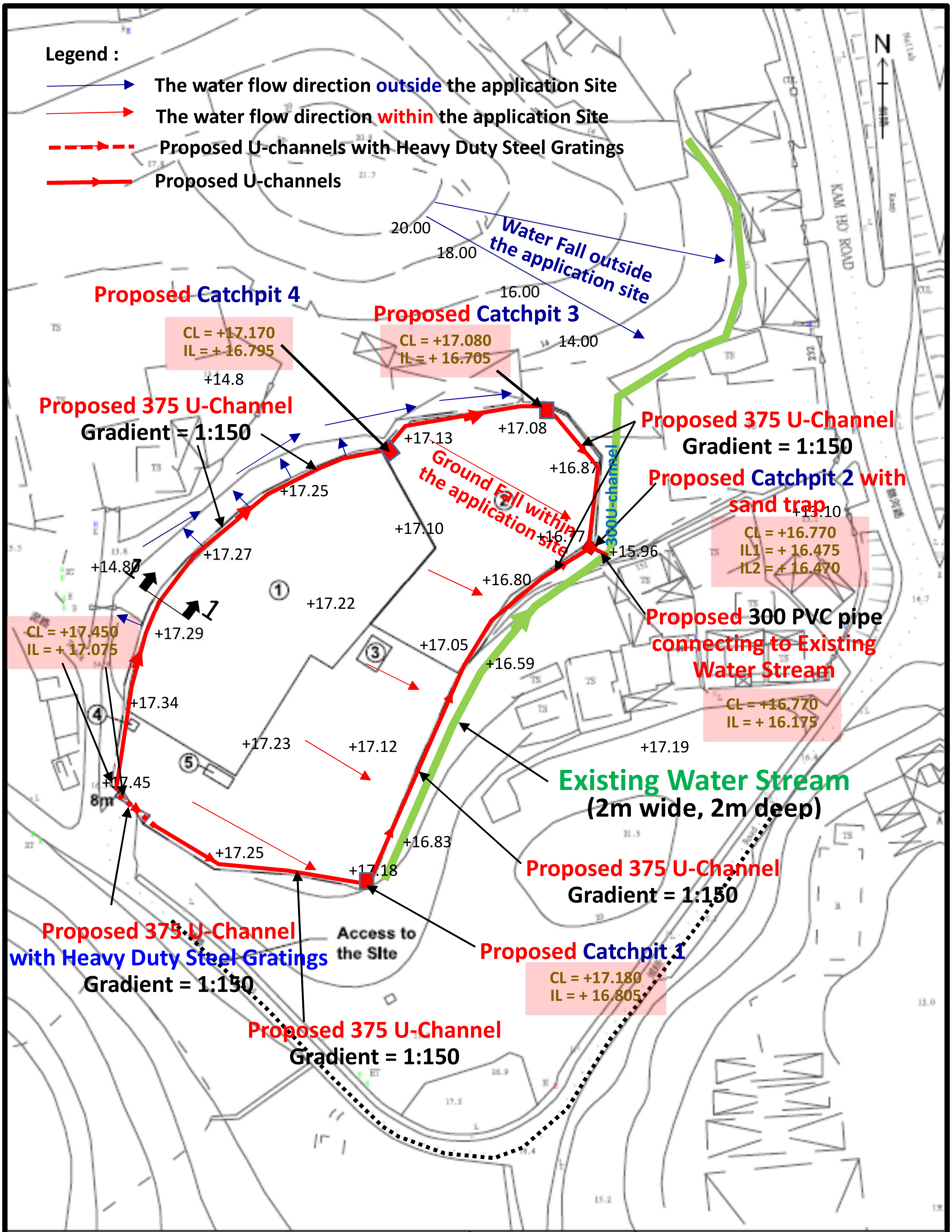
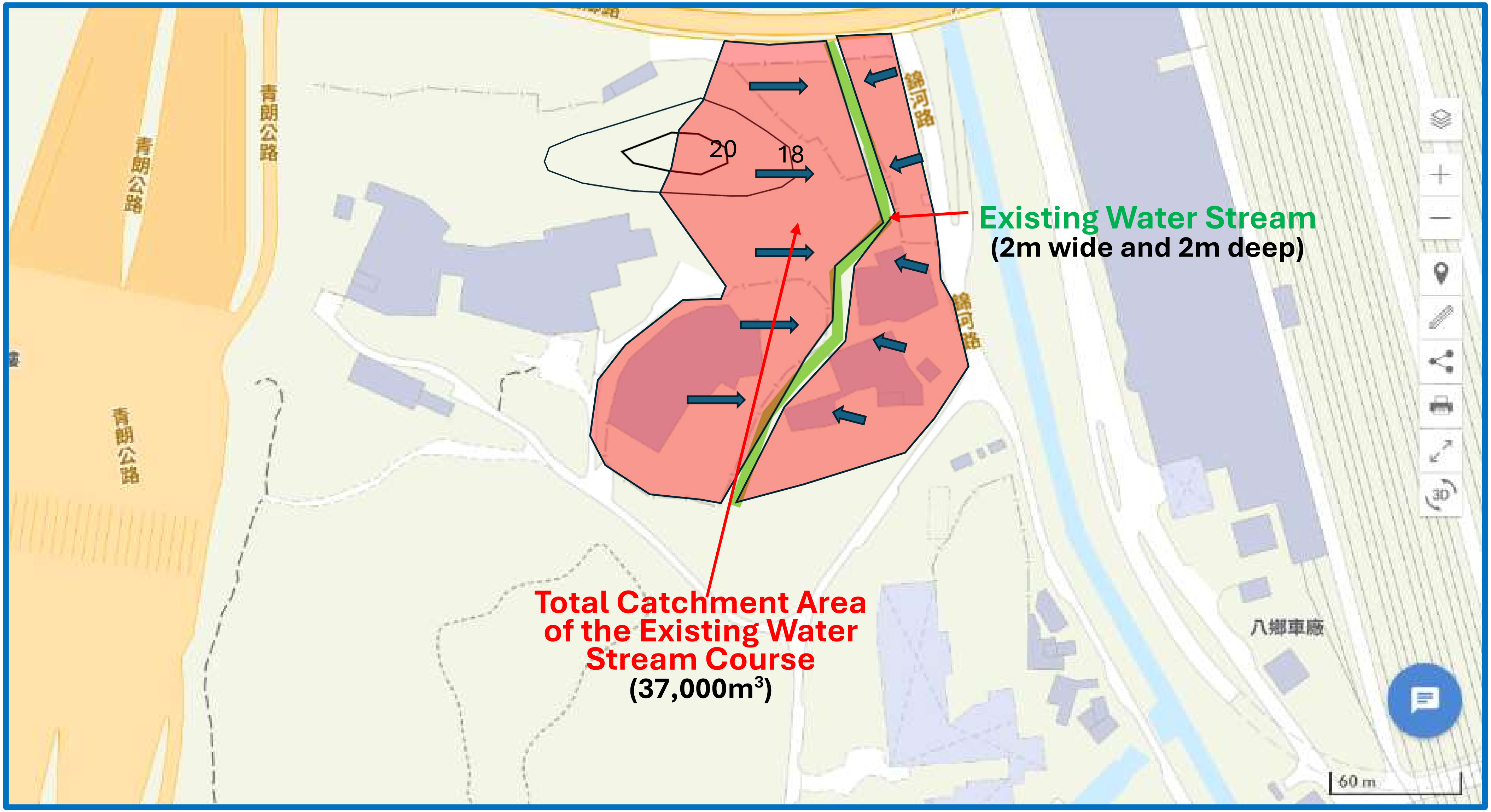
Appendix 3

Submitted Drainage Proposal to Planning Department on 27.6.2024 in compliance with Approval Condition (d) of last application (No. A/YL-KTS/946)



Drainage Plan	Drawing No. 001C



Catchment Area of the Existing Water Stream Course

Drainage Design
For the application near Kam Ho Road
(2nd Revised Calculations)
26-6-2024

DSD - STORMWATER DRAINAGE MANUAL

7.5.2 Rational Method

$$Qp = 0.278CiA$$

where Qp = peak runoff in m^3/s

C = runoff coefficient (dimensionless)

i = rainfall intensity in mm/hr

A = catchment area in km^2

In Hong Kong, a value of C = 1.0 is commonly used in developed urban areas. In less developed areas, appropriate C values in order to ensure that the design would be fully cost-effective.

Surface Characteristics	**Runoff coefficient, C***
Asphalt	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Grassland (heavy soil**)	
Flat	0.13 - 0.25
Steep	0.25 - 0.35
Grassland (sandy soil)	
Flat	0.05 - 0.15
Steep	0.15 - 0.20

The surface of the site will be covered by Asphalt, the C should be **0.85** (Mid value)

6.6.1 Village Drainage and Main Rural Catchment Drainage Channels

'Village Drainage' refers to the local stormwater drainage system within a village. A stormwater drain conveying stormwater runoff from an upstream catchment but happens to pass through a village may need to be considered as either a 'Main Rural Catchment Drainage Channel' or 'Village Drainage', depending on the nature and size of the upstream catchment. In any case, the impact of a **50-year** event should be assessed in the planning and design of village drainage system to check whether a higher standard than 10 years is justified.

Table 10 – Recommended Design Return Periods based on Flood Levels

Intensively Used Agricultural Land	2-5 years
Village Drainage including Internal Drainage System under a Polder Scheme	10 years [1,3]
Main Rural Catchment Drainage Channels	50 years [2,3]
Urban Drainage Trunk Systems	200 years [4]
Urban Drainage Branch Systems	50 years [4]

Notes:

1. The impact of a 50-year event should be assessed in each village to check whether a higher standard than 10 years can be justified.
2. Embanked channels must be capable of passing a 200-year flood within banks.
3. For definitions of Village Drainage and Main Rural Catchment Drainage Channels, refer to Section 6.6.1.
4. For definitions of Urban Drainage Branch and Urban Drainage Trunk Systems, refer to Section 6.6.2.

50 years is used

Table 2d – Intensity-Duration-Frequency (IDF) Relationship of North District Area
for durations not exceeding 240 minutes

Duration (min)	**Extreme Intensity x (mm/h) for various Return Periods T(year)**						
	2	5	10	20	50	100	200
240	28.5	37.7	43.4	48.6	54.9	59.4	63.6
120	42.2	54.7	62.5	69.6	78.4	84.7	90.8
60	61.0	75.7	84.3	92.0	101	108	114
30	84.0	100	110	118	128	135	142
15	106	127	139	150	163	173	182
10	119	141	155	168	184	196	208
5	138	161	177	193	216	234	254

i (rainfall intensity) = **101mm/hr** (Duration of 60min is used)

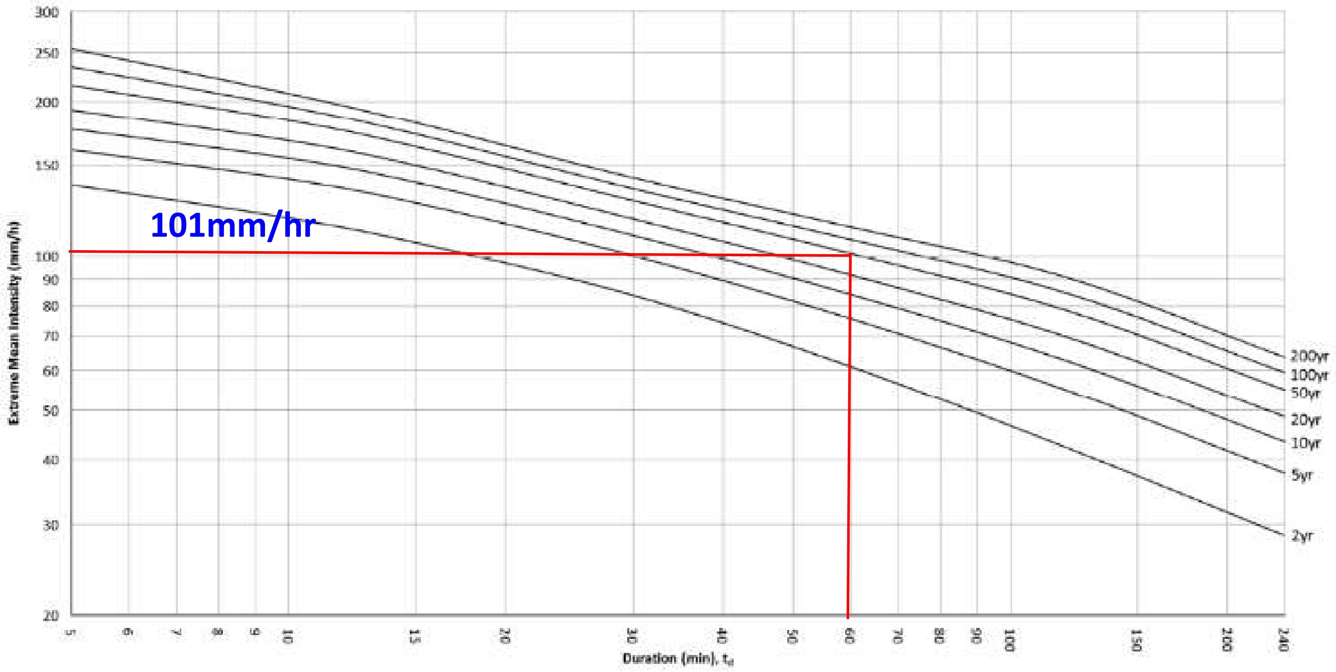


Figure 4d – Intensity-Duration-Frequency Curves of North District Area
(for durations not exceeding 4 hours)

i = 101 mm/hr (50 years)

Calculation of the Flow from the Application Site

$Qp = 0.278CiA$

C = 0.85 (mid Value) Asphalt

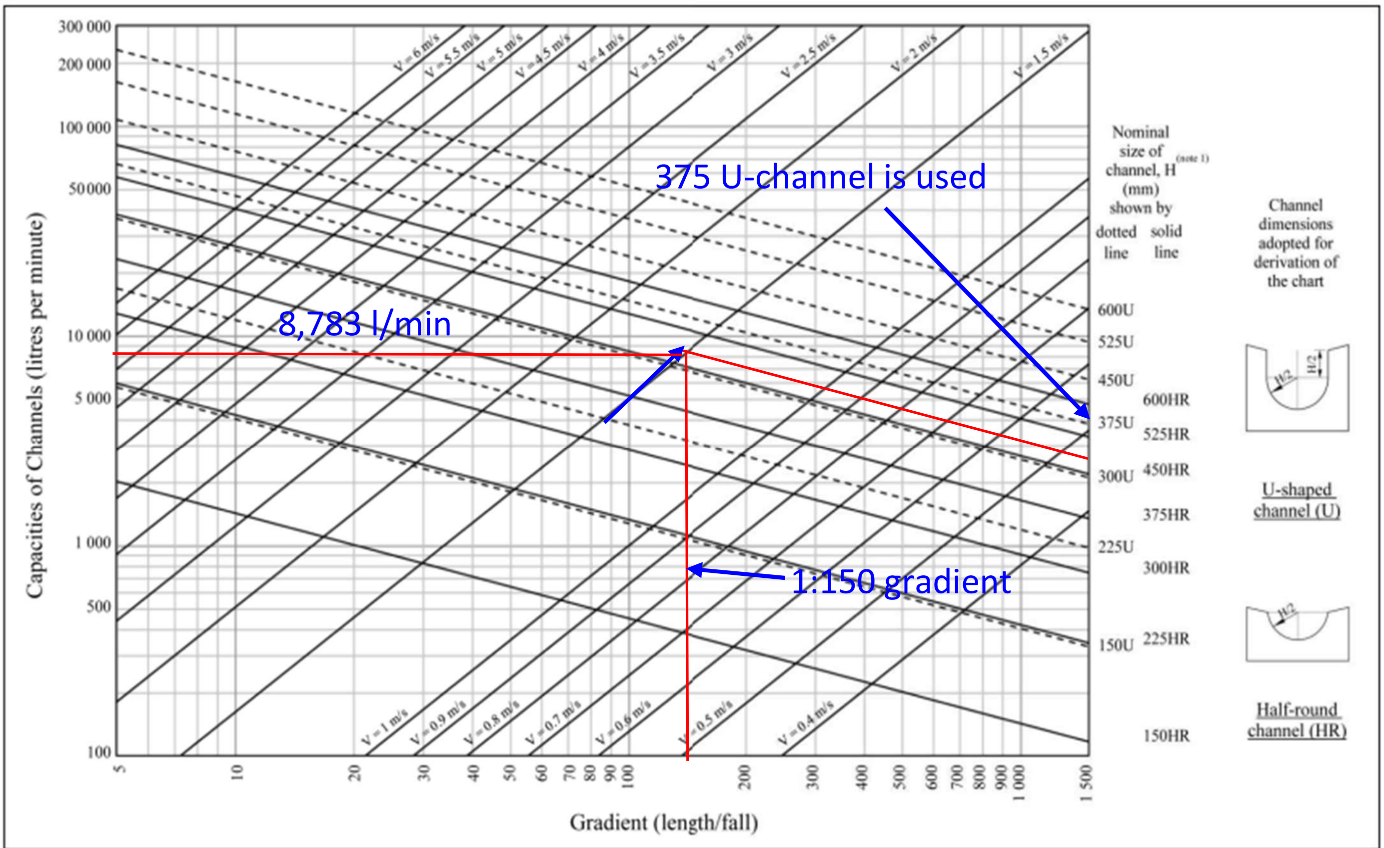
i = 101 mm/hr

A = 6,133m^2 (0.006133km^2)

Qp =0.147m^3/s or 8,783l/min

GEO Technical Guidance Note No. 43 (TGN 43) Guidelines on Hydraulic Design of U-shaped

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

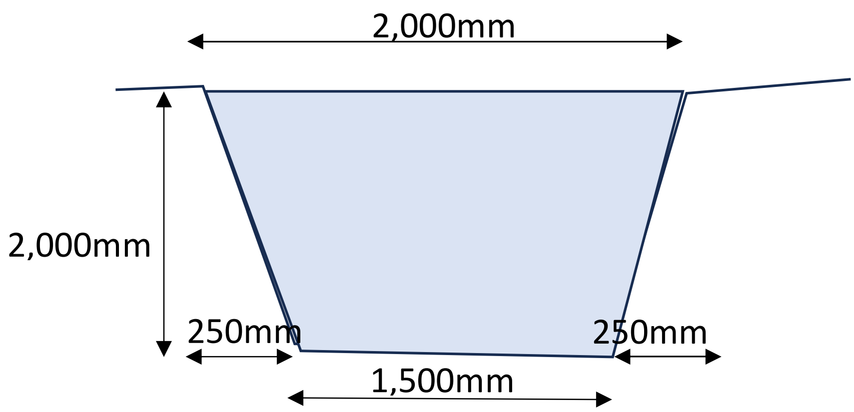


Note: (1) Refer to the latest CEDD Standard Drawings for the details of U-shaped (U) and half-round (HR) channels.

For 8,783l/min, **375 U-channel is used.**

Estimation of the Capacity of Existing Natural Stream Course

$Q = VA$



Typical Cross Section
Of the Existing Stream Course

Chezy's formula : $V = C\sqrt{(m \times i)}$

Where V = velocity of flow

C = Chezy coefficient

m = hydraulic mean depth (HMD)

i = inclination or gradient as 1/X

Manning's formula : $C = m^{1/6} / n$

Where C = Chezy coefficient

n = coefficient of roughness

(0.001 for PVC and Clay,

0.015 for concrete (Lined)

Assume 0.050 for vegetation (Unlined)

m = hydraulic mean depth (HMD)

HMD = area of flow / wetted perimeter

Area of flow = $(2 + 1.5) \times 2 / 2 = 3.5$

Wetted perimeter = $(0.25^2 + 2^2)^{1/2} \times 2 + 1.5 = 5.531$

HMD = 3.5 / 5.531 = 0.632

$C = 0.632^{1/6} / 0.05 = 18.52$

i = 1/200 = 0.005

$V = 18.52 \times (0.632 \times 0.005)^{1/2} = 1.041$m/s

Capacity of the Existing Stream Course

Q = 1.041 x 3.5 = **3.64 m^3/s or 218,610 l/min**

Calculation of the Flow from the Catchment Area onto the Existing Stream Course

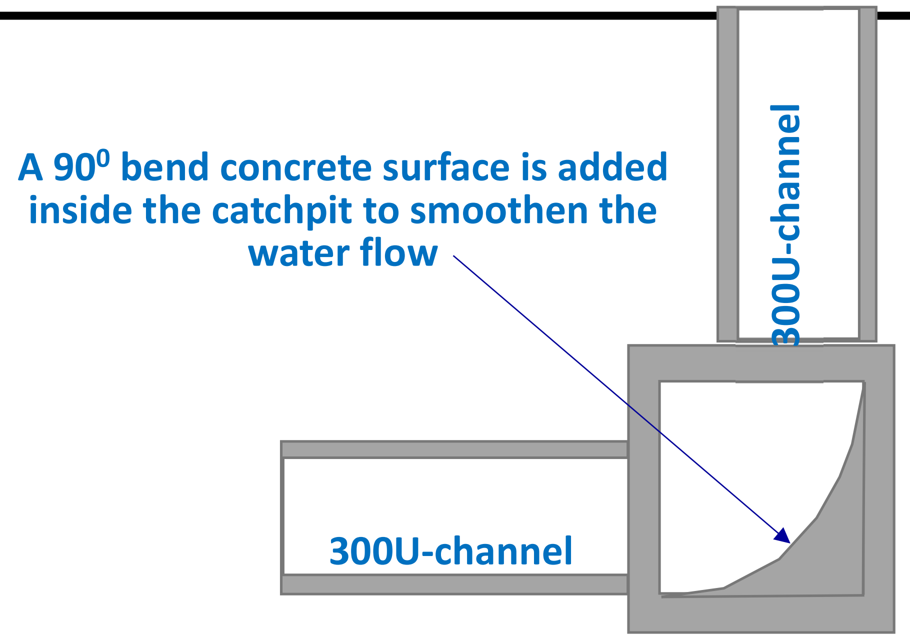
Qp = 0.278CiA

C = 0.85 (mid Value) Asphalt (Assume all on Asphalt, more conversative)

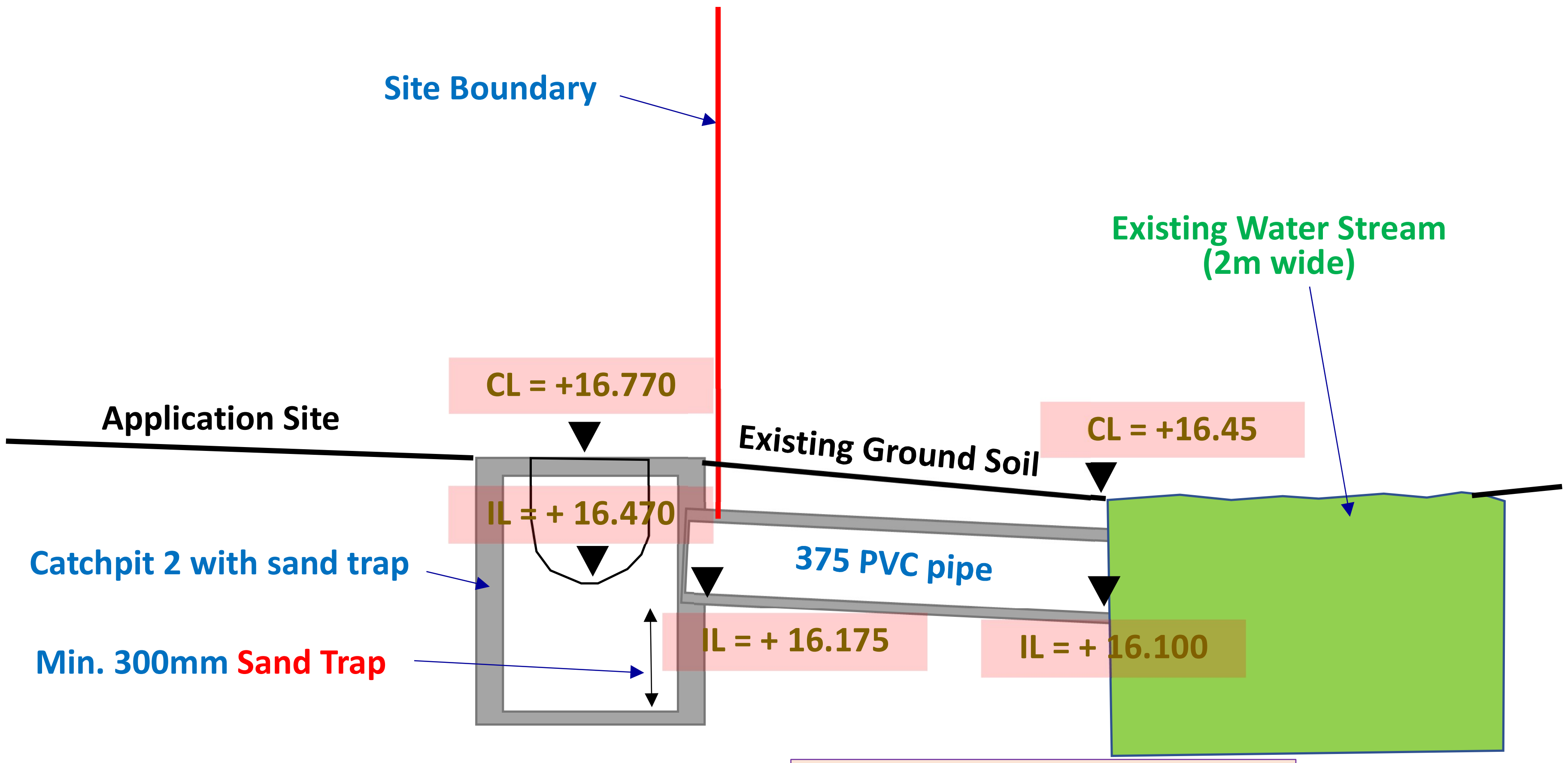
i = 101 mm/hr

A = 37,000m^2 (0.037km^2)

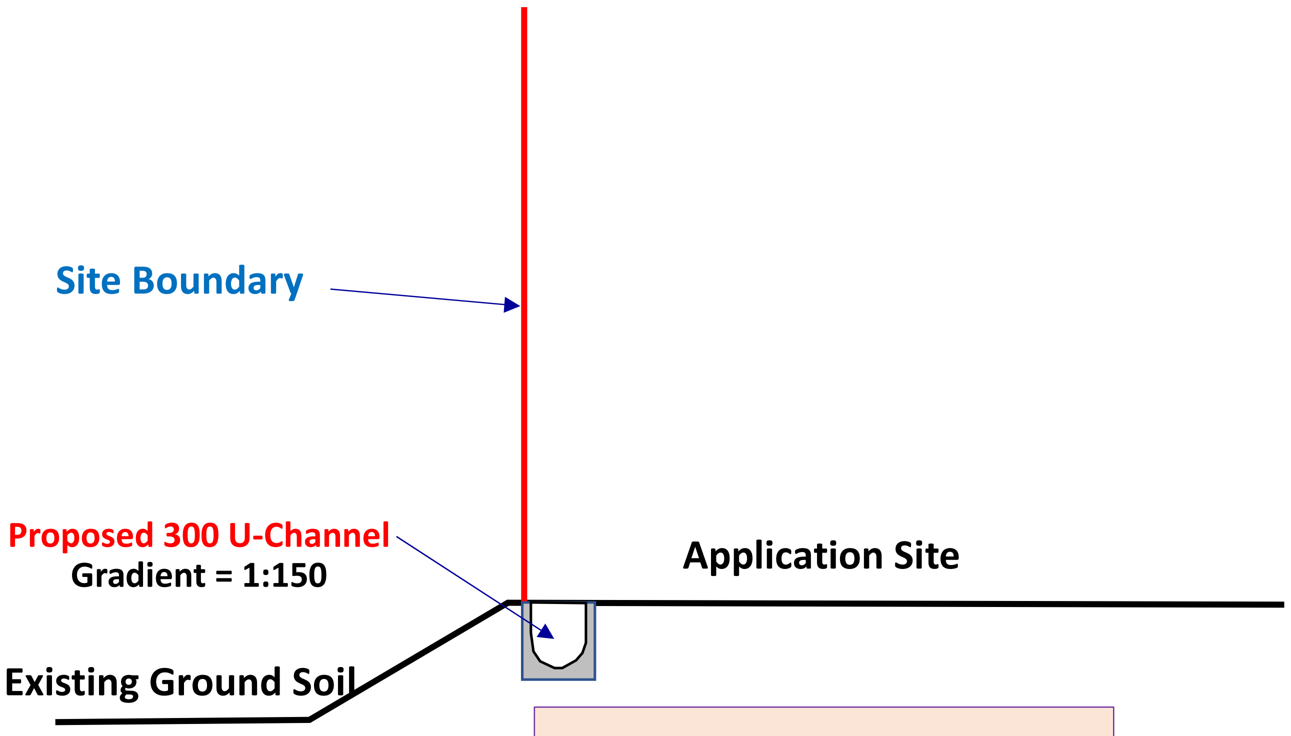
Qp =0.883m^3/s < 3.64 m^3/s Capacity OK



Details for Catchpit 1



Details for Catchpit 2



Section 1 - 1

Catchpit Details & Section	Drawing No. 002C

Existing Natural Stream (Dry weather), the depth is about 2m.

A small Bulldozer is used to clear the vegetation on the stream