APPENDIX B
SEWERAGE IMPACT ASSESSMENT REPORT

Agreement No. CE 92/2017 (CE)

Site Formation and Infrastructure Works for Public Housing Development near Tan Kwai Tsuen, Yuen Long – Investigation, Design and Construction

DRAFT SEWERAGE IMPACT ASSESSMENT REPORT FOR S16 PLANNING APPLICATION (INTENSIFICATION SCHEME)

199086/BIN/090/Issue 3

NOVEMBER 2022

CEDD 土木工程拓展署
Civil Engineering and Development Department

binnies

Agreement No. CE 92/2017 (CE)

Site Formation and Infrastructure Works for Public Housing Development near Tan Kwai Tsuen, Yuen Long - Investigation, Design and Construction

Draft Sewerage Impact Assessment Report for S16 Planning Application (Intensification Scheme)

199086/BIN/090/Issue 3

November 2022

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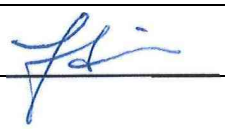
Authorized	Edwin Lo		November 2022

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1 INTRODUCTION

1.1 General

1.1.1 As a prevailing policy on land supply to meet the increasing housing demand in the short, medium and long terms in Hong Kong, the Government has identified potential sites in various districts to be developed for residential use. Amongst others, a site near Tan Kwai Tsuen (the Site), in Yuen Long has been identified for public housing development. The location of the Site is shown in ***Drawing No. 199086/BIN/GEN/001***.

1.1.2 In view of the acute shortage of housing, the domestic PR of the Site is proposed to be intensified to 6.5 with an aim to increase flat production. The Site will provide a total of 7,420 public housing units with planned population intake from 2030 by phases.

1.1.3 Binnies Hong Kong Limited was requested by the Civil Engineering and Development Department (CEDD) to prepare necessary technical assessments of Section 16 (S16) planning application for minor relaxation of PR and building height restriction for the agreement of the Town Planning Board (TPB). In view of the above update, Binnies is responsible to update the Sewerage Impact Assessment before the construction stage of the Project.

1.2 Interfacing Projects

1.2.1 Notable potential interfacing projects include:

- *CE 2/2011 (CE) - Hung Shui Kiu (HSK) New Development Area (NDA) Planning and Engineering Study*
- *CE 19/2015 (TP) - Preliminary Land Use Study for Lam Tei Quarry and the Adjoining Areas – Feasibility Study*
- *CE 35/2012 (CE) - Planning and Engineering Study for Housing Sites in Yuen Long South – Investigation*
- *PWP Item 7259RS and 7279RS - Cycle Tracks connecting North West New Territories with North East New Territories*
- *CE 46/2007 (DS) - Review of Drainage Master Plans (DMP) in Yuen Long and North Districts – Feasibility Study*
- *PWP Item 4223DS - Yuen Long and Kam Tin sewerage treatment upgrade – Upgrading of San Wai Sewage Treatment Works*
- *CE 42/2013 (CE) - Preliminary Feasibility Study on Development the New Territories North*

- *CE 26/2015 (CE) - Site Formation and infrastructural works for the Development at Long Bin, Yuen Long – Feasibility Study*
- *CE 56/2016 (CE) - HSK NDA Stage 1 Works – Design and Construction*
- *CE 39/2016 (CE) - HSK NDA Advance Works, Phases 1 & 2 – Design and Construction*
- *CE 42/2016 (CE) - Environmental Friendly Transport Services in HSK - NDA and Adjacent Areas – Feasibility Study*
- *CE 86/2017 (CE) - Fostering a Pedestrian and Bicycle-friendly environment in HSK NDA and YLS Development – Feasibility Study*
- *CE 41/2015 (GE) – Landslip Prevention and Mitigation Programme, 2015, Package G – Landslip Prevention and Mitigation Works and Provision of Emergency Works Services for Natural Terrain Landslides Occurring in Mainland West (North) – Investigation, Design and Construction*
- *CE 65/2016 (CE) – Further Study on Tuen Mun Western Bypass – Investigation*
- *CEDD's project "Greening Master Plan"*
- *EDB/ ArchSD's primary school projects*
- *Relocation of Existing Services Reservoirs to Cavern and Proposed Service Reservoirs in Cavern in Lam Tei – Feasibility Study by Project Management Division of WSD*
- *Holistic Review Study on the Use of Reclaimed Water in Northwest New Territories by West Development Office of CEDD*
- *Yuen Long South Development – Design and Construction*
- *CE 1/2020 (CE) - Hung Shui Kiu/Ha Tsuen New Development Area Package A Works for Second Phase Development - Design and Construction*
- *CE 11/2020 (CE) – Site Formation and Infrastructure Works for Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun – Feasibility Study*
- *Other utilities supply to the Housing Development*
- *Other relevant projects of planned/committed developments as advised by PlanD, HKHA/ HD, CEDD and other Government B/Ds*
- *Any other relevant projects and assignments, which may arise during the course of the Assignment.*

1.3 Purposes of this Report

1.3.1 As mentioned in Section 1.1.3, due to the update on the PR and number of flats to be provided of the Project, Binnies is responsible to update the Sewerage Impact Assessment before the construction stage of the Project.

1.4 Structure of this Report

1.4.1 This report comprises the following sections after this introduction:

- Section 2 discusses the latest development layout and parameters of the Development;
- Section 3 provides the descriptions of the existing and planned sewerage infrastructure in the vicinity of the Development;
- Section 4 sets out the methodology and approach to carry out the SIA for the Development;
- Section 5 assesses the potential sewerage impacts arising from the Development; proposes appropriate mitigation measures and the optimal sewerage scheme for the Development; and
- Section 6 summarises the findings and recommendations of this report.

2 LATEST DEVELOPMENT PROPOSAL

2.1 Development Parameters

2.1.1 The latest development parameters including but not limited to the flat productions, provisions of non-domestic facilities and design populations of the Development are summarised in ***Table 2.1*** and ***Table 2.2***.

Table 2.1 – Major Development Parameters

Domestic	
Total No. of Flats	7,420
Non-domestic	
GFA for Welfare Facilities (m^2)	15,849
GFA for Retail Complex (m^2)	5,912
GFA for Car Parking (m^2)	42,850
GFA for Other Facilities(1) (m^2)	1,098
Total GFA (m^2)	74,509
Primary School	
No. of classrooms	30
Public Transport Interchange (PTI)	
GFA for PTI (m^2)	6340

Notes:
(1) Other Facilities include ancillary offices for domestic.
(2) The Primary School is located to the west of the public housing site outside the application site boundary.

Table 2.2 – Design Populations

Domestic	
No. of Population	20,034(1)
Retail, Welfare and Other Facilities	
No. of Employees (2)	800
Primary School and Kindergarten	
No. of students (3)	1,215
No. of teachers (4)	109

Notes:
(1) Person per flat = 2.7
(2) Worker densities of 3.5 workers (Retail Trade) and 3.3 workers (Community, Social & Personal Services) per $100m^2$ GFA are adopted based on Table 8 of Commercial and Industrial Floor Space Utilization Survey published by Planning Department for the estimation of employees in retail and welfare / other facilities, respectively. No sewage generation at carpark is assumed. 30 no. of employees for the PTI is assumed.
(3) 180 students per 6 classrooms kindergarten and 25.5 students per class for primary school are assumed based on Chapter 3 of Hong Kong Planning Standards and Guidelines.
(4) Pupil-Teacher ratios of 8.6:1 (kindergarten) and 13.8:1 (primary school) are assumed based on Education Bureau's 2017/18 figures and statistics available on Education Bureau's website.

3 EXISTING AND PLANNED SEWERAGE INFRASTRUCTURE

3.1 Existing Sewerage Facilities

3.1.1 The Site are presently unsewered. Existing public sewers, which is about 250m from the Site, is running along Shun Tat Street, Castle Peak Road (Hung Shui Kiu), Hung Shui Kiu Main Street and Shek Po Road. The public sewer collecting the sewage generated would discharge to Ha Tsuen Sewage Pumping Station (HTSPS) and then to San Wai Sewage Treatment Works (SWSTW) for treatment and disposal. ***Figure Nos. 199086/BIN/SIA/001***, ***002 and 003*** show the existing sewerage systems in the vicinity of the Site.

3.2 Planned Sewerage Facilities

3.2.1 HTSPS is located at Ping Ha Road, to the west of Tin Ying Road. HTSPS currently has a design capacity of 193,100m^3/day upon completion of expansion works in 2014 under PWP No. 4368DS - Yuen Long South Sewerage and Expansion of Ha Tsuen Sewage Pumping Station.

3.2.2 The Development lies within the catchment of SWSTW, which was completed under DSD's project "Upgrading of San Wai sewage treatment works – phase 1" under PWP No. 4411DS. SWSTW is located at Ha Tsuen Road. SWSTW has an existing design capacity of 200,000m^3/day.

4 APPROACH FOR SEWERAGE IMPACT ASSESSMENT

4.1 Standards and Guidelines

4.1.1 This SIA has been undertaken in accordance with the following standards, Code of Practice and Design Manuals:-

- Environmental Protection Department (EPD)'s Report No. EPD/TP l/05- "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning" (GESF);
- Drainage Services Department (DSD)'s Sewerage Manual (Part 1) – Key Planning Issues and Gravity Collection System;
- DSD's Sewerage Manual (Part 2) – Pumping Stations and Rising Mains; and

4.2 Design Criteria

4.2.1 The proposed sewerage system is checked and designed to cater for the Development based on flows estimated from the predicted population and employment data. The proposed sewers are designed to provide sufficient capacities to accommodate peak flow without surcharge and fulfill the following criteria:

- Velocity – The sewers shall be sized to achieve a self-cleansing velocity of 1 m/s at full bore flow. The maximum velocity at full bore flow shall be limited to 3 m/s.
- Gradient – The sewers shall be laid to follow the ground profile wherever possible, but at all times a gradient steep enough to satisfy the minimum velocity criteria given above shall be maintained.
- Cover – A minimum pipe cover of 0.9 m and 0.45 m will be adopted for pipes in carriageway and footpath respectively and wherever practical.

4.3 Unit Flow Factors

4.3.1 Sewage generated from the Development is categorized into the following sources: residential, which consists of the sewage generated from the residents of the public housing developments; students and teachers of the proposed primary school and kindergartens; visitors and employees of the welfare facilities; and patrons and employees of retail facilities.

4.3.2 The unit flow factors are adopted in accordance with EPD's GESF. The adopted unit flow factors are summarised in ***Table 4.1***.

Table 4.1 – Adopted Unit Flow Factors

Type	Recommended Unit Flow Factor (m^3/unit/day)	Unit	Remarks
Residential			
Public Rental Housing (PRH)/ Subsidized Sale Flats (SSF) (1)	0.19	Person	Table T-1, EPD's GESF
Retail, Welfare and Other Facilities			
Job Type J11 (Community, Social & Personal Services)	0.28	Employee	Table T-2, EPD's GESF
Job Types J4 (Wholesale and Retail)	0.28	Employee	Table T-2, EPD's GESF
School			
Student	0.04	Person	Table T-2, EPD's GESF
Job Type J11 (Community, Social & Personal Services) for Teacher	0.28	Employee	Table T-2, EPD's GESF
PTI			
Job Type J3 (Transport, Storage & Communication)	0.18	Employee	Table T-2, EPD's GESF

Note:
(1) The development is classified as Domestic Private R1.

4.4 Average Dry Weather Flow

4.4.1 The Average Dry Weather Flow (ADWF) and Peak Flow generated from the development sites is provided in ***Table 4.2***, and the detailed breakdown is provided in **Appendix A1**.

Table 4.2 – Average Dry Weather Flow and Peak Flow of Sewage from the Development

	Flow Type	ADWF (m^3/day)	Contributing Population	Total ADWF (1) (m^3/day)	Peak Flow (1) (m^3/day)
The Development (Tan Kwai Tsuen)	Residential	3,806.5	15,610	4,214.6	12,643
	Retail, Welfare and Other Facilities	356.4			
	School	46.3			
	PTI	5.4			

Note:
(1) Peak factor is assumed to be 3.

4.4.2 Under the Sewerage Impact Assessment conducted under Investigation stage, the total ADWF generated of the previous development scenario was 4,960.4m^3/day. Due to the update on the development parameters of Section 16 (S16) planning application, the total ADWF generated from the Development is 4,214.6m^3/day, as shown in **Table 4.2**.

5 SEWERAGE IMPACT ASSESSMENT

5.1 Proposed Sewerage Arrangements

5.1.1 The Site is presently unsewered. It is proposed to provide new sewers to collect and convey the sewage generated from the Site and discharge the sewage to the existing sewerage. According to the feasibility study, the sewage generated from the Site will be conveyed to SWSTW for treatment.

5.1.2 As the existing sewers along Shun Tat Street, Castle Peak Road (Hung Shui Kiu), Hung Shui Kiu Main Street and Shek Po Road has no spare capacity to cater for the additional sewage arising from the Development, new gravity sewers are required to cater for the additional sewage flow from the Development.

5.1.3 With liaison with the concurrent housing developments in Ping Shan South (PSS) and Lam Tei North (LTN) under Agreement No. CE11/2020(CE), the sewage generated from PSS and LTN is planned to discharge to the proposed sewer under this Development. The ADWF generated from the interface sites estimated under CE11/2020(CE) were extracted in ***Table 5.1***. While the sewerage impact assessment of PSS and LTN developments will be carried out separately under CE11/2020 (CE), the new sewer proposed under this development will cater for the sewage generated from PSS and LTN development.

Table 5.1 – Average Dry Weather Flow from Interface Projects

	ADWF (m^3/day)	**Contributing Population**	**Peak Flow (1) (m3/day)**
Ping Shan South (PSS)	6,782	25,118	20,346
Lam Tei North (LTN)	4,152	15,378	12,456

Note:
(1) Peak factor is assumed to be 3.

5.1.4 The proposed sewerage works are shown on ***Figure nos. 199086/BIN/SE/101 to 115***. The design of the sewerage works is shown in ***Appendix A2***.

5.2 Potential Impacts on Sewage Treatment Works and Sewage Pumping Stations

Sewage Pumping Stations

5.2.1 Sewage generated from the Development will be conveyed to HTSPS followed by SWSTW through the proposed gravity sewers along Shun Tat Street, Castle Peak Road (Hung Shui Kiu), Hung Shui Kiu Main Street and Shek Po Road.

5.2.2 HTSPS is located at Ping Ha Road, to the west of Tin Ying Road. HTSPS has an existing design capacity of 193,100m^3/day upon completion of expansion works in 2014 under PWP No. 4368DS - Yuen Long South Sewerage and Expansion of Ha Tsuen Sewage Pumping Station. The current average daily treatment loading for HTSPS is 144,080 m^3/day as suggested by DSD.

Table 5.2 – Sewage Flow Conveyed to the Concerned Sewage Pumping Stations

Sewage Pumping Station	Existing Design Capacity (m^3/day)	Estimated Total ADWF from the Development (m^3/day)
HTSPS	193,100	4,216

Sewage Treatment Works

5.2.3 The SWSTW is located at Ha Tsuen Road. SWSTW has an existing design capacity of 200,000m^3/day. The estimated total ADWF from the Development is 4,216m^3/day. The sewage generated from the Development is about 2.1% of the design capacity of upgraded SWSTW.

5.2.4 As stated in Section 5.1.1, the existing SWSTW would have a confirmed reserve capacity for the sewage generated from the Site according to the feasibility study. In view that there is no increase in the estimated total ADWF from the Development compared with the results of the feasibility study, the existing SWSTW will have sufficient capacity and no adverse impact is anticipated to be imposed on the existing SWSTW by the Development.

5.3 Key Concern During Construction and Operation

Land matters

5.3.1 The proposed strategy involves new gravity sewers along the proposed access road, Shun Tat Street, Castle Peak Road (Hung Shui Kiu), Hung Shui Kiu Main Street and Shek Po Road to cater for the additional sewage flow from the Development.

5.3.2 The full section of the new gravity sewers will run along government land and public road. It is not envisaged that requisition of private lot would be required for construction nor future operation. In summary, the proposed strategy is considered viable in terms of land.

Environmental Impact

5.3.3 The proposed strategy involves discharge of the sewage from the Development to public sewerage via the new gravity sewers. All the above gravity sewers will have adequate capacities and will be laid underground.

5.3.4 Also, the sewage from the Site will be discharged to SWSTW for proper treatment before discharging to the existing Urmston Road Outfall for disposal. Therefore, no adverse environmental impact will be anticipated.

Construction

5.3.5 Construction of the new gravity sewers would mainly involve conventional technology such as cut and cover excavation and trenchless techniques. The details of the new gravity sewers along the proposed vehicular bridge over Hung Shui Kiu Main Nullah and the associated connection arrangement would be discussed with the relevant maintenance authorities and provided in the detailed design stage. There is no significant constraint in terms of complexity by a general civil works contractor.

5.4 Implementation Strategy of Proposed Sewerage Scheme

Implementation Programme of Proposed Sewerage Works

5.4.1 The implementation programme of proposed sewerage works is summarized in ***Table 5.3***.

Table 5.3 – Implementation Programme

Activity	Target Date
Commencement of Construction of Sewerage Works from Housing Site to Shun Tat Street	Nov 2022
Commencement of Construction of Sewerage Works from Housing Site to HTSPS	April 2023

Construction and Maintenance Matrix for Proposed Sewerage Works

5.4.2 The parties responsible for constructing and maintaining the proposed sewerage works are listed in ***Table 5.4***.

Table 5.4 – Construction and Maintenance Matrix

Description of Proposed Sewerage Works	Construction Party	Maintenance Party
Proposed new sewerage	CEDD	DSD
Internal sewerage for the proposed housing site	HD	HD
Internal sewerage for the proposed school sites	ArchSD	EDB

6 CONCLUSION AND RECOMMENDATION

6.1.1 The Development lies within the catchment of the SWSTW. The estimated sewage generated from the Development is 4,216m^3/day (ADWF) with the detailed breakdown in **Table 4.2**.

6.1.2 The sewage disposal for the sewage generated from the Site is to HTSPS and then to SWSTW.

6.1.3 New gravity sewers will be provided between the Site and the existing sewerage at HTSPS.

6.1.4 The proposed sewerage works are considered feasible in terms of regional sewerage strategy, land, and environmental impact and construction considerations. The Development is considered sustainable in terms of sewerage.

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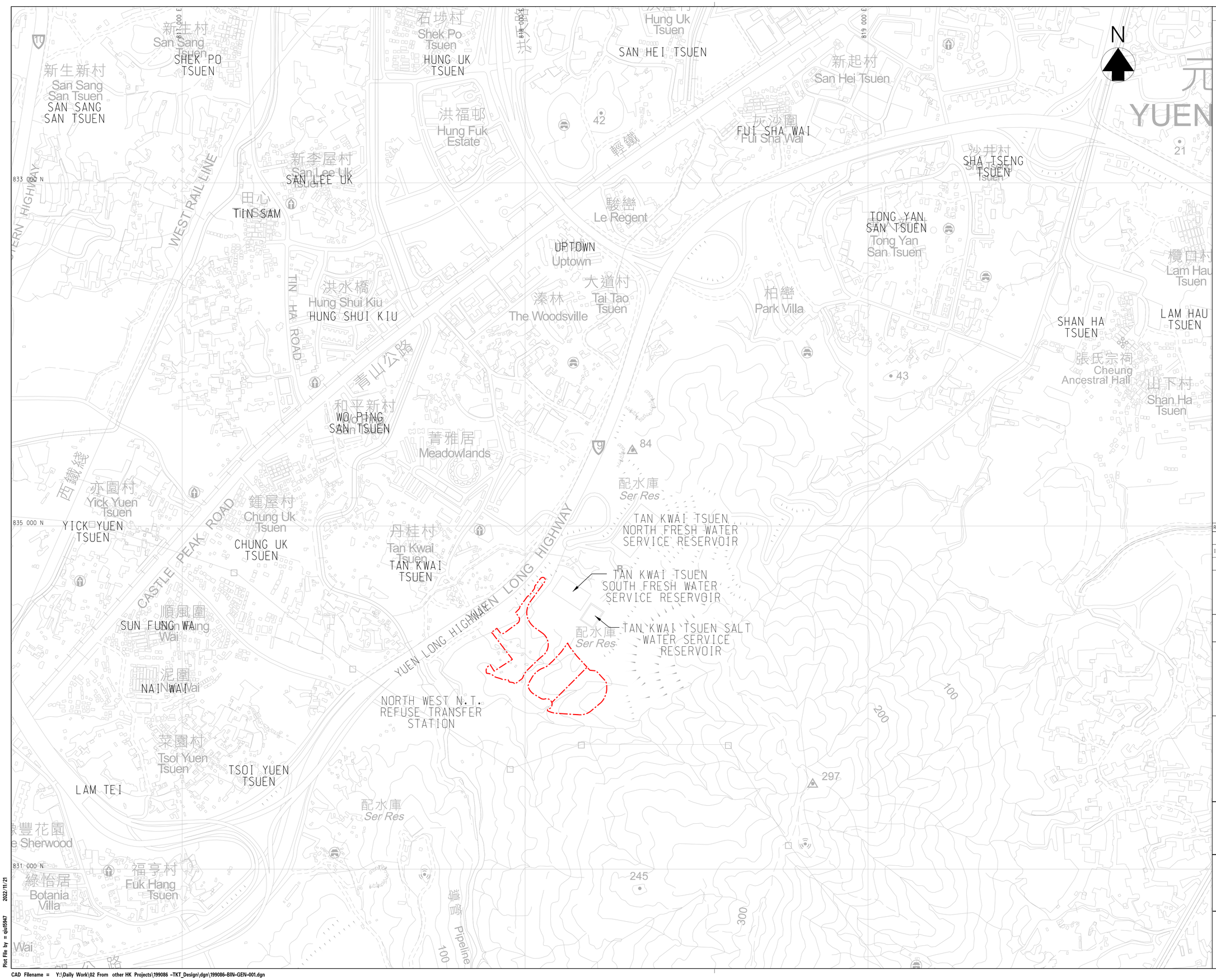
DRAWINGS



LEGEND:

PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED G/IC FACILITIES

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
SITE LOCATION PLAN

Drawing No.
199086/BIN/GEN/001

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CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

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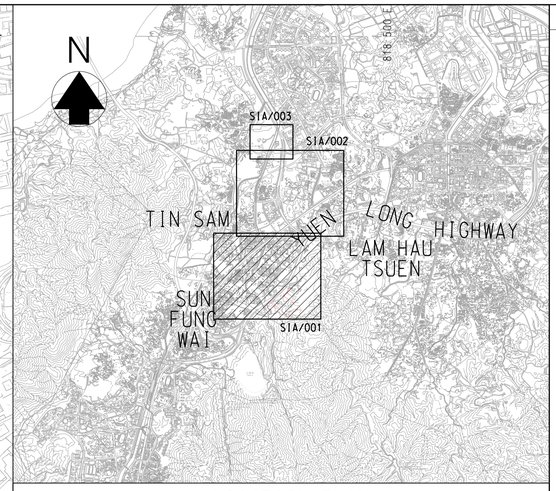

LOCATION PLAN
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LEGEND:

PROPOSED PUBLIC HOUSING DEVELOPMENT SITE

EXISTING SEWERAGE SYSTEM

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	KWM	LCH	SZ	LCH	
Date	09/18	09/18	09/18	09/18	

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
EXISTING SEWERAGE SYSTEM

(SHEET 1 OF 3)

Drawing No.
199086/BIN/SIA/001

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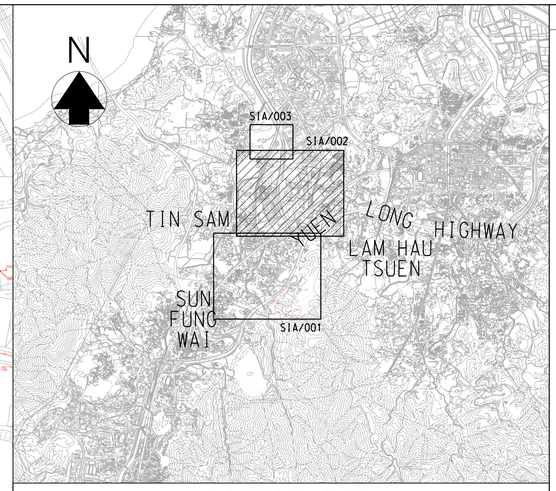

LOCATION PLAN
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LEGEND:

PROPOSED PUBLIC HOUSING DEVELOPMENT SITE

EXISTING SEWERAGE SYSTEM

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	KWM	LCH	SZ	LCH	
Date	09/18	09/18	09/18	09/18	

Approved

Agreement no.
CE 92/2017 (CE)

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Drawing Title
EXISTING SEWERAGE SYSTEM

(SHEET 2 OF 3)

Drawing No.
199086/BIN/SIA/002

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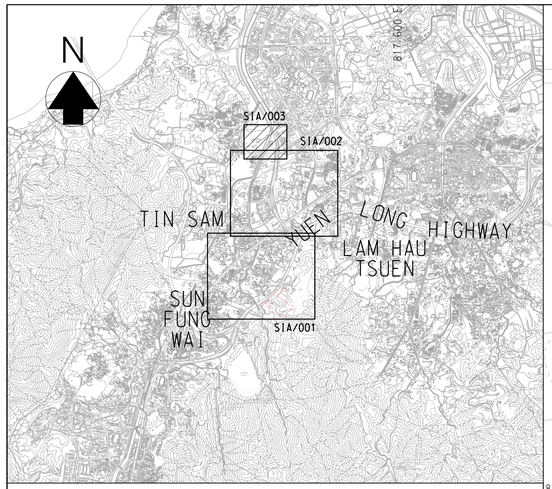

LOCATION PLAN
SCALE 1:50000

LEGEND:

PROPOSED PUBLIC HOUSING DEVELOPMENT SITE

EXISTING SEWERAGE SYSTEM

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	KWM	LCH	SZ	LCH
Date	09/18	09/18	09/18	09/18

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
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Drawing No.	Scale
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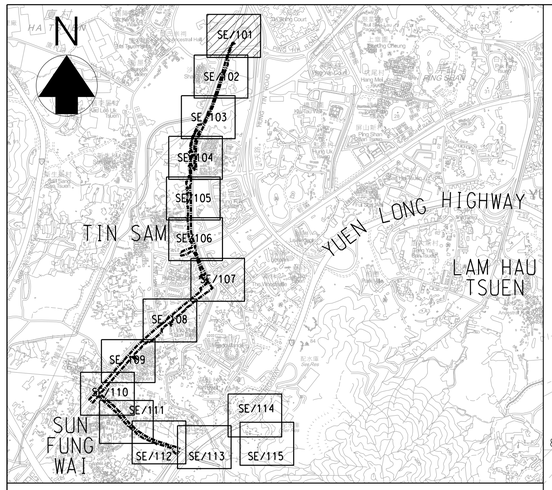

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SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE

817 800 E
817 900 E
818 000 E
817 700 E
834 300 N
834 200 N
834 100 N

FMH-0001
C.L.: +5.20mPD
A1: -2.21mPD
X1: -2.21mPD

FGJ1002227
IL -1.07

FMH-1001A
C.L.: +6.20mPD
A1: -2.25mPD
X1: -2.25mPD

1000(OD)
1200
CL 5.20
A1 -1.05-1200
X1 -1.05-1200

FSH1009872
C.L.: +6.35mPD
A1: -2.31mPD
X1: -2.31mPD

FMH1009040
CL 5.18
A1 -1.00-1200
X1 -1.00-1200

FMH-0002
C.L.: +5.22mPD
A1: -2.14mPD
X1: -2.14mPD

FMH1009041
CL 5.22
A1 -0.94-1200
X1 -0.94-1200

Road 道路
Nullah
Ramp 斜路
Cycling Track 單車徑
PING HA ROAD
TIN YING ROAD 天影路
露天貨倉 Open Storage
厦村污水抽水站
DRAINAGE SERVICES DEPARTMENT
HA TSUEN SEWAGE PUMPING STATION

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/102

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 1 OF 15)

Drawing No.
199086/BIN/SE/101

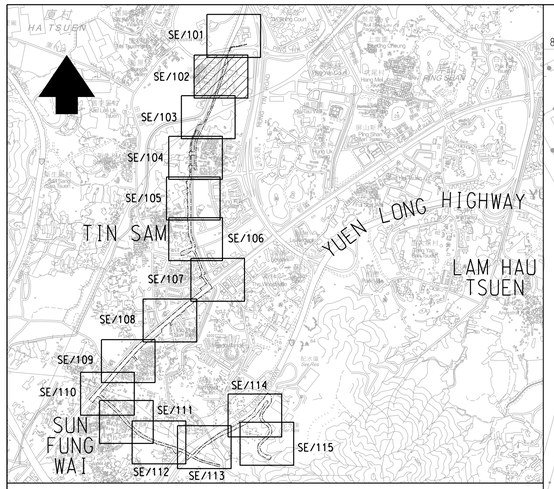
Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = zhxl6611 2022/7/27

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-SE-101.dgn



LOCATION PLAN
SCALE 1:20000

834 100 N
817 700 E
817 800 E
817 900 E
817 600 E
834 000 N
833 900 N

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/101

MATCH LINE

FMH-0003
C.L.: +5.16mPD
A1: -2.09mPD
X1: -2.09mPD

FMH1009042
CL 5.16
A1 -0.84-1200
X1 -0.84-1200

FMH-0004
C.L.: +5.23mPD
A1: -2.05mPD
X1: -2.05mPD

FMH1009043
CL 5.10
A1 -0.79-1200
X1 -0.79-1200

FMH-0005
C.L.: +5.25mPD
A1: -2.01mPD
X1: -2.01mPD

FMH-0006
C.L.: +5.28mPD
A1: -1.94mPD
X1: -1.94mPD

FMH1009044
CL 5.15
A1 -0.61-1200
X1 -0.61-1200

FMH-0007
C.L.: +4.94mPD
A1: -1.88mPD
X1: -1.88mPD

FMH1009032
CL 5.21
A1 -0.46-1200
X1 -0.46-1200

FMH-0008
C.L.: +4.90mPD
A1: -1.81mPD
X1: -1.81mPD

1200
1000(OD)

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/103

停車場
Car Park
博愛醫院楊晉培護理安老院
The Pok Oi Hospital Yeung Chun Pui Care and Attention Home
青松護理安老院
Ching Chung Care and Attention Home for The Aged
沙洲里
SHA CHAU LEI
沙洲里休憩處
Sha Chau Lei Sitting-out Area
SHA CHAU LEI ROAD
Nullah
SHEK PO ROAD
石排路
沙洲里路
Cycling Track
露天貨倉
Open Storage

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 2 OF 15)

Drawing No.
199086/BIN/SE/102

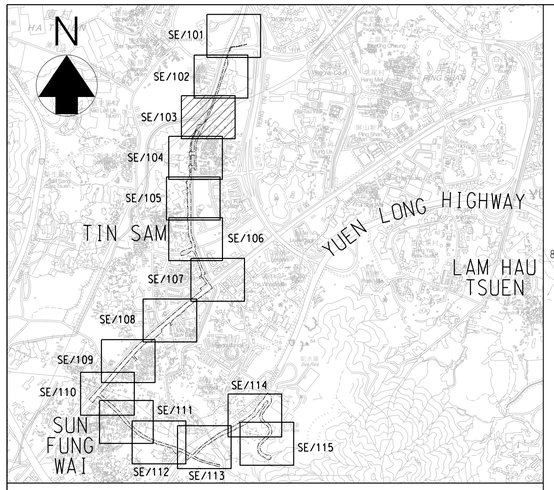
Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qiu15947 2022/11/18

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-SE-102.dgn



LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
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LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/102

MATCH LINE

FMH-0008
C.L.: +4.90mPD
A1: -1.81mPD
X1: -1.81mPD

FMH-0009
C.L.: +4.94mPD
A1: -1.74mPD
X1: -1.74mPD

FMH1009033
CL 5.27
A1 -0.32-1200
X1 -0.32-1200

FMH-0010
C.L.: +4.80mPD
A1: -1.70mPD
X1: -1.70mPD

FMH1009034
CL 5.33
A1 -0.02-1050
A2 0.13-900
X1 -0.17-1200

FMH-0011
C.L.: +5.50mPD
A1: -1.64mPD
X1: -1.64mPD

FMH-0012
C.L.: +6.20mPD
A1: -1.57mPD
X1: -1.57mPD

FMH1009037
CL 6.20
A1 1.60-825
A2 0.61-600
X1 0.16-1050

FMH1009038
CL 6.17
A1 2.24-525
X1 0.70-600

FMH-0013
C.L.: +5.21mPD
A1: -1.54mPD
X1: -1.54mPD

FMH1009020
CL 5.52
A1 2.34-525
X1 2.34-525

FMH1009024
CL 5.55
A1 2.51-525
X1 2.51-525

FMH-0014
C.L.: +5.33mPD
A1: -1.48mPD
X1: -1.48mPD

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/104

817 500 E
817 700 E
817 800 E
833 800 N
833 700 N
833 600 N

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 3 OF 15)

Drawing No.
199086/BIN/SE/103

Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = gjul5947 2022/11/18

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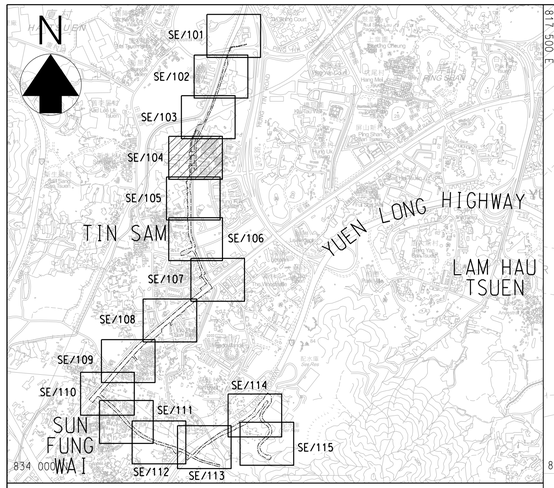

LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
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LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

FMH-0014
C.L.: +5.33mPD
A1: -1.48mPD
X1: -1.48mPD

FMH-0015
C.L.: +5.45mPD
A1: -1.44mPD
X1: -1.44mPD

FMH-0016
C.L.: +5.30mPD
A1: -1.40mPD
X1: -1.40mPD

FMH-0017
C.L.: +5.39mPD
A1: -1.33mPD
X1: -1.33mPD

FMH-0018
C.L.: +6.59mPD
A1: -1.26mPD
X1: -1.26mPD

FMH-0019
C.L.: +6.59mPD
A1: -0.62mPD
X1: -1.19mPD

FMH1009025
CL 5.57
A1 2.61-525
X1 2.61-525

FMH1009026
CL 5.59
A1 2.71-525
X1 2.71-525

FMH1009028
CL 5.63
A1 2.88-525
X1 2.88-525

FMH1009060
CL 6.08
A1 3.05-525
A2 3.25-300
X1 3.02-525

FMH1009063
CL 6.62
A1 3.29-525
A2 3.55-450
X1 3.28-525

FMH1009064
CL 7.31
A1 3.41-525
X1 3.41-525

TWINS 600 PIPE

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/103

MATCH LINE

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/105

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 4 OF 15)

Drawing No.
199086/BIN/SE/104

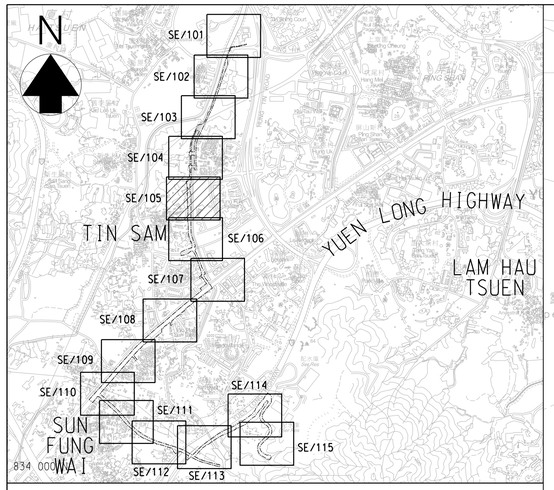
Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = glu15947 2022/11/18

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-SE-104.dgn



LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
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LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

FMH1009064
CL 7.31
A1 3.41-525
X1 3.41-525

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/104
MATCH LINE

FMH-0021
C.L.: +6.50mPD
A1: +0.39mPD
X1: -0.21mPD

FMH1009047
CL 6.91
A1 3.58-525
X1 3.56-525

FMH-0022
C.L.: +6.91mPD
A1: +1.06mPD
X1: +0.46mPD

FMH1009048
CL 7.00
A1 3.79-525
A2 3.93-375
X1 3.77-525

FMH-0023
C.L.: +7.05mPD
A1: +1.93mPD
X1: +1.33mPD

FMH1009051
CL 7.10
A1 3.98-525
A2 5.47-225
X1 4.00-525

FMH-0024
C.L.: +7.13mPD
A1: +2.17mPD
X1: +2.17mPD

FMH1009052
CL 7.14
A1 4.16-525
X1 4.15-525

FMH-0025
C.L.: +7.20mPD
A1: +2.41mPD
X1: +2.41mPD

FMH1009056
CL 7.22
A1 4.43-450
A2 4.47-375
X1 4.33-525

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/106

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 5 OF 15)

Drawing No.
199086/BIN/SE/105

Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = glu15947 2022/11/18

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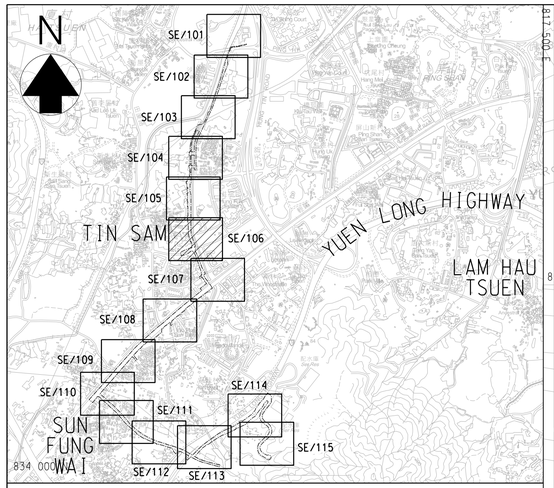

LOCATION PLAN
SCALE 1:20000

817 500 E

817 600 E

817 700 E

833 000 N

832 900 N

832 800 N

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/105

MATCH LINE

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/107

MATCH LINE

FMH1009057
CL 7.28
A1 4.72-450
X1 4.72-450

FMH-0026
C.L.: +7.27mPD
A1: +2.65mPD
X1: +2.65mPD

FMH1021869
CL 7.60
A1 5.04-450
X1 5.01-450

FMH-0027
C.L.: +7.60mPD
A1: +2.89mPD
X1: +2.89mPD

FMH1021870
CL 7.83
A1 5.27-450
X1 5.26-450

FMH-0028
C.L.: +7.83mPD
A1: +3.10mPD
X1: +3.00mPD

FMH1021872
CL 10.08
A1 5.56-450
X1 5.56-450

FMH-0029
C.L.: +10.10mPD
A1: +3.33mPD
X1: +3.33mPD

FMH1026640
CL 10.81
A1 5.69-450
A2 5.78-300
X1 5.68-450

FMH1026665
CL 10.14
A1 5.86-450
X1 5.81-450

FMH-0031
C.L.: +10.14mPD
A1: +3.60mPD
X1: +3.50mPD

FMH1021873
CL 9.86
A1 5.92-450
X1 5.88-450

FMH1021952
CL 8.92
A1 5.58-450
X1 5.58-450

FMH-0032
C.L.: +8.92mPD
A1: +3.75mPD
X1: +3.75mPD

FMH1021878
CL 9.05
A1 6.22-450
A2 6.29-375
X1 6.20-450

900(DD)
450
825

HUNG SHUI KIU TIN SAM ROAD
HUNG PING ROAD
HUNG NGA ROAD
HUNG ON LANE
HUNG TAI ROAD
洪水橋田心路
洪平路
洪雅路
洪安里
瑞豐華庭
SHEFFIELD VILLAS
冠香園
利福醬油
露天貨倉
Open Storage
停車場
Car Park
第一座 Block 1
第二座 Block 2
單車徑
Cycling Track
Ramp
斜路
Podium
平台
Sitting-out Area
休憩處
Outfall
Nullah
CUL
FP
TS

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NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
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LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	TCL	WLC	SZ	LCH	
Date	04/22	04/22	04/22	04/22	

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 6 OF 15)

Drawing No.
199086/BIN/SE/106

Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = ajui5947 2022/11/18

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-SE-106.dgn

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/106

MATCH LINE

FMH1021953
CL 9.07
A1 6.26-450
A2 6.26-450
X1 6.26-450

FMH-0033
C.L.: +9.10mPD
A1: +3.98mPD
X1: +3.98mPD

FMH1021877
CL 9.11
A1 6.38-450
X1 6.37-450

FMH1021974
CL 9.82
A1 6.51-450
A2 6.97-225
X1 6.50-450

FMH-0034
C.L.: +10.08mPD
A1: +4.22mPD
X1: +4.22mPD

FMH1021970
CL 10.08
A1 6.51-450
X1 6.51-450

FMH1021971
CL 10.13
A1 6.39-450
A2 225
A3 6.39-225
X1 6.39-450

FMH-0035
C.L.: +10.13mPD
A1: +4.33mPD
X1: +4.33mPD

FMH-0035A
C.L.: +10.68mPD
A1: +4.45mPD
X1: +4.45mPD

FMH1021916
CL 10.68
A1 6.71-450
X1 6.71-450

FMH1021915
CL 10.57
A1 6.75-450
X1 6.73-450

FMH1021851
CL 11.02
A1 6.84-450
X1 6.84-450

FMH-0036A
C.L.: +11.03mPD
A1: +4.82mPD
X1: +4.82mPD

FMH-0036
C.L.: +11.00mPD
A1: +4.78mPD
X1: +4.63mPD

FMH1021917
CL 11.01
A1 7.02-400
X1 7.02-400

FMH1021914
CL 10.90
A1 6.92-450
A2 7.00-400
X1 6.92-450

FMH-0037
C.L.: +11.09mPD
A1: +4.91mPD
X1: +4.91mPD

FMH1021943
CL 10.96
A1 7.28-400
X1 7.28-400

FMH1021944
CL 10.92
A1 7.11-400
X1 7.11-400

FMH1021941
CL 11.73
A1 7.44-400
X1 7.44-400

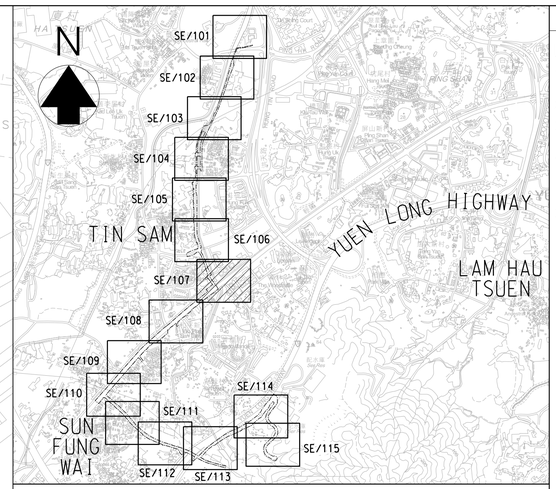
FMH-0038
C.L.: +11.26mPD
A1: +5.21mPD
X1: +5.21mPD

FMH1021942
CL 11.13
A1 7.42-400
X1 7.42-400

MATCH LINE

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/108

817 600 E
817 700 E
817 800 E
817 900 E
832 700 N
832 600 N
832 500 N



LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	TCL	WLC	SZ	LCH	
Date	04/22	04/22	04/22	04/22	

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 7 OF 15)

Drawing No.
199086/BIN/SE/107

Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = glu15947 2022/11/18

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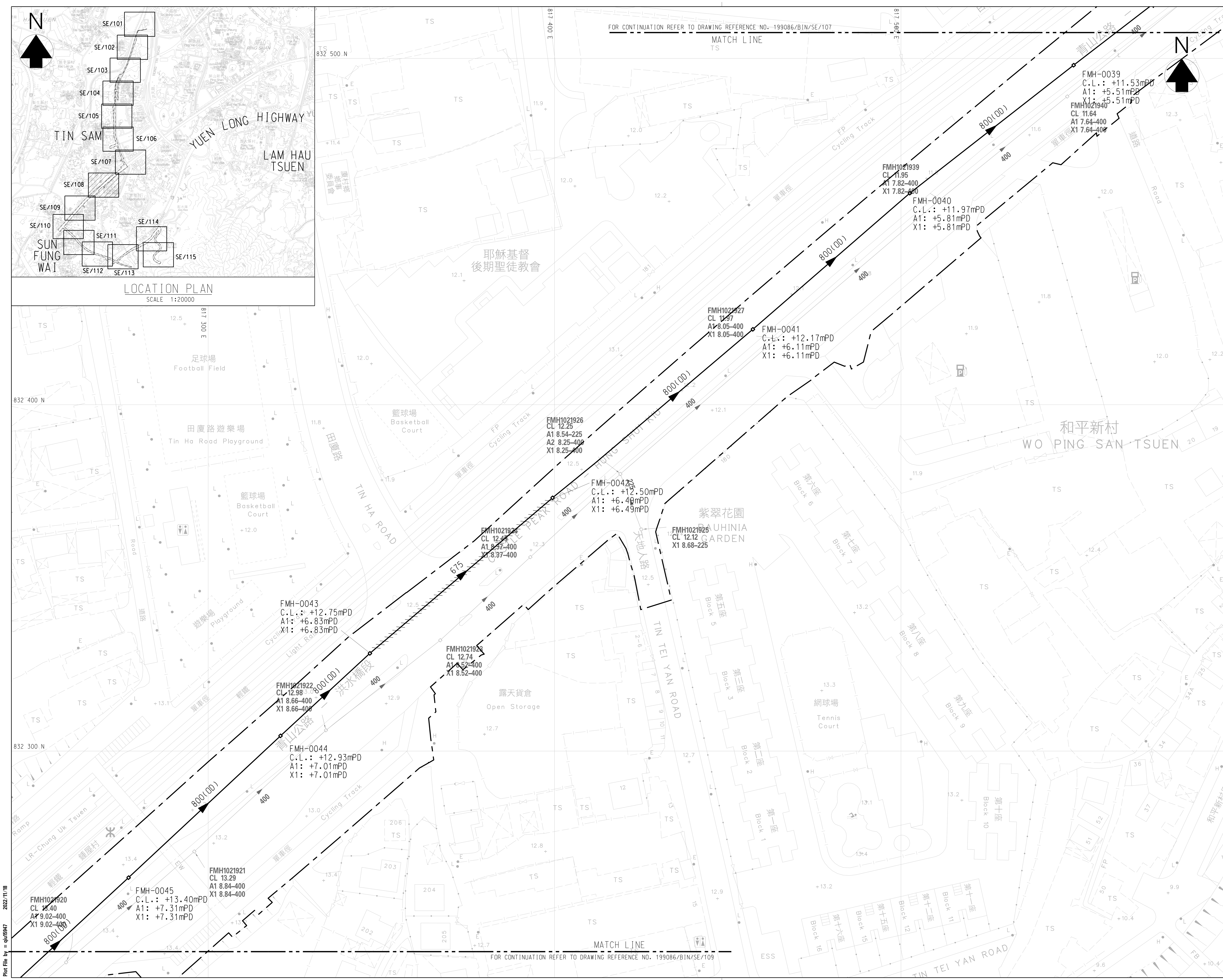

LOCATION PLAN
SCALE 1:20000
SE/101
SE/102
SE/103
SE/104
SE/105
SE/106
SE/107
SE/108
SE/109
SE/110
SE/111
SE/112
SE/113
SE/114
SE/115
TIN SAM
YUEN LONG HIGHWAY
LAM HAU TSUEN
SUN FUNG WAI
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/107
MATCH LINE
832 500 N
832 400 N
832 300 N
817 400 E
817 500 E
817 300 E
FMH-0039
C.L.: +11.53mPD
A1: +5.51mPD
X1: +5.51mPD
FMH1021940
CL 11.64
A1 7.64-400
X1 7.64-400
FMH1021939
CL 11.95
A1 7.82-400
X1 7.82-400
FMH-0040
C.L.: +11.97mPD
A1: +5.81mPD
X1: +5.81mPD
FMH1021927
CL 11.97
A1 8.05-400
X1 8.05-400
FMH-0041
C.L.: +12.17mPD
A1: +6.11mPD
X1: +6.11mPD
FMH1021926
CL 12.25
A1 8.54-225
A2 8.25-400
X1 8.25-400
FMH-0042
C.L.: +12.50mPD
A1: +6.49mPD
X1: +6.49mPD
FMH1021924
CL 12.49
A1 8.37-400
X1 8.37-400
FMH1021925
CL 12.12
X1 8.68-225
FMH-0043
C.L.: +12.75mPD
A1: +6.83mPD
X1: +6.83mPD
FMH1021923
CL 12.74
A1 8.52-400
X1 8.52-400
FMH1021922
CL 12.98
A1 8.66-400
X1 8.66-400
FMH-0044
C.L.: +12.93mPD
A1: +7.01mPD
X1: +7.01mPD
FMH1021921
CL 13.29
A1 8.84-400
X1 8.84-400
FMH-0045
C.L.: +13.40mPD
A1: +7.31mPD
X1: +7.31mPD
FMH1021920
CL 13.40
A1 9.02-400
X1 9.02-400
800(OD)
675
400
CASTLE PEAK ROAD HUNG SHUI KIU
青山公路
洪水橋段
TIN HA ROAD
田厦路
TIN TEI YAN ROAD
天地人路
足球場
Football Field
田厦路遊樂場
Tin Ha Road Playground
籃球場
Basketball Court
耶穌基督後期聖徒教會
和平新村
WO PING SAN TSUEN
紫翠花園
BAUHINIA GARDEN
露天貨倉
Open Storage
網球場
Tennis Court
Cycling Track
MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/109

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NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER, ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

Revision	Date	Description			Initial
		Designed	Checked	Drawn	Checked
Initial		TCL	WLC	SZ	LCH
Date		04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 8 OF 15)

Drawing No. 199086/BIN/SE/108

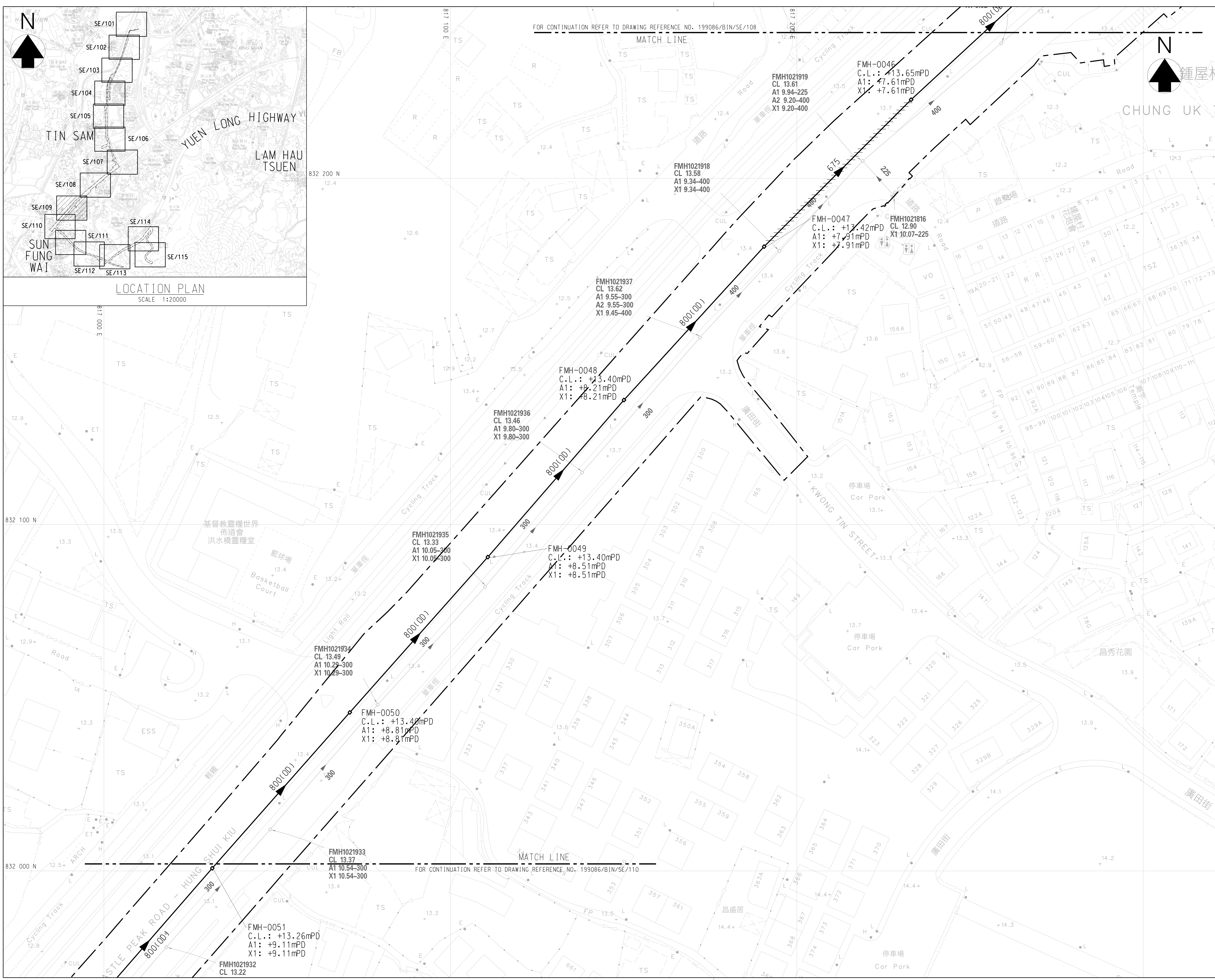
Scale 1 : 500 (A1) 1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = ojo15947 2022/11/18

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-SE-108.dgn



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NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
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5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

Revision	Date	Description			Initial
		Designed	Checked	Drawn	Checked
Initial		TCL	WLC	SZ	LCH
Date		04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG – INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 9 OF 15)

Drawing No.: 199086/BIN/SE/109

Scale: 1 : 500 (A1) 1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qiu15947 2022/11/18

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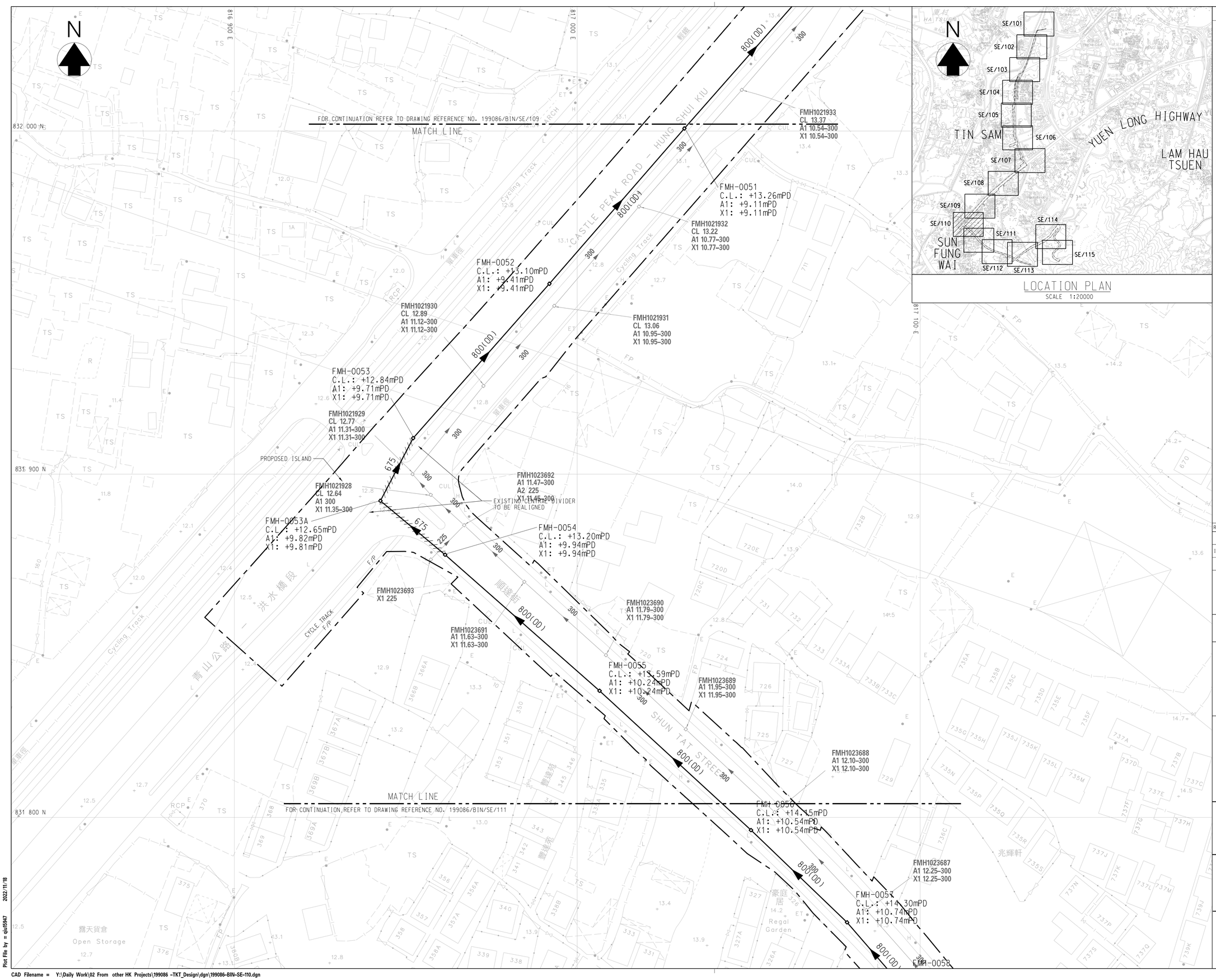


LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PROPOSED SEWAGE PIPE CONSTRUCTED BY TRENCHLESS METHOD

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 10 OF 15)

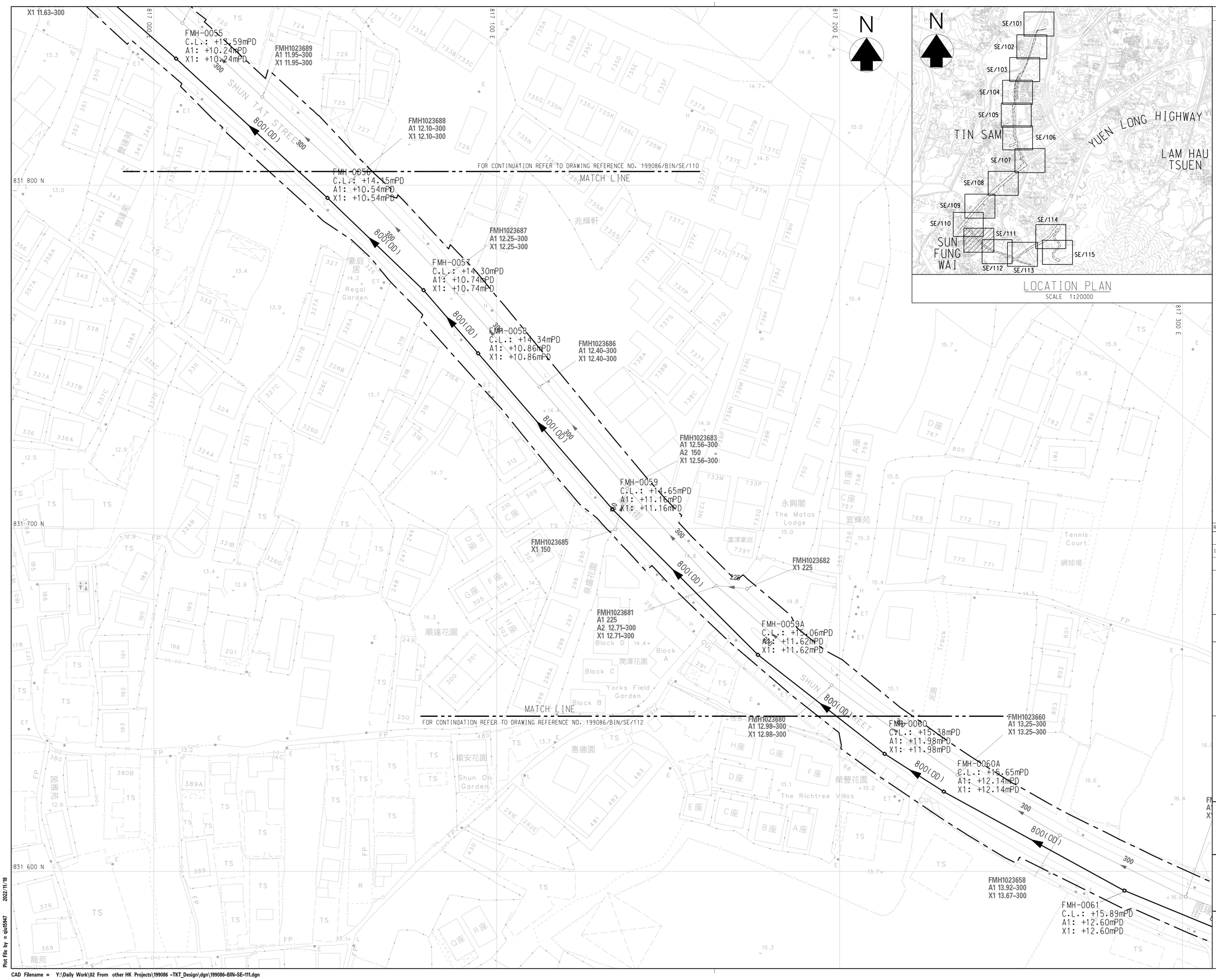
Drawing No.	Scale
199086/BIN/SE/110	1 : 500 (A1) 1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qiu15947 2022/11/18

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-SE-110.dgn



LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 11 OF 15)

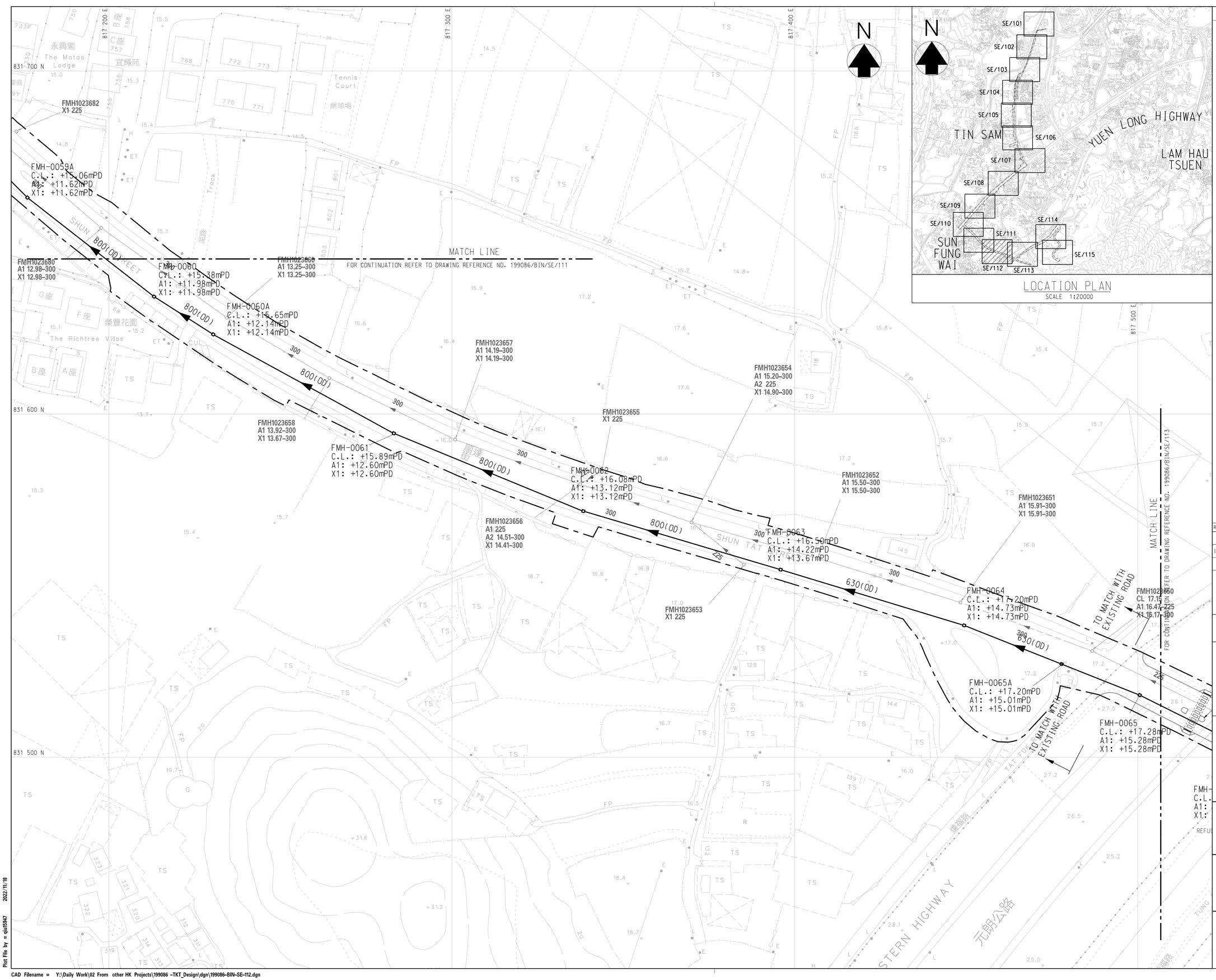
Drawing No.	Scale
199086/BIN/SE/111	1 : 500 (A1) 1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qiu15947 2022/11/18

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-SE-111.dgn



LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PLANNED SEWER TO BE CONSTRUCTED UNDER SEPARATE CONTRACT
- PLANNED SEWER MANHOLE TO BE CONSTRUCTED UNDER SEPARATE CONTRACT

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	TCL	WLC	SZ	LCH	
Date	04/22	04/22	04/22	04/22	

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 12 OF 15)

Drawing No.
199086/BIN/SE/112

Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = glu15947 2022/11/18

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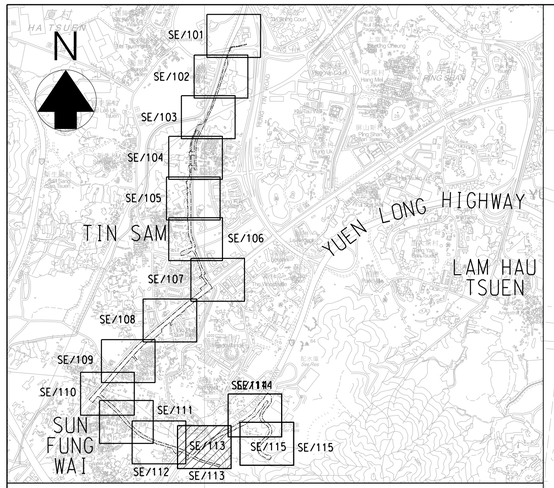

LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE
- PLANNED SEWER TO BE CONSTRUCTED UNDER SEPARATE CONTRACT

FMH-0073
C.L.: +38.03mPD
A1: +34.32mPD
X1: +33.72mPD

FMH-0072
C.L.: +34.71mPD
A1: +32.89mPD
X1: +32.29mPD

FMH-0071
C.L.: +30.58mPD
A1: +29.72mPD
X1: +29.72mPD

FMH-0070
C.L.: +26.35mPD
A1: +25.45mPD
X1: +25.45mPD

FMH-0069A
C.L.: +25.92mPD
A1: +24.40mPD
X1: +21.40mPD

FMH-0069
C.L.: +21.58mPD
A1: +19.23mPD
X1: +18.63mPD

FMH-0068
C.L.: +19.46mPD
A1: +17.72mPD
X1: +17.34mPD

FMH-0067
C.L.: +19.15mPD
A1: +16.87mPD
X1: +16.27mPD

FMH-0066
C.L.: +18.89mPD
A1: +16.08mPD
X1: +16.08mPD

FMH-0065
C.L.: +17.28mPD
A1: +15.28mPD
X1: +15.28mPD

FMH1023650
CL 17.15
A1 16.47–225
X1 16.17–300

FMH1023649
CL 17.71
A1 16.70–225
X1 16.70–225

FMH1023647
A1 17.16–225
X1 17.13–225

FMH1023646
CL 20.05
A1 17.84–225
X1 17.54–225

FMH1023644
CL 21.61
A1 19.47–225
X1 19.17–225

FMH1023643
CL 22.41
A1 20.33–225
X1 20.03–225

FMH1023642
CL 23.85
A1 22.16–225
X1 21.86–225

FMH1023641
CL 25.45
A1 24.11–225
X1 23.81–225

FMH1023640
CL 26.89
X1 25.51–225

UNDERPASS No.1

500(OD)
630(OD)
225
150

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/114

新界西北廢物轉運站
North West N.T.
Refuse Transfer Station

831 600 N
817 500 E
817 600 E
817 700 E
817 800 E

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 13 OF 15)

Drawing No.
199086/BIN/SE/113

Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = ajui5947 2022/11/18

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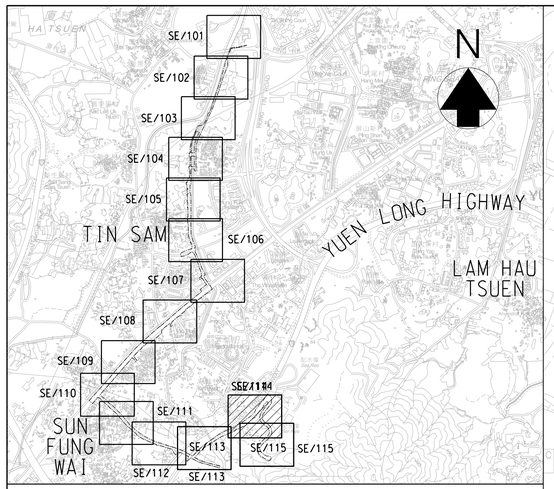

LOCATION PLAN
SCALE 1:20000

817 900 E
818 000 E
818 100 E
831 800 N
831 700 N

FMH-0080
C.L.: +49.53mPD
A1: +46.00mPD
X1: +45.40mPD

FMH-0081
C.L.: +49.72mPD
A1: +47.12mPD
X1: +46.52mPD

FMH-0082
C.L.: +50.16mPD
A1: +47.86mPD
X1: +47.26mPD

FMH-0083
C.L.: +52.42mPD
A1: +49.07mPD
X1: +48.47mPD

FMH-0084
C.L.: +56.62mPD
A1: +50.55mPD
X1: +49.95mPD

FMH-0085
C.L.: +57.26mPD
A1: +51.53mPD
X1: +50.93mPD

FMH-0086
C.L.: +57.86mPD
A1: +52.51mPD
X1: +51.91mPD

FMH-0087
C.L.: +58.97mPD
A1:+53.88mPD
X1:+53.28mPD

FMH-0088
C.L.: +59.53mPD
A1: +54.87mPD
X1: +54.27mPD

FMH-0089
C.L.: +60.08mPD
A1: +55.88mPD
X1: +55.28mPD

FMH-0090
C.L.: +60.62mPD
A1: +56.87mPD
X1: +56.27mPD

FMH-0079
C.L.: +46.94mPD
A1: +44.40mPD
X1: +41.72mPD

FMH-0078
C.L.: +44.63mPD
A1: +40.81mPD
A2: +38.41mPD
X1: +38.41mPD

FMH-0077
C.L.: +43.68mPD
A1: +37.77mPD
X1: +37.77mPD

FMH-0076
C.L.: +43.37mPD
A1: +37.35mPD
A2: +37.82mPD
X1: +37.35mPD

FMH-0075
C.L.: +42.92mPD
A1: +36.76mPD
X1: +36.76mPD

FMH-0074
C.L.: +42.17mPD
A1: +35.94mPD
A2: +35.72mPD
X1: +35.52mPD

CONNECTION POINT (C5)
X1: +38.50mPD
THE END OF THE PIPE
SHALL BE PLUGGED.

CONNECTION POINT (C2)
X1: +38.00mPD
THE END OF THE PIPE
SHALL BE PLUGGED.

CONNECTION POINT (C1)
X1: +35.84mPD
THE END OF THE PIPE
SHALL BE PLUGGED.

THE END OF THE PIPE
SHALL BE PLUGGED.

500(OD)
250(OD)

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/113

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/SE/115

元朗公路
YUEN LONG HIGHWAY
丹桂村
TAN KWAI TSUEN
西方寺念佛舍
Tan Kwai South Fresh Service Re

NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER. ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- HA SITE BOUNDARY
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 14 OF 15)

Drawing No.
199086/BIN/SE/114

Scale
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
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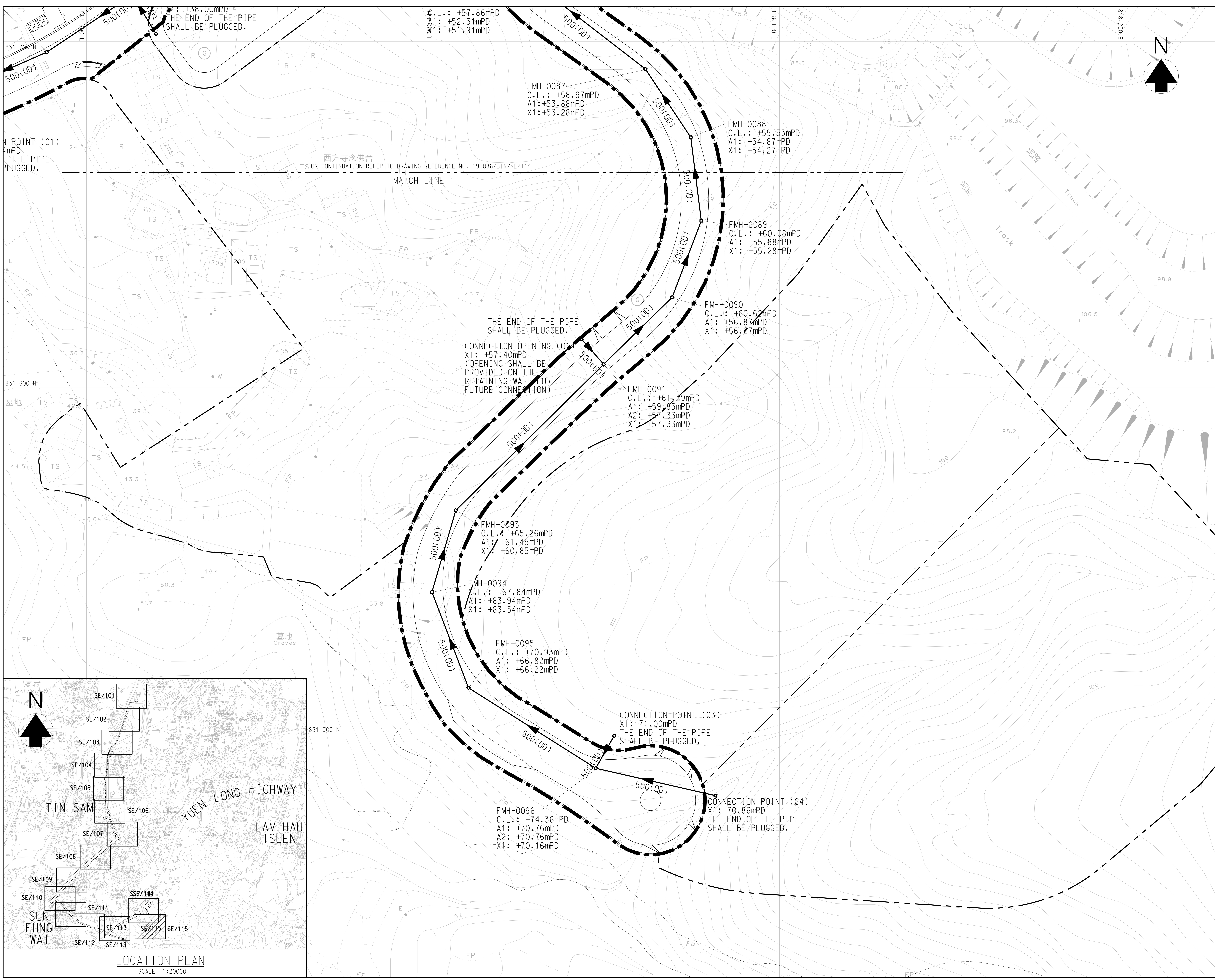
Plot File by = qiuli5947 2022/11/18

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-SE-114.dgn



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NOTES:

1. ALL CO-ORDINATES REFER TO HONG KONG GEODETIC DATUM 1980 AND IN METRES.
2. DIMENSIONS IN MILLIMETERS.
3. ALL LEVELS REFER TO PRINCIPAL DATUM AND IN METRES.
4. LOCATIONS OF PROPOSED SEWERAGE MANHOLES AND SEWERS ARE INDICATIVE ONLY. EXACT LOCATIONS SHALL BE AGREED WITH THE PROJECT MANAGER ON SITE.
5. UNLESS OTHERWISE STATED ON THE DRAWINGS OR AS INSTRUCTED BY THE PROJECT MANAGER, ALL PROPOSED SEWERAGE WORKS ARE TO BE CONSTRUCTED BY OPEN TRENCH METHOD.

LEGEND:

- LIMIT OF WORKS AREA
- HA SITE BOUNDARY
- PROPOSED SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER
- EXISTING SEWER MANHOLE

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	TCL	WLC	SZ	LCH	
Date	04/22	04/22	04/22	04/22	

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL LAYOUT PLAN FOR SEWERAGE WORKS

(SHEET 15 OF 15)

Drawing No. 199086/BIN/SE/115

Scale 1 : 500 (A1) 1 : 1000 (A3)

土木工程拓展署
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APPENDIX A1

Development Parameters and Estimation of ADWF

Appendix A1 - Development Parameters and Estimation of ADWF

Housing Site Phase 1 to Connection Point (C4)					
GFA		**Population**		**Recommended Unit Flow Factor**	**ADWF (m^3/day)**
Domestic					
Total No. of Flats (Phase 1)	1,970	**No. of Population(1) (Phase 1)**	**5319**	0.19	1011
Total site area (m2) (Phase 1)	14,151				
Non-domestic (Phase 1)					
GFA for Welfare Facilities (m2)	4,594	No. of Employees(2)	152	0.28	43
GFA for Retail Complex (m2)	0	No. of Employees(2)	0	0.28	0
GFA for Car Parking (m2)	13,860	-	-	-	-
GFA for Other Facilities (m2)	318	No. of Employees(2)	11	0.28	3
No. of Kindergarten (8 No. of classrooms)	1	No. of students(3)	240	0.28	67
		No. of teachers(4)	28	0.28	8
		Total No. of Population	**431**	**ADWF (Non-domestic)**	**121**
				ADWF (Total)	**1131.3**

Housing Site Phase 2 to Connection Point (C3)					
GFA		**Population**		**Recommended Unit Flow Factor**	**ADWF (m^3/day)**
Domestic					
Total No. of Flats (Phase 2)	2,400	**No. of Population(1) (Phase 2)**	**6480**	0.19	1231
Total site area (m2) (Phase 2)	14,147				
Non-domestic (Phase 2)					
GFA for Welfare Facilities (m2)	4,598	No. of Employees(2)	152	0.28	43
GFA for Retail Complex (m2)	3,128	No. of Employees(2)	110	0.28	31
GFA for Car Parking (m2)	11,230	-	-	-	-
GFA for Other Facilities (m2)	710	No. of Employees(2)	24	0.28	7
No. of Kindergarten (7 No. of classrooms)	1	No. of students(3)	210	0.28	59
		No. of teachers(4)	25	0.28	7
		Total No. of Population	**521**	**ADWF (Non-domestic)**	**146**
				ADWF (Total)	**1377.1**

Housing Site Phase 3 to both Connection Points (O1) & (C5)					
GFA		**Population**		**Recommended Unit Flow Factor**	**ADWF (m3/day)**
Domestic					
Total No. of Flats (Phase 3)	3050	**No. of Population(1) (Phase 3)**	**8235**	0.19	1565
Total site area (m2) (Phase 3)	20,490				
Non-domestic (Phase 3)					
GFA for Welfare Facilities (m2)	6657	No. of Employees(2)	220	0.28	62
GFA for Retail Complex (m2)	2784	No. of Employees(2)	98	0.28	27
GFA for Car Parking (m2)	11760	-	-	-	-
GFA for Other Facilities (m2)	70	No. of Employees(2)	3	0.28	1
0	0	0	0	0.28	0
		0	0	0.28	0
		Total No. of Population	**321**	**ADWF (Non-domestic)**	**90**
				ADWF (Total)	**1654.5**

Note: For conservative purpose, all ADWF is designed to discharge to the upstream Connection Point (O1) in the hydraulic calculation.

Primary School Site to Connection Point (C1)					
GFA		**Population**		**Recommended Unit Flow Factor**	**ADWF (m3/day)**
Primary School					
No. of classrooms	30	No. of students(3)	765	0.04	31
		No. of teachers(4)	56	0.28	16
Total GFA (m2)	6200	**Total No. of Population**	**821**	**Total ADWF**	**46.3**

PTI to Connection Point (C2)					
GFA		**Population**		**Recommended Unit Flow Factor**	**ADWF (m3/day)**
PTI					
GFA for PTI (m2)	6340	No. of employee	30	0.18	5
Total GFA (m2)	6340	**Total No. of Population**	**30**	**Total ADWF**	**5.4**

APPENDIX A2

DESIGN OF PROPOSED NEW SEWERS

Appendix A2 - Design of Proposed Sewers

Assumption

1.) Conservatively assumed that the existing pipe is under bull bored condition i.e. Existing flow(Q2) = Design flow under full bored condtion

2.) 10% of the pipe cross section area is allowed for siltation

Reference

1.) Colebrook-White's equation is adopted for full-bore pipe velocity calculation

								Tan Kwai Tsuen		Ping Shan South		Lam Tei North								
	D	IL1	IL2	L	S = L / (IL1 - IL2)		Ks (PE in poor condition)	Q	P = Qd / 0.27	Q	P = Qd / 0.27	Q	P = Qd / 0.27	Total		Qt = Q + Qo*p	Vc = -(√8gD/S)*log[Ks/(3.7D)+2.51v/(D√2gD/S)]	Qc = pD2/4*Vc			
Sewerage Pipe	Upgrading Diameter (mm)	U/S invert (mPD)	D/S invert (mPD)	Pipe Length (m)	Gradient (1 in)	Hydraulic Radius (m)	Roughness Ks (mm)	Additional ADWF (m^3/day)	Contributing Population	Additional ADWF (m^3/day)	Contributing Population	Additional ADWF (m^3/day)	Contributing Population	Total Contributing Population	Peaking Factor	Downstream Peak Flow (m^3/s)	Full Bore Velocity,Vc (m/s)	Full bore Capacity,Qc (m^3/s)	90% Full bore Capacity,Qc (m^3/s)	Pipe Utilisation	***Pipe Capacity Check***
FMH-0001A to FSH1009872	900	-2.24	-2.29	51.96	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0001 to FMH-0001A	900	-2.18	-2.24	53.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0002 to FMH-0001	900	-2.14	-2.18	30.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0003 to FMH-0002	900	-2.09	-2.14	52.77	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0004 to FMH-0003	900	-2.05	-2.09	33.85	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0005 to FMH-0004	900	-2.01	-2.05	35.56	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0006 to FMH-0005	900	-1.94	-2.01	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0007 to FMH-0006	900	-1.88	-1.94	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0008 to FMH-0007	900	-1.81	-1.88	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0009 to FMH-0008	900	-1.74	-1.81	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0010 to FMH-0009	900	-1.70	-1.74	33.98	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0011 to FMH-0010	900	-1.64	-1.70	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0012 to FMH-0011	900	-1.57	-1.64	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0013 to FMH-0012	900	-1.54	-1.57	25.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0014 to FMH-0013	900	-1.48	-1.54	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0015 to FMH-0014	900	-1.44	-1.48	34.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0016 to FMH-0015	900	-1.40	-1.44	39.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0017 to FMH-0016	900	-1.33	-1.40	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0018 to FMH-0017	900	-1.26	-1.33	60.00	900	0.23	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.036	**0.659**	**0.593**	**88%**	**OK**
FMH-0019 to FMH-0018	TWIN 600	-1.19	-1.26	25.47	352	0.15	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.292	**0.731**	**0.658**	**79%**	**OK**
FMH-0021 to FMH-0019	825	-0.21	-0.62	103.00	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0022 to FMH-0021	825	0.46	0.39	17.30	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0023 to FMH-0022	825	1.33	1.06	67.00	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0024 to FMH-0023	825	2.17	1.93	60.00	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0025 to FMH-0024	825	2.41	2.17	60.00	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0026 to FMH-0025	825	2.65	2.41	60.00	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0027 to FMH-0026	825	2.89	2.65	60.00	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0028 to FMH-0027	825	3.00	2.89	28.92	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0029 to FMH-0028	825	3.33	3.10	58.00	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0031 to FMH-0029	825	3.50	3.33	40.87	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0032 to FMH-0031	825	3.75	3.60	37.65	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0033 to FMH-0032	825	3.98	3.75	58.00	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0034 to FMH-0033	825	4.22	3.98	58.82	250	0.21	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.873	**1.001**	**0.901**	**58%**	**OK**
FMH-0035 to FMH-0034	675	4.33	4.22	29.56	250	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.653	**0.592**	**0.532**	**98%**	**OK**
FMH-0035A to FMH-0035	675	4.45	4.33	28.65	250	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.653	**0.592**	**0.532**	**98%**	**OK**
FMH-0036 to FMH-0035A	675	4.63	4.45	45.39	250	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.653	**0.592**	**0.532**	**98%**	**OK**
FMH-0036A to FMH-0036	675	4.82	4.78	10.43	250	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.653	**0.592**	**0.532**	**98%**	**OK**
FMH-0037 to FMH-0036A	675	4.91	4.82	22.08	250	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.653	**0.592**	**0.532**	**98%**	**OK**
FMH-0038 to FMH-0037	675	5.21	4.91	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0039 to FMH-0038	675	5.51	5.21	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0040 to FMH-0039	675	5.81	5.51	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0041 to FMH-0040	675	6.11	5.81	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0042 to FMH-0041	675	6.49	6.11	75.58	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0043 to FMH-0042	675	6.83	6.49	69.26	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0044 to FMH-0043	675	7.01	6.83	35.16	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0045 to FMH-0044	675	7.31	7.01	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0046 to FMH-0045	675	7.61	7.31	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0047 to FMH-0046	675	7.91	7.61	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0048 to FMH-0047	675	8.21	7.91	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0049 to FMH-0048	675	8.51	8.21	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0050 to FMH-0049	675	8.81	8.51	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0051 to FMH-0050	675	9.11	8.81	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0052 to FMH-0051	675	9.41	9.11	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0053 to FMH-0052	675	9.71	9.41	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0053A to FMH-0053	675	9.81	9.71	20.62	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0054 to FMH-0053A	675	9.94	9.82	24.57	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0055 to FMH-0054	675	10.24	9.94	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0056 to FMH-0055	675	10.54	10.24	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0057 to FMH-0056	675	10.74	10.54	38.82	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0058 to FMH-0057	675	10.86	10.74	24.33	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0059 to FMH-0058	675	11.16	10.86	60.00	200	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	1.850	**0.662**	**0.596**	**87%**	**OK**
FMH-0059A to FMH-0059	675	11.62	11.16	60.00	130	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	2.297	**0.822**	**0.740**	**70%**	**OK**
FMH-0060 to FMH-0059A	675	11.98	11.62	46.87	130	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	2.297	**0.822**	**0.740**	**70%**	**OK**

Appendix A2 - Design of Proposed Sewers

Assumption

1.) Conservatively assumed that the existing pipe is under bull bored condition i.e. Existing flow(Q2) = Design flow under full bored condtion

2.) 10% of the pipe cross section area is allowed for siltation

Reference

1.) Colebrook-White's equation is adopted for full-bore pipe velocity calculation

								Tan Kwai Tsuen		Ping Shan South		Lam Tei North							
	D	IL1	IL2	L	S = L / (IL1 - IL2)		Ks (PE in poor condition)	Q	P = Qd / 0.27	Q	P = Qd / 0.27	Q	P = Qd / 0.27	Total		Qt = Q + Qo*p	Vc = -(√8gD/S)*log[Ks/(3.7D)+2.51v/(D√2gD/S)]	Qc = pD2/4*Vc			
Sewerage Pipe	Upgrading Diameter (mm)	U/S invert (mPD)	D/S invert (mPD)	Pipe Length (m)	Gradient (1 in)	Hydraulic Radius (m)	Roughness Ks (mm)	Additional ADWF (m^3/day)	Contributing Population	Additional ADWF (m^3/day)	Contributing Population	Additional ADWF (m^3/day)	Contributing Population	Total Contributing Population	Peaking Factor	Downstream Peak Flow (m^3/s)	Full Bore Velocity,Vc (m/s)	Full bore Capacity,Qc (m^3/s)	90% Full bore Capacity,Qc (m^3/s)	Pipe Utilisation	***Pipe Capacity Check***
FMH-0060A to FMH-0060	675	12.14	11.98	20.60	130	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	2.297	**0.822**	**0.740**	**70%**	**OK**
FMH-0061 to FMH-0060A	675	12.60	12.14	60.00	130	0.17	0.60	4214.6	15,610	6782	25118	4152	15378	56106	2.97	**0.520**	2.297	**0.822**	**0.740**	**70%**	**OK**
FMH-0062 to FMH-0061	675	13.12	12.60	60.00	115	0.17	0.60	4214.6	15,610	6782	25118			40728	3.00	**0.382**	2.443	**0.874**	**0.787**	**49%**	**OK**
FMH-0063 to FMH-0062	675	13.67	13.12	60.00	110	0.17	0.60	4214.6	15,610	6782	25118			40728	3.00	**0.382**	2.499	**0.894**	**0.805**	**47%**	**OK**
FMH-0064 to FMH-0063	525	14.73	14.22	55.68	110	0.13	0.60	4214.6	15,610					15610	3.00	**0.146**	2.135	**0.462**	**0.416**	**35%**	**OK**
FMH-0065A to FMH-0064	525	15.01	14.73	28.32	100	0.13	0.60	4214.6	15,610					15610	3.00	**0.146**	2.240	**0.485**	**0.436**	**34%**	**OK**
FMH-0065 to FMH-0065A	525	15.28	15.01	26.75	100	0.13	0.60	4214.6	15,610					15610	3.00	**0.146**	2.240	**0.485**	**0.436**	**34%**	**OK**
FMH-0066 to FMH-0065	525	16.08	15.28	60.00	75	0.13	0.60	4214.6	15,610					15610	3.00	**0.146**	2.589	**0.560**	**0.504**	**29%**	**OK**
FMH-0067 to FMH-0066	525	16.27	16.08	19.28	100	0.13	0.60	4214.6	15,610					15610	3.00	**0.146**	2.240	**0.485**	**0.436**	**34%**	**OK**
FMH-0068 to FMH-0067	450	17.34	16.87	23.55	50	0.11	0.60	4214.6	15,610					15610	3.00	**0.146**	2.881	**0.458**	**0.412**	**35%**	**OK**
FMH-0069 to FMH-0068	450	18.63	17.72	45.43	50	0.11	0.60	4214.6	15,610					15610	3.00	**0.146**	2.881	**0.458**	**0.412**	**35%**	**OK**
FMH-0069A to FMH-0069	450	21.40	19.23	43.49	20	0.11	0.60	4214.6	15,610					15610	3.00	**0.146**	4.562	**0.726**	**0.653**	**22%**	**OK**
FMH-0070 to FMH-0069A	450	25.45	24.40	15.73	15	0.11	0.60	4214.6	15,610					15610	3.00	**0.146**	5.270	**0.838**	**0.754**	**19%**	**OK**
FMH-0071 to FMH-0070	450	29.72	25.45	53.40	13	0.11	0.60	4214.6	15,610					15610	3.00	**0.146**	5.774	**0.918**	**0.827**	**18%**	**OK**
FMH-0072 to FMH-0071	450	32.29	29.72	51.39	20	0.11	0.60	4214.6	15,610					15610	3.00	**0.146**	4.562	**0.726**	**0.653**	**22%**	**OK**
FMH-0073 to FMH-0072	450	33.72	32.89	41.34	50	0.11	0.60	4214.6	15,610					15610	3.00	**0.146**	2.881	**0.458**	**0.412**	**35%**	**OK**
FMH-0074 to FMH-0073	450	35.52	34.32	60.00	50	0.11	0.60	4214.6	15,610					15610	3.00	**0.146**	2.881	**0.458**	**0.412**	**35%**	**OK**
FMH-0075 to FMH-0074	450	36.76	35.94	40.80	50	0.11	0.60	4168.3	15,438					15438	3.00	**0.145**	2.881	**0.458**	**0.412**	**35%**	**OK**
C1 to FMH-0074	225	39.29	38.58	14.16	20	0.06	0.60	46.3	171					171	6.00	**0.003**	2.939	**0.117**	**0.105**	**3%**	**OK**
FMH-0076 to FMH-0075	450	37.35	36.76	29.71	50	0.11	0.60	4168.3	15,438					15438	3.00	**0.145**	2.881	**0.458**	**0.412**	**35%**	**OK**
FMH-0077 to FMH-0076	450	37.77	37.35	20.99	50	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.881	**0.458**	**0.412**	**35%**	**OK**
C2 to FMH-0076	450	38.00	37.82	15.89	90	0.11	0.60	5.4	20					20	6.00	**0.000**	2.144	**0.341**	**0.307**	**0%**	**OK**
FMH-0078 to FMH-0077	450	38.41	37.77	60.00	94	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.097	**0.334**	**0.300**	**48%**	**OK**
FMH-0079 to FMH-0078	450	41.72	40.81	60.00	66	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.506	**0.398**	**0.359**	**40%**	**OK**
C5 to FMH-0078	450	38.50	38.41	13.75	150	0.11	0.60	1654.5	6,128					6128	4.00	**0.077**	1.658	**0.264**	**0.237**	**32%**	**OK**
FMH-0080 to FMH-0079	450	45.40	44.40	60.00	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0081 to FMH-0080	450	46.52	46.00	30.77	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0082 to FMH-0081	450	47.26	47.12	8.68	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0083 to FMH-0082	450	48.47	47.86	36.28	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0084 to FMH-0083	450	49.95	49.07	53.18	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0085 to FMH-0084	450	50.93	50.55	22.66	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0086 to FMH-0085	450	51.91	51.53	22.75	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0087 to FMH-0086	450	53.28	52.51	46.01	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0088 to FMH-0087	450	54.27	53.88	23.68	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0089 to FMH-0088	450	55.28	54.87	24.29	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0090 to FMH-0089	450	56.27	55.88	23.65	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0091 to FMH-0090	450	57.33	56.87	27.67	60	0.11	0.60	4162.9	15,418					15418	3.00	**0.145**	2.629	**0.418**	**0.376**	**38%**	**OK**
FMH-0093 to FMH-0091	450	60.85	59.85	60.00	60	0.11	0.60	2508.4	9,290					9290	4.00	**0.116**	2.629	**0.418**	**0.376**	**31%**	**OK**
O1 to FMH-0091	450	57.40	57.33	10.99	150	0.11	0.60	1654.5	6,128					6128	4.00	**0.077**	1.658	**0.264**	**0.237**	**32%**	**OK**
FMH-0094 to FMH-0093	450	63.34	61.45	24.57	13	0.11	0.60	2508.4	9,290					9290	4.00	**0.116**	5.662	**0.900**	**0.810**	**14%**	**OK**
FMH-0095 to FMH-0094	450	66.22	63.94	29.60	13	0.11	0.60	2508.4	9,290					9290	4.00	**0.116**	5.662	**0.900**	**0.810**	**14%**	**OK**
FMH-0096 to FMH-0095	450	70.16	66.82	43.46	13	0.11	0.60	2508.4	9,290					9290	4.00	**0.116**	5.662	**0.900**	**0.810**	**14%**	**OK**
C3 to FMH-0096	450	71.00	70.76	35.46	150	0.11	0.60	1377.1	5,100					5100	4.00	**0.064**	1.658	**0.264**	**0.237**	**27%**	**OK**
C4 to FMH-0096	450	70.86	70.76	10.84	110	0.11	0.60	1131.3	4,190					4190	5.00	**0.065**	1.938	**0.308**	**0.277**	**24%**	**OK**