

## Attachment 2

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Sewerage and Drainage Impact Appraisal (Version E)  
(SDIA (Ver. E))

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# **Sewerage and Drainage Impact Appraisal**

**For**  
**Amendment of Plan to**  
**Rezone from “Residential (Group D)” (“R(D)”), “Residential (Group E)”**  
 **(“R(E)”) and an area shown as ‘Road’**  
**to “Residential (Group C)3” (“R(C)3”**  
**on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11**  
**at Various Lots in Demarcation District 210 and Demarcation District 244**  
**and Adjoining Government land**  
**Ho Chung, Sai Kung, New Territories, Hong Kong**

**Prepared by:** Prudential Surveyors International Limited  
**Version:** **E**  
**Date:** **May 2024**

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## 1. Introduction

### 1.1 Background

1.1.1 This Sewerage and Drainage Appraisal is to support a planning permission from the Town Planning Board (TPB) under Section 12A of the Town Planning Ordinance (CAP. 131) for a proposed rezone of the Subject Site from “Residential (Group D)” (“R(D)”), “Residential (Group E)” (“R(E)”) and an area shown as ‘Road’ to “Residential (Group C)3” (“R(C)3”) within various lots within DD210 and DD244 and adjoining government land in Ho Chung, Sai Kung, New Territories. The application Site (the **Site**) is composed of 3 parcels, namely Parcel A, B and C. [refer to **Figure 1.1**]

1.1.2 The owner of the application Site has the intention to construct six individual houses with twelve car parking spaces in Parcels A and B of the Site and two individual house with four car parking spaces in Parcel C of the Site.

### 1.2 Site and its Surroundings

1.2.1 A site visit was carried out on 6 July 2023. Per the observations from the **site Site** visit, it was observed that the Site is situated in rural environs with a mixture of residential, industrial and storage uses with dwellings. [refer to **Figure 1.2**] The details of the surrounding are that:

- to the north of the Site is some 2 and 3-storey rural housing;
- to the east of the Site are some car repair workshops and to the further east are residential blocks of Marina Cove;
- to the south of the Site is the former Production Centre of Asia Television Limited (abandoned); and
- to the west of the Site is Luk Mei Village with a mixture of traditional single-storey village-type developments and modern 3-storey New Territories Exempted Houses (NTEHs).

1.2.2 Apart from residential buildings, there are scattered structures in the vicinity of the Site intended primarily for industrial uses including an unnamed warehouse, a motor repair workshop (Bayview Motors Company), a food factory under Koon Yick Food Manufacturing Company (冠益華記食品廠) (“Koon Yick”).

### 1.3 Proposed Development

1.3.1 The Proposed Development is to erect six individual houses in Parcel A and B of the Site and two individual houses in Parcel C of the Site. The proposed gross floor area (GFA) of the houses are summarised in Table 1.1

<b>Propose House</b>	<b>Gross Floor Area (GFA) (sqm) (about)</b>
House 1	283.35
House 2	283.35
House 3	283.35
House 4	283.35
House 5	283.35
House 6	283.35
House 7	345.75
House 8	345.75
Total	2,391.6
Average	298.95

Table 1.1 Proposed GFA of Houses

## 2. Sewerage Impact Appraisal

### 2.1 Scope of Works

- 2.1.1 The objective of this Sewerage Impact Appraisal (SIA) is to assess whether the capacity of the sewerage networking is sufficient to cope with the peak sewerage flow arising from the proposed comprehensive residential 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 an unsewered area at present.

### 2.3 Proposed Sewerage Treatment

- 2.3.1 In consideration that the Site is unsewered area, it is necessary to consider the provision of an on-site underground Sewerage Treatment Plant, which will be used for treatment of sewerage generated from the Proposed Development.
- 2.3.2 The applicant will be responsible for the construction, operation and maintenance of the on-site underground Sewerage Treatment Plant and all inter-connecting sewerage pipework (polyethylene pipes) within the Site. The sewerage collected from each house will be discharged to septic tank and soil soakaway pit.
- 2.3.3 The design, operation and maintenance of the proposed underground Sewerage Treatment Plant are in compliance with EPD’s Practice Note for Professional Person (ProPECC) PN 5/93. It is proposed to construct eight entire underground Sewerage Treatment Plant (involve inlet trap, septic tank, outlet trap, inter-connecting pipes and soil soakaway pit) for proposed houses. The proposed capacity of the each septic tank is 15.98 cu.m and it is greater than the estimated daily water consumption of each proposed house. A reference septic tank is illustrated in **Figure 2.2** and the calculation of septic tank are shown in Table 2. For the proposed soil soakaway pit, its size should be determined basing on soil absorption rate and therefore it should be determined in detail design stage.

		(mm)
Proposed Septic Tank Capacity	(L-t)x BxD	(5700-150)1600x1800 = 15.98 cu.m
The proposed septic tank System aims to serve one house with 4 Nos. of Person.		
Estimate Ultimate per capita daily water consumption	Design Flow Rate x Peak Factor	0.37 x 6 = 2.22 cu.m/person/day
Required Septic Tank Capacity	Nos of Person Per House x estimated daily water consumption	4 x 2.22 = 8.88 is less Septic Tank Capacity (15.98 cu.m)
Tank to be desludged every 6 months		
The soil soakaway pit to be designed in accordance with PROPECC PN5/93 and its size shall be determined base on absorption capacity of soil and ultimate consumption rate.		

Table 2.1 - Calculation of Septic Tank

- 2.3.4 In addition, the proposed septic tank would be inspected at least once every 6 months by the applicant. If there is any flooding / overflow from the Septic Tank or foul smell become noticeable, immediate inspection would be carried out. Desludging the Septic Tank when thickness of sludge exceeds 30cm or ¼ of overall water depth or clogging of the septic tank outlet pipe or the soakaway pit or soil is suspected. Last, disposing the sludge would be carried out properly. Sludge removed would be transported by specialist contractors to sewerage treatment works for disposal.
- 2.3.5 The location of the proposed underground Sewerage Treatment Plant for the Site is illustrated in **Figure 2.3**.
- 2.3.6 Once the concerned public sewerage system is available in the vicinity, the Septic Tank System will be abandoned and replaced with a pump pit and a connection terminal manhole. All sewerage generated from the Proposed Development will be conveyed to the public sewerage system.

## 2.4 Assessment Criteria, Methodology and Assumptions

- 2.4.1 The adopted unit flow factor and global peaking factors will adopt the figures stipulated in the Guidelines for Estimating Sewerage Flows for Sewerage Infrastructure Planning (GESF) (Version 1.0) issued by the Environmental Protection Department (EPD) in March 2005 to estimate the sewerage flow generated from the Proposed Development.
- 2.4.2 With reference to Table T-1: Unit Flow Factors for Domestic Flows in the GESF (Version 1.0), the unit flow factors for private housing R4 domestic flow is 0.37cu.m/person/day.



## 2.5 Estimation of Sewerage Flow

2.5.1 The primary source of contaminants arising from the Site will be from bathrooms, toilets and kitchens from residential houses.

2.5.2 Table 2.2 shows the estimated peak sewerage flow for the Proposed Development.

<b>Calculation for Sewerage Flow Generation Rate of the Site</b>			
1a. Total number of units	=	8	units
1b. Total number of residents	=	32	people
1c. Design flow	=	0.37	cu.m/person/day – refer to Private R4 in Table T-1 of GESF
1d. Sewerage generation rate	=	9.25	cu.m/day
1e. Peak factor	=	6	refer to Section 3.3 from EPD’s Guidelines for Design of Small Sewerage Treatment Plant
1f. Estimated total peak flow	=	6 x 9.25 =55.5	cu.m/day
<b>Sewerage to be discharge to Septic Tank</b>			
2a. Number of septic tank proposed for the development	=	8	units
2b. Number of persons served by each septic tank	=	32 / 8 = 4	people
2c. Required capacity of each septic tank	=	4x 0.37 x 6 = 8.88	cu.m/day
2d. Design capacity of each septic tank	=	15.984 > 8.88	cu.m/day – refer to <b>Table 2.1</b>

Table 2.2 - Estimated Sewerage Flow from the Site

2.5.3 As shown in Table 2.2 above, the estimated total peak flow for the Proposed Development is 55.5 cu.m/day and the capacity of each proposed septic tank (15.984 cu.m/day) is greater than required capacity (8.88 cu.m/day).

## 2.6 Discussion

- 2.6.1 According to the drainage record plans obtained from DSD, there is no existing public sewerage network serving the Site. Sewerage from the Site is proposed to be discharged to the proposed underground Sewerage Treatment Plant.
- 2.6.2 The applicant shall take the maintenance responsibility of the septic tank and soil soakaway pit in order to maintain the operation of the proposed underground Sewerage Treatment Plant.
- 2.6.3 According to the design of the septic tank for the Proposed Development presented in Table 2 and estimated sewerage generation, it is anticipated that the proposed underground Sewerage Treatment Plants shown in **Figure 2.3** will have sufficient capacity to cater for sewerage generated from the proposed residential development.

## 2.7 Conclusion

- 2.7.1 Based on the sewerage generated and the capacity of the septic tank, it is anticipated that there will be no serious adverse sewerage impact to the area after the implementation of the development.

## 3. Drainage Impact Appraisal

### 3.1 Scope of Works

- 3.1.1 The objective of this Drainage Impact Appraisal (DIA) 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.

### 3.2 Assessment Methodology

#### 3.2.1 Assessment Method

Potential drainage impacts due to the propose development are identified by comparing the existing drainage conditions against that the drainage conditions after the proposed development.

The rainfall statistics at HKO Headquarters has been adopted in estimating the rainfall intensity of the catchments using Intensity-Duration-Frequency Relationship as expressed by the following equation:

$$i = \frac{a}{(t_d + b)^c}$$

where

$i$  is extreme mean intensity (mm/hr)

$t_d$  is the duration in minutes

$a, b, c$  are the constants given in Table 3a of SDM

Moreover, the Colebrook-White equation is used for the design of circular pipe.

### 3.2.2 Design Parameters

#### Climate Change

According to the recommendations of SDM 2018 Corrigendum No. 1/2022, climate change effect should be incorporated into the design of drainage system. Normally, climate change effect up to end of 21st century plus design allowance should be accounted for.

Nevertheless, for drainage system that can be upgraded progressively at later stage, design for drainage provision can firstly consider the projection of rainfall increase in the mid 21st century. Adequate Site area / relevant provisions should then be reserved / provided to facilitate future upgrading works taking into account the projection of rainfall increase plus design allowance in end of 21st century.

For drainage design that could hardly be upgraded progressively at later stage, design for drainage provision should consider the projection of rainfall increase plus design allowance in end of 21st century at the first place.

Table 28 and Table 31 of SDM 2018 Corrigendum No. 1/2022 are reproduced in Table 3.1 and Table 3.2. They show the recommended rainfall increase due to climate change and the design allowance respectively.

	Rainfall Increase
Mid 21 <sup>st</sup> Century	11.1%
End of 21 <sup>st</sup> Century	16.0%

Table 3.1 – Rainfall Increase for Climate Changes (SDM) for use of Capacity Check of the Ultimate stage

Rainfall Increase	Extreme Sea Level Rise (Sum of Mean Sea Level Rise and Storm Surge Increase)				
	Return Period (Years)	North Point/Quarry Bay (m)	Tai Po Kau (m)	Tsim Bei Tsui (m)	Tai O (m)
12.1%	2	0.20	0.22	0.20	0.19
	5	0.21	0.24	0.22	0.19
	10	0.22	0.25	0.23	0.21
	20	0.22	0.27	0.23	0.21
	50	0.24	0.29	0.25	0.22
	100	0.24	0.31	0.26	0.23
	200	0.25	0.34	0.27	0.24

Table 3.2 – Design Allowance in End of 21st Century

In summary, the SDM 2018 Corrigendum No. 1/2022 recommends the rainfall intensity should be increased by 11.1% and 28.1% to account for climate change effect up to mid century and end century respectively.

**Sedimentation**

For design of new proposed drains, sediment for the pipeline system follows the recommendation given in Section 9.3 of SDM 2018, which suggests allowing 5% reduction in flow area if the gradient is greater than 1 in 25, and 10% reduction in flow area in other areas.

**3.2.3 Design Return Periods of DSD Drainage System**

With reference to the DSD SDM 2018 clause 6.6.2, underground drainage pipes with a diameter smaller than 1.8m (or equivalent diameter in case of a box culvert) conveying stormwater to a trunk drain, river, or sea are normally classified as “Urban Drainage Branch System”. An Urban Drainage Trunk System” collects stormwater from branch drains and conveys the flow to outfalls in river or sea. Pipes with size or box culverts with equivalent diameter equal to or larger than 1.8m are normally considered as trunk drains.

Recommended Design Return Periods from DSD SDM 2018 are shown in Table 3.3.

Drainage Type	Design Return Period
Urban Drainage Trunk Systems	200 years
Urban Drainage Branch Systems	50 years

Table 3.3 – Recommended Design Return Periods

The proposed permanent drainage network within the Development and existing unnamed drainage system along Ho Chung North Road and Luk Mei Tsuen Road are provided with a diameter less than 1.8m and are considered as Urban drainage branch systems. The design return period for the abovementioned drainage systems is 1 in 50 years according to Table 3.3.

**3.2.4 Design Rainfall**

The Rational Method is adopted to estimate the peak runoff:

$$i = \frac{a}{(t_d + b)^c}$$

where

- i = Extreme Mean Intensity (mm/hr)
- t<sub>d</sub> = Rainfall Duration (min)
- a, b, c = Storm Constants

a	451.3
b	2.46
c	0.337

Table 3.4 – Storm Constants for Return Period of 50 years at HKO Headquarters Based on SDM

### **3.2.5 Runoff Parameters of Drainage System**

In estimate of runoff coefficient (C), the following sets of runoff coefficient have been considered.

Making reference to the DSD SDM 2018 clause 7.5.2, a runoff coefficient of 0.25 was adopted for vegetated surface and 0.95 was adopted for paved surface of the Site. After the Proposed Development, the runoff coefficient would be changed since the Site would be changed from paved to partially vegetated and partially paved surface. An equivalent runoff coefficient ( $C_{equ}$ ) has been calculated for the Proposed Development based on proportion of paved and vegetated surface area. The calculation for the equivalent runoff coefficient of the Site area and the adopted runoff coefficient for other catchments in concern are provided in **Figure 3.5**.

### **3.3 Existing and Planned Drainage Facilities**

- 3.3.1 According to the existing drainage record plan from the Drainage Services Department (DSD) there are no drainage maintained by the DSD in the vicinity. This is shown in **Figure 2.1**.
- 3.3.2 Upon a **site Site** investigation carried out on July 6 2023, a series of unnamed stormwater manholes were located along Ho Chung North Road and Luk Mei Tsuen Road (main road) and a series of U-channels were identified along Luk Mei Tsuen Road of the Parcel A and Parcel B of the Site. It is most likely these U-channels /pipes are connected to the drainages along Ho Chung North Road / Luk Mei Tsuen Road. These non-documented drainages are shown in **Figure 3.1**.
- 3.3.3 According to the information provided by the Contractor of Highways Department's Hiram's Highway Improvement Stage 1 Project [refer to **Figure 3.1A and 3.1B**], there is an existing nominal diameter (DN) 300 storm drain located under Ho Chung North Road and 450-525 storm drains located under Luk Mei Tsuen Road in the vicinity of the Site. The storm drains were completed in February 2021<sup>1</sup>. The U-channels identified along Luk Mei Tsuen Road were recently built in 2023.
- 3.3.4 A drainage layout plan comprising the mentioned drainage information is presented in **Figure 3.2**.

### **3.4 Drainage Catchment Area**

- 3.4.1 The drainage catchment areas included upstream catchment area and the Site. **Figure 3.3** illustrates the estimated overall upstream catchment area. The catchment area within the Site includes the open area and the roof of the buildings.
- 3.4.2 The surface runoff discharged from the upstream catchment area would be collected by the existing perimeter U-channel surrounding the Site along Luk Mei Tsuen Road.

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<sup>1</sup> Highways Department's web site (2023) Hiram's Highway Improvement Stage 1

### **3.5 Drainage Calculations for the Proposed Provision of Drainage Facilities**

3.5.1 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 m<sup>3</sup>/s

C = runoff coefficient

i = rainfall intensity in mm/hr

A = catchment area in km<sup>2</sup>

3.5.2 The Rainfall Increase due to Climate Change at the end of 21<sup>st</sup> Century of 16% and the Rainfall Increase for Design Allowance of 12.1% would be included to the rainfall intensity in accordance with Table 28 and Table 31 of the Stormwater Drainage Corrigendum No. 1/2022. 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, Jan). The design rainfall duration is taken as the time of concentration (t<sub>c</sub>):

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

where

A = catchment area (m<sup>2</sup>)

H = average catchment slope (m/100m)

L = catchment Length (m)

3.5.3 As the drains in the area has been built and there is no other nearby proposed development, it would be assumed the catchment area to be include the Proposed Development and Ho Chung North Road. They are identified as Catchment A1, A2, A3, R1 and R2. The catchment area refers to **Figure 3.4**.

Assuming that:

i. The area of Catchment:

A1 = 678.22 m<sup>2</sup> (0.0006 km<sup>2</sup>);

A2 = 1265.38 m<sup>2</sup> (0.0012 km<sup>2</sup>);

A3 = 922.58 m<sup>2</sup> (0.0009 km<sup>2</sup>);

R1 = 435.96 m<sup>2</sup> (0.0004 km<sup>2</sup>); and

R2 = 715.85 m<sup>2</sup> (0.0007 km<sup>2</sup>).

ii. Catchment R1 and R2 is paved. The catchment of the Site (A1, A2 and A3) before Proposed Development is almost paved. The catchment of the Site after Proposed Development is partially vegetated and partially paved. and therefore Therefore the value of runoff coefficient (C) for paved area is taken as 0.95 and for vegetated area is taken as 0.25, and the equivalent runoff coefficient has been calculated for the Site after Proposed Development based on proportion of paved and vegetated surface area as shown in **Figure 3.5**.

3.5.4 The time of concentration of catchment A1+A2 and A3 before Proposed Development are: 14.3729 mins and 10.4967 mins respectively. The average adjusted rainfall intensity due to climate change for catchment A1+A2 and A3 before Proposed Development would then be 223.2538 mm/hr and 243.8391 mm/hr respectively. Therefore, the total peak runoff from Parcel A and B before Proposed Development is 0.1061 m<sup>3</sup>/s, while the total peak runoff from Parcel C before Proposed Development is 0.0580 m<sup>3</sup>/s.

3.5.5 The time of concentration of catchment A1, A2 and A3 after Proposed Development are: 7.8609 mins, 15.5561 mins, and 15.2357 mins respectively. The average adjusted rainfall intensity due to climate change for catchment A1, A2 and A3 after Proposed Development would then be 263.2637 mm/hr, 218.2010 mm/hr and 219.5244 mm/hr respectively. Therefore, the total peak runoff from Parcel A and B after Proposed Development is 0.1109 m<sup>3</sup>/s, while the total peak runoff from Parcel C after Proposed Development is 0.0522 m<sup>3</sup>/s.

3.5.6 The runoff calculation for catchment R1 and R2 should be the same as there is no difference before and after the Proposed Development. Therefore the time of concentration of catchment R1 and R2 are: 9.2439 mins and 17.0690 mins respectively. The average adjusted rainfall intensity due to climate change for catchment R1 and R2 would then be 252.3406 mm/hr and 212.3514 mm/hr respectively. Therefore, the total peak runoff from Catchment R1 is 0.0267 m<sup>3</sup>/s while the total peak runoff from Catchment R2 is 0.0393 m<sup>3</sup>/s. Therefore, the total peak runoff from Catchment A1+A2+R1 is 0.1375 m<sup>3</sup>/s, while the total peak runoff from A1+A2+A3+R1+R2 is 0.2290 m<sup>3</sup>/s.

3.5.7 As a result, the total peak runoff from Catchment A1+A2+R1 is 0.1328 m<sup>3</sup>/s before Proposed Development and 0.1145 m<sup>3</sup>/s after Proposed Development, while the total peak runoff from A1+A2+A3+R1+R2 is 0.2300 m<sup>3</sup>/s before Proposed Development and 0.1932 m<sup>3</sup>/s after Proposed Development. It implies that there is a 2 to 4% drop of peak runoff after providing more vegetated greenery areas and reducing paved areas after the Proposed Development.

3.5.8 The detailed design calculations of proposed drainage system are provided in **Figure 3.5**. 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 Site and the said portion of Ho Chung North Road. The intercepted stormwater will then be discharged to the proposed 300 mm surface U-channel and connect to the existing storm drain outside the Site along Ho Chung North Road. The utilisation rate is 68 to 77% before Proposed Development and 59 to 64% after Proposed Development, which implies the utilisation of the drainage system would have been decreased about 9 to 12% after the Proposed Development.

## **3.6 Proposed Drainage System**

3.6.1 For Parcel A and B of the Site, the surface runoff discharged from the Site will gravitate to lower grounds and be collected by the proposed 300mm U-channel surrounding the Site and the proposed 300mm U-channel located across the Site. 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 unnamed stormwater manhole along Ho Chung North Road.

- 3.6.2 For Parcel C of the Site, the surface runoff discharged from the Site will be collected by the proposed 300mm U-channel surrounding the Site. 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 unnamed stormwater manhole along Ho Chung North Road.
- 3.6.3 The indicative drainage connection is shown in **Figure 3.4**.

### **3.7 Discussion**

- 3.7.1 According to the drainage record plans obtained from DSD, there is no existing public drainage network serving the Site. A series of unnamed drainage pipes on Ho Chung North Road are have been built for the Highways Department's Hiram's Highway Improvement Stage 1 Project. These drainage pipes are capable to collect the surface runoff from the Site.
- 3.7.2 The surface runoff from the Site will be collected by the proposed perimeter U-channel and discharged to the unnamed storm water manholes along Ho Chung Road/Luk Mei Tsuen Road.
- 3.7.3 The estimated flow rate of surface runoff discharge from the Site **after Proposed Development** to public 300 dia. drainage pipe on Ho Chung North Road is about **0.16 0.13** m<sup>3</sup>/s and the public pipe is capable to collect the runoff.
- 3.7.4 Therefore, the proposed drainage connection is feasible for the Proposed Development.

### **3.8 Conclusion**

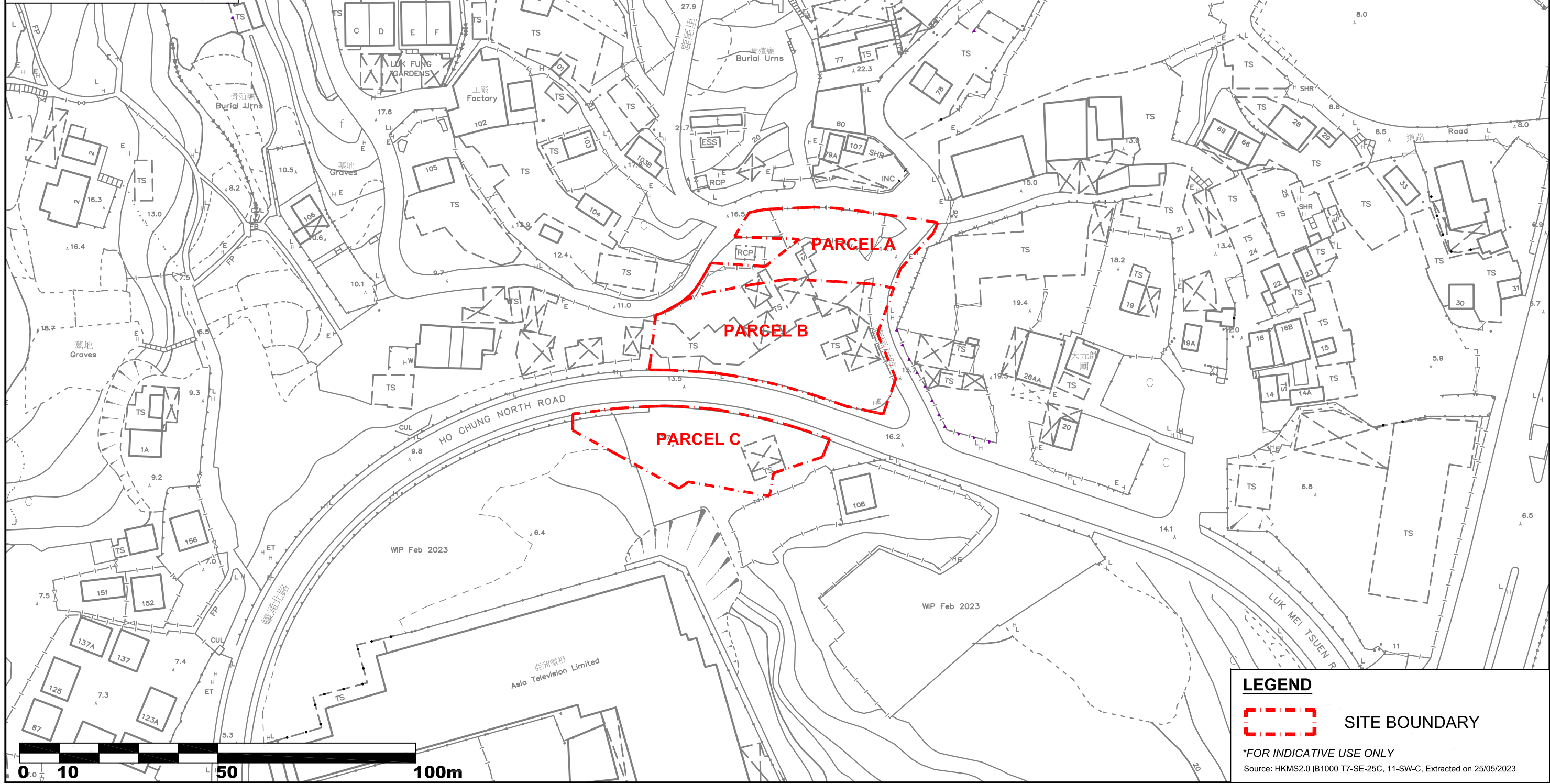
- 3.8.1 Based on the proposed drainage system, it is anticipated that there will be no serious adverse drainage impact to the existing drainage system after the implementation of the development.




## Figures

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**LEGEND**

 SITE BOUNDARY

*\*FOR INDICATIVE USE ONLY*

Source: HKMS2.0 IB1000 T7-SE-25C, 11-SW-C, Extracted on 25/05/2023

File Name :  
Source :

**PRUDENTIAL** 利達行  
SURVEYING · LAND ADVISORY · VALUATION 行

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

JOB TITLE:  
Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as "Road" to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong

Drawing Title  
**LOCATION PLAN**

Rev	Description	Date

Drawn	CN	Date	19/07/2023
Checked	RT	Approved	RT
Scale	1:1000 @ A3		

Drawing No.	Figure 1.1
Rev.	-



\*For Indicative Use Only

**LEGEND**

SITE BOUNDARY

PLANNED DEVELOPMENT

Source: HKMS 2.0 Aerial Photo E154298C 6000' (9 Mar 2022)

File Name :  
Source :

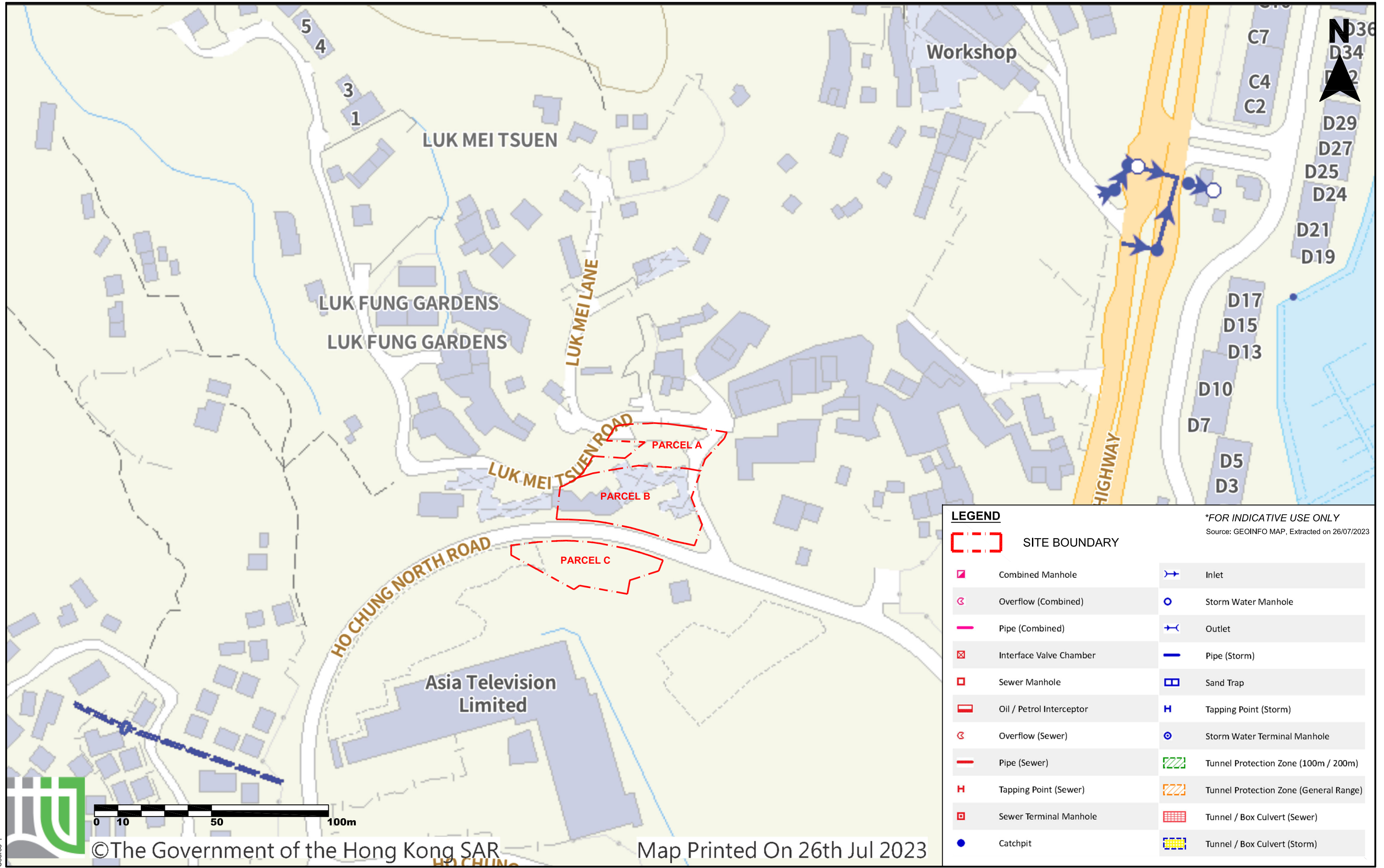
**PRUDENTIAL** 滙豐地產  
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Drawing Title  
**THE SITE AND ITS SURROUNDINGS**

Drawn	CN	Date	08/08/2023	Drawing No.	FIGURE 1.2
Checked	RT	Approved	RT		
Rev	Description	Date	Scale	N.T.S.	Rev.



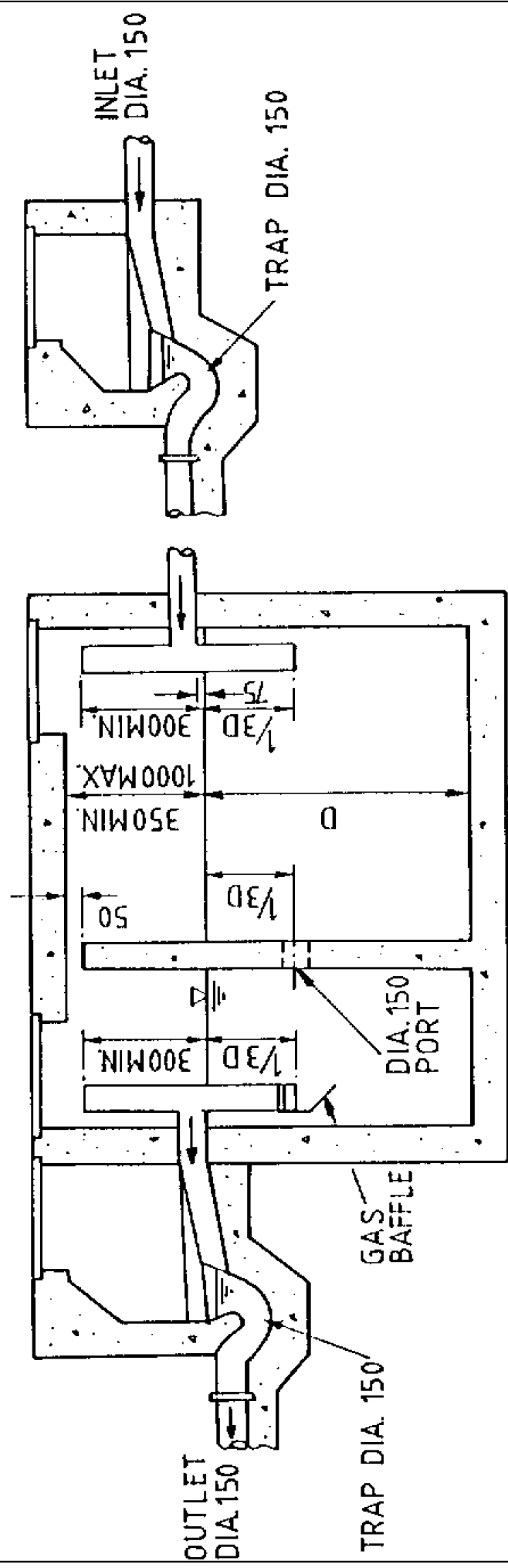
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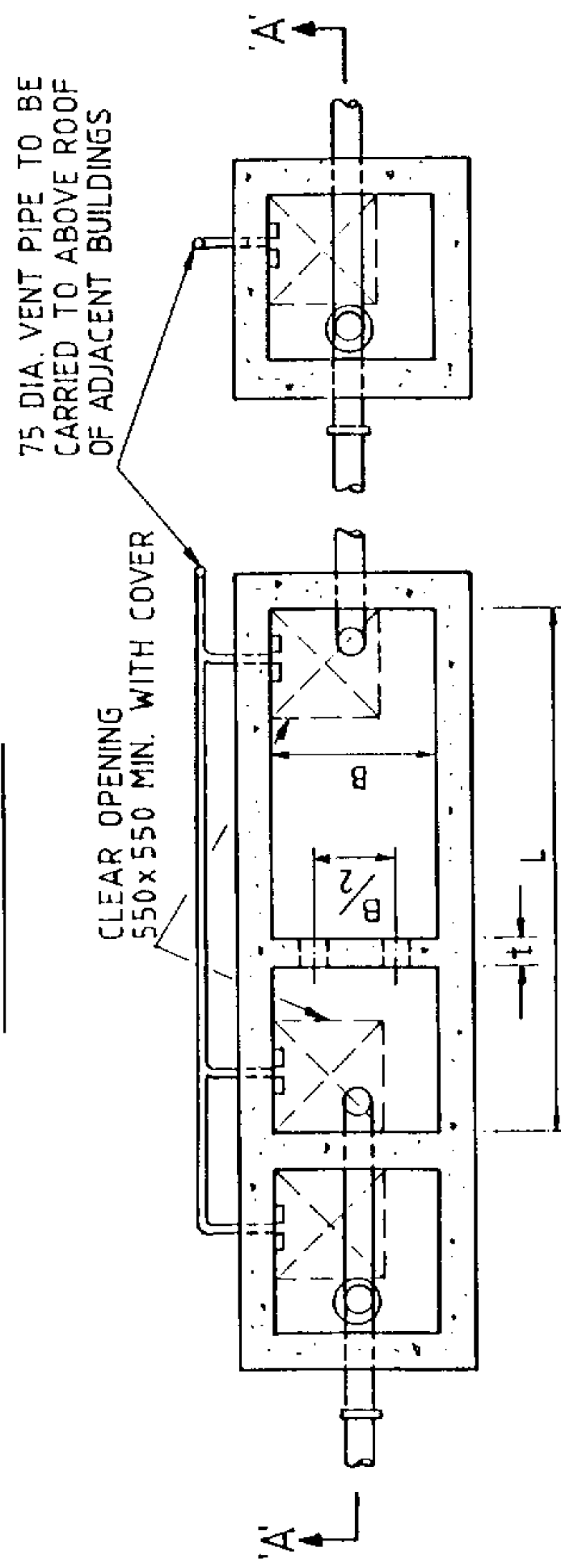
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Map Printed On 26th Jul 2023

	ADDRESS: 2/F & 3/F TUNG HIP COMMERCIAL BUILDING 244 DES VOEUX ROAD CENTRAL HONG KONG TEL: 2507 8333 FAX: 2598 6576	JOB TITLE: Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as "Road" to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong	Drawing Title EXISTING DSD UTILITY RECORD PLAN	Drawn CN Date 26/07/2023	Drawing No. Figure 2.1
				Checked RT Approved RT	Scale 1:1500 @ A3 Rev. -
Rev. Description Date					



### SECTION A-A



### NOTES:-

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
2. SIZE
  - a.  $4B \geq L > 3B$
  - b.  $1800 \text{ mm} \geq D > 1200 \text{ mm}$
3. RATIO OF VOLUMES OF FIRST AND SECOND CHAMBERS = 2 : 1
4. CAPACITY (SUBJECT TO NOTE 2)
  - a.  $CAPACITY C = (L - t) \times B \times D$
  - b. NOT LESS THAN  $2.3 \text{ m}^3$  BUT NOT MORE THAN  $41 \text{ m}^3$
5. NOT LESS THAN  $QN$  WHERE  $N$  IS THE NUMBER OF PERSONS SERVED AND  $Q$  IS THE ESTIMATED ULTIMATE PER CAPITA DAILY WATER CONSUMPTION
6. SURFACE WATER MUST NOT BE CONNECTED TO THE TANK
7. TANK TO BE DESLUDGED EVERY 6 MONTHS
8. NO OVERFLOW OR BYPASS PIPE IS ALLOWED.
9. PLEASE REFER TO THE BOOKLET "GUIDANCE NOTES ON DISCHARGES FROM VILLAGE HOUSES" PUBLISHED BY EPD FOR FURTHER GUIDELINES ON OPERATION AND MAINTENANCE OF SEPTIC TANK SYSTEM.

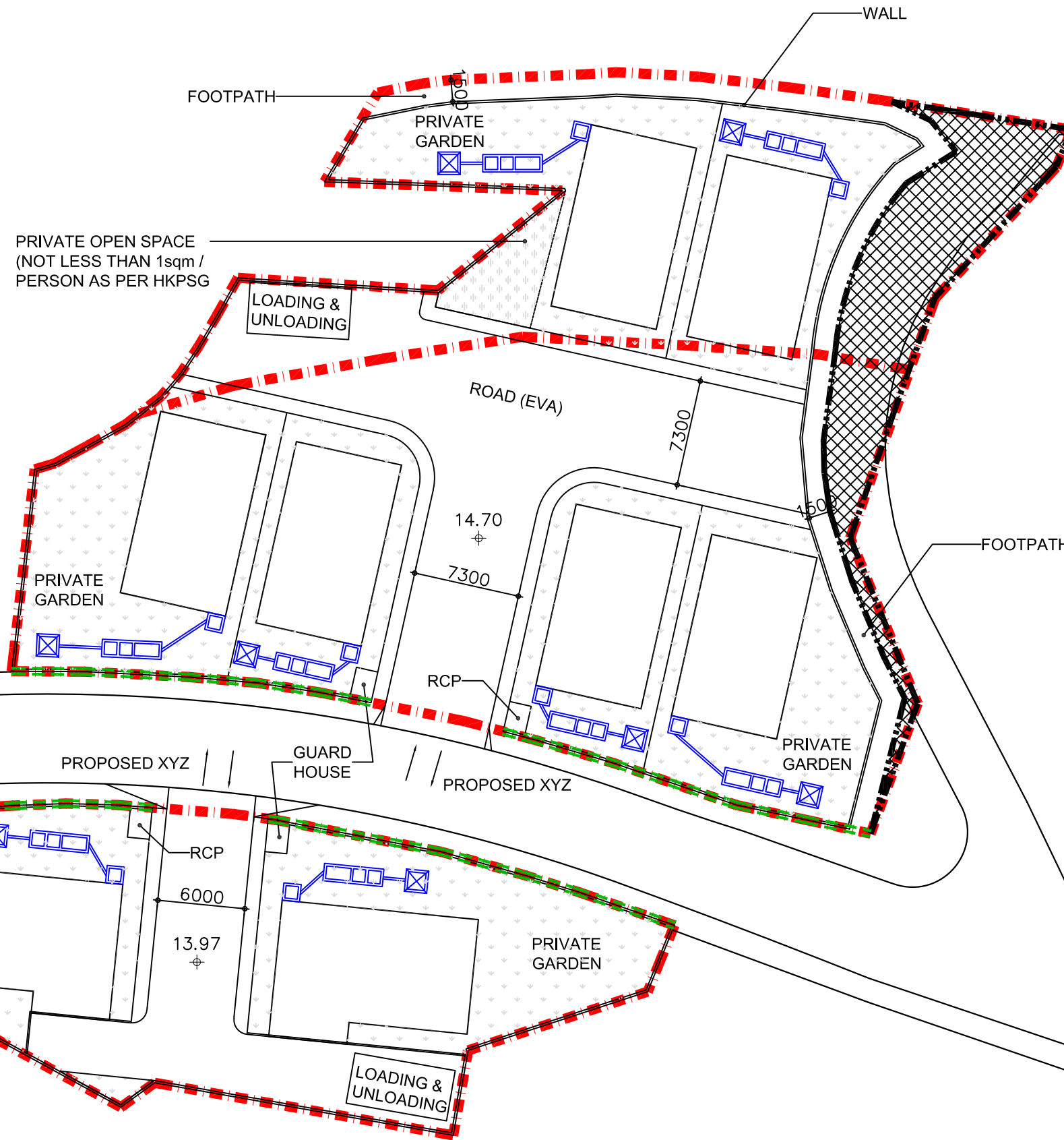
\*FOR INDICATIVE USE ONLY  
Source: EDP ProPECC PN 5/93 Appendix D



JOB TITLE:  
Amendment of Plan to Remove from "Residential (Group D)" (RD1), "Residential (Group E)" (RE1) and "Residential (Group F)" (RF1) to "Residential (Group C1)" (RC1) on the Approved Ho Chung Outline Zoning Plan No. SSK/CH/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjacent Government Land, Ho Chung, Sai Kung, New Territories, Hong Kong

Drawing Title  
REFERENCE SEPTIC TANK

Rev	Description	Date	Drawn	Date	Drawing No.
			CN	07/08/23	Fig. 2.2
			Checked	Approved	
			RT	RT	
			Scale	N.T.S.	Rev.
					-



### LEGEND

- SITE BOUNDARY
- AREA TO BE DEDICATED AS RIGHT OF WAY
- GREEN NOISE BARRIER
- PRIVATE GARDEN
- BUILDING FOOTPRINT
- PRIVATE OPEN SPACE
- INLET TRAP
- SEPTIC TANK & OUTLET TRAP
- 150 DIA. POLYETHYLENE PIPES
- SOIL SOAKAWAY PIPES (SIZE TO BE DETERMINED IN DETAILED DESIGN)

File Name :  
Source :

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244 DES VOEUX ROAD CENTRAL HONG KONG  
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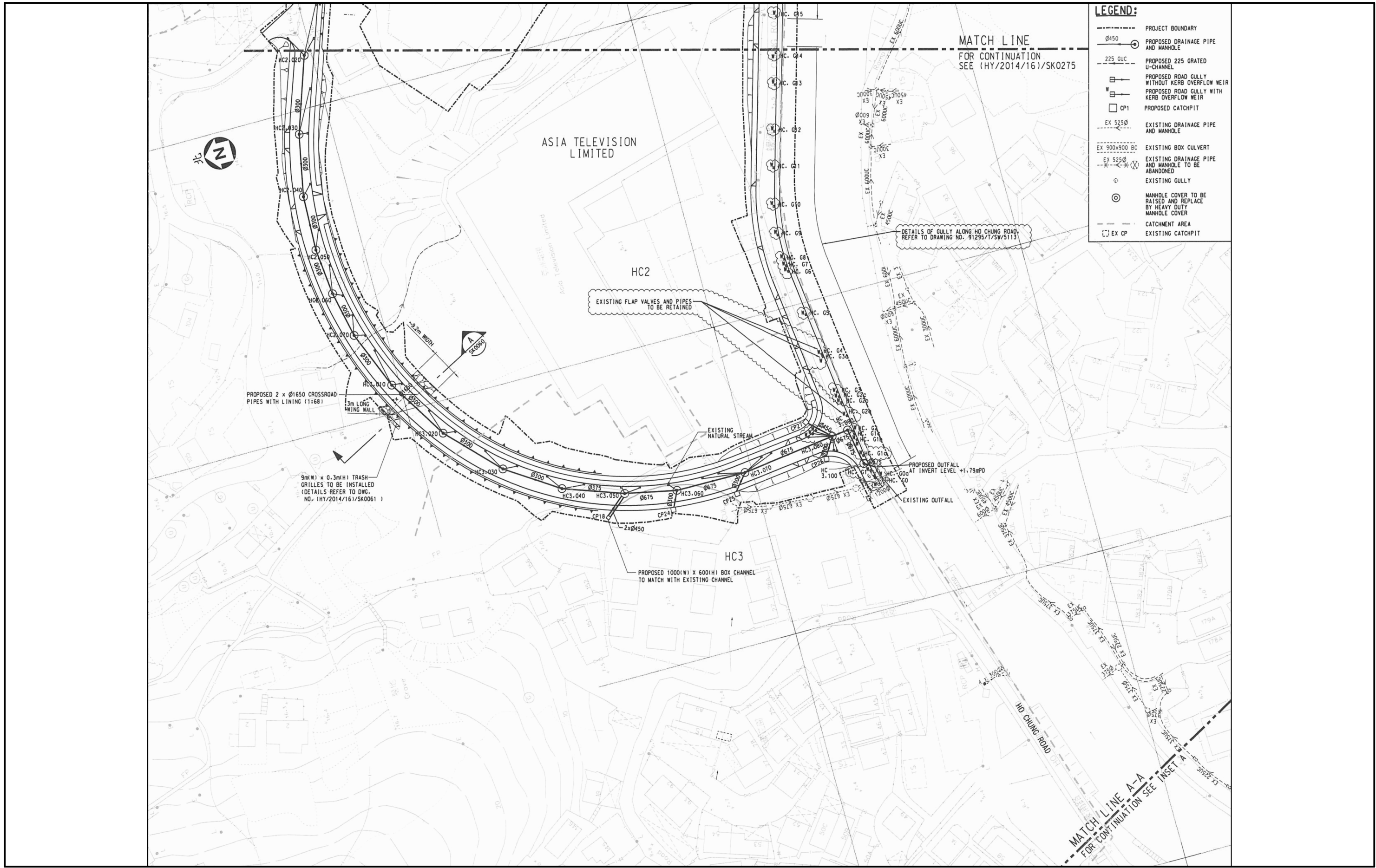
JOB TITLE:  
Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as "Road" to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong

Drawing Title  
**PROPOSED SEWERAGE LAYOUT PLAN**

1	Sewerage Layout Update	16/08/23	Drawn	CN	Date	19/12/2023
2	Layout Update	19/12/23	Checked	RT	Approved	RT
Rev	Description	Date	Scale	1:350 @ A3		

Drawing No.  
**Figure 2.3**

Rev. **2**



File Name :  
Source :

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FAX: 2598 6576

JOB TITLE:  
Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as "Road" to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong

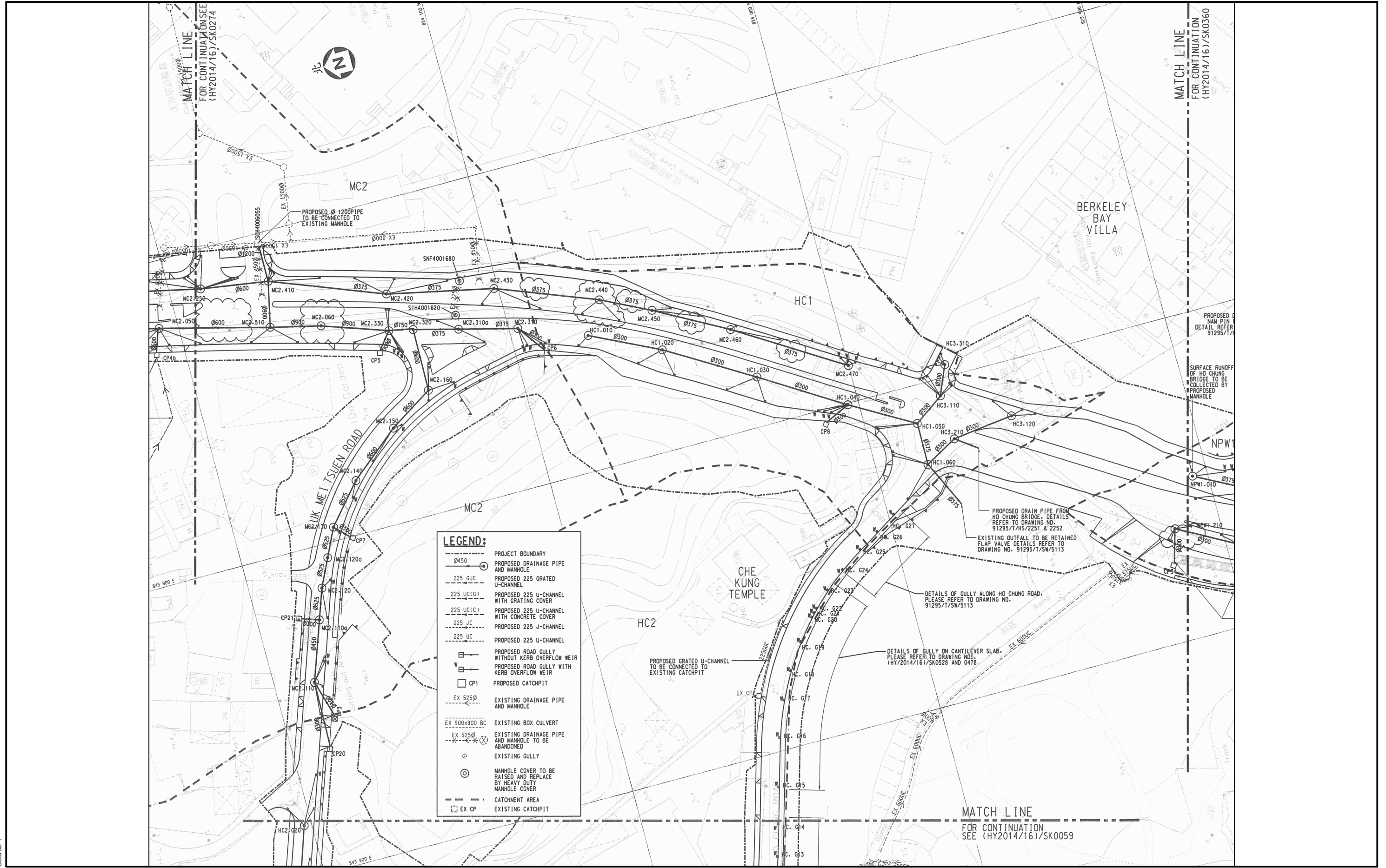
Drawing Title  
**PROPOSED DRAINAGE LAYOUT FROM THE HIRAM'S HIGHWAY IMPROVEMENT STAGE 1 PROJECT**

Drawn	CN	Date	07/08/2023
Checked	RT	Approved	RT
Scale	N.T.S.		

Drawing No.  
**Fig. 3.1A**

Rev. -





File Name :  
Source :

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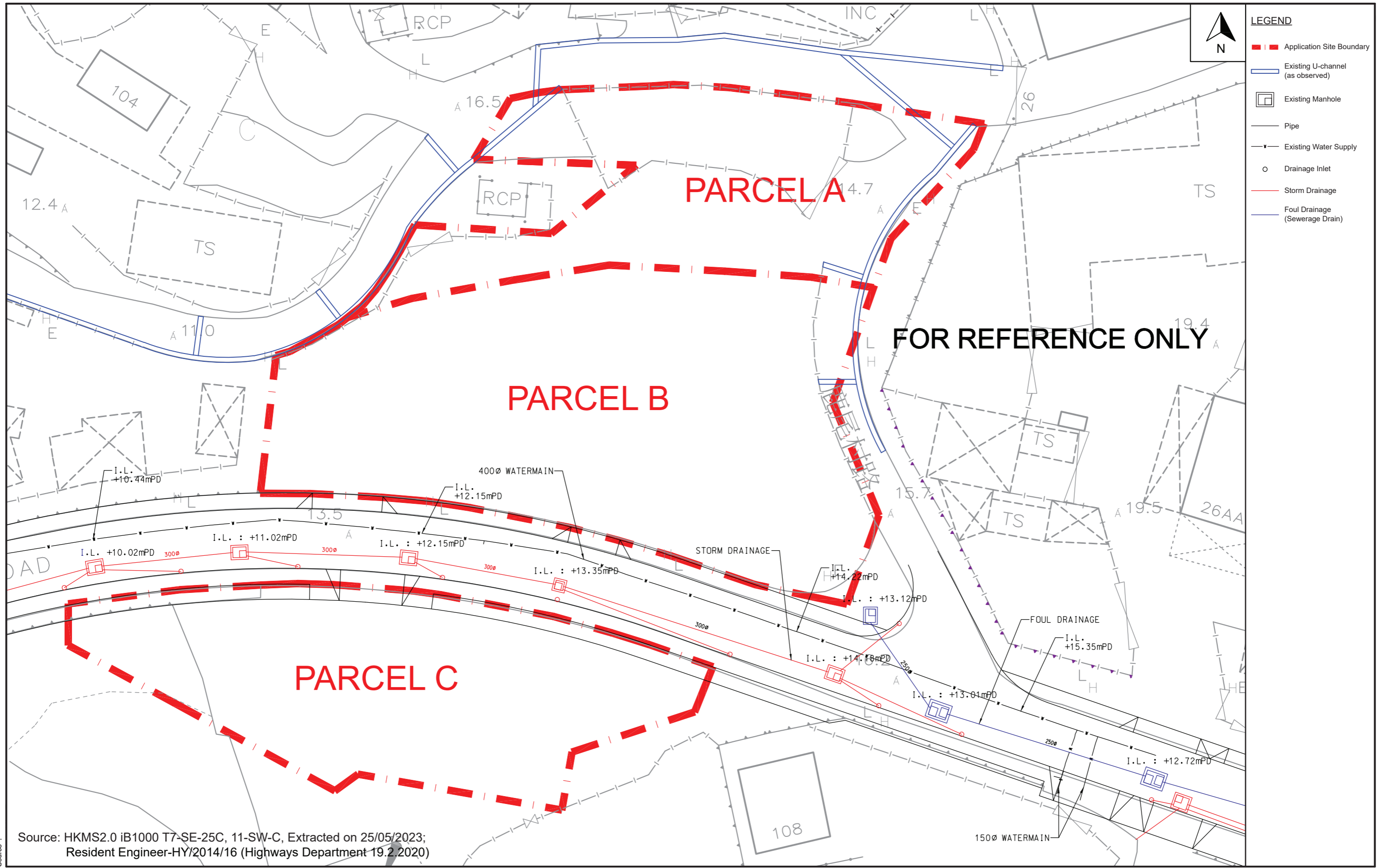
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Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as "Road" to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong

Drawing Title  
**PROPOSED DRAINAGE LAYOUT FROM THE HIRAM'S HIGHWAY IMPROVEMENT STAGE 1 PROJECT**

Drawn	CN	Date	07/08/2023
Checked	RT	Approved	RT
Scale	N.T.S.		

Drawing No.  
**Fig. 3.1B**

Rev. -



Source: HKMS2.0 iB1000 T7-SE-25C, 11-SW-C, Extracted on 25/05/2023;  
Resident Engineer-HY/2014/16 (Highways Department 19.2 2020)

File Name :  
Source :

	ADDRESS: 2/F & 3/F TUNG HIP COMMERCIAL BUILDING 244 DES VOUEUX ROAD CENTRAL HONG KONG TEL: 2507 8333 FAX: 2598 6576	JOB TITLE: Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as "Road" to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong	Drawing Title DRAINAGE LAYOUT PLAN	09/08/23	Drawn CN	Date 30/10/2023	Drawing No. Figure 3.2
				30/10/23	Checked RT	Approved RT	
Rev	Description	Date	Scale N.T.S.	Rev.	1		

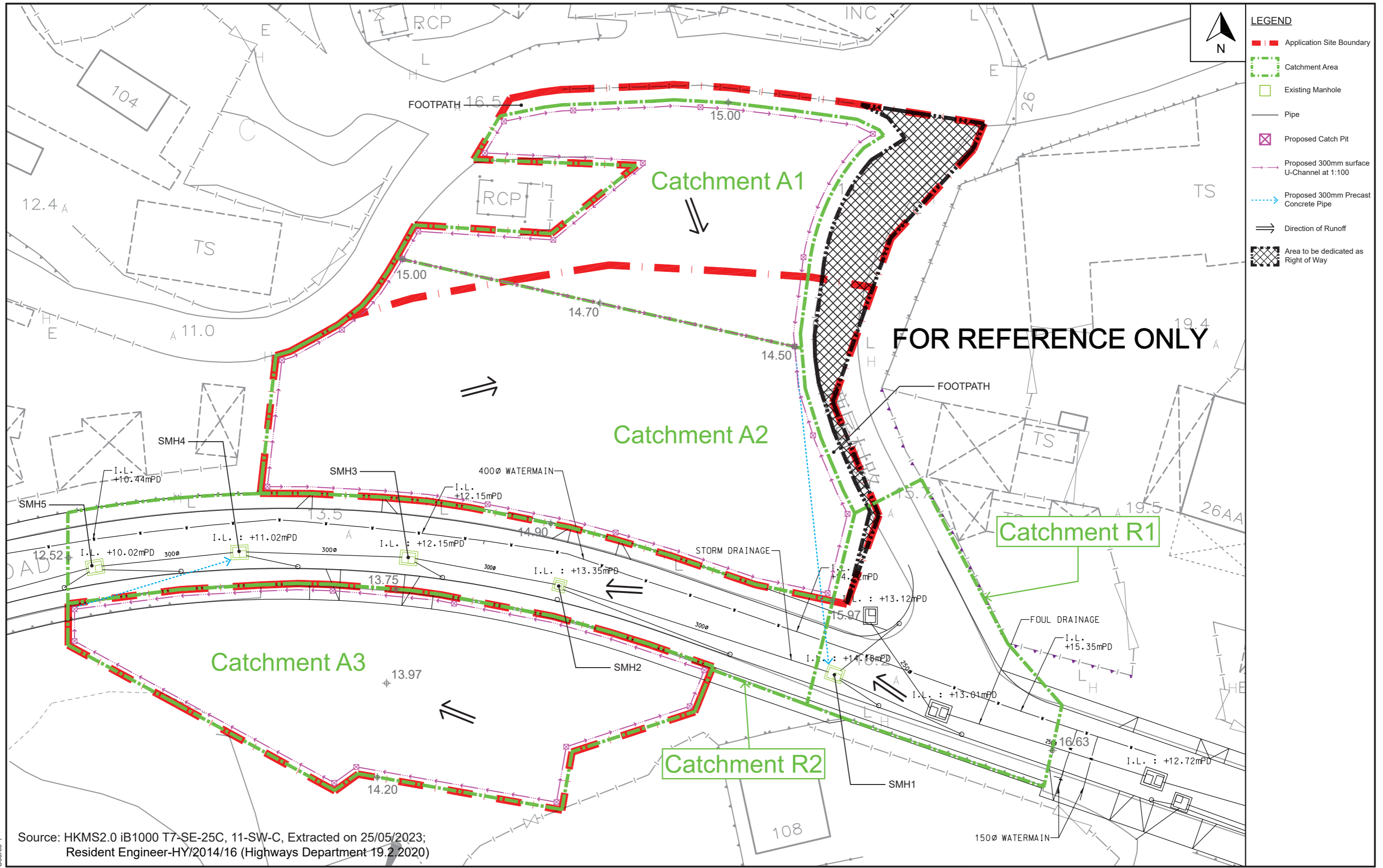


**LEGEND**

- - - Application Site Boundary
- Direction of Water Flow
- Upstream Catchment Area
- Catchment Area of the Site
- Existing U-channel (as observed)

File Name :  
Source :

<b>PRUDENTIAL</b> <small>SURVEYING · LAND ADVISORY · VALUATION 行</small>	ADDRESS: 2/F & 3/F TUNG HIP COMMERCIAL BUILDING 244 DES VOEUX ROAD CENTRAL HONG KONG TEL: 2507 8333 FAX: 2598 6576	JOB TITLE: Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as "Road" to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong	Drawing Title CATCHMENT AREA PLAN	Drawn	Date	Drawing No.
				CN	09/08/2023	
Checked	RT	Approved	RT	Scale	N.T.S.	Rev.
Rev	Description	Date				



File Name :  
Source :

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FAX: 2598 6576

JOB TITLE:  
Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as "Road" to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots in Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong

Drawing Title  
PROPOSED DRAINAGE CONNECTION

-	-	07/08/23	Drawn	CN	Date	28/02/2024	Drawing No.
1	Drainage Layout Update	06/11/23	Checked	RT	Approved	RT	Figure 3.4
2	Legend Update	21/12/23	Checked	RT	Approved	RT	
3	Legend Update	28/02/24	Checked	RT	Approved	RT	
Rev	Description	Date	Scale	N.T.S.			Rev.

3

**Formula Used**

Time of Concentration

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

Intensity

$$I = \frac{a}{(tc + b)^c}$$

Runoff

$$Q = 0.278 C i A$$

Runoff Coeff. for Vegetated Area [C]	Runoff Coeff. for Paved Area [C]	Intensity Coeff. (taken from Table 3a of Stormwater Design Manual, 1 in 50 return)					
0.25	0.95	a	451.3	b	2.46	c	0.337

**Runoff Calculation before Proposed Development**

Catchment	Area [A] (km <sup>2</sup> )	Vegetated Area [A] (km <sup>2</sup> )	Paved Area [A] (km <sup>2</sup> )	Average Slope [H] (m per 100m)	Longest Path [L] (m)	Time of Conc. [tc] (min.)	Intensity (mm/hr)	Adjusted Intensity due to Climate Change [i] (mm/hr)	Designed Runoff [Q] (m <sup>3</sup> /s)
A1+A2	0.0018	0	0.0018	4.2	70.5156	14.3729	174.2809	223.2538	0.1061
<b>Total Peak Runoff from Parcel A and Parcel B (m<sup>3</sup>/s)</b>									<b>0.1061</b>

**Runoff Calculation after Proposed Development**

Catchment	Area [A] (km <sup>2</sup> )	Vegetated Area [A] (km <sup>2</sup> )	Paved Area [A] (km <sup>2</sup> )	Equivalent Runoff Coefficient [C <sub>equi</sub> ]	Average Slope [H] (m per 100m)	Longest Path [L] (m)	Time of Conc. [tc] (min.)	Intensity (mm/hr)	Adjusted Intensity due to Climate Change [i] (mm/hr)	Designed Runoff [Q] (m <sup>3</sup> /s)
A1	0.0006	0.0002	0.0004	0.72	1.0	25.8804	7.8609	205.5142	263.2637	0.0315
A2	0.0012	0.0003	0.0009	0.78	1.0	54.8909	15.5561	170.3364	218.2010	0.0564
<b>Total Peak Runoff from Parcel A and Parcel B (m<sup>3</sup>/s)</b>										<b>0.0879</b>

Catchment	Area [A] (km <sup>2</sup> )	Vegetated Area [A] (km <sup>2</sup> )	Paved Area [A] (km <sup>2</sup> )	Average Slope [H] (m per 100m)	Longest Path [L] (m)	Time of Conc. [tc] (min.)	Intensity (mm/hr)	Adjusted Intensity due to Climate Change [i] (mm/hr)	Designed Runoff [Q] (m <sup>3</sup> /s)
A3	0.0009	0	0.0009	6.4	52.2359	10.4967	190.3506	243.8391	0.0580
<b>Total Peak Runoff from Parcel C (m<sup>3</sup>/s)</b>									<b>0.0580</b>
<b>Total Peak Runoff from the Site (m<sup>3</sup>/s)</b>									<b>0.1641</b>

Catchment	Area [A] (km <sup>2</sup> )	Vegetated Area [A] (km <sup>2</sup> )	Paved Area [A] (km <sup>2</sup> )	Equivalent Runoff Coefficient [C <sub>equi</sub> ]	Average Slope [H] (m per 100m)	Longest Path [L] (m)	Time of Conc. [tc] (min.)	Intensity (mm/hr)	Adjusted Intensity due to Climate Change [i] (mm/hr)	Designed Runoff [Q] (m <sup>3</sup> /s)
A3	0.0009	0.0003	0.0006	0.72	1.0	52.2359	15.2357	171.3696	219.5244	0.0394
<b>Total Peak Runoff from Parcel C (m<sup>3</sup>/s)</b>										<b>0.0394</b>
<b>Total Peak Runoff from the Site (m<sup>3</sup>/s)</b>										<b>0.1272</b>

Catchment	Area [A] (km <sup>2</sup> )	Vegetated Area [A] (km <sup>2</sup> )	Paved Area [A] (km <sup>2</sup> )	Average Slope [H] (m per 100m)	Longest Path [L] (m)	Time of Conc. [tc] (min.)	Intensity (mm/hr)	Adjusted Intensity due to Climate Change [i] (mm/hr)	Designed Runoff [Q] (m <sup>3</sup> /s)
R1	0.0004	0	0.0004	2.0	33.4742	9.2439	196.9872	252.3406	0.0267
R2	0.0007	0	0.0007	4.5	77.0259	17.0690	165.7700	212.3514	0.0393
<b>Total Peak Runoff from Catchment A1+A2+R1 (m<sup>3</sup>/s)</b>									<b>0.1328</b>
<b>Total Peak Runoff from Catchment A1+A2+A3+R1+R2 (m<sup>3</sup>/s)</b>									<b>0.2300</b>

Catchment	Area [A] (km <sup>2</sup> )	Vegetated Area [A] (km <sup>2</sup> )	Paved Area [A] (km <sup>2</sup> )	Average Slope [H] (m per 100m)	Longest Path [L] (m)	Time of Conc. [tc] (min.)	Intensity (mm/hr)	Adjusted Intensity due to Climate Change [i] (mm/hr)	Designed Runoff [Q] (m <sup>3</sup> /s)
R1	0.0004	0	0.0004	2.0	33.4742	9.2439	196.9872	252.3406	0.0267
R2	0.0007	0	0.0007	4.5	77.0259	17.0690	165.7700	212.3514	0.0393
<b>Total Peak Runoff from Catchment A1+A2+R1 (m<sup>3</sup>/s)</b>									<b>0.1145</b>
<b>Total Peak Runoff from Catchment A1+A2+A3+R1+R2 (m<sup>3</sup>/s)</b>									<b>0.1932</b>

Comparison of Total Peak Runoff before and after Proposed Development
-2%
-4%

Pipe Material	Classification	Surface Roughness [k <sub>s</sub> ]		Kinematic Viscosity at 20°C [ν] (m <sup>2</sup> /s)
		(mm)	(m)	
Precast Concrete Pipes with 'O' Ring Joints	Poor	0.6	0.0006	1.0035E-06

**Drainage Capacity Check**

Section	Catchment	Circular Pipe Size [D] (mm)	Length [L] (m)	I.L.		Gradient [S]	Wetted Cross-Sectional Area [A] (m <sup>2</sup> )	Hydraulic Radius [R=D/4] (m)	Velocity $V = -\sqrt{32gRS} \log \left[ \frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS}} \right]$ (m/s)	Capacity [Q=AV] (m <sup>3</sup> /s)	Reduction due to Sedimentation (m <sup>3</sup> /s)	Utilisation Rate before Proposed Development	Utilisation Rate after Proposed Development	Comparison of Utilisation Rate
				Upstream	Downstream									
SMH1 to SMH2	A1+A2+R1	300	22	14.18	13.35	0.04	0.07	0.08	3.07	0.22	0.1950	68%	59%	-9%
SMH4 to SMH5	A1+A2+A3+R1+R2	300	12.5	11.02	10.02	0.08	0.07	0.08	4.47	0.32	0.3002	77%	64%	-12%

OK  
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: Amendment of Plan to Rezone from "Residential (Group D)" ("R(D)", "Residential (Group E)" ("R(E)") and an area shown as 'Road' to "Residential (Group C)3" ("R(C)3") on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 at Various Lots In Demarcation District 210 and Demarcation District 244 and Adjoining Government land, Ho Chung, Sai Kung, New Territories, Hong Kong	Drawing Title Design Calculation of Proposed Drainage System	-	-	06/11/23	Drawn	CN	Date	08/05/2024	Drawing No. Figure 3.5
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2	Calculation Update	29/02/24	Checked	RT	Approved	RT					Rev.
3	Calculation Update	08/05/24	Scale	-							
Rev	Description	Date									<b>3</b>

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