DRAINAGE IMPACT ASSESSMENT

Proposed Temporary Open Storage of Construction Machinery and Materials, Recycling Materials and Used Electrical Appliances with Ancillary Workshop for a Period of 3 Years at Various Lots in D.D. 119 and Adjoining Government Land, Tong Yan San Tsuen, Yuen Long, New Territories

DATE: Oct 2025

Contents

1. Introduction

1.1 Project Background

Ching Wan Engineering Consultants Company was appointed by the client of the captioned site to conduct a drainage impact assessment (DIA) for a Proposed Temporary Open Storage of Construction Machinery and Materials, Recycling Materials and Used Electrical Appliances with Ancillary Workshop for a Period of 3 Years at Various Lots in D.D. 119 and Adjoining Government Land, Tong Yan San Tsuen, Yuen Long, New Territories (Location Plan is shown in Appendix A).

The proposed use is under S.16 planning application with case no. A/YL-TYST/1334. This DIA report is prepared in support of the planning application.

This DIA is to assess the likely impacts of the proposed development on the existing drainage system, form the drainage connection point and recommend the necessary improvement/upgrading works.

1.2 Objectives of the Report

The report is to present the Drainage Impact Assessment (DIA) due to the proposed warehouse development. It includes formulation of proposed storm drain systems and mitigation measures with the aim to minimize the impacts to the existing drainage system, minimizing flood risk within and around the site.

The objectives of this report are set out as follows:

- To assess the existing flooding susceptibility;
- To assess the flooding susceptibility of the proposed development;
- To assess the likely impacts of the proposed development on the existing drainage system upon completion;
- To carry out schematic design of the drainage system arising from the proposed development including carrying out all necessary hydraulic analysis to substantiate the proposed scheme;
- To formulate drainage connection point and details for the proposed development to illustrate the hydraulic feasibility of the proposed connection point; and
- To formulate and recommend suitable mitigation measures including

necessary improvement/upgrading works to existing drainage system for the proposed development.

1.3 Structure of the Report

The structure of this report is as follows:

Section 1 – Introduces the background of the study, as well as the purpose of this report

Section 2 – Presents the key data of the proposed development on which the impact assessment is based.

Section 3 – Assess the impacts on the existing and designed storm drain systems due to the development and formulate corresponding mitigation measures.

Section 4 – Conclusion

2. PROJECT DESCRIPTION

2.1 Site Location

The project site is located right in the south of Lam Tai East Road. Vehicles shall enter the site via Kung Um Road. Location Plan is shown in Appendix A.

2.2 Existing Condition

The site is currently with warehouse structure and open storage area. The Site Plan is presented in Appendix B.

Lam Tai East road is right in the northern side of the site. There is an existing nullah in the further north. This existing nullah is the final discharge point of the runoff generated from the proposed development.

In the east, south and west of the site, there are other warehouses, natural vegetation, burial grounds and graves

There is an existing natural stream as named stream 1 passing through the site from south to north, and another natural stream as named stream 2 right in the east of the site. These two natural streams finally discharge to the existing nullah in the north of Lam Tai East Road.

3 DRAINAGE IMPACT ASSESSMENT

3.1 Introduction

Site inspection was carried out and the existing drainage facility inside and in the vicinity of the site was recorded. Desk study was carried out to identify the final discharge point.

3.2 Methodology

The following approach is adopted in carrying out the DIA.

- Identify the scope of development
- Identify the existing drainage systems within the site.
- Design a drainage system for the proposed development.
- Examine the potential impacts arising from the development on the drainage condition upon completion; and
- Recommend mitigation of the potential impacts including improvement or upgrading of exiting drainage system.

3.3 Design Assumption and Parameters

The following is referred in the DIA:

i. Stormwater Drainage Manual (SDM) for Planning, Design and Management (2018)
ii. SDM Corrigendum No. 1/2022: Rainfall increase due to climate change
iii. SDM Corrigendum No. 1/2024 for updated storm constants.
iv. Catchment area is defined based on the topographical information is DLO's geoinfo map.

The following rainfall runoff parameters are adopted in this study

- Runoff coefficients C=0.95 for paved and rood surfaces
- Runoff coefficient C=0.25 for permeable surface
- Storm constant a=505.5, b=3.29 and c=0.355 for 50 years return period is adopted (Table 3a, Corrigendum No.1/2024).

Manning equation is applied for existing natural streams and nullah hydraulic analysis. The roughness coefficient for Manning equation is 0.030 for existing natural streams, 0.012 for existing nullah

200mm sediment thickness is adopted for the calculation of maximum capacity of open channel and nullah.

Colebrook-White Equation is applied for existing 1050mm dia. concrete pipe in stream 1 hydraulic analysis. The kinematic viscosity of fluid and hydraulic pipeline roughness is $1.14*10^{-6}$ m^2/s and 0.00015 m respectively.

3.4 Existing Drainage System

The critical segment of existing stream 1 is the 1050mm dia. concrete pipe as shown in photo 4 (Appendix C shows the locations and photos of the existing streams). The critical segment of existing stream 2 is a rectangle open channel with dimensions 2.5m(W)x1m(D) as shown in photo 1. These two existing streams finally discharge to the existing nullah in the north of the site.

3.5 Proposed Drainage System

A 375UC/750UC is proposed peripherally around the site to prevent runoff escaped from the site. Four discharge points (750mm dia. concrete pipe) are designed to discharge the runoff from the site to the existing stream 1, And two discharge points (750mm dia. concrete pipe) are designed to discharge the runoff from the site to the existing stream 2 (Appendix D shows the Drainage Proposal of the site)

3.6 Drainage impact Assessment

The proposed 375UC/750UC/750 concrete pipe is checked. It is capable to collect the runoff generated from the site. No flooding risk. (Appendix E shows the detailed calculation).

The existing stream 1 and stream 2 is checked. For existing stream 1, it is recommended to construct a 2.5m(W)x1m(D) Open Channel to replace the existing 1050mm dia. concrete pipe. For existing Stream 2, it is capable to collect the runoff generated from the site. No flooding risk. (Appendix F shows the detailed calculation).

The existing nullah is checked. It is capable to collect the runoff generated from the site. No flooding risk. (Appendix G shows the detailed calculation)

Other recommendation:

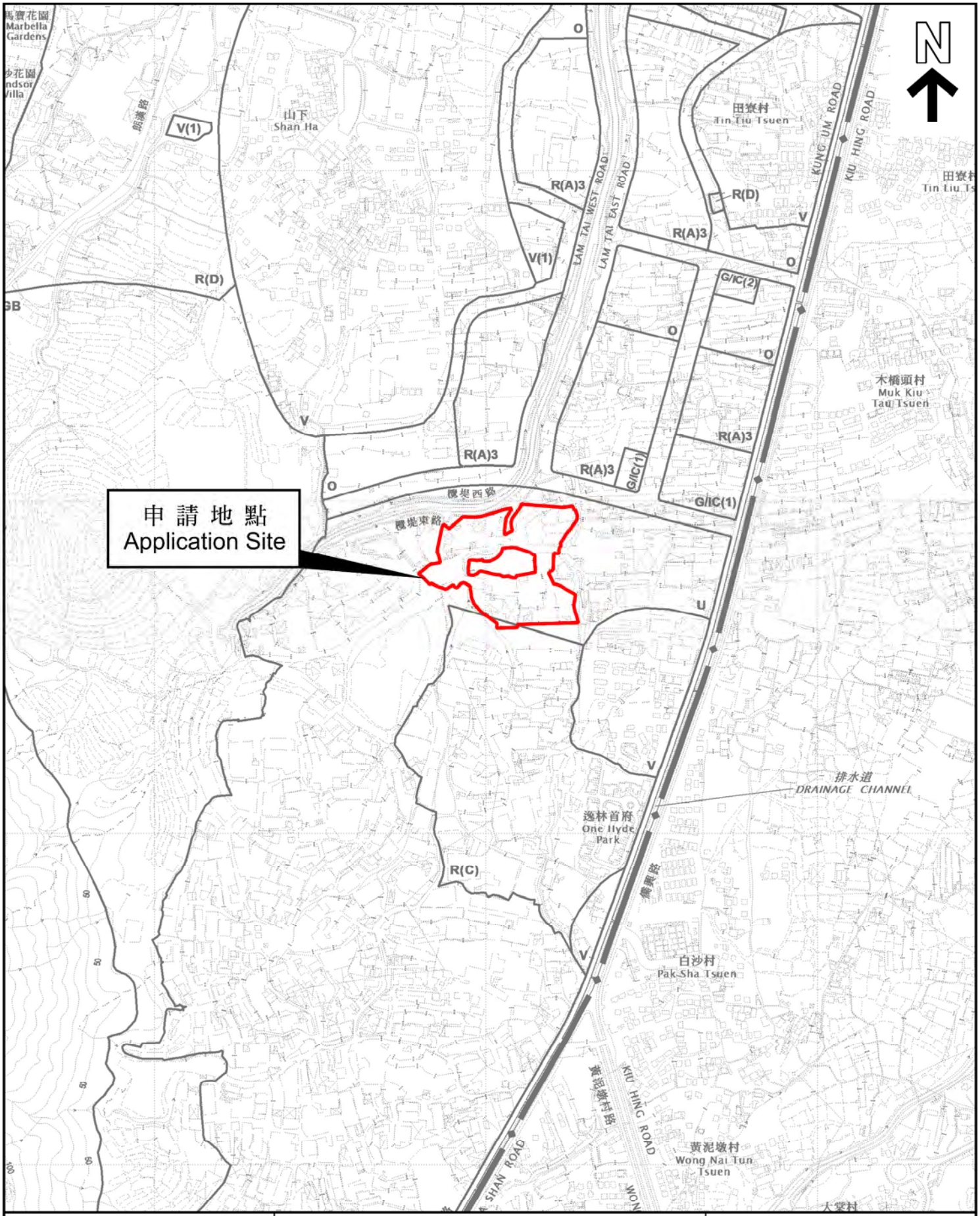
It is recommended that the hoarding, if any, should be open-bottom type to allow the designed drains to collect the overland flow.

It is also recommended to remove the vegetation and debris in the existing open channel to utilize the capacity,

4. Conclusion

- A warehouse development is proposed in the site.
- Proposed 375UC/750UC/750concrete pipe is capable to collect the design runoff.
- Existing Stream 1, construct a 2.5m(W)x1m(D)open channel to replace the existing 1050mm dia. concrete pipe.
- Existing Stream 2, it is capable to collect the runoff generated from the site. No flooding risk.
- All drains are finally discharged the existing nullah in Lam Tai East Road. The existing nullah is capable to collect the design runoff.
- Hoarding, if any, is recommended to be open-bottom type to collect the overland flow.
- It is also recommended to remove the vegetation and debris in the existing open channel to utilize the capacity,
- With the designed drains and recommendations, the proposed development would not cause any flooding to any existing/proposed drains.

Appendix A – LOCATION PLAN



本摘要圖於2025年9月16日擬備，
所根據的資料為於2021年8月10日
核准的分區計劃大綱圖編號 S/YL-TYST/14
EXTRACT PLAN PREPARED ON 16.9.2025
BASED ON OUTLINE ZONING PLAN No.
S/YL-TYST/14 APPROVED ON 10.8.2021

位置圖 LOCATION PLAN

SCALE 1 : 7 500 比例尺

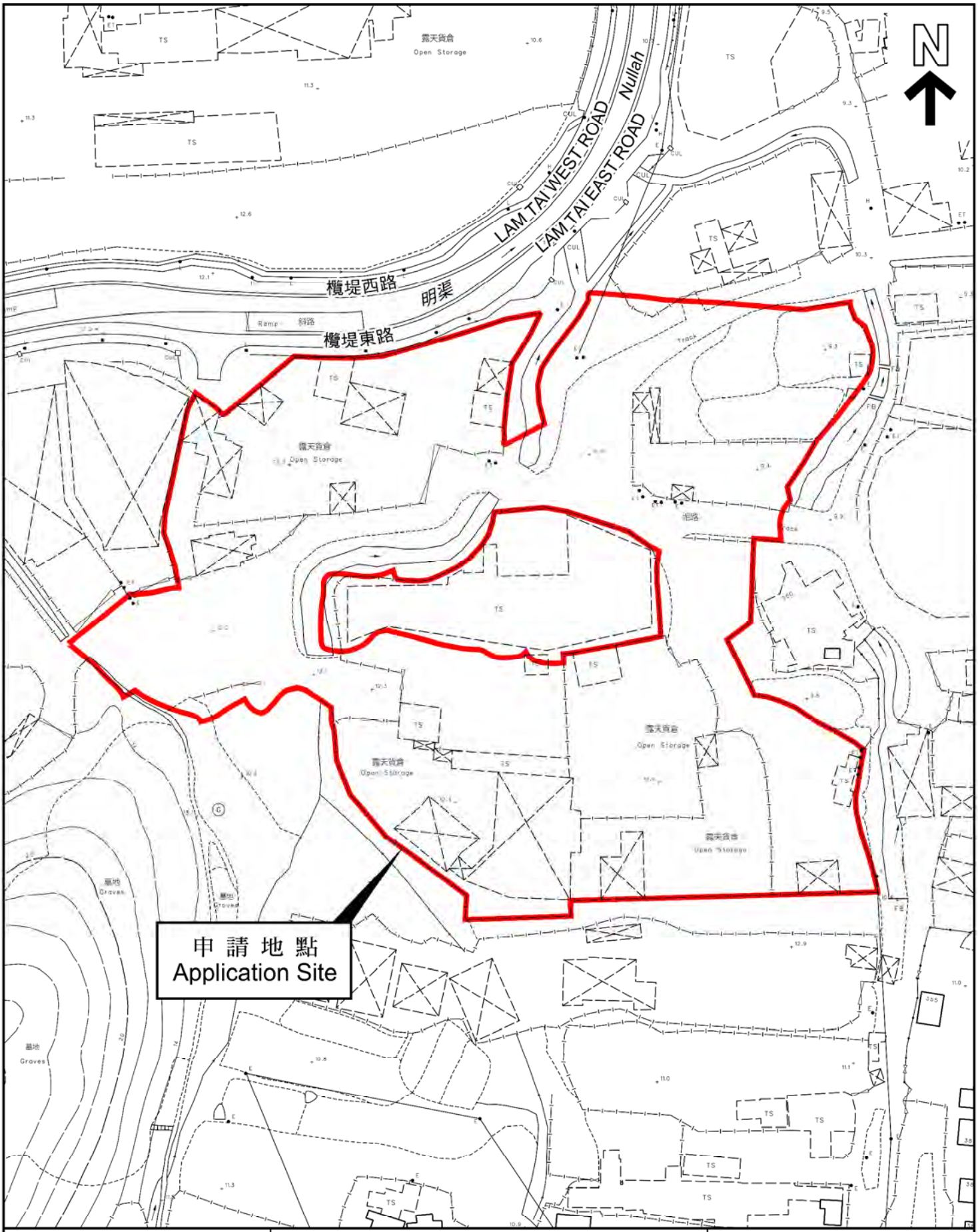
米 METRES 100 0 100 200 300 米 METRES

申請地點界線只作識別用
APPLICATION SITE BOUNDARY
FOR IDENTIFICATION PURPOSE ONLY

參考編號
REFERENCE No.

A/YL-TYST/1334

Appendix B – SITE PLAN



本摘要圖於2025年9月16日擬備，
所根據的資料為測量圖編號
6-NW-19A及C
EXTRACT PLAN PREPARED ON 16.9.2025
BASED ON SURVEY SHEETS No.
6-NW-19A&C

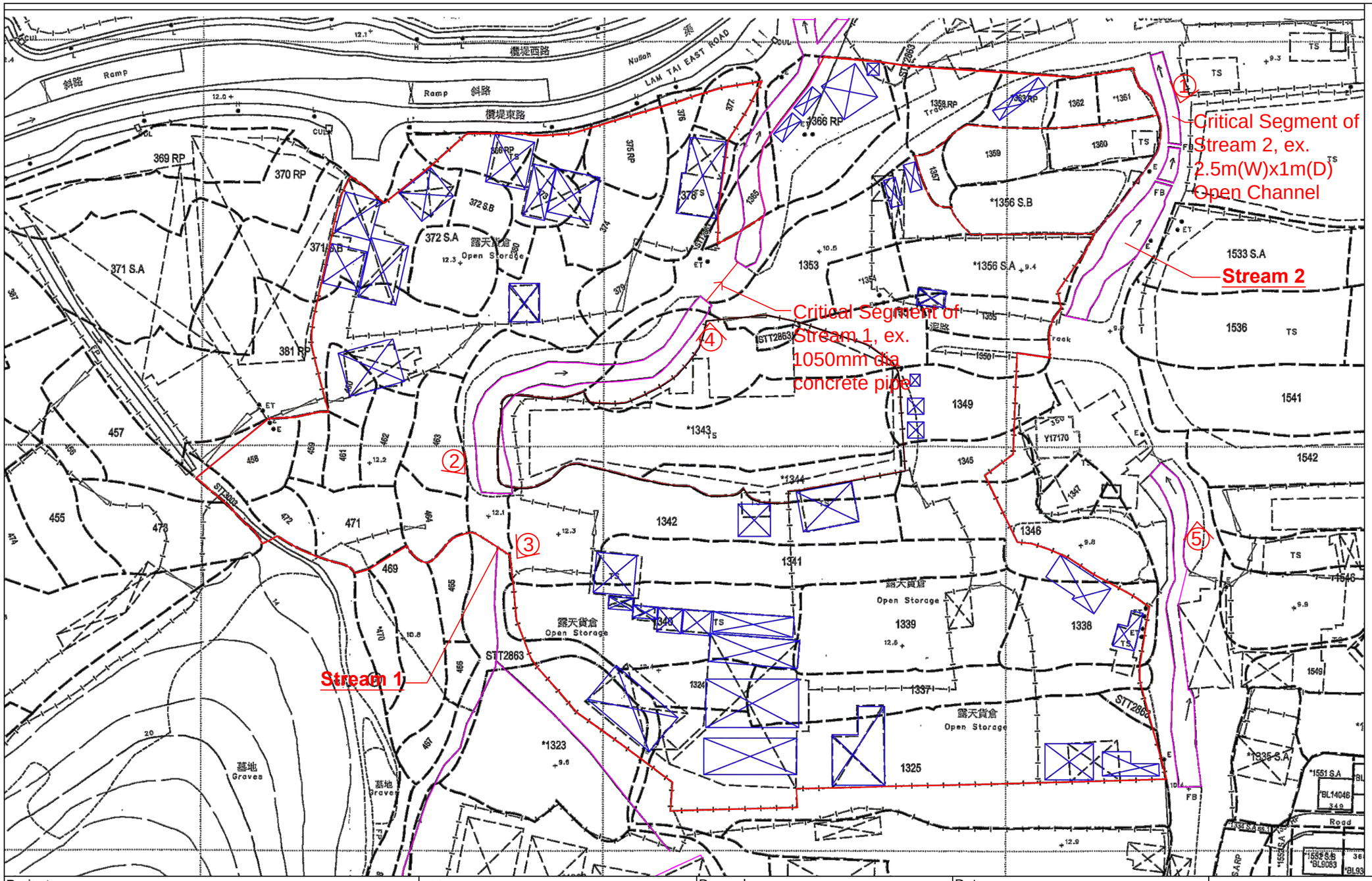
平面圖 SITE PLAN

申請地點界線只作識別用
APPLICATION SITE BOUNDARY
FOR IDENTIFICATION PURPOSE ONLY

參考編號
REFERENCE No.
A/YL-TYST/1334

Appendix C – LOCATIONS AND PHOTOS OF EXISTING STREAM 1

AND STREAM, 2



LEGEND

① Photo Viewport

Project: **Temporary Open Storage of Construction Machinery and Materials, Recycling Materials and Used Electrical Appliances with Ancillary Workshop for a Period of 3 Years at Various Lots in D.D. 119 and Adjoining Government Land, Tong Yan San Tsuen, Yuen Long, New Territories** **(Application No.:A/YL-TYST/1334)**	Title: DIA - Locations and Photos of Existing Stream 1 and Stream 2	Drawn by: DM Check by: DM	Date: 24-10-2025 Drawing No: P01

正宏工程顧問公司

CHING WAN ENGINEERING CONSULTANT COMPANY

Photo 1

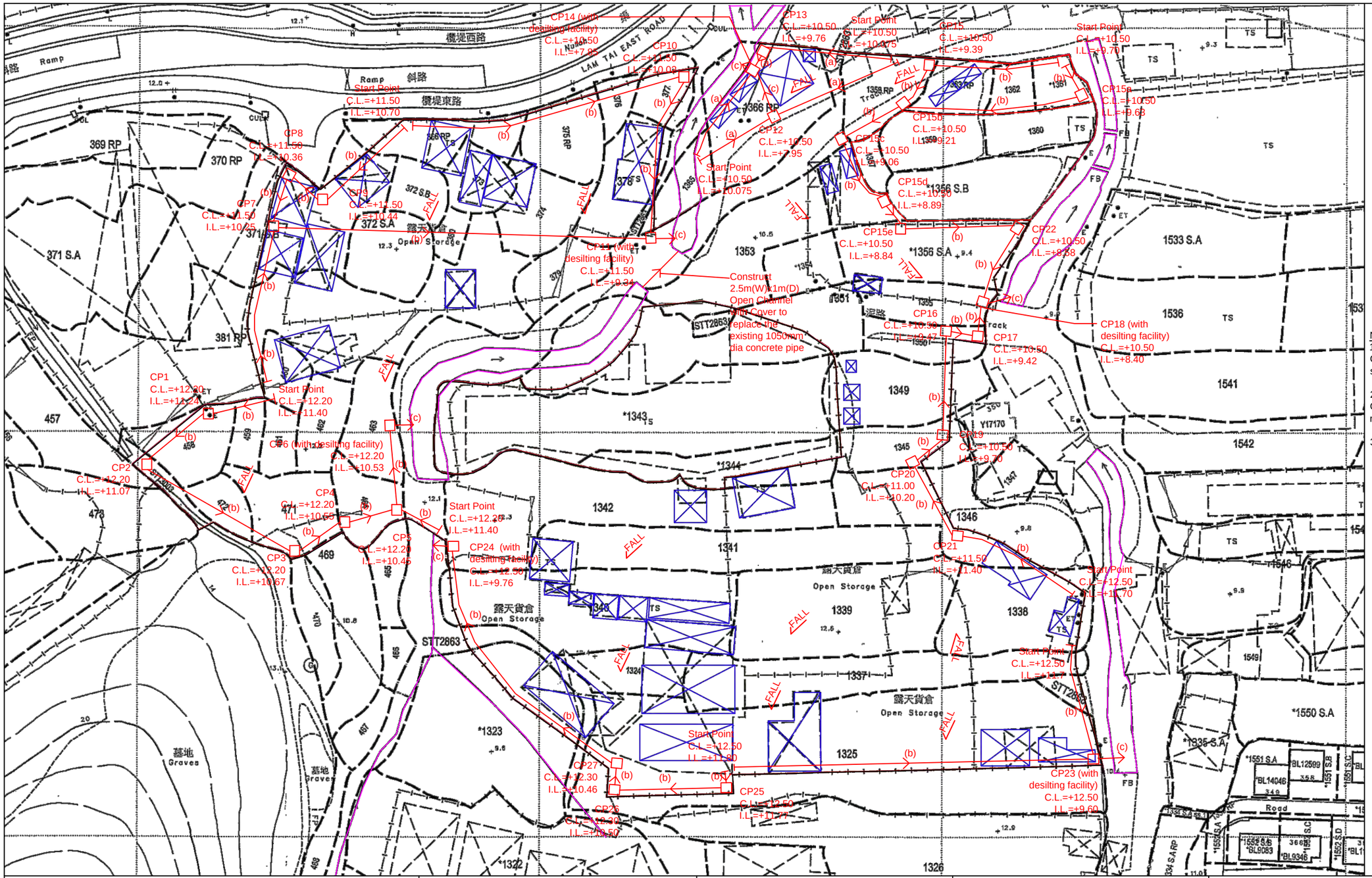
Photo 2

Photo 3

Photo 4

Photo 5

Appendix D – DRAINGAE PROPOSAL



LEGEND

- □CP — Proposed CatchPit
- (a) → — Proposed 375UC (1:100) with Cast Iron Cover
- (b) → — Proposed 750UC (1:100) with Cast Iron Cover
- (c) → — Proposed 750mm dia. (1:150) underground concrete pipe
- ⇒ — Existing Stream

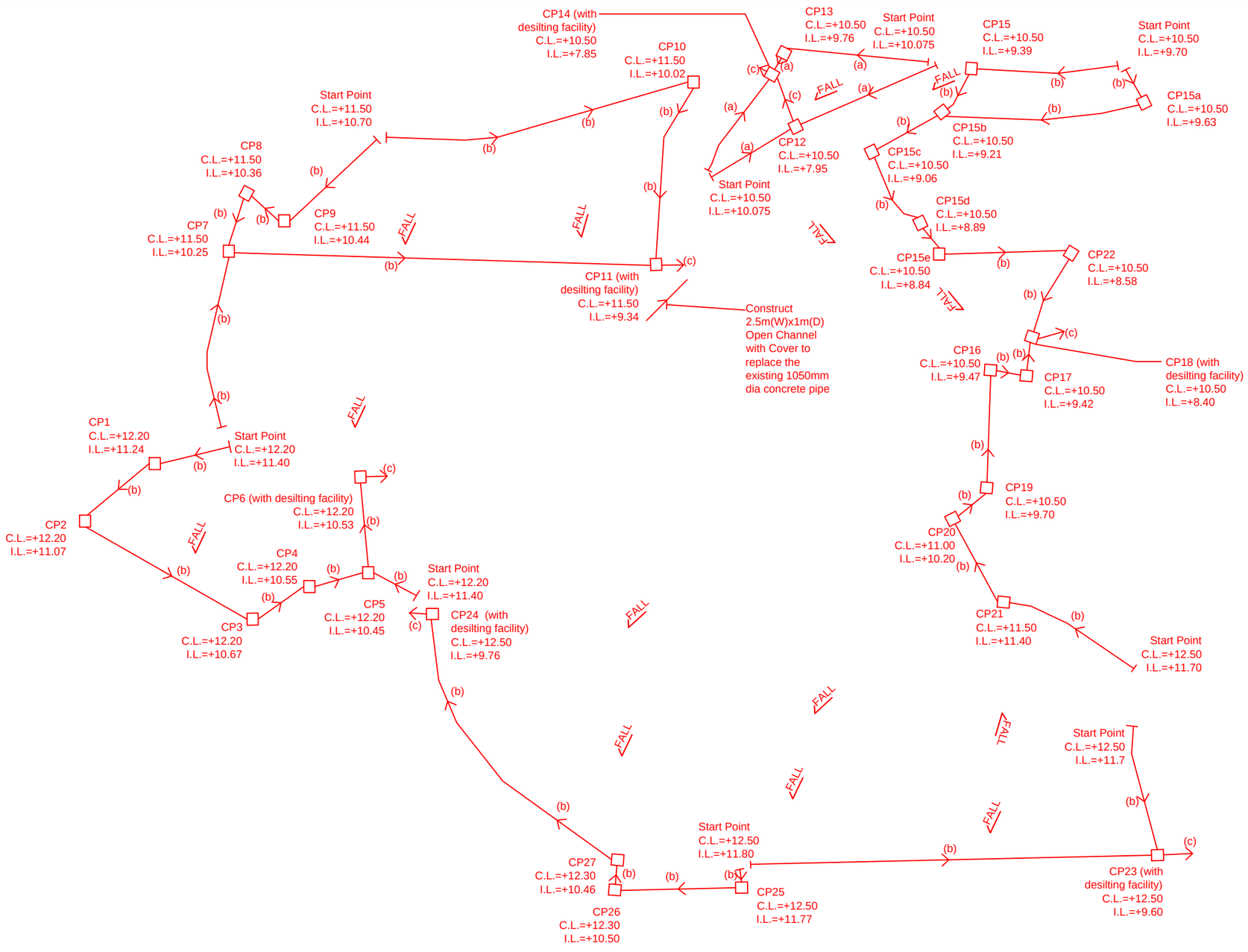
Note:

1. Catchpits (CP6, CP11, CP14, CP18, CP23 & CP24) with desilting facility shall follow CEDD standard drawing No. C2406l.
2. Catchpit and UC follows Typical Details of Geotechnical Manual for Slope Fig.8.10 and Fig.8.11 respectively.
3. Open-bottom Type Fence Wall to be erected..

Project: **Temporary Open Storage of Construction Machinery and Materials, Recycling Materials and Used Electrical Appliances with Ancillary Workshop for a Period of 3 Years at Various Lots in D.D. 119 and Adjoining Government Land, Tong Yan San Tsuen, Yuen Long, New Territories** **(Application No.:A/YL-TYST/1334)**	Title: Drainage Proposal - LAYOUT	Drawn by: DM Check by: DM	Date: 24-10-2025 Drawing No: D01

正宏工程顧問公司

CHING WAN ENGINEERING CONSULTANT COMPANY



LEGEND

- CP — Proposed CatchPit
- (a) — Proposed 375UC (1:100) with Cast Iron Cover
- (b) — Proposed 750UC (1:100) with Cast Iron Cover
- (c) — Proposed 750mm dia. (1:150) underground concrete pipe
- Existing Stream

Note:

1. Catchpits (CP6, CP11, CP14, CP18, CP23 & CP24) with desilting facility shall follow CEDD standard drawing No. C2406I.

2. Catchpit and UC follows Typical Details of Geotechnical Manual for Slope Fig.8.10 and Fig.8.11 respectively.

3. Open-bottom Type Fence Wall to be erected..

Project:

Temporary Open Storage of Construction Machinery and Materials, Recycling Materials and Used Electrical Appliances with Ancillary Workshop for a Period of 3 Years at Various Lots in D.D. 119 and Adjoining Government Land, Tong Yan San Tsuen, Yuen Long, New Territories

(Application No.:A/YL-TYST/1334)

Drainage Proposal - LAYOUT (without base map)

DM

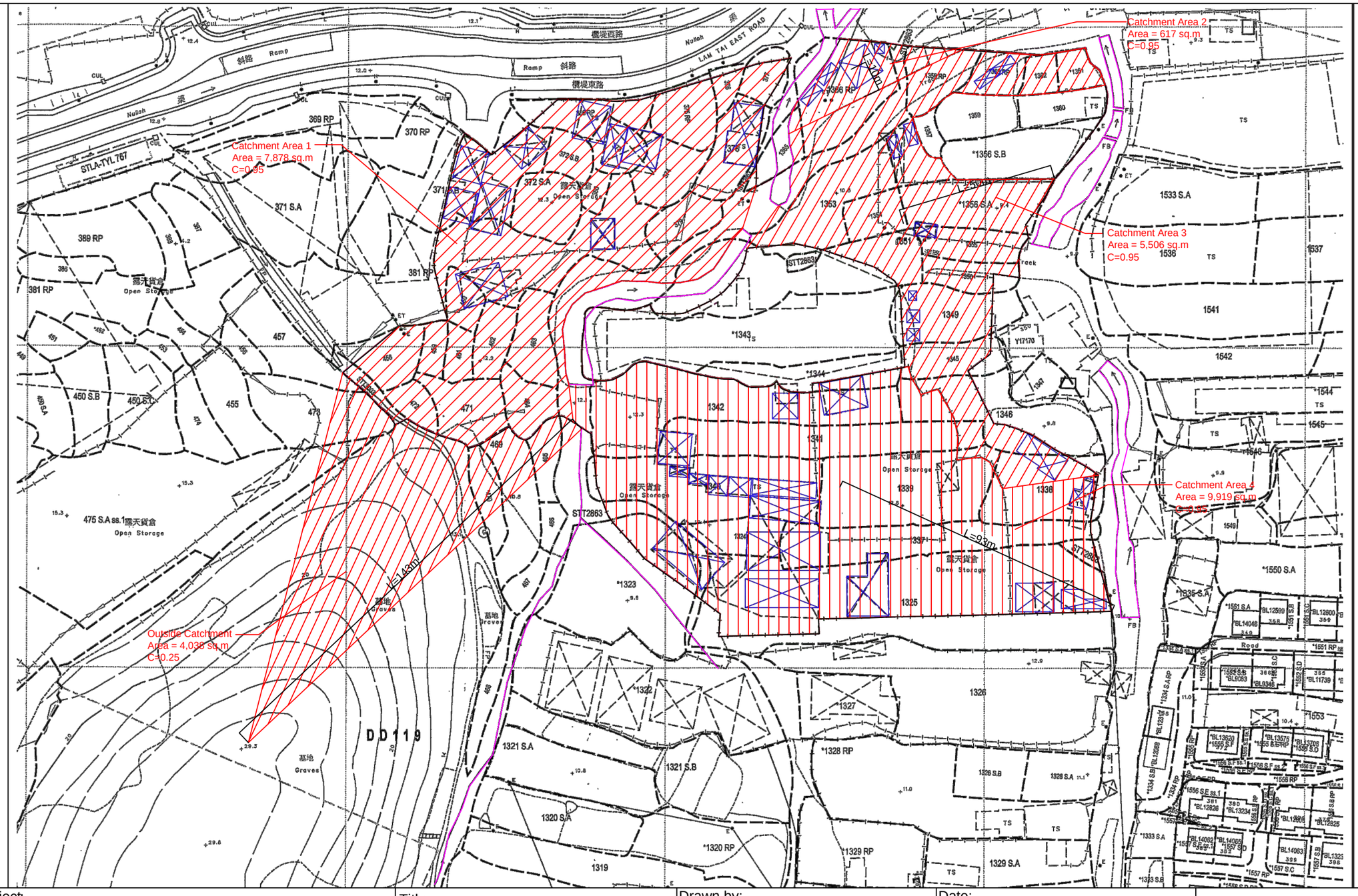
Check by: DM

24-10-2025

Drawing No: D02

正宏工程顧問公司

CHING WAN ENGINEERING CONSULTANT COMPANY



LEGEND

- CP — Proposed CatchPit
- (a) — Proposed 375UC (1:100) with Cast Iron Cover
- (b) — Proposed 750UC (1:100) with Cast Iron Cover
- (c) — Proposed 750mm dia. (1:150) underground concrete pipe
- Existing Stream

Note:

1. Catchpits (CP6, CP11, CP14 CP22 & CP23) with desilting facility shall follow CEDD standard drawing No. C2406I.

2. Catchpit and UC follows Typical Details of Geotechnical Manual for Slope Fig.8.10 and Fig.8.11 respectively.

3. Open-bottom Type Fence Wall to be erected..

Project: **Temporary Open Storage of Construction Machinery and Materials, Recycling Materials and Used Electrical Appliances with Ancillary Workshop for a Period of 3 Years at Various Lots in D.D. 119 and Adjoining Government Land, Tong Yan San Tsuen, Yuen Long, New Territories** **(Application No.:A/YL-TYST/1334)**	Title: Drainage Proposal - Catchment Area Plan	Drawn by: DM Check by: DM	Date: 24–10–2025 Drawing No: D03

正宏工程顧問公司

CHING WAN ENGINEERING CONSULTANT COMPANY

Appendix E – CALCULATION OF PROPOSED 375UC/750UC/750

CONCRETE PIPE

Catchment Area 1, Area	=	7878	m^2	(C=	0.95)
Catchment Area 2, Area	=	617	m^2	(C=	0.95)
Catchment Area 3, Area	=	5506	m^2	(C=	0.95)
Catchment Area 4, Area	=	9919	m^2	(C=	0.95)
Outside Catchment Area 1, Area	=	4038	m^2	(C=	0.25)

Calculation of Design Runoff of the Proposed Development,

For the design of drains inside catchment area 1, Catchment Area 1 + outside catchment area

$\Sigma Q = \Sigma 0.278\ C\ i\ A$

$A = 7878+4038 = 11916 = 0.011916$ m^2 / km^2

$t = 0.14465\ L/\ H^{0.2}A^{0.1}$
$= 0.14465*143/1^{0.2}*11916^{0.1}$
$= 8.092$ min

$i = 1.111*a/(t+b)^c$
$= 1.111*505.5/(8.092+3.29)^{0.355}$
$= 236.9$ mm/hr

(50 yrs return period, Table 3a, Corrigendum 2024, SDM) and (11.1% increase due to climate change)

Therefore, $Q = 0.278*0.25*236.9*0.004038+0.278*0.95*236.9*0.007878$
$= 0.5593$ m^3/sec
$= \underline{\mathbf{33556}}$ lit/min

Provide 750UC (1:100) is OK

For the design of drains inside catchment area 2, Catchment Area 2

$\Sigma Q = \Sigma 0.278\ C\ i\ A$

$A = 617 = 0.000617$ m^2 / km^2

$t = 0.14465\ L/\ H^{0.2}A^{0.1}$
$= 0.14465*10/1^{0.2}*617^{0.1}$
$= 0.761$ min

$i = 1.111*a/(t+b)^c$
$= 1.111*505.5/(0.761+3.29)^{0.355}$
$= 341.8$ mm/hr

(50 yrs return period, Table 3a, Corrigendum 2024, SDM) and (11.1% increase due to climate change)

Therefore, $Q = 0.278*0.95*341.8*0.000617$
$= 0.0557$ m^3/sec
$= \underline{\mathbf{3342}}$ lit/min

Provide 375UC (1:100) is OK

For the design of drains inside catchment area 3, Catchment Area 3

$\Sigma Q = \Sigma 0.278\ C\ i\ A$

$A = 5506 = 0.005506$ m^2 / km^2

$t = 0.14465\ L/\ H^{0.2}A^{0.1}$
$= 0.14465*50/1^{0.2}*5506^{0.1}$
$= 3.056$ min

$i = 1.111*a/(t+b)^c$
$= 1.111*505.5/(3.056+3.29)^{0.355}$
$= 291.4$ mm/hr

(50 yrs return period, Table 3a, Corrigendum 2024, SDM) and (11.1% increase due to climate change)

Therefore, $Q = 0.278*0.95*291.4*0.005282$
$= 0.4238$ m^3/sec
$= \underline{\mathbf{25427}}$ lit/min

Provide 750UC (1:100) is OK

For the design of drains inside catchment area 4, Catchment Area 4

$\Sigma Q = \Sigma 0.278\ C\ i\ A$

$A = 9919 = 0.009919$ m^2 / km^2

$t = 0.14465\ L/\ H^{0.2}A^{0.1}$
$= 0.14465*93/1^{0.2}*9919^{0.1}$
$= 5.360$ min

$i = 1.111*a/(t+b)^c$
$= 1.111*505.5/(5.36+3.29)^{0.355}$
$= 261.1$ mm/hr

(50 yrs return period, Table 3a, Corrigendum 2024, SDM) and (11.1% increase due to climate change)

Therefore, $Q = 0.278*0.95*261.1*0.011462$
$= 0.6840$ m^3/sec
$= \underline{\mathbf{41038}}$ lit/min

Provide 750UC (1:100) is OK

GEO Technical Guidance Note No. 43 (TGN 43)
Guidelines on Hydraulic Design of U-shaped and Half-round Channels on Slopes

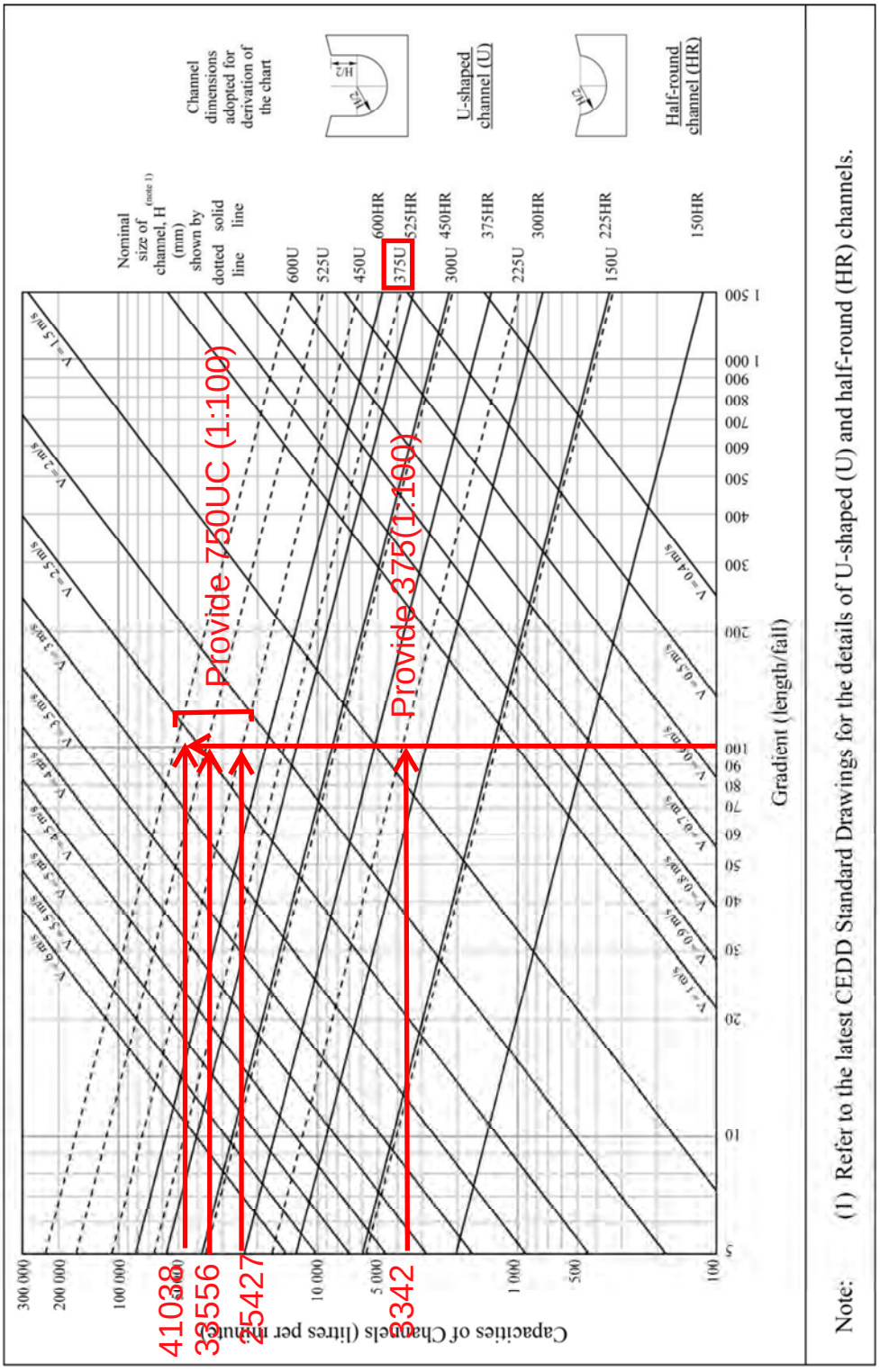


Figure 1 - Chart for the rapid design of U-shaped and half-round channels up to 600 mm

Check 750mm dia. Pipes by Colebrook-White Equation

$$V = -\sqrt{(8gDs)}\log\left(\frac{ks}{3.7D} + \frac{2.51v}{D\sqrt{(2gDs)}}\right)$$

where :

V	=			mean velocity (m/s)	
g	=	9.81	m/s2	gravitational acceleration (m/s2)	
D	=	0.75	m	internal pipe diameter (m)	
ks	=	0.00015	m	hydraulic pipeline roughness (m)	(Table14, from DSD SDM 2018, concrete pipe)
v	=	1.14E-06	m2/s	kinematic viscosity of fluid (m2/s)	
s	=	0.006667		hydraulic gradient	

Therefore, design V of pipe capacity = 2.6177 m/s

Q= 0.8VA (0.8 factor for sedimentation)

= 0.925 m3/s

= 55511 lit/min

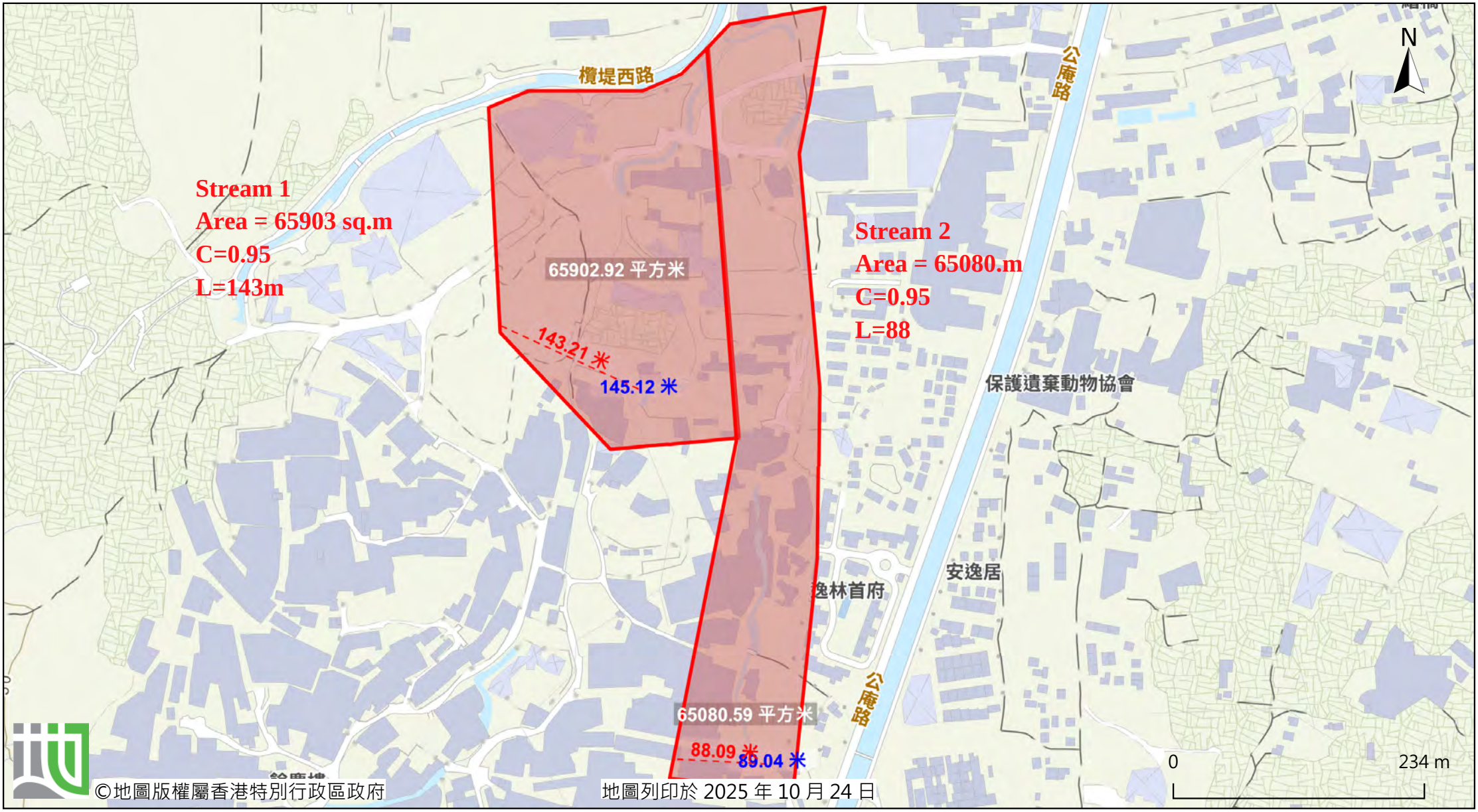
> 41038 lit/min Ok

Appendix F – CALCULATION OF EXISTING STREAM 1 AND STREAM, 2

GEOINFO MAP
地理資訊地圖

前往地圖: https://www.map.gov.hk/gm/geo:22.4243,114.0197?z=4514

Catchment Area Plan for Ex. Stream 1 and Stream 2



由「地理資訊地圖」網站提供: https://www.map.gov.hk

Check 1050mm dia. Pipes by Colebrook-White Equation

$$V = -\sqrt{(8gDs)}\log\left(\frac{ks}{3.7D} + \frac{2.51v}{D\sqrt{(2gDs)}}\right)$$

where :

V	=			mean velocity (m/s)	
g	=	9.81	m/s2	gravitational acceleration (m/s2)	
D	=	1.05	m	internal pipe diameter (m)	
ks	=	0.00015	m	hydraulic pipeline roughness (m)	(Table14, from DSD SDM 2018, concrete pipe)
v	=	1.14E-06	m2/s	kinematic viscosity of fluid (m2/s)	
s	=	0.01		hydraulic gradient	

Therefore, design V of pipe capacity = 3.9493 m/s

Q= 0.8VA			(0.8 factor for sedimentation)
= 2.736	m3/s		
= 164144	lit/min		
< 257975	lit/min	NOT OK	

Catchment Area 1, Area	=	65903	m^2	(C=	0.95	), L=	143 m
Catchment Area 2, Area	=	65081	m^2	(C=	0.95	), L=	88 m

Calculation of Design Runoff of the Proposed Development,
For checking Existing Stream 1,

$\Sigma Q = \Sigma 0.278\ C\ i\ A$

$A = 65903\ m^2$
$= 65903$
$= 0.065903\ km^2$

$t = 0.14465\ L/\ H^{0.2}A^{0.1}$
$= 0.14465*143/1^{0.2}*65903^{0.1}$
$= 6.820$ min

$i = 1.111*a/(t+b)^c$ (50 yrs return period, Table 3a, Corrigendum 2024, SDM) and (11.1% increase due to climate change)
$= 1.111*505.5/(6.820+3.29)^{0.355}$
$= 247.0$ mm/hr

Therefore, $Q = 0.278*0.95*247.0*0.065903$
$= 4.2996\ m^3/sec$
$= \mathbf{257975}$ lit/min

For checking Existing Stream 2,

$\Sigma Q = \Sigma 0.278\ C\ i\ A$

$A = 65081\ m^2$
$= 0.065081\ km^2$

$t = 0.14465\ L/\ H^{0.2}A^{0.1}$
$= 0.14465*88/1^{0.2}*65081^{0.1}$
$= 4.202$ min

$i = 1.111*a/(t+b)^c$ (50 yrs return period, Table 3a, Corrigendum 2024, SDM) and (11.1% increase due to climate change)
$= 1.111*505.5/(4.202+3.29)^{0.355}$
$= 274.8$ mm/hr

Therefore, $Q = 0.278*0.95*274.8*0.065081$
$= 4.7225\ m^3/sec$
$= \mathbf{283352}$ lit/min

Providing 1050mm dia. concrete pipe is NOT ok

Calculation Maximum Capacity of Existing 2500mm(W)x1000mm(D) Open Channel

Manning Equation $V = R^{2/3}*S_r^{0.5}/n$

where $R = A/(W+2D)$ W= 2.5 m
$= 0.4878$ m D= 0.8 m (200mm freeboard considered)
A= 2 m2

$n = 0.03$ $s/m^{1/3}$ (Talbe 13 of Stormwater Drainage Manual)

$S_f = 0.02$

Therefore, $V = 0.8077^{2/3}*0.02^{0.5}/0.030$
$= 2.921$ m/sec

Maximum Capacity (Q_{max}) $= V*A$
$= 5.84235\ m^3/sec$
$= 350541$ lit/min
> 283352 lit/min

For Stream 1, it is recommended to construct a 2500mm(W)x1000mm(D) Open Channel to replace the existing 1050mm dia. concrete pipe

It is OK fpor Stream 2

Appendix G – CALCULATION OF EXISTIGN NULLAH

GEOINFO MAP
地理資訊地圖

前往地圖: https://www.map.gov.hk/gm/geo:22.4275,114.0168?z=18056

Catchment Area Plan for existing nullah in Lam Tai East Road

由「地理資訊地圖」網站提供: https://www.map.gov.hk

Calculation of Design Runoff for the Nullah beside Lam Tai East Road,

Catchment Area 1, Area = 1155578 m^2 (C= 0.95)

Catchment Area 2, Area = 564422 m^2 (C= 0.25)

Total Area = 1720000 m^2

$\Sigma Q = \Sigma 0.278\ C\ i\ A$

A = 1720000 m^2

= 1.72 km^2

t = $0.14465\ L/\ H^{0.2}A^{0.1}$

= $0.14465*50/1^{0.2}*1720000^{0.1}$

= 1.721 min

i = $1.111*a/(t+b)^c$ (10 yrs return period, Table 3a, Corrigendum 2024, SDM) and (11.1% increase due to climate change)

= 1.111*485.0/(1.721+3.11)0.397

= 288.3 mm/hr

Therefore, Q = 0.278*0.95*288.3*1.155578+0.278*0.25*288.3*0.564422

= 99.3075 m^3/sec

= 5958451 lit/min

Calculation Maximum Capacity of the Nullah beside Lam Tai East Road,

Manning Equation $V = R^{2/3}*S_f^{0.5}/n$

where R = W*D/(2D+W) W= 5 m

= 1.4583 m D= 3.5 m

n = 0.012 $s/m^{1/3}$ (Talbe 13 of Stormwater Drainage Manual)

S_f = 0.01

Therefore, V = $1.4583^{2/3}*0.01^{0.5}/0.012$

= 10.7166 m/sec

Maximum Capacity (Q_{max}) = V*A

= V*W*(D-0.2)

= 176.8237 m^3/sec

= 10609424 lit/min

> 5958451 lit/min OK