

Appendix C

Sewerage and Drainage Assessment

Intentionally Blank

Sewerage and Drainage Appraisal

For

Section 16 Application

For

Proposed Temporary Logistic Centre, Warehouse (excluding Dangerous Goods) and Vehicle Repair Workshop

For a Period of 3 Years

and Associated Filling of Land and Pond

at the Remaining Portion (RP) of 342 (part) and RP of 343

in Demarcation District (D.D.) 87,

North New Territories, Hong Kong

Proposed by: Prudential Surveyors International Limited

Revision: -

Date: December 2023

TABLE OF CONTENT

1.	Introduction	4
1.1	Background	4
1.2	The Site and its Surroundings.....	4
1.3	Proposed Development.....	4
2.	Sewerage Appraisal.....	6
2.1	Scope of Works	6
2.2	Existing Sewerage Facilities.....	6
2.3	Estimation of Sewerage Flow.....	6
2.4	Proposed Sewerage Arrangement.....	6
2.5	Conclusion.....	7
3.	Drainage Appraisal.....	8
3.1	Scope of Works	8
3.2	Existing Drainage Facilities	8
3.3	Drainage Catchment Area	8
3.4	Drainage Calculations for the Proposed Provision of Drainage Facilities	8
3.5	Proposed Drainage Connection	9
3.6	Conclusion.....	9

List of Figures

<i>Figure 1.1</i>	<i>Location Plan</i>
<i>Figure 1.2</i>	<i>Site Location and the Surroundings</i>
<i>Figure 2.1</i>	<i>Existing DSD Utility Record Plan</i>
<i>Figure 2.2</i>	<i>Layout Plan</i>
<i>Figure 3.1</i>	<i>Proposed Drainage Connection</i>
<i>Figure 3.2</i>	<i>Design Calculation of Proposed Drainage System</i>

List of Tables

<i>Table 1.1</i>	<i>Proposed Development Parameters</i>
<i>Table 2.1</i>	<i>Estimated Sewerage Flow from the Site</i>

Appendices

<i>Appendix A</i>	<i>Reference Sand Trap</i>
<i>Appendix B</i>	<i>Reference Petrol Interceptor</i>

1. Introduction

1.1 Background

1.1.1 The purpose of this Sewerage and Drainage Appraisal (SDA) is to furnish members of the TPB with details of the development proposal in support of this S16 Application and other necessary information to facilitate consideration of the Proposed Development.

1.2 The Site and its Surroundings

1.2.1 The Site, with an area of about 3,060 sq.m, is located to the North of Kong Nga Po Road and to the Southeast of San Uk Ling Holding Centre, North New Territories, Hong Kong **[Figure 1.1]**. Currently, the Site has remained fallowed from agriculture productivity and an abandoned fish pond for many years. There are no intention by the landowners to use the land for agricultural use at this time.

1.2.2 The Site is surrounded by existing natural features such as woodlands, as well as, existing man-made features such as warehouses, temporary structures, pigsties/farms, and roads. The details of the current context and the planned context of the surrounding are as follows: **[Figure 1.2]**:

Current Context

- to the north of the Site are some warehouses;
- to the further north are natural features composing of mainly woodlands;
- to the east of the Site is a road (unnamed) and some temporary structures and warehouses;
- to the south of the Site is a pigsty/farm and Kong Nga Po Road,
- to the further south are some pigsties and woodlands; and

Planned Context

- to the west of the Site is the Planned Police Facilities.

1.2.3 The Site is accessible via Kong Nga Po Road.

1.3 Proposed Development

1.3.1 The following table summarises the major development parameters for this Proposed Development: -

Major Development Parameters	Proposed Development
Site area	About 3,060 sq.m <i>Covered Area: about 581 sq.m (approx. 19%)</i> <i>Uncovered Area: about 2,479 sq.m (approx. 81%)</i>
Site Coverage	About 19%
Applied Use	Temporary Logistic Centre, Warehouse (excluding Dangerous Goods) and Vehicle Repair Workshop for a period of 3 Years and Associated Filling of Land and Pond

Major Development Parameters	Proposed Development
Nos. of Temporary Structures	1 nos. structure for Freight Working Area (H: not exceeding 7m, L: not exceeding 20m, W: not exceeding 13m) 1 nos. of Site Office (H: not exceeding 3m, L: not exceeding 7m, W: not exceeding 3m) 1 nos. of Vehicle Repair Workshop (H: not exceeding 7m, L: not exceeding 25m, W: not exceeding 20m)
Fences	1.8m high fences will be established around the Site
Tree Planting	<i>Cinnamomum burmannii</i> and <i>Scheera heptaphylla</i> will be planted along the Site boundary within the Site at the spacing of about 3m to 4m
Parking Provision ¹	1 nos. Accessible Parking/Private Parking (L: 5m, W: 3.5m) 1 nos. Heavy Goods Vehicle Parking also able to be used for loading/unloading (L: 11m, W: 3.5m)

Table 1.1 - Proposed Development Parameters

¹ Referenced to Hong Kong Planning and Standards Guidelines Chapter 8.

2. Sewerage Appraisal

2.1 Scope of Works

- 2.1.1 The objective of this Sewerage Appraisal (SA) is to assess whether the capacity of the sewerage networking is sufficient to cope with the peak sewerage flow arising from the Proposed Development.
- 2.1.2 Existing drainage record plan from the Drainage Services Department (DSD) is shown in **Figure 2.1**.

2.2 Existing Sewerage Facilities

- 2.2.1 According to the drainage record plan, there is no existing public sewerage network serving the Site. [refer to **Figure 2.1**]. Hence, the Site is in an unsewered area at present.

2.3 Estimation of Sewerage Flow

- 2.3.1 The peak sewerage flow from the Proposed Development is estimated based on the population. The Proposed Development is designed to accommodate 10 workers. With reference to Report No.: EPD/TP 1/05 Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Version 1.0, the Unit Flow Factors for Commercial Flows (Transport, Storage & Communication) is 0.100 (Planning for Future ($\text{m}^3/\text{person}/\text{day}$)). Table 2.1 shows the design peak sewage flow for the Proposed Development.

Calculation for Sewerage Flow Generation Rate of the Site			
1a. Total number of workers	=	10	people
1b. Unit Flow Factors	=	0.100	$\text{m}^3/\text{person}/\text{day}$ – refer to Commercial activities J3 in Table T-2 of GESF
1c. Total Flow	=	1	m^3/day

Table 2.1 Estimated Sewerage Flow from the Site

2.4 Proposed Sewerage Arrangement

- 2.4.1 The total design peak flow from the Site has been estimated to be approximately $1 \text{ m}^3/\text{day}$ (1000L). In consideration that the Site is unsewered area, it is necessary to consider the provision of portable toilets, which is the most cost-effective and environmentally sound approach for collecting and treating (off-site) the sewage generated from the Site. To ease congestion, it is proposed to provide 3 nos. of portable toilets with integral storage tanks of 500L each, with a total capacity of 1.5 m^3 and will not be connected to a septic tank or soakaway system (STS). Periodic collection of waste will be arranged by the Applicant or as required.
- 2.4.2 Any other wastewater generated from the site, such as floor cleaning, will be limited to several cubic metres and will be poured into the portable toilets. Then, the collected wastewater will be taken off site.

- 2.4.3 The layout plan indicating the location of the proposed portable toilets for the Site is illustrated in **Figure 2.2**.

2.5 Conclusion

- 2.5.1 A sewage appraisal has been conducted for the Proposed Development. The results show that 1m³/day of total sewage flow is expected to be generated from the Proposed Development upon full occupancy. To ease congestion, a total of 3 nos. of portable toilets with 500L capacity (total capacity 1500L) is proposed for the 10 on-site workers.
- 2.5.2 Based on the sewerage generated and the capacity of the portable toilets, it is anticipated that there will be no serious adverse sewerage impact to the area after the implementation of the development.

3. Drainage Appraisal

3.1 Scope of Works

- 3.1.1 The objective of this Drainage Appraisal (DA) is to assess whether the Proposed Development may cause adverse impacts on drainage and flooding. These impacts will be identified and mitigation measures will be proposed in order to demonstrate that the Proposed Development will not cause an unacceptable increase in the risk of flooding in areas upstream of, adjacent to or downstream of the development.
- 3.1.2 Existing drainage record plan from the Drainage Services Department (DSD) was attached in **Figure 2.1**.

3.2 Existing Drainage Facilities

- 3.2.1 According to the drainage record plan, there is no existing public drainage network serving the Site [refer to Figure 2.1]. Hence, the Site is not serviced by drains at present.

3.3 Drainage Catchment Area

- 3.3.1 The drainage catchment areas included upstream catchment area and the Site. **Figure 3.1** illustrates the estimated upstream catchment area and the Site.
- 3.3.2 The surface runoff discharged from the upstream catchment area and the Site would be collected by the proposed perimeter U-channel inside the Site and flow through a sand trap and petrol interceptor and discharged to the proposed stormwater manholes outside the Site.

3.4 Drainage Calculations for the Proposed Provision of Drainage Facilities

- 3.4.1 The Rational Method has been adopted for hydraulic analysis and the peak runoff is given by the following expression:

$$Q = 0.278 C i A$$

where

Q = peak runoff in m³/s

C = runoff coefficient

i = rainfall intensity in mm/hr

A = catchment area in km²

- 3.4.2 The average rainfall intensity (i) is estimated on the basis of the design rainfall duration and 50 years return period according to Chapter 4 and Table 3a of the Stormwater Drainage Manual (fifth edition, January 2018). The design rainfall duration is taken as the time of concentration (t_c):

$$t_c = 0.14465L/(A^{0.1} H^{0.2})$$

where

A = catchment area (m²)

H = average catchment slope (m/100m)

L = catchment Length (m)

3.4.3 Assuming that:

- i. The area of catchment A is approximately 4683.6071 m² (0.0047 km²) including the size of the upstream area; and
- ii. The area of catchment B is approximately 3060.7798 m² (0.0031 km²) including the size of the Site; and
- iii. Catchment A is almost unpaved and therefore the value of runoff coefficient (C) for unpaved area is taken as 0.35.
- iv. Catchment B is almost paved and therefore the value of runoff coefficient (C) for paved area is taken as 0.95.

3.4.4 The time of concentration of the Catchment A and B is 35.75 mins. The average rainfall intensity for Catchment A and B would then be 132.22 mm/hr. Therefore, the total peak runoff from Catchment A and B is 0.1698 m³/s.

3.4.5 The detailed design calculations of proposed drainage system are provided in **Figure 3.2**. In accordance with the Chart for the Rapid Design of Channels in “Geotechnical Manual for Slopes”, 300mm surface U-channel in 1:100 gradient is considered adequate to dissipate all the stormwater accrued by the upstream area and the Site. The intercepted stormwater will then be discharged to the proposed 300 mm surface U-channel and flow through a sand trap and petrol interceptor and connect to the proposed stormwater manholes outside the Site and flow into the existing water source Ping Yuen River.

3.5 Proposed Drainage Connection

3.5.1 Stormwater runoff from paved surfaces within the Site will be directed to a managed stormwater drainage system. Runoff from the roofs of structures and road surfaces including access roads within the site, may carry suspended solids and other pollutants such as fuel, oils and heavy metals that could enter nearby surface water bodies if uncontrolled. Mitigation measures including installation of sand traps [refer to **Appendix A**] and petrol interceptors [refer to **Appendix B**] in the stormwater drainage system can effectively reduce the potential impacts of these pollutants on downstream river water quality.

3.5.2 The surface runoff discharged from the upstream area and the Site will be collected by the proposed perimeter 300mm U-channel surrounding the Site and flow through a sand trap and petrol interceptor. The storm water collected from the U-channel would flow into the 300mm precast concrete pipes to a proposed new manhole. The new manhole will be connected to the existing water source Ping Yuen River with minimal disturbance.

3.5.3 The indicative drainage connection is shown in **Figure 3.1**.

3.6 Conclusion

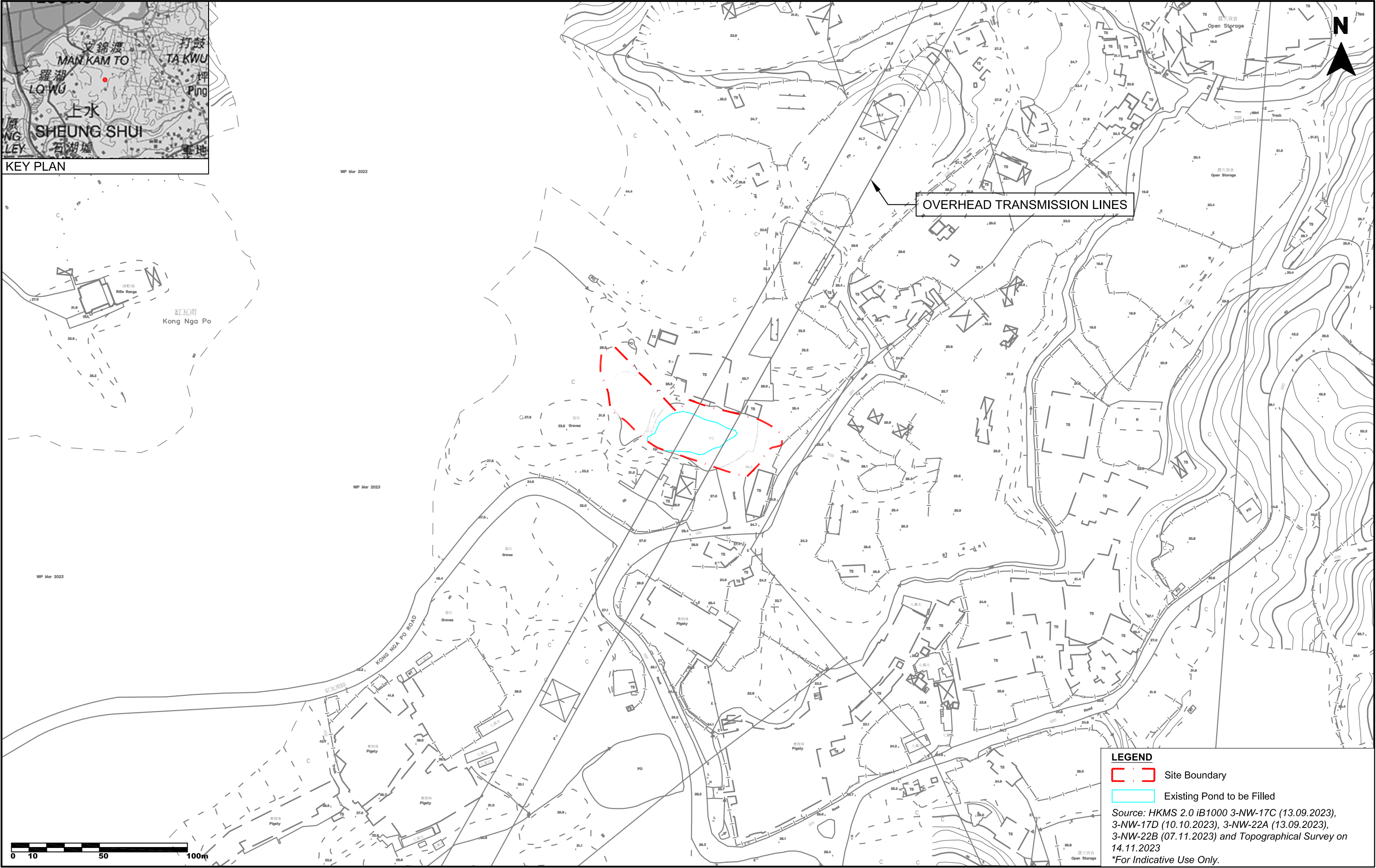
3.6.1 A drainage appraisal has been conducted for the Proposed Development. The surface runoff from the upstream area and the Site will be collected by the proposed perimeter U-channel, flow through a sand trap and petrol interceptor and discharged to the proposed stormwater manholes outside the Site and flow into the existing water source Ping Yuen River.

3.6.2 Based on the proposed drainage system, it is anticipated that there will be no serious adverse drainage impact to the area after the implementation of the development.

Intentionally Blank

Figures

Intentionally Blank



File Name :
Source :

 PRUDENTIAL SURVEYING • LAND ADVISORY • VALUATION	ADDRESS: 2/F & 3/F TUNG HIP COMMERCIAL BUILDING 244 DES VOEUX ROAD CENTRAL HONG KONG TEL: 2507 8333 FAX: 2598 6576	JOB TITLE: Section 16 Application for Proposed Temporary Logistic Centre, Warehouse (excluding Dangerous Goods) and Vehicle Repair Workshop for a Period of 3 Years and Associated Filling of Land and Pond at the Remaining Portion (RP) of 342 (part) and RP of 343 in Demarcation District (D.D.) 87, North New Territories, Hong Kong	Drawing Title LOCATION PLAN				Drawn	CN	Date	20/11/2023	Drawing No. Figure 1.1			
							Checked	RT	Approved	RT				
										Scale	1 : 2 000 @ A3			Rev.
				Rev		Description		Date						

LEGEND

SITE BOUNDARY

Combined Manhole

Overflow (Combined)

Pipe (Combined)

Interface Valve Chamber

Sewer Manhole

Oil / Petrol Interceptor

Overflow (Sewer)

Pipe (Sewer)

Tapping Point (Sewer)

Sewer Terminal Manhole

Catchpit

Inlet

Storm Water Manhole

Outlet

Pipe (Storm)

Sand Trap

Tapping Point (Storm)

Storm Water Terminal Manhole

Tunnel Protection Zone (100m / 200m)

Tunnel Protection Zone (General Range)

Tunnel / Box Culvert (Sewer)

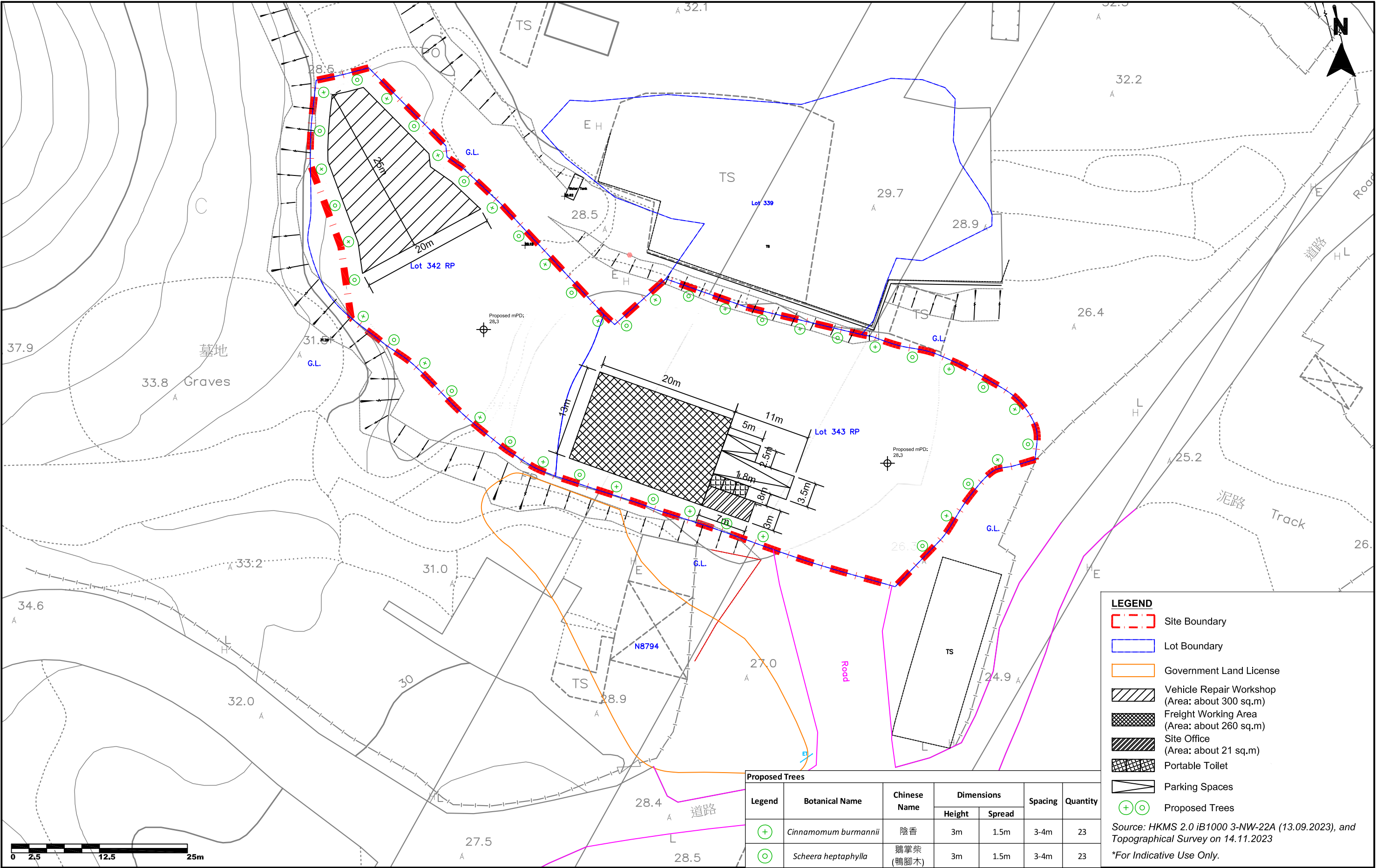
Tunnel / Box Culvert (Storm)

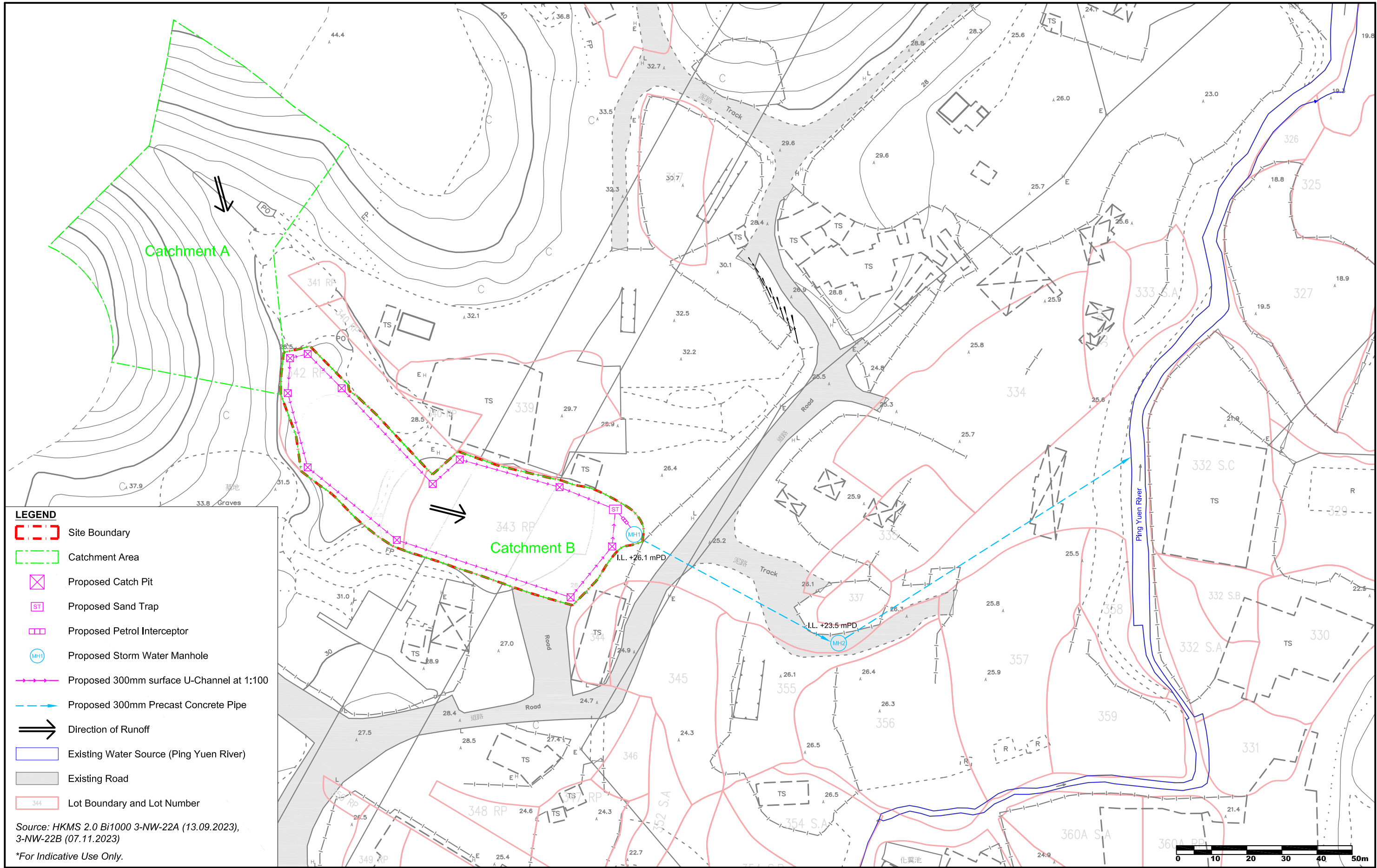
*FOR INDICATIVE USE ONLY

Source: GEOINFO MAP, Extracted on 15/11/2023

File Name :
Source :

PRUDENTIAL SURVEYING • LAND ADVISORY • VALUATION ADDRESS: 2/F & 3/F TUNG HIP COMMERCIAL BUILDING 244 DES VOEUX ROAD CENTRAL HONG KONG TEL: 2507 8333 FAX: 2598 6576	JOB TITLE: Section 16 Application for Proposed Temporary Logistic Centre, Warehouse (excluding Dangerous Goods) and Vehicle Repair Workshop for a Period of 3 Years and Associated Filling of Land and Pond at the Remaining Portion (RP) of 342 (part) and RP of 343 in Demarcation District (D.D.) 87, North New Territories, Hong Kong	Drawing Title Existing DSD Utility Record Plan			Drawn CN	Date 23/11/2023	Drawing No. Figure 2.1
					Checked RT	Approved RT	
					Scale 1:8000 @ A3		Rev.
			Rev	Description	Date		-





 PRUDENTIAL SURVEYING • LAND ADVISORY • VALUATION	ADDRESS: 2/F & 3/F TUNG HIP COMMERCIAL BUILDING 244 DES VOEUX ROAD CENTRAL HONG KONG TEL: 2507 8333 FAX: 2598 6576	JOB TITLE: Section 16 Application for Proposed Temporary Logistic Centre, Warehouse (excluding Dangerous Goods) and Vehicle Repair Workshop for a Period of 3 Years and Associated Filling of Land and Pond at the Remaining Portion (RP) of 342 (part) and RP of 343 in Demarcation District (D.D.) 87, North New Territories, Hong Kong	Drawing Title Proposed Drainage Connection			Drawn CN	Date 27/11/2023	Drawing No. Figure 3.1
						Checked RT	Approved RT	
						Scale 1:1000 @ A3		Rev.
				Rev	Description	Date		-

Formula Used

Time of Concentration

t_c = 0.14465L/(A^0.1 H^0.2)

Intensity

I = a / (tc + b)^c

Runoff

Q = 0.278 C i A

Runoff Calculation after Proposed Development

Runoff Coeff. for Unpaved Area [C]	Runoff Coeff. for Paved Area [C]	Intensity Coeff. (taken from Table 3a of Stormwater Design Manual, 1 in 50 return)					
0.35	0.95	a	451.3	b	2.46	c	0.337

Catchment	Area [A] (km²)	Unpaved Area [A] (km²)	Paved Area [A] (km²)	Average Slope [H] (m per 100m)	Longest Path [L] (m)	Time of Conc. [t_c] (min.)	Intensity [i] (mm/hr)	Runoff from Unpaved Area (m³/s)	Runoff from Paved Area (m³/s)	Peak Runoff [Q] (m³/s)
A	0.0047	0.0047	0	17	116	16.27	168.12	0.0766	0	0.0766
B	0.0031	0	0.0031	1	100	25.69	146.56	0	0.1185	0.1185
A+B	0.0078	0.0047	0.0031	9	215	35.75	132.22	0.0603	0.1095	0.1698
Total Peak Runoff from Catchment A and B (m³/s)										0.1698

Drainage Capacity Check after Proposed Development

Section	Catchment	Open Circular Channel Size [D]	Roughness Factor [n]	Length [L] (m)	I.L.		Gradient [S]	Wetted Cross-Sectional Area [A]	Wetted Perimeter [P]	Hydraulic Radius R=A/P	Velocity V=R^2/3 S^1/2 /n (m/s)	Capacity Q=AV (m³/s)
					Upstream	Downstream						
MH1 to MH2	A+B	300	0.015	61.5257	26.1	23.5	0.04	0.07	0.94	0.08	2.44	0.1723

OK

File Name :
Source :



ADDRESS: 2/F & 3/F TUNG HIP COMMERCIAL BUILDING
244 DES VOEUX ROAD CENTRAL HONG KONG
TEL: 2507 8333
FAX: 2598 6576

JOB TITLE:
Section 16 Application for Proposed Temporary Logistic Centre, Warehouse (excluding Dangerous Goods) and Vehicle Repair Workshop for a Period of 3 Years and Associated Filling of Land and Pond at the Remaining Portion (RP) of 342 (part) and RP of 343 in Demarcation District (D.D.) 87, North New Territories, Hong Kong

Drawing Title
Design Calculation of Proposed Drainage System

Rev	Description	Date
-----	-------------	------

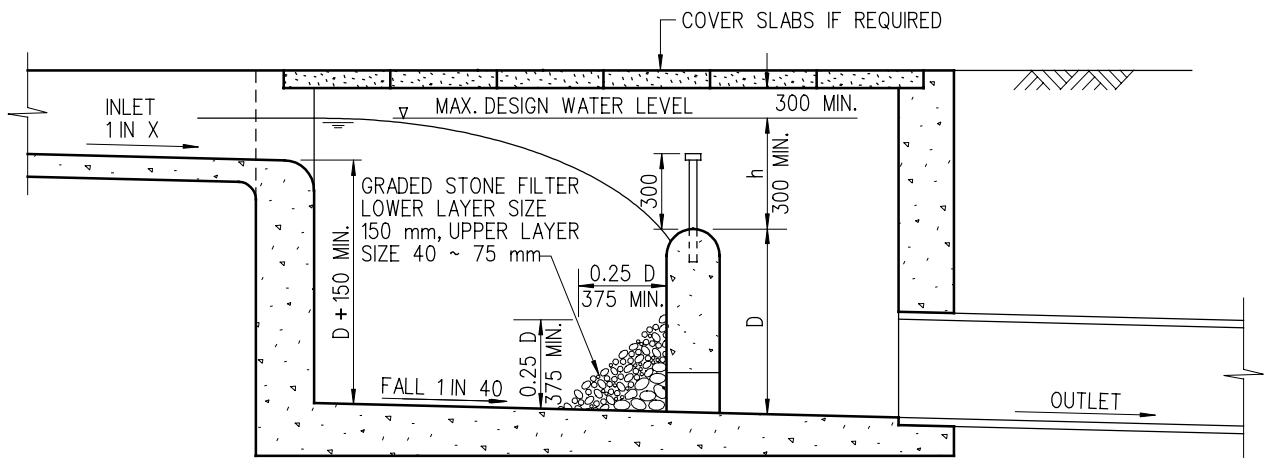
Drawn	CN	Date	16/11/2023
Checked	RT	Approved	RT
Scale		-	

Drawing No.	Figure 3.2
Rev.	

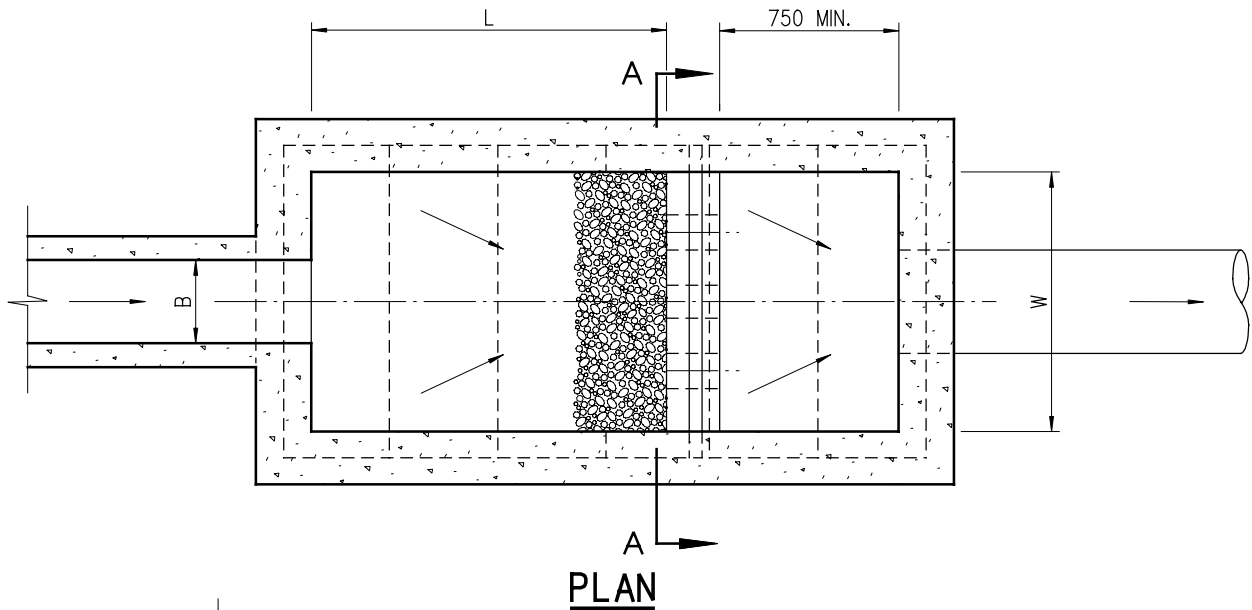
Appendix A

Reference Sand Trap

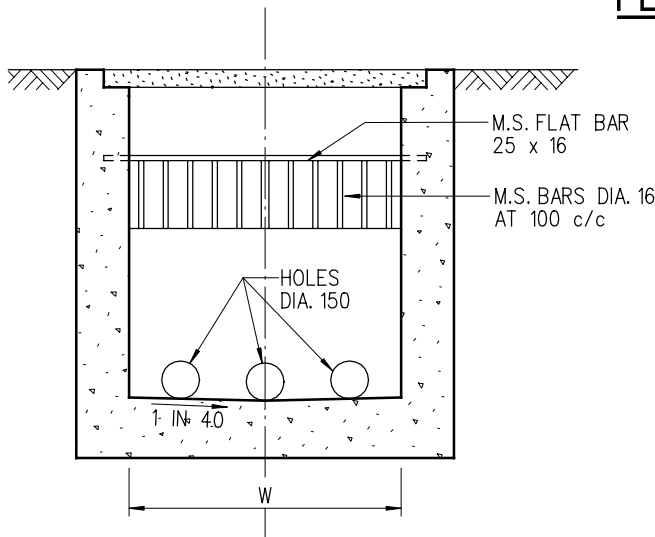
Intentionally Blank



LONGITUDINAL SECTION



PLAN



SECTION A-A

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. NORMALLY FOR DRAINS OF 900 mm DIA. AND BELOW. FOR BIGGER DRAINS AND STEEP TERRAIN, SAND TRAP SHOULD BE SPECIALLY DESIGNED.
3. SIZE
DEPTH : $D \leq 750$
WIDTH : $W \geq 3B$
LENGTH : $4.8D^{0.67} h^{0.5} X^{0.5} \geq 4B$
4. GRADED STONE FILTER SHALL BE CRUSHER RUN GRANITE AGGREGATE.
5. CAPACITY D W L TO BE ACCORDING TO SIZE AND NATURE OF CATCHMENT, PROVIDING DETENTION TIME NOT LESS THAN 5 MINUTES FOR MAX. DESIGN FLOW OF INLET.

B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001
REV.	DESCRIPTION	SIGNATURE	DATE

SAND TRAP

DRAINAGE SERVICES DEPARTMENT

REFERENCE

DRAWING No.

SCALE

DIAGRAMMATIC

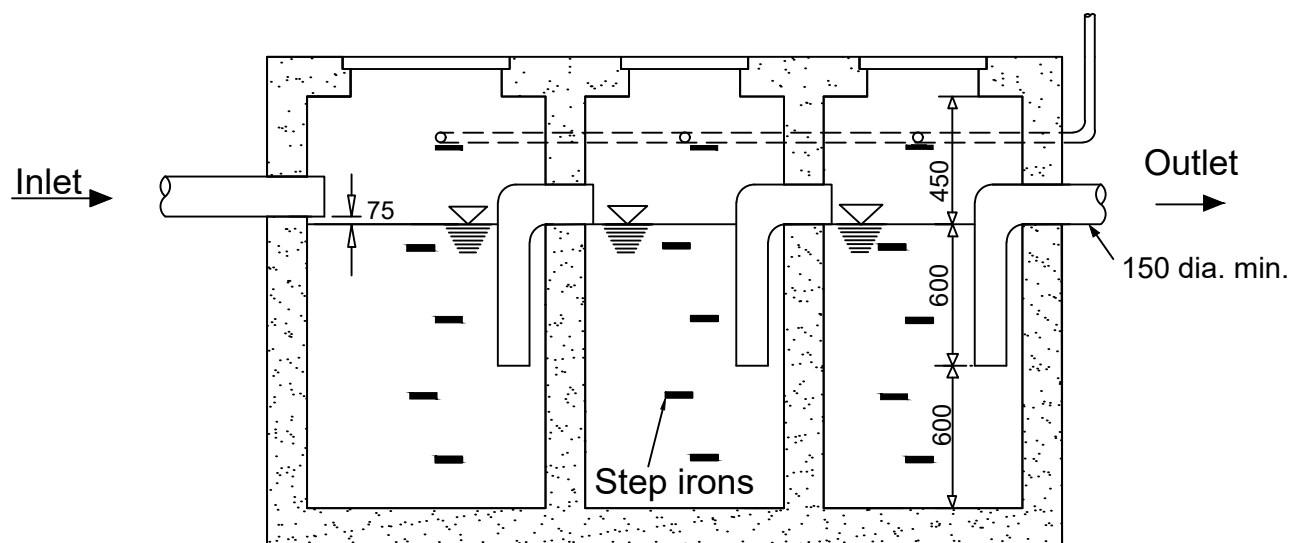
DS 1025B

Intentionally Blank

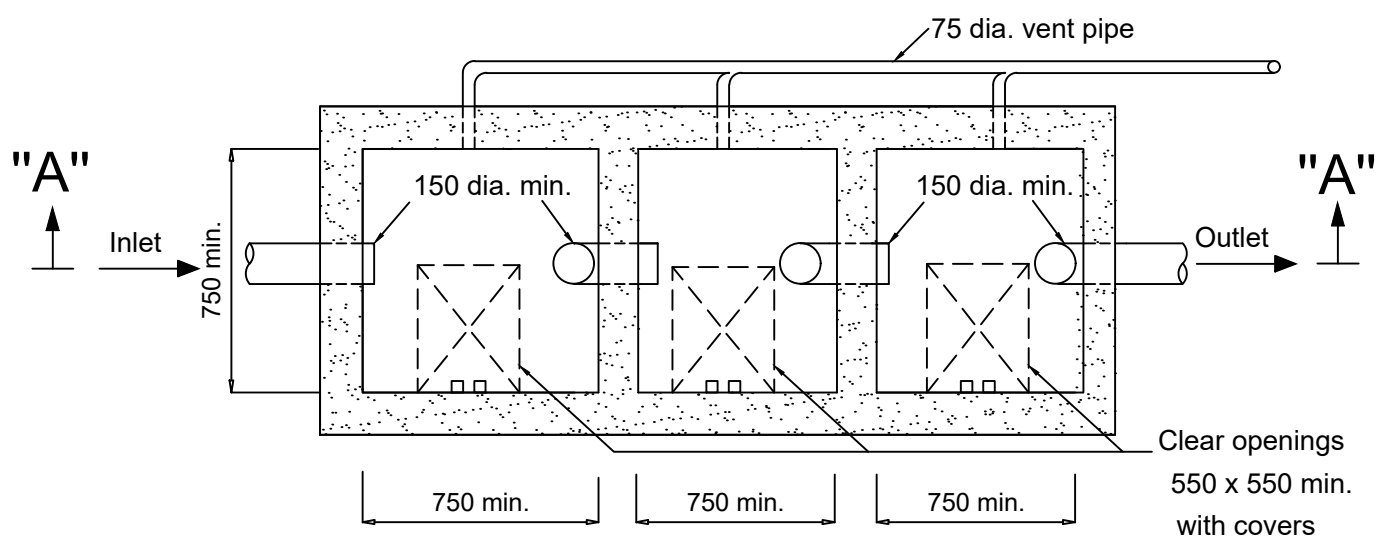
Appendix B

Reference Petrol Interceptor

Intentionally Blank



SECTION A-A



PLAN

Note:

1. All dimensions are in millimetres (mm)

TYPICAL DETAILS OF
A PETROL INTERCEPTOR

DRAWING NO.
EP 50/D1/1/01

DATE
1/23

SCALE
NTS

ENVIRONMENTAL
PROTECTION
DEPARTMENT
HONG KONG



Intentionally Blank