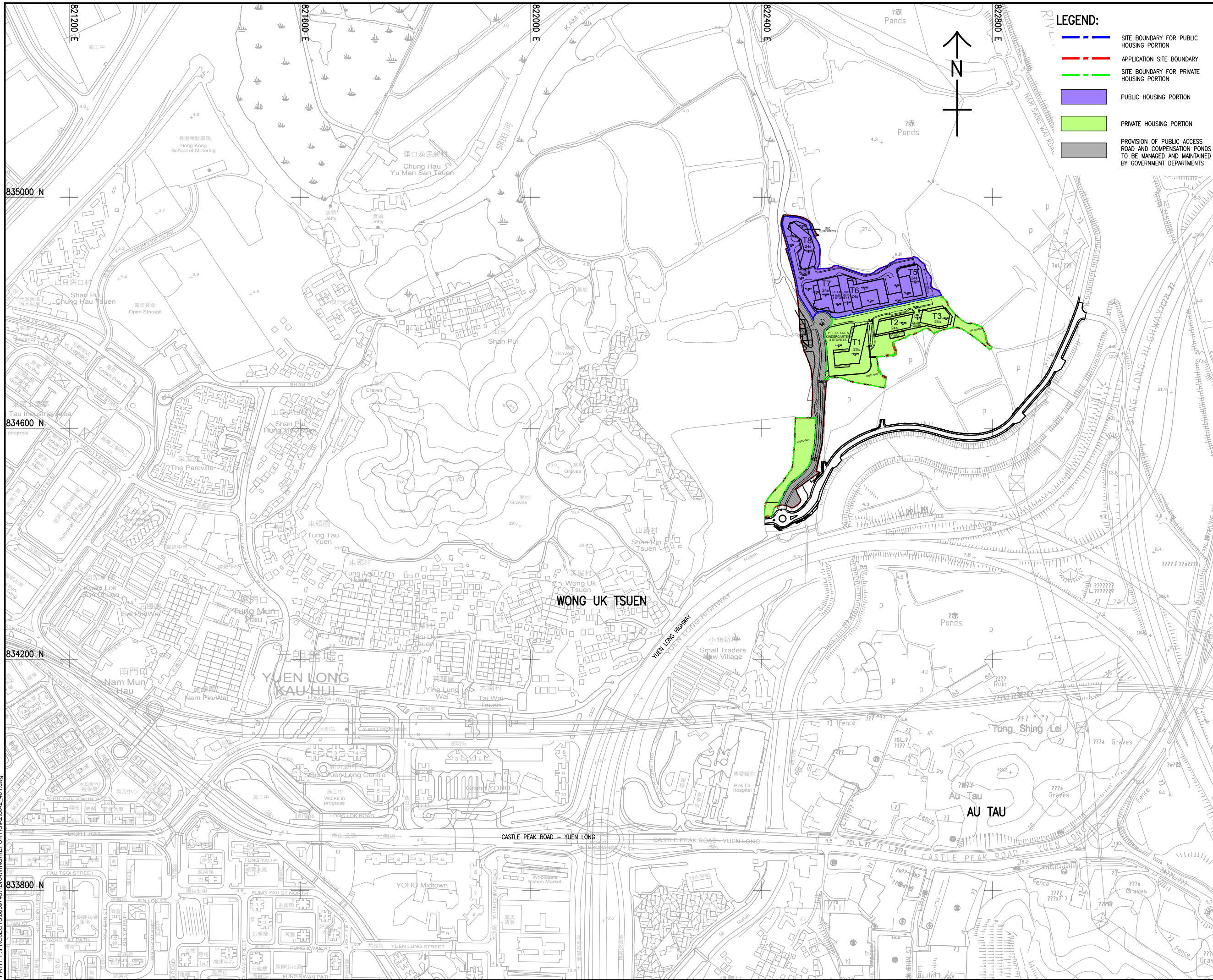
6. CONCLUSION

- 6.1.1 The estimated sewage generated in terms of Average Dry Weather Flow, from the Proposed Development is about 2,708.4m³/day including 10% increase in design numbers of population. The flow is equal to approximately 25.31% of the current capacity of ATSPS. It is unlikely that the ATSPS will be overloaded.

- 6.1.2 As revealed by hydraulic assessment results, the proposed sewage discharge scheme is feasible. No significant impact on sewerage conveyance system is anticipated.
- 6.1.3 Subjected to the updated sewerage connection to Au Tau SPS at detailed design stage. A detailed design for the sewerage connection will be submitted to DSD for approval.

END OF TEXT

Figures



PROJECT
श्री

PROPOSED RESIDENTIAL
DEVELOPMENT IN VARIOUS
LOTS (TO BE KNOWN AS LOT
1696) IN D.D. 115 AT
TUNG SHING LEI, YUEN LONG

CLIENT
駐

CONSULTANT
丁樹國公司

AECOM Asia Company Ltd
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SUB-CONSULTANTS
分枝工程顧問公司

ISSUE/REVISION			
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IR #/REV	DATE 日付	DESCRIPTION 内容	CHK 検査

STATUS

SCALE
比例

DIMENSION UNIT
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DIMENSION UNIT
尺寸單位

METRES

KEY PLAN

PROJECT NO.
項目番号

60597457

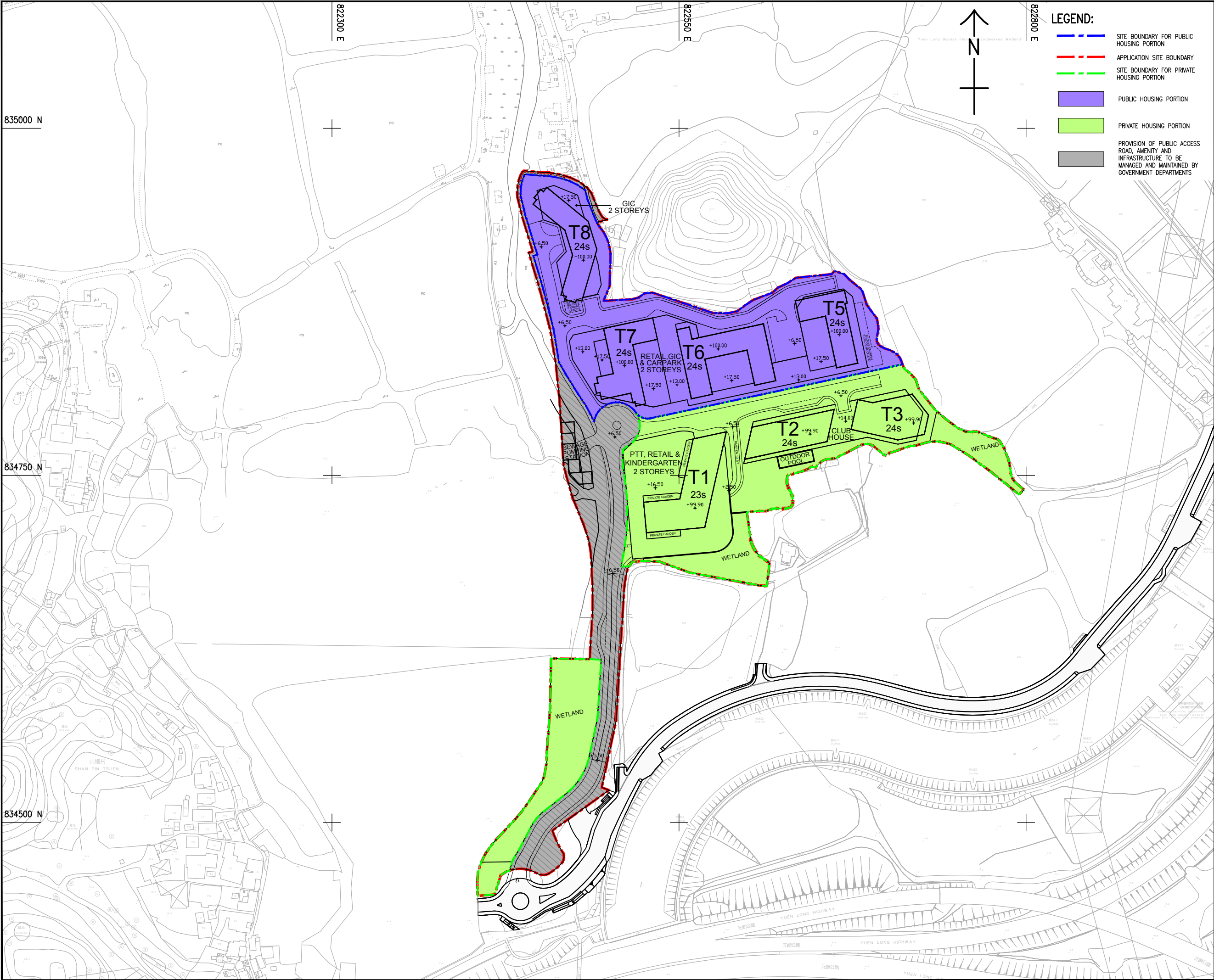
SHEET TITLE
18-2

LOCATION PLAN

SHEET NUMBER

60597457/SIA2/FIGURE 1

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:
Pic File By: Haiquan.zhao
10/04/2024
PATH: P:\PROJECTS\60597457\DRAWING\REPORT\SIA2\SIA2_402.dwg



AECOM

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT IN VARIOUS LOTS (TO BE KNOWN AS LOT 1696) IN D.D. 115 AT TUNG SHING LEI, YUEN LONG

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ISSUE/REVISION
001

NO.	DATE	DESCRIPTION	CHK.

STATUS
001

SCALE
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DIMENSION UNIT
METRES

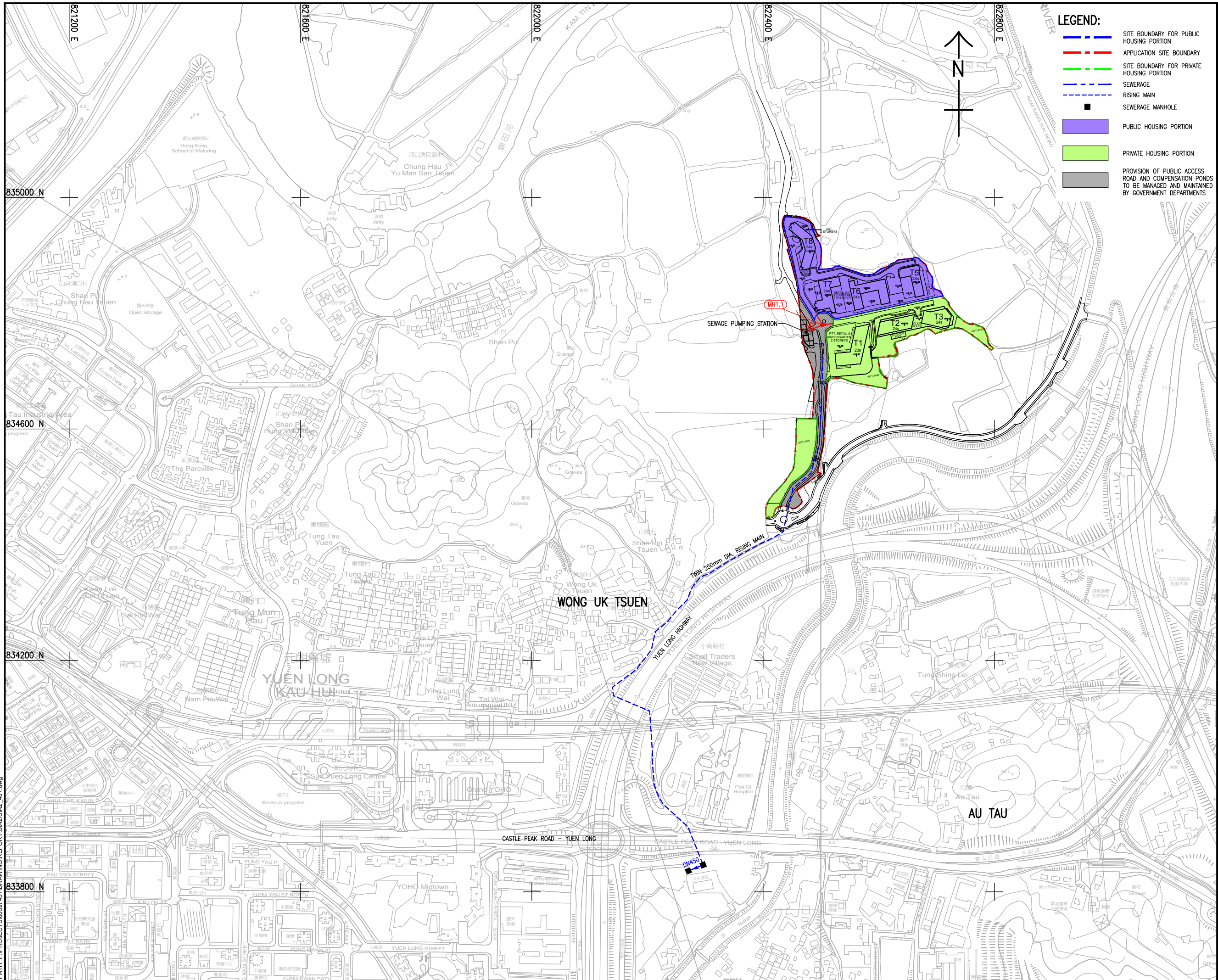
KEY PLAN
001

PROJECT NO.
60597457

CONTRACT NO.
H&L

SHEET TITLE
PROPOSED MASTER LAYOUT PLAN

SHEET NUMBER
60597457/SIA2/FIGURE 2



PROPOSED RESIDENTIAL
DEVELOPMENT IN VARIOUS
LOTS (TO BE KNOWN AS LOT
1696) IN D.D. 115 AT
TUNG SHING LEI, YUEN LONG

CONSULTANT
INDIA

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STATUS

SCALE
12月

KEY PLAN

PROJECT NO.
項目編號

60597457

SHEET TITLE
圖名欄

LOCATION PLAN

SHEET NUMBER

60597457/SIA2/FIGURE 3

— 1 —


Appendix A

Sewerage Generation Calculation

Appendix B

Hydraulic Calculation of Proposed Sewer and Rising Mains

<div><div>AECOM</div><div>Asia Co. Ltd.</div></div>		Proposed Land Sharing Pilot Scheme Development for a Site at Various Lots in DD115, Tung Shing Lei, Yuen Long																				Project No.		60597457					
																						Date		1/31/2024					
																						By		0					
Manhole		Ground																											
U/S	D/S	Cover Level		Invert Level		Invert Depth		Size	Length	Grad	Material	k _s	Velocity	Time of Flow	Capacity	Direct Discharge	Flow from Upstream	Total Average Flow	Contributing Population	Peaking Factor	Catchment Inflow Factor	Total Peak Flow	Percentage Capacity	Factor of Safety	Remarks	Cover			
		U/S mPD	D/S mPD	U/S mPD	D/S mPD	U/S m HIDE	D/S m HIDE																				Manhole Type	U/S (m)	
MH1.1	SPS	6.50	6.50	3.00	2.78	3.50	3.73	375	27.0	120	PE100	0.15	1.79	0.25	0.1982	0.00	2708.41	2708.41	10031.00	4.0	1.0	0.1412 ⁽¹⁾	71.24%	1.40	E1	3.13			

 Consulting Engineers Tower 2, Grand Central Plaza 138, Shatin Rural Committee Road Shatin, New Territories, Hong Kong	Project			
	Proposed Land Sharing Pilot Scheme for a Site at Various Lots in D.D. 115, Tung Shing Lei, Yuen Long			
	Drawing Ref N/A	Calculated by	Checked by	Page
	Subject			Date 15 Dec 2023

Rising Main Design

Total Estimated Sewage	=	2708.41 m ³ /day	
Peaking Factor	=	4	(Contributing Population = 2708.41 /0.27
Design Flow	=	125.39 L/s	= 10031.15
	=	0.125 m ³ /s	10000 - 25000 people)
Assume Inner Diameter,	=	250 mm	
Flow Area	=	0.0491 m ²	
Velocity	=	<u>2.554 m/s</u>	

- 1) The twin rising mains is proposed and the velocity of one pipe is within the range of 1m/s to 3m/s, the diameter of the rising main is found to be acceptable.
- 2) Only one rising main will be in operation at a time.

Appendix C

Au Tau Sewage Pumping Station Information (Provided by DSD) and Capacity Assessment

From: [REDACTED]
Sent: Tuesday, 12 October 2021 14:04
To: [REDACTED]
Cc: [REDACTED]
Subject: [EXTERNAL] Re: [Internet] [No. LSPS/002] Land Sharing Pilot Scheme Application in Various Lots in D.D. 115 and adjoining Government Land, Ho Chau Road, Yuen Long, N.T. (near Tung Shing Lei) - Request for Information

Dear [REDACTED]

Your requested information as follows. Please be reminded that the information shall be solely used for this project.

Au Tau SPS

Designed ADWF: 10,700 m³/day

Designed peak flow: 410 L/s

Current average daily flow: approx. 800 m³/day

Regards,

[REDACTED]
Drainage Services Department
[REDACTED]



From: [REDACTED]
To: [REDACTED]
Cc: [REDACTED]
Date: 28/09/2021 14:52
Subject: [Internet] [No. LSPS/002] Land Sharing Pilot Scheme Application in Various Lots in D.D. 115 and adjoining Government Land, Ho Chau Road, Yuen Long, N.T. (near Tung Shing Lei) - Request for Information
Serial No.:

=====
This email was delivered via Internet which may not be trustworthy.
You are advised to pay special attention to any embedded URLs or attachments.
Do not click the URLs or open the attachment unless you know it is safe to do
=====

Dear [REDACTED]

Further to the captioned LSPS application and further to our previous letters to you (dated: 2021/03/23 and 2021/07/23; letter soft copies attached for ease of reference), much appreciated if you can furnish us with the information on the design capacity and current flow rates of the Au Tau Sewage Pumping Station.

Should you have any further queries, please feel free to reach me at [REDACTED]
Many thanks!

Best regards,

[REDACTED]

AECOM

11/F, Tower 2, Grand Central Plaza
138 Shatin Rural Committee Road
Shatin, New Territories, Hong Kong
aecom.com

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This message has been analyzed by Deep Discovery Email Inspector.

[Redacted] "00201110101.pdf" deleted by SentinelOne S2; AU/ST1-00201110101-01 [Redacted] "00201110101.pdf" deleted by SentinelOne S2; AU/ST1-00201110101-01

Capacity Assessment on Au Tau Sewage Pumping Station

According to the information from DSD, the design ADWF of Au Tau SPS is 10,700m³/d.

- Current daily flow approx. = 800 m³/d. (Refer to Appendix C of SIA)
- ADWF of the proposed development is 2,708.41 m³/d. (Refer to Appendix B of SIA)
- ADWF of other planned development is 3,300 m³/d.

Total = 6808.41m³/d < 10,700m³/d