

Appendix 6

SEWERAGE IMPACT ASSESSMENT

The Hong Kong Jockey Club

Proposed Place of Recreation, Sports or Culture (Public Riding School) with Ancillary Facilities at Government Land in D.D. 233, The Restored Landfill Site (TKOL II/III) in TKO Area 105, Tseung Kwan O (GLA TSK-500(Part))

Sewerage Impact Assessment

Reference: SIA REP 002

Rev. 2 | 30 January 2026

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 304521

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1. Introduction

1.1 Project Description

This **Sewerage Impact Assessment (SIA)** is prepared in support of the Section 16 (“S16”) Planning Application to allow for the development of a Public Riding School with ancillary facilities (e.g. utility trench) (collectively as the “**PRS**”) at Government Land in D.D. 233, The Restored Landfill Site (TKOL II/III) in TKO Area 105, New Territories (“**TKOL II/III**”) for the HKJC Public Riding Schools Limited (the “**Applicant**”). The Application Site comprises of three (3) existing platforms and land required for the provision of ancillary utility trench connecting to the three (3) platforms (collectively as the “**Application Site**”) within TKOL II/III. The PRS aligns with the Government’s policy objectives in fostering more public participation in the community through wider visibility and popularity of horse riding, supporting equestrian as an elite sport, and maintaining Hong Kong as a centre for major international sports events.

The Application Site is predominately zoned “Open Space” (“O”) on the Approved Tseung Kwan O Outline Zoning Plan No. S/TKO/32 (“**Approved OZP**”), whilst a strip of area at the north is zoned “Green Belt” (“GB”) and a minor portion abutting Chun Sing Street is zoned “Other Specified Uses” annotated “Industrial Estate” (“OU(Industrial Estate)”) on the Approved OZP. The PRS with ancillary facilities (‘Horse Riding School’ subsumed under ‘Place of Recreation, Sports or Culture’ use) is a Column 2 use under the “O”, “GB” and “OU(Industrial Estate)” zones that may be permitted with or without conditions on Application under S16 of the Town Planning Ordinance (“**TPO**”). There are no plot ratio (“**PR**”), building height (“**BH**”), and site coverage (“**SC**”) restrictions imposed on the “O”, “GB” and “OU(Industrial Estate)” zones of the Approved OZP. While a portion of TKOL II/III falls within the Clear Water Bay Country Park (“**CWBCP**”), the Application Site does not involve any areas falling within the Country Park Boundary.

The PRS is located on three (3) platforms, namely the Lower Platform (i.e. Reception and Hospitality Lounges) (approx.+6.0mPD), Middle Platform (i.e. Pony Paddock & Pavilion I)(approx. +40.0mPD) and Upper Platform (i.e. Horse Paddock & Pavilion II) (approx.140.0mPD), with a proposed total GFA of approx. 9,000m² and a proposed building height of 4.8m to 7.7m. An ancillary utility trench connecting to the three (3) platforms is also proposed to accommodate various essential utilities services in support of the PRS operations.

1.2 Purpose of the Report

The objective of this SIA report is to identify, assess and mitigate potential sewerage impacts from the proposed development of new PRS at the three platforms within TKOL II/III; and formulate an acceptable discharge scheme to support the proposed development.

1.3 Structure of the Report

This report is structured as follow:

Section 1 Introduction

Introduction and a brief description of the project

Section 2 Sewerage Impact Assessment

Assessment of the sewerage impact due to the proposed development

Section 3 Conclusion

Conclusion of the assessment results

2. Sewerage Impact Assessment

2.1 Assessment Approach

This SIA has been carried out in accordance with the guidelines set out in Environmental Protection Department (EPD)'s Report No. EPD/TP 1/05 Guidelines for Estimating Sewage Flows (GESF) for Sewerage Infrastructure Planning Version 1.0 and DSD's Sewerage Manual.

2.2 Sewerage Flow Estimation

Referring to DSD's sewerage record, as-built drawings of the Tseung Kwan O Landfills Restoration under Contract No. EP/SP/29/95 and Contract No. CV/89/05, major sewerage facilities in the vicinity of the Site are listed as the following,

- 1) 375 mm diameter to 450 mm diameter public sewer along Chun Shing Street and Chun Yat Street
- 2) 600 mm diameter to 1650 mm diameter public sewer along Wan Po Road
- 3) 300 mm diameter sewer along the boundary of the Site used by TKOL II/III

Relevant records and drawings are provided in **Appendix A** and the sewerage catchment plan of the abovementioned sewerage facilities are appended to **Appendix B**. The sewerage catchments consist of TKOL II/III, TKO InnoPark zoned "Other Specified Uses (Industrial Estate)" in the Approved OZP, the existing HSBC Building Tseung Kwan O, the existing Tai Chik Sha Fire Station cum Ambulance Depot, the South East New Territories Landfill and its extension (SENT/ SENTX), TKOL II/III and its restoration contractor's site office.

2.2.1 Development Parameters

As advised by the HKJC, the number of staffs and visitors per day for the proposed PRS shall range from 45 to 50 and 200 to 350 respectively. For conservativeness, 50 nos. staffs and 350 nos. visitors per day are assumed in this assessment. Based on the latest planning, 74 nos. horses would be kept at the proposed PRS.

2.2.2 Population Estimation

TKO InnoPark zoned "Other Specified Uses (Industrial Estate)" in the Approved OZP

776,397.32 m² of Other Specified Uses (Industrial Estate) land use falls into the sewerage catchment of the 600mm diameter to 1650 mm diameter sewer along Wan Po Road. The plot ratio is assumed as 2.5, which is the maximum average plot ration for Special Industrial Use – Industrial Estate stipulated in Table 1 of the Hong Kong Planning Standards and Guidelines Chapter 5 Industry. The employment density is assumed as 3.4 nos. workers per GFA (in 100 m²) and referred to the Commercial and Industrial Floor Space Utilisation Survey published by the Planning Department, which is applicable for all economic activities.

Tai Chik Sha Fire Station cum Ambulance Depot

The plan area of Tai Chik Sha Fire Station cum Ambulance Depot is 3,225.4 m². There is no requirement on the plot ratio of Government, Institution and Community Facilities, and is assumed as 2.5. The employment density is assumed as 3.3 nos. workers per GFA (in 100 m²) and referred to the Commercial and Industrial Floor Space Utilisation Survey published by the Planning Department, which is applicable for Community, Social and Personal Services.

HSBC Building Tseung Kwan O

The GFA of the HSBC Building Tseung Kwan O is 56,000 m² (<https://www.leighorange.com/project/hsbc-building-tko-sus/>). The employment density is assumed as 5.5 nos. workers per GFA (in 100 m²) and referred to the Commercial and Industrial Floor Space Utilisation Survey published by the Planning Department, which is applicable for Financial, Insurance, Real Estate & Business Services.

SENT/ SENTX

The sewage generated from SENT/ SENTX is not estimated by the number of employees. The figure adopted is the design flow rate of 1,500 m³/day of its leachate treatment plant extracted from Agreement No. CE 10/2005 (EP) South East New Territories (SENT) Landfill Extension – Feasibility Study: Environmental Impact Assessment Report – Volume 1 (Reference #0036286).

TKOL II/III and its Restoration Contractor's Site Office

The sewage generated from TKOL II/III is not estimated by the number of employees. The figure adopted is advised by EPD's restoration contractor, which the sewage flow from landfill facilities vary from 750 m³/day to 1,450 m³/day, subject to seasons. The latter is used in this assessment for conservativeness. For the sewage flow generated from EPD's restoration contractor's site office, it is advised by EPD that that number of staff and TKOL II/III and its restoration contractor's site office is approximately 23 nos.

2.2.3 Unit Flow Factors and Peaking Factors

Unit flow factors (UFF) under EPD's Report No. EPD/TP 1/05 GESF for Sewerage Infrastructure Planning Version 1.0 are generally adopted for sewage flow estimation.

Table 2.1 – Unit Flow Factors

Land Use	Category	Unit Flow Factor (m ³ /day)
Proposed PRS – Staff	J11 – Community, Social & Personal Services	0.28
Proposed PRS – Visitors	School Student	0.04
TKOL II/III Restoration Contractor's Site Office	Territorial Average	0.28
Tai Chik Sha Fire Station cum Ambulance Depot	J11 – Community, Social & Personal Services	0.28
HSBC Building TKO	J6 – Finance, Insurance, Real Estate & Business Services	0.08
Other Specified Use (Industrial Estate)	J1 – Manufacturing (Tseung Kwan O)	1.08

Sewage flows from horse cleaning is also considered in this assessment. It is assumed that each horse would be cleaned on a daily basis for a duration of 20 minutes under the flow rate of 15 L/minute.

Peaking factors cater for seasonal/diurnal fluctuation and normal amount of infiltration and inflow. The peaking factors adopted in this study are shown in the table below.

Table 2.2 – Peaking Factors

Population Range	Peaking Factor (including stormwater allowance) for Facility with Existing Upstream Sewerage	Peaking Factor (excluding stormwater allowance) for Facility with New Upstream Sewerage
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)
Notes:		
N = Contributing population in thousands.		

$$\text{Contributing population} = \frac{\text{Calculated total average flow (m}^3\text{/day)}}{0.27 \text{ (m}^3\text{/person/day)}}$$

2.3 System Capacity

The capacity of the proposed and existing sewerage system is checked by using the continuity equation, assuming full-bore flow condition:

$$Q = VA$$

where, Q = peak runoff in m^3/s

V = cross-sectional mean velocity in m/s

A = cross-sectional area of the pipe/channel in m^2

The cross-section mean velocity, V , of drainage pipes is estimated using the Colebrook-white equation:

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

where, V = cross-sectional mean velocity in m/s

R = hydraulic radius in m

S_f = friction gradient

k_s = roughness

ν = kinematic viscosity

The roughness, k_s for the proposed and existing sewers is assumed to be 3 mm in accordance with DSD's Sewerage Manual Table 5, i.e., Sewers/ drains slimed to about half depth; velocity, when flowing half full, approximately 0.75 m/s, clayware, poor and sewers/ drains slimed to about half depth; velocity, when flowing half full, approximately 1.2 m/s, concrete, spun or vertically cast, poor.

2.4 Sewerage Impact Assessment

Two sewerage connection points are identified for the proposed PRS. One at manhole FMH4035436 at Chung Shing Street/ Chung Yat Street with a 450 mm diameter downstream public sewer, and the another at manhole S11A with a 300mm diameter downstream sewer, which is currently used by TKOL II/III, connected to the Tseung Kwan O Preliminary Treatment Works. The proposed sewerage connections with 225mm diameter pipes are indicated in **Appendix C**. 100% of the estimated sewage peak flow from the proposed PRS is adopted to assess the sewerage impact downstream to each proposed connection point for conservativeness.

Table 2.5 – Summary of Catchments within near the Site/ in the Vicinity

Sewerage Catchment	Average Dry Weather Flow (m ³ /day)	Peak Flow (L/s)	Sewerage Connection Point
Proposed PRS	60.24	5.58	FMH4035436
			S11A

Proposed Place of Recreation, Sports or Culture (Public Riding School) with Ancillary Facilities at Government Land in D.D. 233, The Restored Landfill Site (TKOL II/III) in TKO Area 105, Tseung Kwan O (GLA TSK-500 (Part))

TKOL II/III	7.73	20.86	S11A
HSBC Building TKO	295.68	20.53	FMH4035432
Tai Chik Sha Fire Station cum Ambulance Depot	89.41	6.21	FMH4035439
Other Specified Use (Industrial Estate)	85527.93	3046.53	FMH4035440
SENT/ SENTX	-	20.83	FMH4035440

Table 2.6 – Hydraulic Performance of Sewerage Connection Points

Upstream Manhole	Downstream Manhole	Pipe Size (mm)	Peak Flow (L/s)	Pipe Capacity (L/s)	Percentage Full (%)
FTMH-L1.4	FMH-1	225	5.58	40.70	13.71%
FMH-1	FMH4035436	225	5.58	40.70	13.71%
FMH4035436	FMH4035437	450	24.72	124.21	19.90%
FMH4035437	FMH4035438	450	24.72	163.19	15.15%
FMH4035438	FMH4035439	450	24.72	142.83	17.30%
FMH4035439	FMH4035440	450	30.93	157.24	19.67%
FMH4035440	FMH4035441	1650	3080.84	3697.92	83.31%
FTMH-L3.3	S11A	225	5.58	33.21	16.80%
S11A	S12	300	26.43	54.65	48.36%
S12	S13	300	26.43	42.93	61.58%

The capacity of existing sewers which would be utilised by the proposed PRS is checked. The detailed calculations are appended to **Appendix D**. For the 450 mm to 1650 mm diameter sewers from FMH4035436 to FMH4035441, the capacities are 19.90% to 83.31% utilised and checked to be sufficient. For the 300mm diameter sewers from S11A to S13, the capacities are 48.36% to 61.58% and also checked to be sufficient.

3. Conclusion

3.1 Conclusion

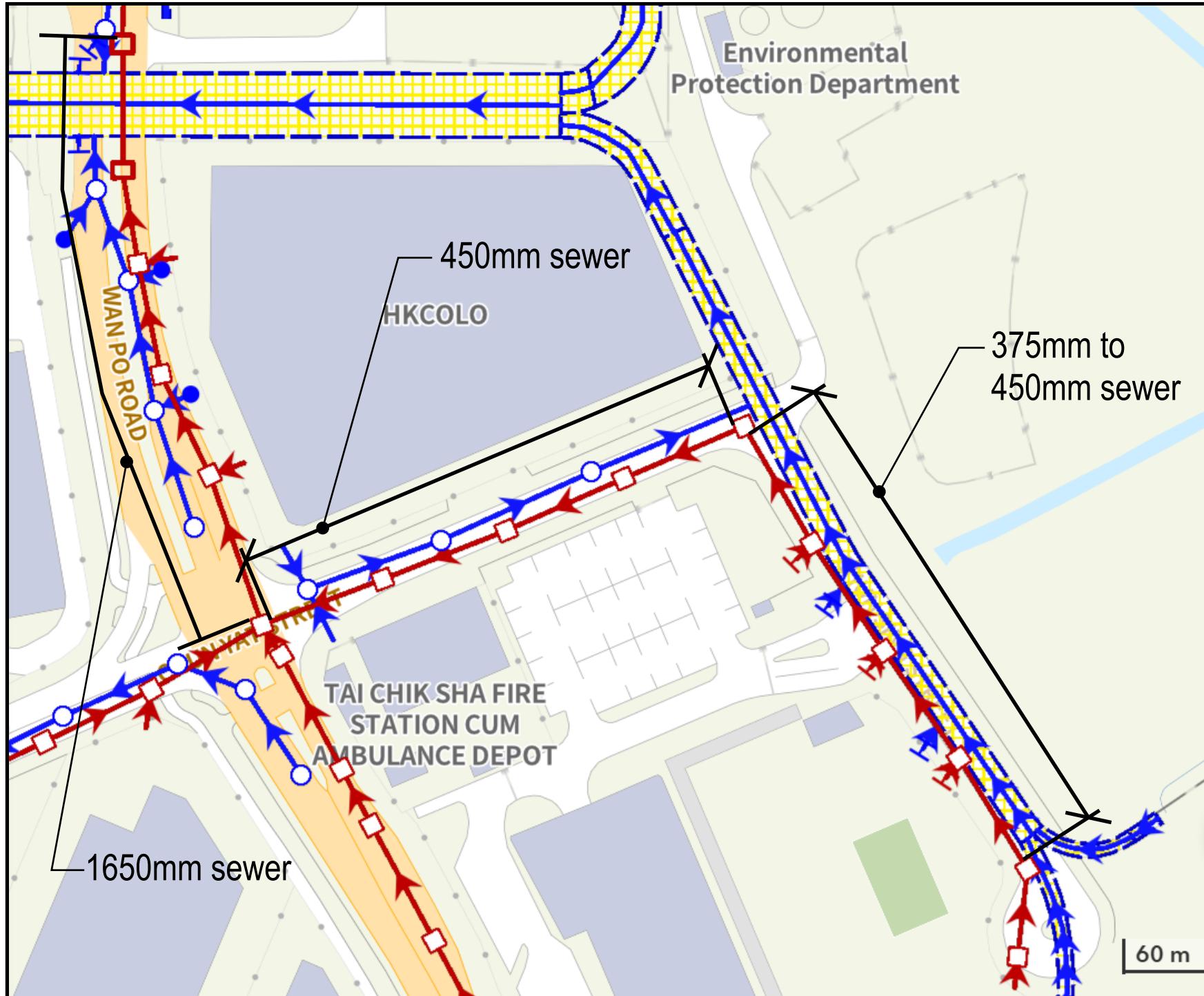
This report assessed the sewerage impact of the proposed PRS at the restored landfill site (TKOL II/III) in Tseung Kwan O. The existing sewerage system downstream to the proposed connection point had been checked to have sufficient capacity.

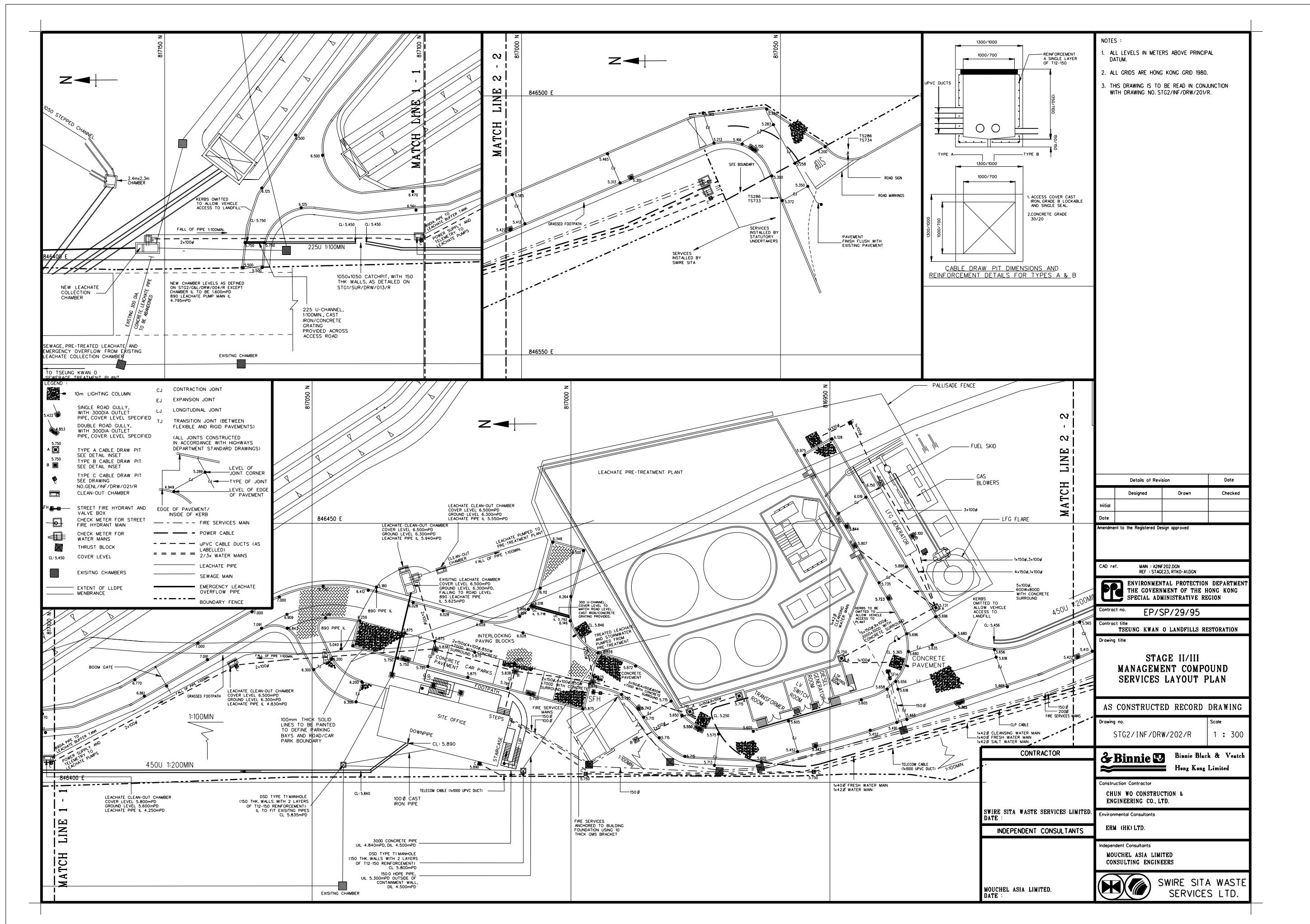
No adverse sewerage impact is anticipated due to the proposed development.

Appendix A

Records and As-built Drawings of Existing Sewerage System

Existing Sewerage Records

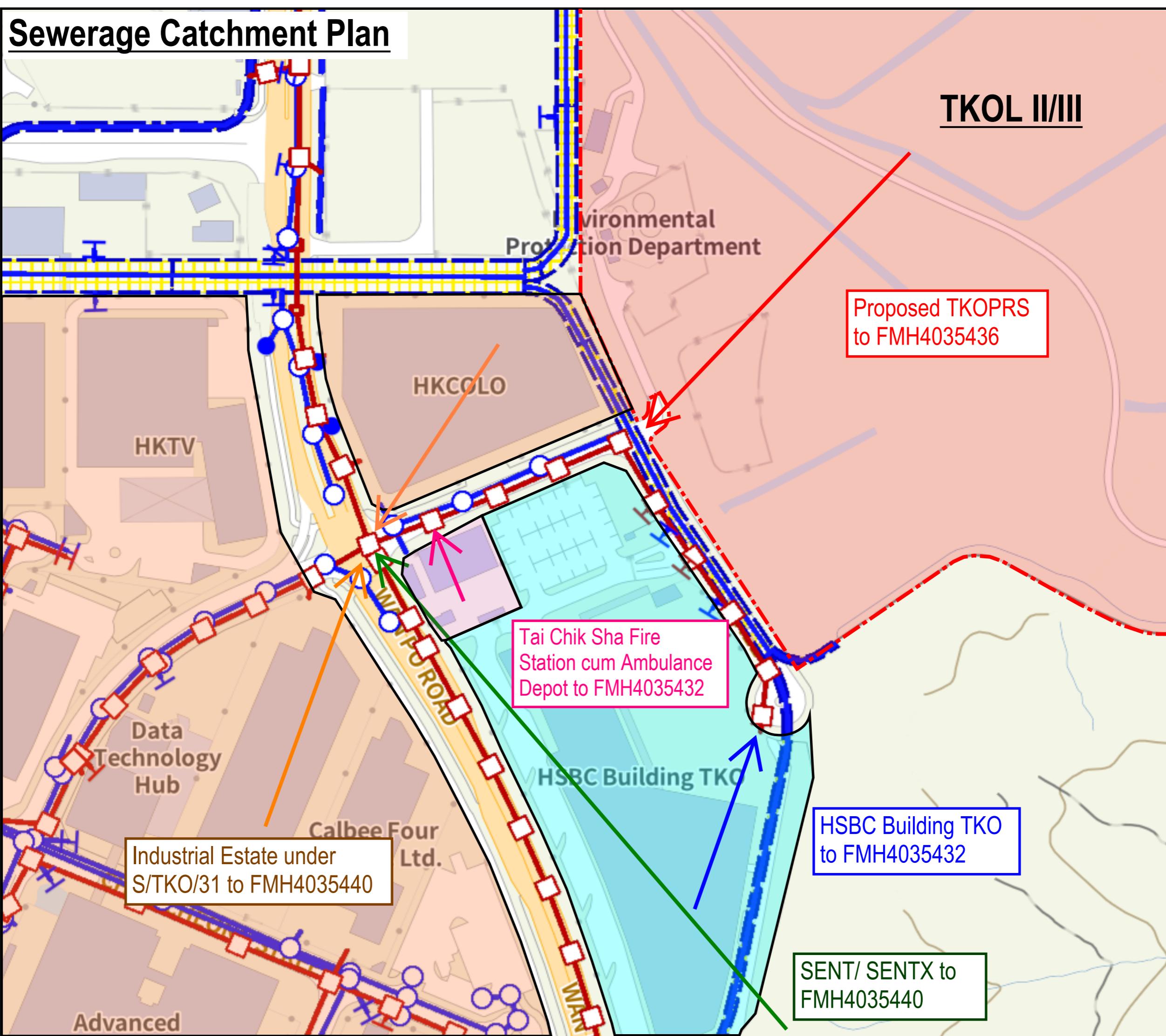




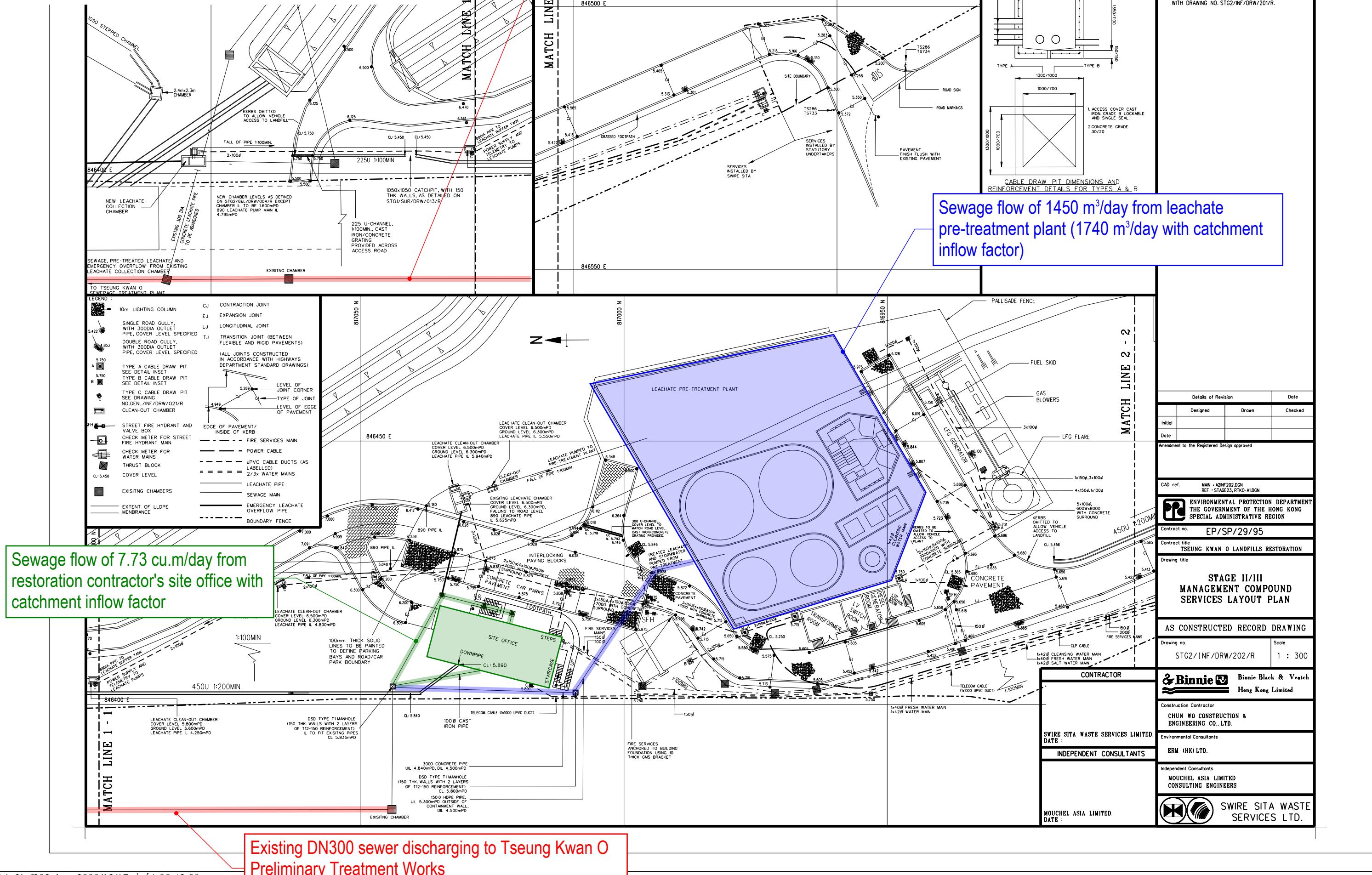
Appendix B

Sewerage Catchment Plan

Sewerage Catchment Plan



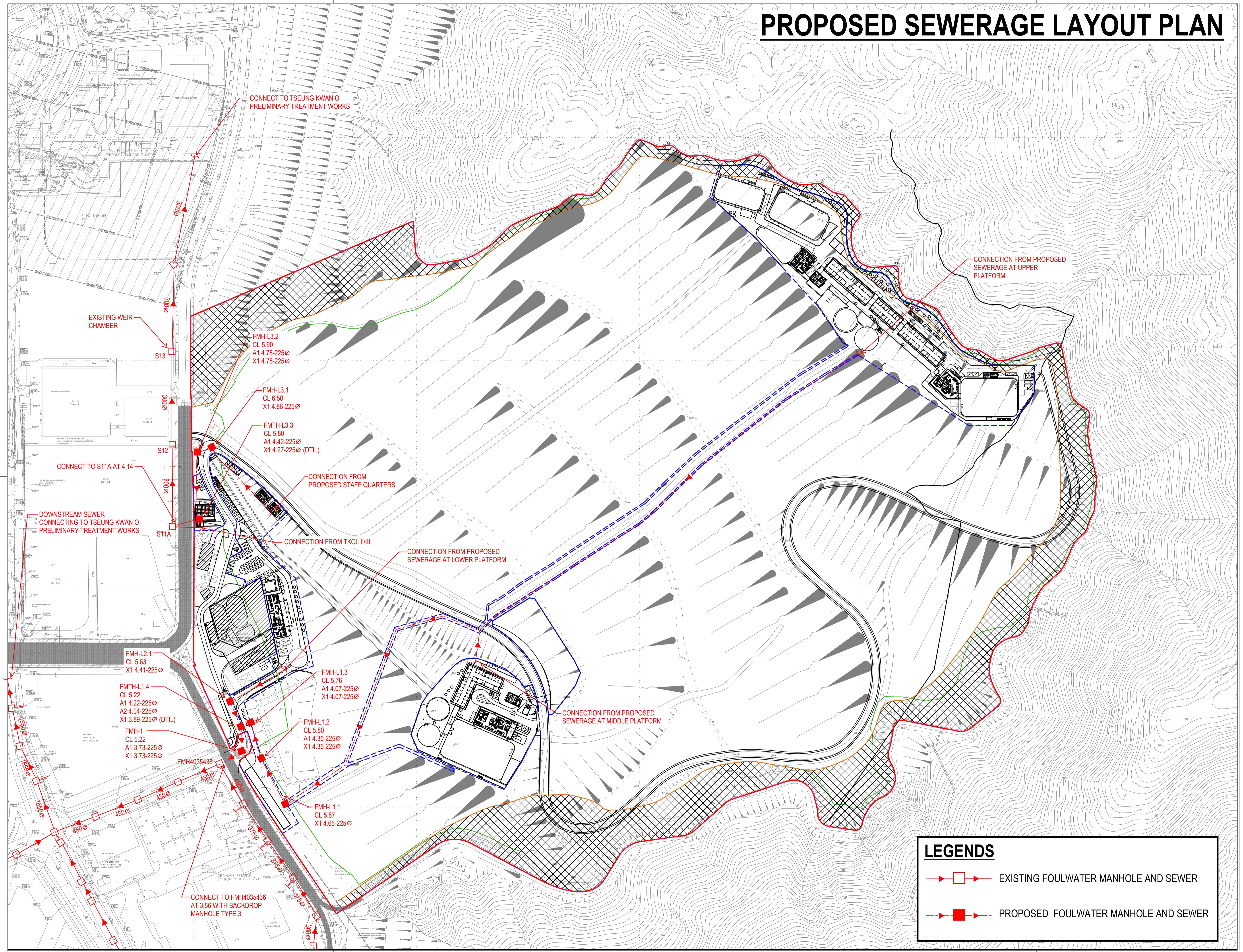
Sewerage Catchment Plan for Existing DN300 Sewer to Tseung Kwan O Preliminary Treatment Works



Appendix C

Proposed Sewerage Layout Plan

PROPOSED SEWERAGE LAYOUT PLAN



Appendix D

Hydraulic Calculations

TABLE D1
Estimation of Sewage Flows Estimation for Existing Developments**Design Code**

1. Based on EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning.
2. Plumbing Engineering Services Design Guide by The Institute of Plumbing.

Design Assumption:

Global Peaking Factor, P (Including Stormwater Allowance) as per Table T-5

Global Unit Flow Factors as per Tables T-2 and T-3

Catchment Inflow Factor for Central (PCIF = 1.20) as per Table T-4

Development Schedule

Sewage Flow Estimates	Estimation	Remark
HSBC Building TKO		
Non-domestic		Connect to FMH4035432
GFA (m ²)	56000.00	Zoning "OU"
Worker Density (No. of Worker per 100m ²)	5.50	Community, Social & Personal Services
No. of Employee	3080	
Unit flow factor (m ³ /person/day)	0.08	J6 - Finance, Insurance, Real Estate & Business Services
ADWF, (m ³ /day)	295.68	P _{CF} = 1.20 included
Tai Chik Sha Fire Station cum Ambulance Depot		
Non-domestic		Connect to FMH4035439
Plan Area (m ²)	3225.40	Special Industrial Use - Industrial Estate
Plot Ratio	2.50	G/I/C
GFA (m ²)	8063.50	Community, Social & Personal Services
Worker Density (No. of Worker per 100m ²)	3.30	
No. of Employee	266	J11 - Community, Social & Personal Services
Unit flow factor (m ³ /person/day)	0.28	P _{CF} = 1.20 included
ADWF, (m ³ /day)	89.41	
Other Specified Use (Industrial Estate)		
Non-domestic		Connect to FMH4035440
Plan Area (m ²)	776397.32	Special Industrial Use - Industrial Estate
Plot Ratio	2.50	Zoning "OU"
GFA (m ²)	1940993.30	All economic activities
Worker Density (No. of Worker per 100m ²)	3.40	
No. of Employee	65994	J1 - Manufacturing (Tseung Kwan O)
Unit flow factor (m ³ /person/day)	1.08	P _{CF} = 1.20 included
ADWF, (m ³ /day)	85527.93	
SENTX/SENTX		
Non-domestic		Connect to FMH4035440
GFA (m ²)	-	
Worker Density (No. of Worker per 100m ²)	-	
No. of Employee	-	
Unit flow factor (m ³ /person/day)	-	
Peak Flow, (m ³ /day)	1800.00	P _{CF} = 1.20 included
		Sewage flow from SENTX extracted from SENTX EIA Report Volume 1 (Reference #0036286) 1500 is the design flow rate of the leachate treatment plant
TKOL II/III		
Non-domestic		Connect to S11A
GFA (m ²)	-	
Worker Density (No. of Worker per 100m ²)	-	
No. of Employee	-	
Unit flow factor (m ³ /person/day)	-	
Peak Flow, (m ³ /day)	1740.00	P _{CF} = 1.20 included
		Sewage flow from TKOL II/III Landfill Facilities advised by EPD's restoration contractor. Sewage flow varies from 750 m ³ /day to 1450 m ³ /day, subject to seasons
TKOL III/III Restoration Contractor's Site Office		
No. of Employee (Restoration Contractor and EPD)	23.00	Connect to S11A
Unit flow factor (m ³ /person/day)	0.28	General - territorial average
ADWF, (m ³ /day)	7.73	P _{CF} = 1.20 included

Notes:

Employment density shall refer to Commercial and Industrial Floor Space Utilization Survey published by PlanD.

Office = 5.5 employee per 100m² of GFARetail = 3.5 employee per 100m² of GFARestaurant = 5.1 employee per 100m² of GFACommunity, Social & Personal Services = 3.3 employee per 100m² of GFA

TABLE D2
Estimation of Sewage Flows Estimation for Existing Developments

Design Code

1. Based on EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning.
2. Plumbing Engineering Services Design Guide by The Institute of Plumbing.

Design Assumption:

Global Peaking Factor, P (Including Stormwater Allowance) as per Table T-5
 Global Unit Flow Factors as per Tables T-2 and T-3
 Catchment Inflow Factor for Central (PCIF = 1.20) as per Table T-4

Development Schedule

Sewage Flow Estimates	Estimation	Remark
TKOPRS		
No. of Staff	50	
Unit flow factor (m ³ /person/day)	0.28	
ADWF, (m ³ /day)	16.80	J11 Community, Social & Personal Services PCIF = 1.20 Included
No. of Visitors	350	
Unit flow factor (m ³ /person/day)	0.04	
ADWF, (m ³ /day)	16.80	School Student PCIF = 1.20 Included
Sewage flow from horse cleaning		
No. of Horses	74.00	
Flow Rate of Horse Cleaning (L/min)	15.00	
Duration of Horse Cleaning (min.)	20.00	
Frequency of Horse Cleaning (Number of time per day)	1.00	
ADWF, (m ³ /day)	26.64	PCIF = 1.20 included
Sub total ADWF, (m³/day)	60.24	

Proposed Place of Recreation, Sports or Culture (Public Riding School) with Ancillary Facilities at Government Land in D.D. 233, The Restored Landfill Site (TKOL II/III) in TKO Area 105, Tseung Kwan O (GLA TSK-500 (Part))

Table D3 - Hydraulic Calculation - Sewerage design

Parameters:

ks = 3.0 mm (for slimed clayware sewer pipe with 0.75m/s under poor condition)
 ks = 0.6 mm (for slimed clayware sewer pipe with 1.2m/s under poor condition)
 ks = 3.0 mm (for slimed concrete sewer pipe with 1.2m/s under poor condition)
 u = 0.000001

Capacity Check

From	To	ADWF (m ³ /d)	Contributing Population	Peaking Factor	Peak (L/s)	Diameter (mm)	Upstream G.L. (mPD)	Downstream G.L. (mPD)	Upstream I.L. (mPD)	Downstream I.L. (mPD)	Upstream Cover	Downstream Cover	Length (m)	Gradient	Area (m ²)	Perimeter (m)	R=A/P	Pipe Roughness, ks (mm)	Full Bore Velocity (m/s)	Full Bore Capacity (L/s)	% of Capacity	Remark
FMH-L1.1	FMH-L1.2	60	223	8	5.58	225	5.87	5.80	4.65	4.35	1.00	1.23	30.00	0.01	0.04	0.71	0.06	3.00	1.02	40.70	13.71%	
FMH-L1.2	FMH-L1.3	60	223	8	5.58	225	5.80	5.76	4.35	4.07	1.23	1.46	27.42	0.01	0.04	0.71	0.06	3.00	1.02	40.70	13.71%	
FMH-L1.3	FTMH-L1.4	60	223	8	5.58	225	5.76	5.22	4.07	4.04	1.46	0.96	3.47	0.01	0.04	0.71	0.06	3.00	1.02	40.70	13.71%	
FMH-L1.2	FTMH-L1.4	60	223	8	5.58	225	5.63	5.22	4.41	4.22	1.00	0.77	18.50	0.01	0.04	0.71	0.06	3.00	1.02	40.70	13.71%	
FTMH-L1.4	FMH-L1	60	223	8	5.58	225	5.22	5.22	3.89	3.73	1.11	1.26	15.55	0.01	0.04	0.71	0.06	3.00	1.02	40.70	13.71%	
FMH-L1	FMH4035436	60	223	8	5.58	225	5.22	5.48	3.73	3.56	1.26	1.69	16.80	0.01	0.04	0.71	0.06	3.00	1.02	40.70	13.71%	
FMH4035436	FMH4035437	356	1318	6	24.72	450	5.48	5.57	0.72	0.63	4.31	4.49	38.94	0.00	0.16	1.41	0.11	3.00	0.78	124.21	19.90%	
FMH4035437	FMH4035438	356	1318	6	24.72	450	5.57	5.14	0.63	0.48	4.49	4.21	37.66	0.00	0.16	1.41	0.11	3.00	1.03	163.19	15.15%	
FMH4035438	FMH4035439	356	1318	6	24.72	450	5.14	4.77	0.43	0.31	4.26	4.01	39.30	0.00	0.16	1.41	0.11	3.00	0.90	142.83	17.30%	
FMH4035439	FMH4035440	445	1649	6	30.93	450	4.77	5.50	0.28	0.14	4.04	4.91	37.85	0.00	0.16	1.41	0.11	3.00	0.99	157.24	19.67%	
FMH4035440	FMH4035441	85973	318419	3	3080.84	1650	5.50	5.20	-1.66	-1.76	5.51	5.31	47.20	0.00	2.14	5.18	0.41	3.00	1.73	3697.92	83.31%	
FMH-L3.1	FMH-L3.2	60	223	8	5.58	225	6.50	5.90	4.86	4.78	1.42	0.90	7.81	0.01	0.04	0.71	0.06	3.00	1.02	40.70	13.71%	
FMH-L3.2	FTMH-L3.3	60	223	8	5.58	225	5.90	5.80	4.78	4.42	0.90	1.16	54.00	0.01	0.04	0.71	0.06	3.00	0.84	33.21	16.80%	
FTMH-L3.3	S11A	60	223	8	5.58	225	5.80	-	4.27	4.14	1.16	-	19.13	0.01	0.04	0.71	0.06	3.00	0.84	33.21	16.80%	
S11A	S12	68	252	8	26.43	300	-	-	3.11	2.80	-	-	79.89	0.00	0.07	0.94	0.08	3.00	0.77	54.65	48.36%	
S12	S13	68	252	8	26.43	300	-	-	2.80	2.60	-	-	83.40	0.00	0.07	0.94	0.08	3.00	0.61	42.93	61.58%	