Annex 1

Revised Sewage Impact Assessment

Sewage Impact Assessment For Section 16 Planning Application of Proposed Temporary Concrete Batching Plant for a Period of 5 Years in "Other Specified Uses" annotated "Boatyard and Marine-oriented Industrial Uses" Zone, Tsing Yi Town Lots Nos. 14 and 15 and Adjoining Government Land, Tam Kon Shan Road, Tsing Yi, New Territories

SEWAGE IMPACT ASSESSMENT REPORT

Reference: 31048-R05-03
Date: May 2025

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Contents

1 Introduction

1.1 Background

The Applicant intends to seek Town Planning Board ("TPB") approval for a Proposed Temporary Concrete Batching Plant for a Period of 5 Years at Tsing Yi Town Lots (TYTL) 14 and 15 and Adjoining Government Land, Tam Kon Shan Road, Tsing Yi (hereafter "the proposed development").

In the Approved Tsing Yi Outline Zoning Plan No. S/TY/32 (referred to as the "OZP"), the Application Site is zoned as "Other Specified Uses" annotated "Boatyard and Marine-oriented Industrial Uses". According to the Schedule of Uses outlined in the OZP, the intended use of a Concrete Batching Plant falls under Column 2 uses. Consequently, obtaining planning permission from TPB is necessary for the proposed temporary concrete batching plant under Section 16 of the Town Planning Ordinance.

As there is a public sewer system currently available in the vicinity of the subject site, it is necessary to propose a sewerage connection between the proposed development and the public sewer.

AXON Engineering & Consulting Limited (AXON) was commissioned to carry out a Sewage Impact Assessment (SIA) report to review and recommend appropriate sewage treatment and disposal scheme.

1.2 Objectives

The objectives of the SIA are as follow:

- to estimate the sewage generation; and
- to examine the impact arising from the estimated sewage on the proposed sewerage connection and existing sewer system.

1.3 References

Reference is made to the following document:

1. Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (GESFSIP) (Version 1.0), EPD; and

2. Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM), EPD; and

3. Sewerage Manual – Key Planning Issues and Gravity Collection System (Sewerage Manual) (3rd edition), Drainage Services Department (DSD), May 2013.

2 Baseline Conditions and Review Methodology

2.1 Site Description

The Application Site has an approximate area of 4,335m^2 and is bounded by TYTL 14, TYTL 15 and Adjoining Government Land, Tam Kon Shan Road, Tsing Yi. The site location is shown in **Figure 2.1**.

2.2 Evaluation of Wastewaters Generation

The Concrete Batching Plant (CBP) is designed to include three production lines, achieving an overall processing capacity of 300 cubic meters per hour and 4,200 cubic meters per day. The concrete batching procedure primarily entails the management of raw materials from their delivery to storage, followed by the respective weigh hoppers, concrete batch mixers, and ultimately the loading of the mixed concrete onto mixer trucks for distribution.

The concrete batching and ground washing processes are designed to generate no effluent. As outlined in the environmental assessment of this Concrete Batching Plant, the project proponent will adopt a "Zero Discharge Strategy" for these operations: water used for ground washing will be collected and transferred to wastewater tanks for reuse in truck washing or recycled for concrete production. Additionally, concrete waste will be collected by a concrete reclaimer, which will separate the cement slurry water from the aggregates. The cement slurry water will subsequently be treated through a filter press to extract cement particles, enabling the clear water to be recycled for site cleaning, dust control or even concrete production.

The main types of wastewaters generated by the proposed development will be sewage from on-site staff and visitors (concrete mixer truck drivers). To estimate sewage generation, the following assumptions were made:

- The proposed development will have 15 on-site staff and 600 visitors per day, which is derived from dividing the daily concrete production (4,200 cubic meters) by capacity of concrete mixer trucks (7 cubic meters)
- For on-site staff, the combined UFF of 0.230m³/person/day is used to calculate sewage generation for the on-site staff, based on the Commercial Employee and Commercial Activities J9 (Construction) in Table T-2 of GESFSIP.

- For visitor, the combined UFF of 0.0026m^3/person/visit (= 200mL micturition + 1L flushing + 1.4L handwashing) is used to calculate sewage generation for the based on the (1) Human's micturition is assumed to be 200mL in accordance with P.3081 of Magill's Medical Guide, 6th edition; (2) Volume of flushing system as advised by the supplier; and (3) Volume of handwashing system in accordance with BEAM Plus New Buildings Version 1.2 in July 2012.

As calculated in **Appendix A**, the estimated Average Dry Weather Flow (ADWF) is 5.01m³/day and the Design Peak Flow is 0.0005m³/second, respectively.

2.3 Proposed Sewerage Connection and Calculation

It is essential to highlight that sufficient foul water manholes from the Drainage Services Department (DSD) are situated along Tam Kon Shan Road. A proposed sewerage connection, consisting of a 150mm underground pipe, aims to connect the public sewer to the manhole within the planned development, and a 225mm underground pipe functions for enhancing existing government pipes FMD4003000. Manning's Equation for calculating the pipe capacities was adopted for this analysis:

$$V = \frac{R^{2/3} S^{1/2}}{n}$$

where
V = mean velocity, m/s
S = slope of the total energy line
n = Manning's roughness coefficient
R = hydraulic radius, m

A Manning's roughness coefficient of 0.015 was utilized to determine the capacities of the new concrete drainpipe, reflecting the assumption of the concrete pipe being in fair condition.

The proposed layout plan for the sewerage connection, along with comprehensive calculations, can be found in **Figure 2.2** and **Appendix B**, respectively. Pipe DP1 establishes a direct link between the Manhole MH1 located on the Site and the Government Foul Water Manhole FMH4052191, whereas Pipe DP2 enhances two existing 150mm government pipes FMD4003000 by replacing them with a 225mm diameter pipe that offers greater hydraulic capacity and improved self-cleaning properties. A summary of pipe's capacity is outlined in **Table 2.1**.

Table 2.1 Capacities of the Pipes

Type	ID	Capacity, m^3/s	Design Peak Flow, m^3/s	% of Capacity Flow	OK? (Y/N)
Underground Pipe (150 mm)	DP1	0.0111	0.0005	4%	Y
Underground Pipe (225 mm)	DP2	0.0270	0.0005	2%	Y

As depicted in **Table 2.1**, the proposed sewerage connection is designed to ensure that the peak design flow does not its total capacity, effectively discharging the sewage produced by the proposed development.

2.4 Sensitivity Test

An evaluation of the sewerage impact of the proposed development on the existing sewer system has been conducted through a sensitivity test for the public foul water drainpipe FWD4019926, which connects the government foul water manholes FMH4019395 and FMH4019396. The boundaries of assessment for sensitivity test are depicted in **Figure 2.3**, including the upstream catchments (nearby developments along Tam Kon Shan Road) and encompassing the public sewer network between FMH4019445 and FMH4019396.

In a conservative approach, the upstream flow resulting from the nearby development along Tam Kong Shan Road is assumed to equal the full bore capacity of the upstream public foul water drainpipe FWD4019925, which is $0.0197m^3/s$, as indicated in the calculations sheet found in **Appendix B**. The design peak flow for the sensitivity test is the total of this maximum capacity of pipe FWD4019925 and the design peak flow from the proposed development, amounting to $0.0202m^3/s$.

A Manning's roughness coefficient of 0.017 was applied to evaluate the capacities of the public clay drainpipe FWD4019926, which reflects the assumption that the common clay drainage tile is in poor condition. A summary of the sensitivity test results for drainpipe FWD4019926 is provided in **Table 2.2**, with detailed calculations available in **Appendix B**.

Table 2.2 Capacities of the Pipes (Sensitivity Test)

Type	ID	Capacity, m^3/s	Design Peak Flow, m^3/s	% of Capacity Flow	OK? (Y/N)
Underground Pipe (300 mm)	Government Drainpipe FWD4019926	0.0217	0.0202	93%	Y

As depicted in **Table 2.3**, the public foul water drainpipe FWD4019926 possesses adequate hydraulic capacity to accommodate both the foul water from the upstream catchment area and the wastewater generated by the proposed development. As a result, no adverse sewerage impact will arise from the proposed development.

3 Summary and Conclusions

The Applicant intends to seek Town Planning Board ("TPB") approval for a Proposed Temporary Concrete Batching Plant for a Period of 5 Years at Tsing Yi Town Lots (TYTL) 14 and 15 and Adjoining Government Land, Tam Kon Shan Road, Tsing Yi.

The estimated Design Peak Flow and Estimated Average Dry Weather Flow (ADWF) from the proposed development are estimated to be 0.0005m³/second and 5.01m³/day, respectively. The effluent is proposed to be discharged to the public sewer.

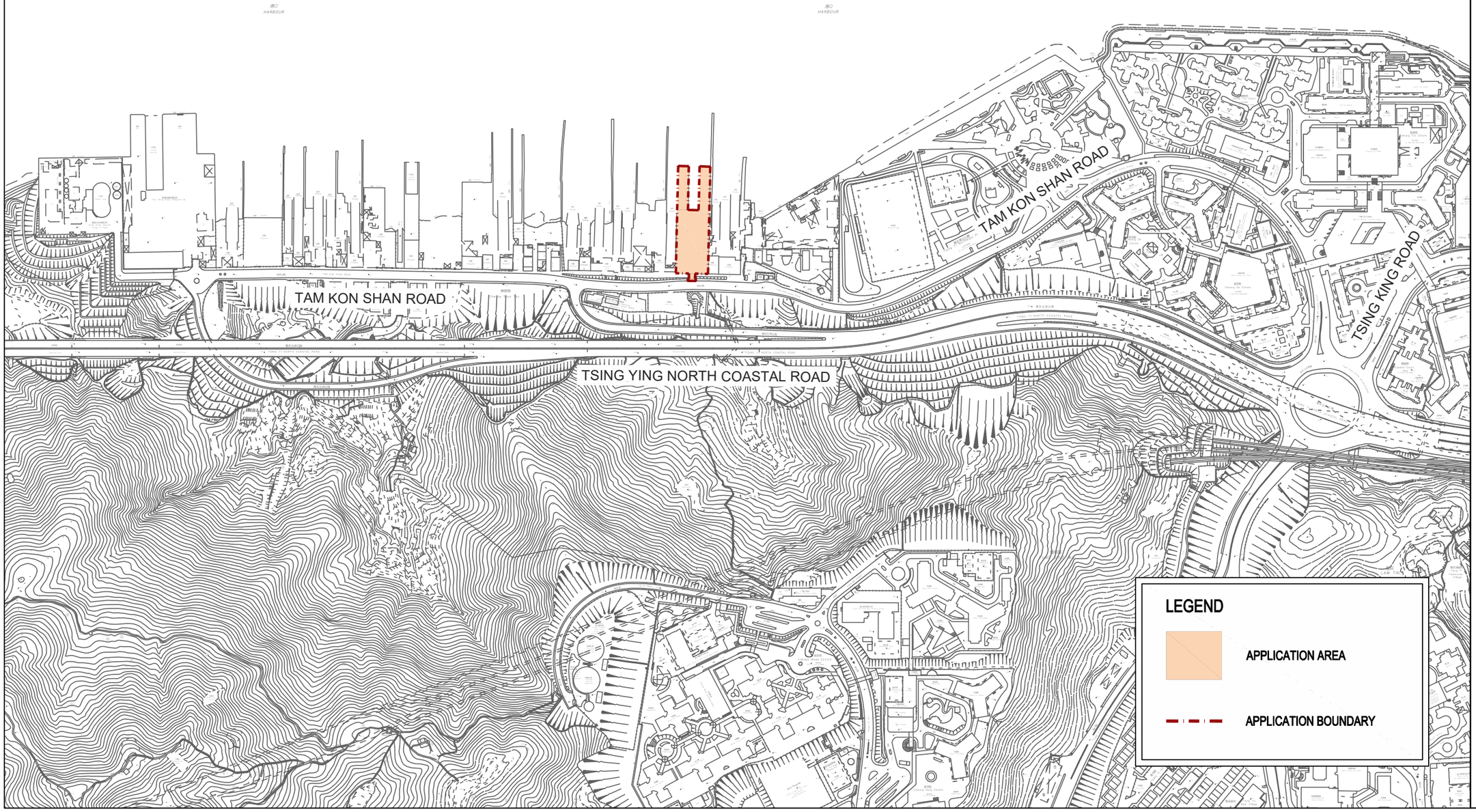
With the provision of proposed sewerage connection mentioned in **Section 2.3** and the sensitivity test analysis for the existing sewerage system discussed in **Section 2.4**, no adverse sewerage impact will arise from the proposed development.

Figures

Sewerage Impact Assessment for Section 16 Planning Application of Proposed Temporary Concrete Batching Plant for a Period of 5 Years in "Other Specified Uses" annotated "Boatyard and Marine-oriented Industrial Uses" Zone, Tsing Yi Town Lots Nos. 14 and 15 and Adjoining Government Land, Tam Kon Shan Road, Tsing Yi, New Territories

SITE LOCATION

FIGURE 2.1



Scale : 1:5000 (A3)

Date : APR 2025

Rev. :

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C:\USERS\USER\DESKTOP\31048\DATA\DRAWINGS\AI\FIGURE 2.1.DWG

Sewerage Impact Assessment for Section 16 Planning Application of Proposed Temporary Concrete Batching Plant for a Period of 5 Years in "Other Specified Uses" annotated "Boatyard and Marine-oriented Industrial Uses" Zone, Tsing Yi Town Lots Nos. 14 and 15 and Adjoining Government Land, Tam Kon Shan Road, Tsing Yi, New Territories

PROPOSED SEWERAGE CONNECTION

FIGURE 2.2

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C:\USERS\USER\DESKTOP\31048\DATA\DRAWINGS\AI\FIGURE-2.2.DWG

MH1
CL 4.31
X1 3.85 - 150

DP1 - 150, Grad - 0.01

DP2 - 225,
Grad - 0.007

FWD4019925 - 300
Grad - 0.001

FWD4019926 - 300
Grad - 0.0012

GOVERNMENT FOUL WATER MANHOLE FMH4052191
CL 5.26
A1 3.70 - 150
~~X1 3.79 - 2 x 150~~ NEW X1 3.70 - 225

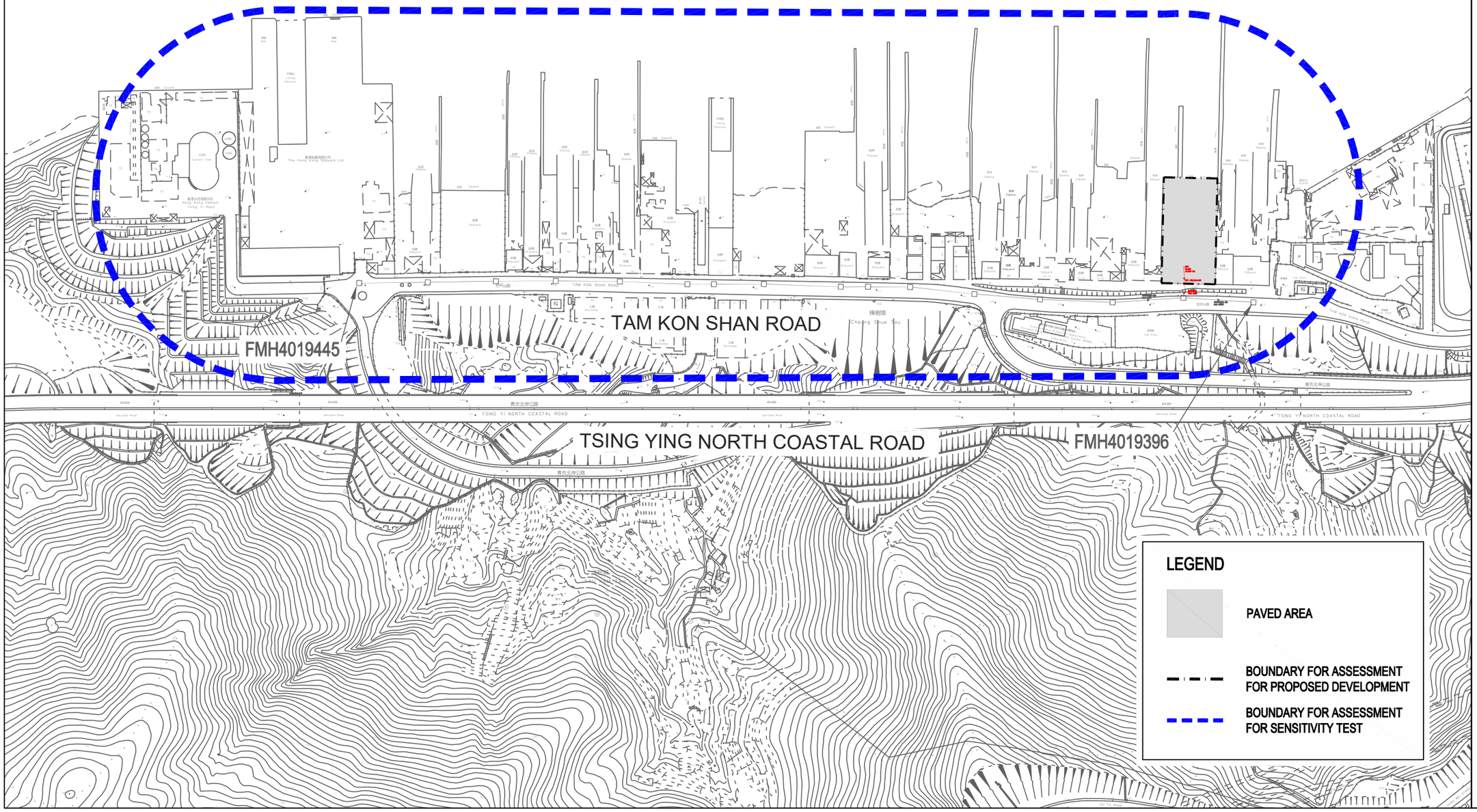
GOVERNMENT FOUL WATER MANHOLE FMH4019394
CL 5.38
A1 3.72 - 300
A2 3.72 - 225
X1 3.72 - 300

GOVERNMENT FOUL WATER MANHOLE FMH4019395
CL 5.09
A1 3.67 - 300
~~A2 2 x 150~~ NEW A2 3.67 - 225
X1 3.67 - 300

GOVERNMENT FOUL WATER MANHOLE FMH4019396
CL 5.46
A1 3.61 - 300
A2 3.61 - 225
X1 3.61 - 300

LEGEND

- PAVED AREA
- BOUNDARY FOR ASSESSMENT FOR PROPOSED DEVELOPMENT
- DP1 — PROPOSED UNDERGROUND DRAINPIPE
- MH1 — PROPOSED MANHOLE



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BOUNDARY FOR SENSITIVITY TEST

FIGURE 2.3

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Appendix A

Calculations of Wastewater Generation

Catchment A - Calculation of Sewage Generation from the Site

				Remarks
On-site Staff				
No. of Production Line	=	3	line	
Production Line occupancy	=	5	person/line	Information advised by the Applicant
No. of workers	=	15	persons	
Unit Flow Factor of Industrial Employees	=	0.08	m^3/person/day	The unit flow factors of Commercial Employees in Table T-2 of GESFSIP (note 1).
Unit Flow Factor of Industrial Activities	=	0.15	m^3/person/day m^3/p	The unit flow factors of Commercial Activities J9 (Construction) in Table T-2 of GESFSIP (note 1).
Combined Unit Flow Factor	=	0.23	m^3/person/day	
Estimated peak daily flow	=	3.45	m^3/day	
Visitor (Truck Driver)				
No. of Visitors	=	600	persons	
Micturition	=	0.0002	m^3	P.3081 of Magill's Medical Guide
Flushing	=	0.001	m^3	The information is advised by the supplier
Handwawshing	=	0.0014	m^3	BEAM Plus New Buildings Version 1.2 in July 2012.
Combined Unit Flow Factor	=	0.0026	m^3/person/visit	
Estimated peak daily flow of the Site Staff	=	1.56	m^3/day	
Total				
Estimated Average Dry Weather Flow (ADWF)	=	5.01	m^3/day	
		0.21	m^3/hour	
Unit Contributing Flow	=	0.27	m^3/person/day	The unit contributing flow in Section 12.1 of GESFSIP (note 1).
Contributing Population	=	19	person	
Flowrate Peaking Factor	=	8		The peaking factor for population < 1,000 population recommended in Table T-5 of GESFSIP (note 1).
Design Peak Flow	=	1.67	m^3/hour	
Design Peak Flow	=	0.0005	m^3/second	

Note:

1. Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (GESFSIP) Version 1.0 published by the Environmental Protection Department

Appendix B

Sewerage Drain Analysis Including Sensitivity Test

Sewerage Drain Analysis

The fair conditions of concrete pipe are considered for the value of n for Manning equation (DSD SM Table 6)

Drain Pipe ID	Nominal Diameter, mm	Upper Invert Level	Lower Invert Level	Gradient	Manning's Roughness Coefficient	Cross Section Area, m^2	Wetted Perimeter, m	Hydraulic Radius, m	Full Bore Velocity (Vc), m/s	Full Bore Capacity (Qc), m^3/s	Design Flow (Q), m^3/s	% of Capcity Flow	Sufficient Capacity (Y/N)
DP1 [from MH1 to Government Manhole FMH4052191]	150	3.85	3.70	0.010	0.015	0.0159	0.47	0.034	0.7	0.0111	0.0005	4%	Y
DP2 [to Government Manhole FMH4019395]	225	3.70	3.67	0.007	0.015	0.0358	0.71	0.051	0.8	0.0270	0.0005	2%	Y

Sewerage Drain Analysis - Sensitivity Test

The bad conditions of common clay drainage tile are considered for the value of n for Manning equation (DSD SM Table 6)

Drain Pipe ID	Nominal Diameter, mm	Upper Invert Level	Lower Invert Level	Gradient	Manning's Roughness Coefficient	Cross Section Area, m^2	Wetted Perimeter, m	Hydraulic Radius, m	Full Bore Velocity (Vc), m/s	Full Bore Capacity (Qc), m^3/s	Design Flow (Q), m^3/s	% of Capcity Flow	Sufficient Capacity (Y/N)
Government Drainpipe FWD4019925 [from Government Manhole FMH4019394 to Government Manhole FMH4019395]	300	3.72	3.67	0.001	0.017	0.0636	0.94	0.068	0.3	0.0197	N/A	N/A	N/A
Government Drainpipe FWD4019926 [from Government Manhole FMH4019395 to Government Manhole FMH4019396]	300	3.67	3.61	0.0012	0.017	0.0636	0.94	0.068	0.3	0.0217	0.0202	93%	Y