Appendix B - Technical assessments conducted in the previously approved planning application No. A/YL-ST/658

Sewerage Impact Assessment

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

AGREEMENT NO. CE 47/2020 (CE) –
TERM CONSULTANCY FOR SITE FORMATION AND INFRASTRUCTURE WORKS FOR PROPOSED HOUSING DEVELOPMENTS IN ZONE 2 (2021 – 2024) – FEASIBILITY STUDY

TASK ORDER NO. 9 – SAN TIN
Sewerage Impact Assessment (SIA) Report (Issue 1)

July 2023

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

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TASK ORDER NO. 9 – SAN TIN

Sewerage Impact Assessment (SIA) Report (Issue 1)

[CONFIDENTIAL]

PROJECT NO.: 2512219A

DATE: JULY 2023

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REVISION HISTORY

REVISION	DATE	PREPARED BY	CHECKED BY	APPROVED BY
Issue 1	25 July 2023	Various	Vincent So	Emeric Wan

TABLE OF CONTENT

DRAWINGS

ABBREVIATIONS

ADWF	Average Dry Weather Flow
CEDD	Civil Engineering and Development Department
CIF	Community Isolation Facility
DSD	Drainage Services Department
EPD	Environmental Protection Department
GESF	Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning
GFA	Gross Floor Area
MiC	Modular Integrated Construction
UFF	Unit Flow Factor
WSP	WSP (Asia) Limited

1 INTRODUCTION

1.1 BACKGROUND

1.1.1 WSP (Asia) Ltd. (WSP) is commissioned by the Civil Engineering and Development Department (CEDD) to submit the Section 16 Planning Application to seek permission from the Town Planning Board (TPB/ the Board) for the Proposed Temporary Training Facilities (the proposed development) at the San Tin Community Isolation Facility (CIF) (Application Site/Site), on a temporary basis up to 31 October 2024.

1.1.2 The Applicant, CEDD, proposes a development on a temporary basis up to 31 October 2024. The Application Site falls within an area zoned for "Other Specified Uses (Services Stations)" under the Approved San Tin Outline Zoning Plan No. S/YL-ST/8 (OZP). In accordance with Clause No. (11) (b) of the covering Notes of the approved OZP, *"……temporary use or development of any land or building not exceeding a period of three years requires permission from the Town Planning Board……*". Therefore, this planning application is submitted to the TPB under Section 16 of the Town Planning Ordinance for the proposed temporary development.

1.1.3 The Application Site is currently occupied by San Tin CIF. With the epidemic in Hong Kong having been brought under control gradually, the CIF have been put into standby mode. To fully utilize the existing resources and facilities, the Applicant intends to convert the existing San Tin CIF as the proposed temporary development up to 31 October 2024.

1.2 STRUCTURE OF THE REPORT

1.2.1 This SIA report contains the following sections in addition to this introduction: -

Section 2 Describes the existing site conditions and presents the key development parameters of the Development for the SIA

Section 3 Discusses the methodology and design parameters for the SIA

Section 4 Presents the existing and planned sewerage system; estimates sewage flow from the Proposed Development and proposes the sewerage discharge points; assesses the potential sewerage impacts from the Proposed Development and proposes mitigation measures if necessary

Section 5 Summarizes the finding and provide conclusion of the SIA report

2 SITE DESCRIPTION

2.1 DESCRIPTION OF THE SITE

2.1.1 The proposed development is located at the existing Yuen Long San Tin Community Isolation Facility which is bounded by Castle Peak Road – San Tin to the east, San Tin Tsuen Road to the north and Tung Wing On Road to the south.

2.2 DEVELOPMENT SCHEDULE

2.2.1 Taking into account the Site is previously used as CIF, the units and required infrastructure have already been constructed. The anticipated population intake would be October 2023 tentatively and the Site is intended to operate till 31 October 2024.

3 METHODOLGY AND DESIGN PARAMETERS FOR SEWERAGE IMPACT ASSESSMENT

3.1 METHODOLOGY

Assessment Approach

3.1.1 The following approach and methodology have been adopted in this sewerage impact assessment:-

- Carry out the desktop study and site visit to collect relevant information for the assessment;
- Investigate and review the existing and planned sewerage networks and determine the sewage flow generated from the existing community isolation facility;
- Determine the potential sewage arising from the proposed development; and;
- Assess the sewerage impacts and recommend the mitigation measures if necessary

Information Collection

3.1.2 The following information is collected for the assessment:-

- Sewerage Record Plan in the vicinity of the Site;
- Topographic data at the Site;
- Sewage flow generation from the existing site; and
- Treatment capacity of the existing/planned pumping station and sewage treatment works.

Design Standards, Guidelines and Reference

3.1.3 The assessment is conducted in accordance with the following standards, guidelines and reference:-

- Sewerage Manual Part 1 – Key Planning Issues and Gravity Collection System, Third Edition, May 2013 published by DSD;
- Sewerage Manual Part 2 – Pumping Stations and Rising Mains, Second Edition, May 2013 published by DSD; and
- Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (GESF) published by EPD.

Hydraulic Analysis

3.1.4 The sewage in the sewerage system is assumed to be in free-flow condition. The capacity for gravity sewers is assessed using the Colebrook–White equation.

Colebrook-White

$$\overline{V} = -\sqrt{32gRS_f}\log\left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}}\right]$$

3.2 DESIGN PARAMETERS AND ASSUMPTIONS

Unit Flow Factors

3.2.1 The Unit Flow Factors (UFF) has been adopted in accordance with Table T-1 and Table T-2 of the GESF. The Unit Flow Factor adopted in the assessment for the existing development is "Temporary and non-domestic" and the proposed development is "School student" as indicated in Table 3.2a below.

Table 3.2a – Unit Flow Factors

Component	Category/ Use	UFF (m^3/person/day)
Domestic Flow	Temporary and non-domestic	0.150
Student Flow	School student	0.040

3.2.2 The Catchment Inflow Factors (P_{cif}) cater for the net overall ingress of water or waste water to the sewerage system. They are catchment-dependent and applicable to major sewerage facilities of a catchment. They are not applicable to new catchments which are deemed to be free from misconnections and pipe defects. Therefore, the P_{cif} are not applicable in estimating the total flows from the new development areas.

3.2.3 For the existing sewerage system in Yuen Long District, P_{cif} of 1.00 will be adopted in accordance with Table T-4 of the GESF.

3.2.4 The average sewage flow, $Q_{average}$, is as follows:-

$$Q_{average} = (Q_{domestic} + Q_{commercial} + Q_{other}) \times P_{cif}$$

Peaking Factors

3.2.5 Peaking factors cater for seasonal / diurnal fluctuation and normal amount of infiltration and inflow. The peaking factors shall be in accordance with Table T-5 of GESF and are shown in the Table 3.2b. As the downstream sewers were designed to cater the sewage generated from the CIF only, the peaking factor (excluding stormwater allowance) will be adopted. As the design population of the existing community isolation facility and the proposed development are 2,800 (+280) and 100 respectively, the peaking factor will be taken as 5 and 6 respectively.

Table 3.2b – Peaking Factors for Various Population Ranges

Population Range	Peaking Factor (including stormwater allowance) for facility with existing upstream sewerage	Peaking Factor (excluding stormwater allowance) for facility with new upstream sewerage
(a) For sewers		
<1,000	8	6
1,000 – 5,000	6	5
5,000 – 10,000	5	4
10,000 – 50,000	4	3
>50,000	Max (7.3/ $N^{0.15}$, 2.4)	Max (6/ $N^{0.175}$, 1.6)
(b) Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations		
<10,000	4	3
10,000 – 25,000	3.5	2.5
25,000 – 50,000	3	2
>50,000	Max (3.9/ $N^{0.065}$, 2.4)	Max (2.6/ $N^{0.065}$, 1.6)

N is the contributing population in thousands

3.2.6 Peaking factors (including stormwater allowance) are usually applied to assess and design sewers, as a measure to take into account the deterioration of pipe conditions with time despite that new sewerage systems are provided.

3.2.7 The peak sewage flow, Q_{peak}, is as follows:-

$$Q_{peak} = Q_{average} \times P$$

Material

3.2.8 The roughness coefficients used for Colebrook-White (ks) are based on values provided in the Table 5 of DSD Sewerage Manual Part 1 2013 and are summarized in Table 3.2c.

Table 3.2c – Roughness Coefficients for Sewerage Design

Material	Roughness Coefficients, ks
Concrete	3.0 mm (velocity approximately 0.75 m/s, normal condition)

Siltation

3.2.9 Suitable allowance is made for the deposition of sediment in existing sewers. 10% reduction in flow area is adopted to take into account the effects to flow capacity due to materials deposited on the sewer bed.

4 SEWERAGE IMPACT ASSESSMENT AND PROPOSED MITIGATION MEASURES

4.1 EXISTING SEWERAGE SYSTEM

4.1.1 The sewage of the Proposed Development was pumped to the San Tin CIF sewage pumping station (SPS) and then to the Sewage Treatment Facilities at Lok Ma Chau Control Point by two 1.8km-long DN200 rising mains via San Sham Road. The capacity of the existing sewerage facilities advised by DSD are summarized in Table 4.1.

Table 4.1 Current capacity of existing sewerage facilities

Sewerage Facilities	Design Capacity (m^3/day)
San Tin CIF SPS (Upstream of Lok Ma Chau Control Point Sewage Treatment Plant)	500
Lok Ma Chau Control Point Sewage Treatment Plant	498

4.1.2 The population of the community isolation facility is 2,800 and an additional 10% is assumed for staff operation. The design sewage flow is summarised in Table 4.2.

Table 4.2 Design Sewage Flow from the existing Community Isolation Facility

Type	Population	Unit Flow Factor (UFF) (m^3/h/d)	Average Dry Weather Flow (ADWF) (m^3/d)	Peak Flow (L/s)
Temporary and non-domestic	2,800 (Design Population) + 280 (Staff Operation)	0.15	462	22.92

4.2 SEWAGE GENERATION ESTIMATION

Sewage Generation from the Site

4.2.1 The anticipated population of the site is 100.

4.2.2 Based on the design population of the proposed development, the sewage flow from the Site is estimated and shown on Table 4.3.

Table 4.3 Estimated Sewage Flow from the Proposed development

Type	Population	Unit Flow Factor (UFF) (m^3/h/d)	Average Dry Weather Flow (ADWF) (m^3/d)	Peak Flow (L/s)
School Student	100	0.04	4	0.28

4.3 SEWERAGE IMPACT ASSESSMENT

Impact to Existing Sewer

4.3.1 The total ADWF and peak flow generated from the proposed development are estimated to be 4 m^3/day and 0.28 L/s which are only 0.9% and 1.2% of those of the previous community isolation facility respectively.

4.3.2 The capability of the existing sewerage system downstream to cater the sewage generation from the site will not be affected by the proposed development.

4.3.3 As the anticipated sewage discharge of the proposed development is minimal and significantly less than that of the previous community isolation facility, it is considered that the existing sewerage system at the site and at the downstream of the site would be capable of catering the sewage generation and there will be no sewerage impact due to the proposed development.

4.4 PROPOSED SEWERAGE DISCHARGE

4.4.1 The sewage generated will be collected and discharged in the same manner as the existing community isolation facility which is to be conveyed to the existing sewage treatment facilities at Lok Ma Chau Control Point via the existing twin DN200 rising mains.

4.4.2 An alternative method to cater the small sewage discharge is to employ vacuum tankers to tanker away the sewage during operation and deliver the sewage to the sewage treatment facilities at Lok Ma Chau Control Point. Detailed operational arrangement shall be agreed with DSD and EPD at later stage.

5 CONCLUSION

5.1 CONCLUSION

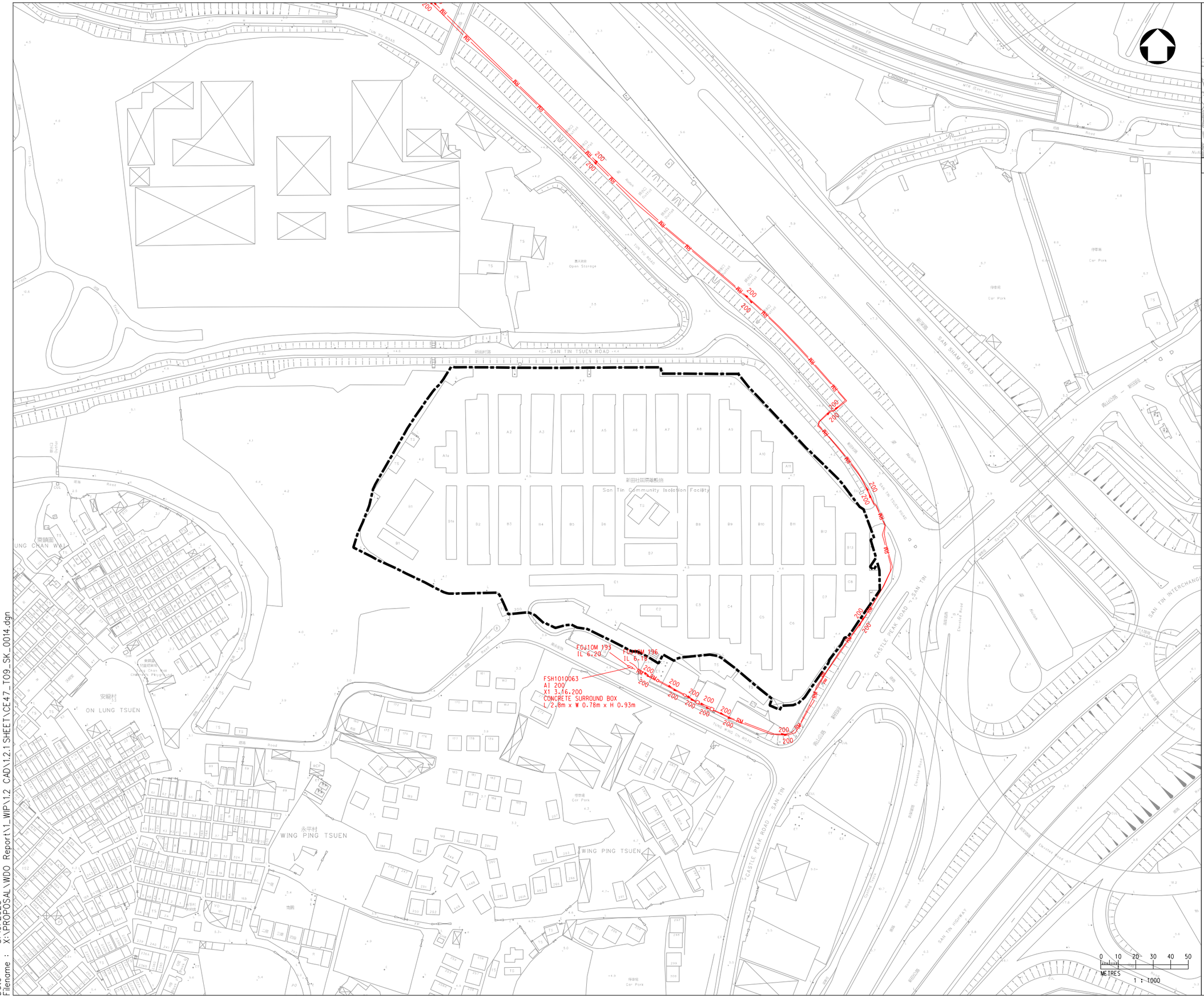
5.1.1 The total ADWF and peak flow generated from the proposed development are estimated to be 4 m^3/day and 0.28 L/s which would be significantly lower than those of the previous community isolation facility.

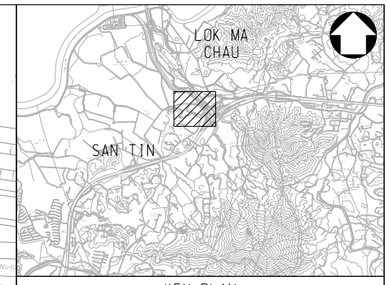
5.1.2 Therefore, it is considered that the existing sewerage system at the site and at the downstream of the site would be capable of catering the sewage generation and there will be no sewerage impact due to the proposed development.

5.1.3 The sewage generated will be collected and discharged in the same manner as the existing community isolation facility which is to be conveyed to the existing sewage treatment facilities at Lok Ma Chau Control Point via the existing twin DN200 rising mains.

5.1.4 An alternative method to cater the small sewage discharge is to employ vacuum tankers to tanker away the sewage during operation and deliver the sewage to the sewage treatment facilities at Lok Ma Chau Control Point. Detailed operational arrangement shall be agreed with DSD and EPD at later stage.

DRAWINGS





KEY PLAN

LEGEND :

SITE BOUNDARY OF PLANNED DEVELOPMENT

EXISTING SEWERAGE

Rev	Description	By	Date

Consultant

wsp

Project title

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Drawing title

TASK ORDER NO. 9 - SAN TIN EXISTING SEWERAGE LAYOUT PLAN

Drawing no.	Rev.
CE47/T09/SK/0014	-

Drawn	Date	Checked	Approved
CAD	JUN 2023	VS	YWY

Scale	Status
1:1000 (A1)	-

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
西拓展處
WEST DEVELOPMENT OFFICE

Date : 8/16/2023
Filename : X:\PROPOSAL\WDO Report\1_WIP\1.2 CAD\1.2.1 SHEET\CE47_T09_SK_0014.dgn