

Appendix 7

Drainage Impact Assessment

Proposed Residential Re-development

at

No. 66 Deep Water Bay Road

Hong Kong

R.B.L. 573

Drainage

Impact Assessment Report

Proposed Residential Re-development at 66 Deep Water Bay Road, Hong Kong
R.B.L. 573
Drainage Impact Assessment Report

Kwong Wah Consultants Ltd.

Issue & Revision Record Sheet

Client Name : BLUE WATER GROUP MANAGEMENT LIMITED

Project Title : Proposed Residential Re-development at
No. 66 Deep Water Bay Road, R.B.L. 573

Report Title : Drainage Impact Assessment Report

Report Revision Number : Rev.0

Date : 24 April 2025

Rev	Date	Originator	Checker	Approver	Description
0	24 April 25	N. Chow	W. Mak	W. Mak	1 st Issue

Unit 1802, 18/F CFC Tower
28 Mody Road
Tsimshatsui
Hong Kong

Tel 2356 0918
Fax 2581 2113

CONTENT	PAGE
1. Introduction	4
2. Objective	4
3. Methodology	4
4. Information Available for Study	5
. Project Outline	5
6. Existing Watercourse and Drainage Route.....	5
7. Proposed Drainage System	8
8. Conclusion.....	11

Appendix

- I. Site Location Plan
- II. BD's Drainage Record Plan
- III. DSD's Record Plan
- IV. BD's GBP Record Plan
- V. Proposed Re-development Plan
- VI. Assessment of Existing Sewer Capacity (Hydraulic Calculation)

1) Introduction

- 1.1 The subject site at No. 66 Deep Water Bay Road is proposed for re-development into two (2) residential houses with a one-storey basement accommodating common plant rooms and car parking facilities. The total site area is 2,043.869 m² (refer to **Appendix I – Site Location Plan**).

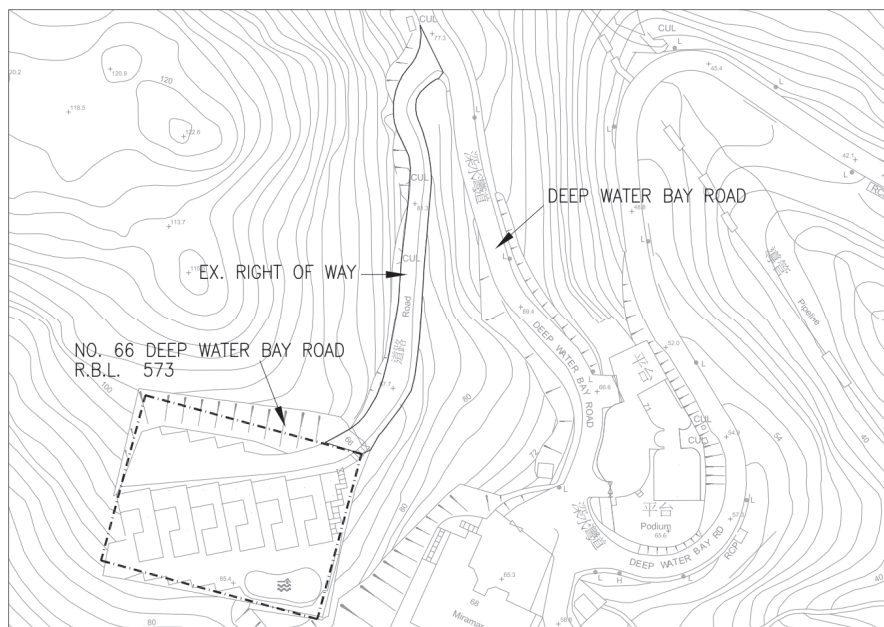


Fig. 1 – Site Location Plan

2) Objective

- 2.1 This report assesses the potential impact on existing drainage infrastructure and evaluates changes in stormwater runoff resulting from the proposed re-development.

3) Methodology

- 3.1 The assessment follows the DSD Stormwater Drainage Manual (DSD SDM).
- 3.2 Stormwater runoff calculations are based on the latest hydrological data from Corrigendum No. 1/2022.
- 3.3 Open channel flow rates are evaluated using Manning's Equation.

4) Information Available for Study

- 4.1 Drainage Record Plans from the Building Department
- 4.2 DSD's Drainage Record Plans
- 4.3 Topographical and Boundary Survey conducted by a licensed land surveyor

5) Project Outline

- 5.1 The redevelopment proposes two (2) low-rise single-family houses (maximum three storeys) on the existing site.
- 5.2 The site area remains unchanged at 2,043.869 m².
- 5.3 A new basement level will be constructed for car parking and E&M plant rooms.
- 5.4 The site slopes north to south, with an access road (Right of Way) on the eastern side connecting to Deep Water Bay Road. The surrounding area consists of natural terrain.

6) Existing Watercourses and Drainage Route

6.1 6.1 Public Drainage Infrastructure

- 6.1.1 No public drainage facilities are located within the immediate vicinity or downstream of the site.

6.2 Catchment & Flow Path Overview

- 6.2.1 Existing catchments and flow paths are illustrated in Appendix II.

6) Existing Watercourses and Drainage Route (Cont'd)

6.3 Drainage Flow Path for Northern Slope

6.3.1 Runoff from Catchment A is intercepted by an existing 500mm (W) U-channel outside the lot boundary. Stormwater is conveyed via a slope channel and surface channel to a sand trap near Deep Water Bay Road (~100m away). From there, it discharges into Government Manhole **SMH7089970**, connecting to cross-road drain **SGJ7049268**, and ultimately into a natural stream course.

6.3.2 Below the U-channel, runoff from **Catchment B** flows into the site.

6.4 Drainage Flow Path for the Site

6.4.1 Within the lot boundary, runoff from **Catchment B** merges with **Catchment C** and is intercepted by an existing 250mm (W) U-channel, discharging into **Building Drainage System 1**.

6.4.2 **Building Drainage System 1** consists of underground pipes and manholes along the driveway (**Catchment D**). After passing through Grease Trap 2 and a terminal manhole, drainage discharges into the access road's underground system, eventually reaching the sand trap at the road junction.

6.4.3 A small eastern portion (**Catchment E**) is a natural slope with no drainage infrastructure. Runoff flows directly onto government slope and adjacent private land (RBL667 & Ext., No. 68 Deep Water Bay Road).

6.4.4 The remaining site area (**Catchment F**) discharges via **Building Drainage System 2** into a **600mm (W) government U-channel** at the southwest corner. This U-channel extends approx. 7m before terminating at **Catchpit with trap "CP-01"**, which discharges into a natural stream course.

6) Existing Watercourses and Drainage Route (Cont'd)

6.5 Evaluation of Runoff Collection

6.5.1 Per DSD SDM Table 10, a 50-year return period and rainfall intensity of 218 mm/hr are adopted for design.

6.5.2 Runoff calculations are summarized below (see **Appendix III** for details).

Catchment Ref.	Location	Area (m ²)	Surface Condition	Catchment Coefficient	Rainfall Intensity (mm/hr)	Rainfall Inc. Factor (End of 21 Cen)	Flowrate (L/s)	Discharge Point
A	Northern Slope	682.80	Steep Slope (Heavy Soil)	0.35	218	16.0%	16.8	Access Road (East)
B	Northern Slope	120.86	Steep Slope (Heavy Soil)	0.35			3.0	
C	Site (North Portion) Slope	176.77	Steep Slope (Heavy Soil)	0.35			4.3	
D	Site (North Portion) Driveway	524.28	Concrete	0.85			31.3	
E	Site (East Portion) Slope	36.44	Steep Slope (Heavy Soil)	0.35			0.9	Slope (East), and downstream RBL 667 & Ext.
F	Site (South Portion) Building	1287.85	Concrete	0.85			76.9	Ex. 600mm U-channel (Southwest)
		18.53	Steep Slope (Heavy Soil)	0.35			0.5	

6.6 Identified Drainage Issues

6.6.1 The existing drainage system presents the following concerns:

- i. Discharge is dispersed across three routes (access road, government slope, and southwest U-channel), complicating maintenance.
- ii. No drainage infrastructure for Catchment E, leading to uncontrolled runoff onto adjacent properties.

6.6 Problems of Existing Drainage Route

6.6.1 The following problems had been identified from the existing Drainage Route of the site:

- i. Run-off from the site was discharged via 3 routes: Access Road (East), Government Slope (East) and Slope U-Channel (Southern West), which was not favorable for management and maintenance.
- ii. No drainage facility was provided for Catchment E. Run-off was discharged directly to government slope and affecting RBL 667 & Ext.

7) Proposed Drainage System

7.1 General Retention of Northern Slope

7.1.1 The northern slope will remain largely unchanged.

7.2 Unified Discharge Point

7.2.1 A reconstructed internal drainage system will consolidate all site runoff into a single discharge point at the southwest corner (600mm U-channel).

7.2.2 Catchment B (northern slope) and Catchment G (site runoff) will be diverted to this outlet.

7.3 Disconnection from Access Road Drainage

7.3.1 The existing underground pipe connection to the access road will be removed, eliminating off-site discharge to the east.

7.4 Podium Development for Catchment E

7.4.1 The natural slope in Catchment E will be replaced with a podium structure incorporating proper drainage, preventing runoff onto government and private land.

7) Proposed Drainage System (Cont'd)

7.5 Post-Redevelopment Runoff Assessment

7.5.1 The future drainage flow path is illustrated in Appendix IV.

7.5.2 Total discharge into the 600mm U-channel will increase from 77.4 L/s to 107.4 L/s.

7.5.3 The revised drainage pattern is illustrated below and attached in **Appendix V**.

Catchment Ref:	Location	Area (m2)	Surface Condition	Catchment Coefficient	Rainfall Intensity (mm/hr)	Rainfall Inc. Factor (End of 21 Cen)	Flowrate (L/s)	Discharge Point
A	Northern Slope (Government)	682.80	Steep Slope (Heavy Soil)	0.35	218	16.0%	16.8	Access Road (East)
B	Northern Slope (Government)	120.86	Steep Slope (Heavy Soil)	0.35			3.0	Ex. 600mm U-channel on Slope (Southwest)
G	Site (After Re-development)	2,043.87						
	Greenery	284.62	Flat, Soil	0.2			4.0	
		130.29	Steep Slope (Heavy Soil)	0.35			3.2	
	Concrete	1,628.96	Concrete	0.85			97.3	

Drainage Discharge Point	Existing (L/s)	After Re-development (L/s)
Access Road (East)	38.6	0
Government Slope (East) & downstream RBL 667	0.9	0
Ex. 600mm U-channel on slope (Southern West)	77.4	107.4

7.6 Capacity Assessment of 600mm U-Channel

7.6.1 Using Manning's Equation, the channel's capacity is evaluated as follows:

Runoff collected by 600mm U-Channel:

	Area (m ²)	Surface Condition	Catchment Coefficient	Flowrate (L/s)
Site	2,043.87			107.4
Upstream Slope	264.41	Steep Slope	0.35	6.5
			Total	113.9

$$\text{Flow velocity, } V = \frac{1}{U} \times R^{\frac{2}{3}} \times S^{\frac{1}{2}}$$

Where U = Roughness coefficient of pipe
(for concrete lined channel in fair condition, U = 0.016)
R = Hydraulic Radius
S = Gradient of fall

Gradient Fall:

$$\begin{aligned} S &= \text{Upstream I.L.} - \text{Downstream I.L.} / \text{Length} \\ &= (80.21 - 79.25) / 7.37\text{m (as surveyed)} \\ &= 0.13 \end{aligned}$$

Assuming 1/2 bore flow of 600mm channel,

$$\begin{aligned} R &= 0.25 D \\ V &= \frac{1}{0.016} \times (0.25 \times 0.6)^{\frac{2}{3}} (0.13)^{\frac{1}{2}} \\ &= 6.36 \text{ m/s} \end{aligned}$$

Handling capacity

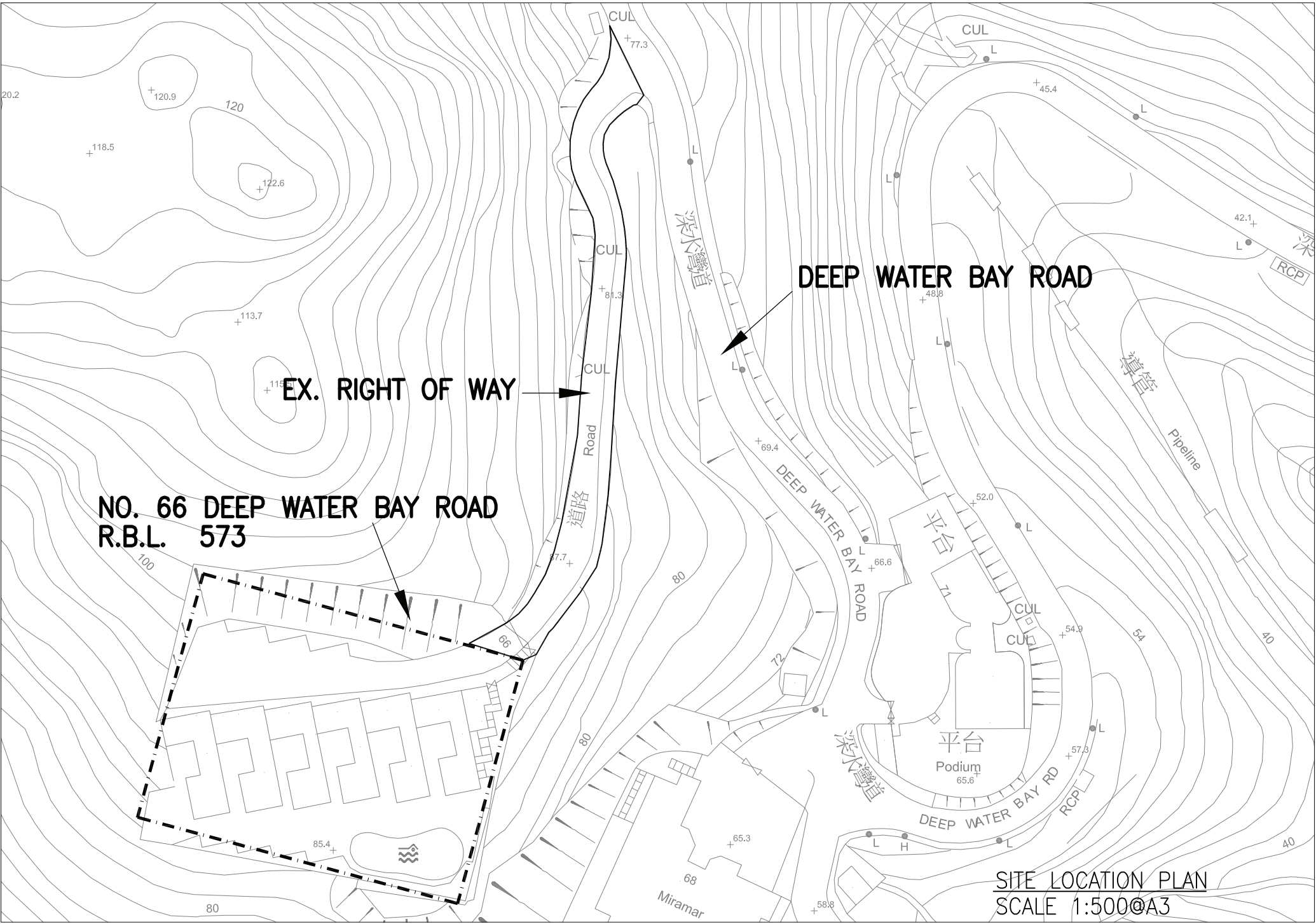
$$\begin{aligned} Q &= AV \\ &= (3.14 \times 0.3^2 / 2) \times (6.36) \\ &= 0.8989 \text{ m}^3/\text{s} \\ &= 898.9 \text{ l/s} \\ &> 113.9 \text{ l/s} \quad (12.7\%, \text{ acceptable}) \end{aligned}$$

8) Conclusion

- 8.1 The proposed redevelopment improves drainage efficiency by consolidating runoff into a single discharge point.
- 8.2 No uncontrolled runoff will flow onto government slopes or adjacent property (RBL667 & Ext.).
- 8.3 The existing 600mm U-channel has sufficient capacity (12.7% utilization) to accommodate increased flows.
- 8.4 No adverse impacts on existing drainage infrastructure are anticipated.

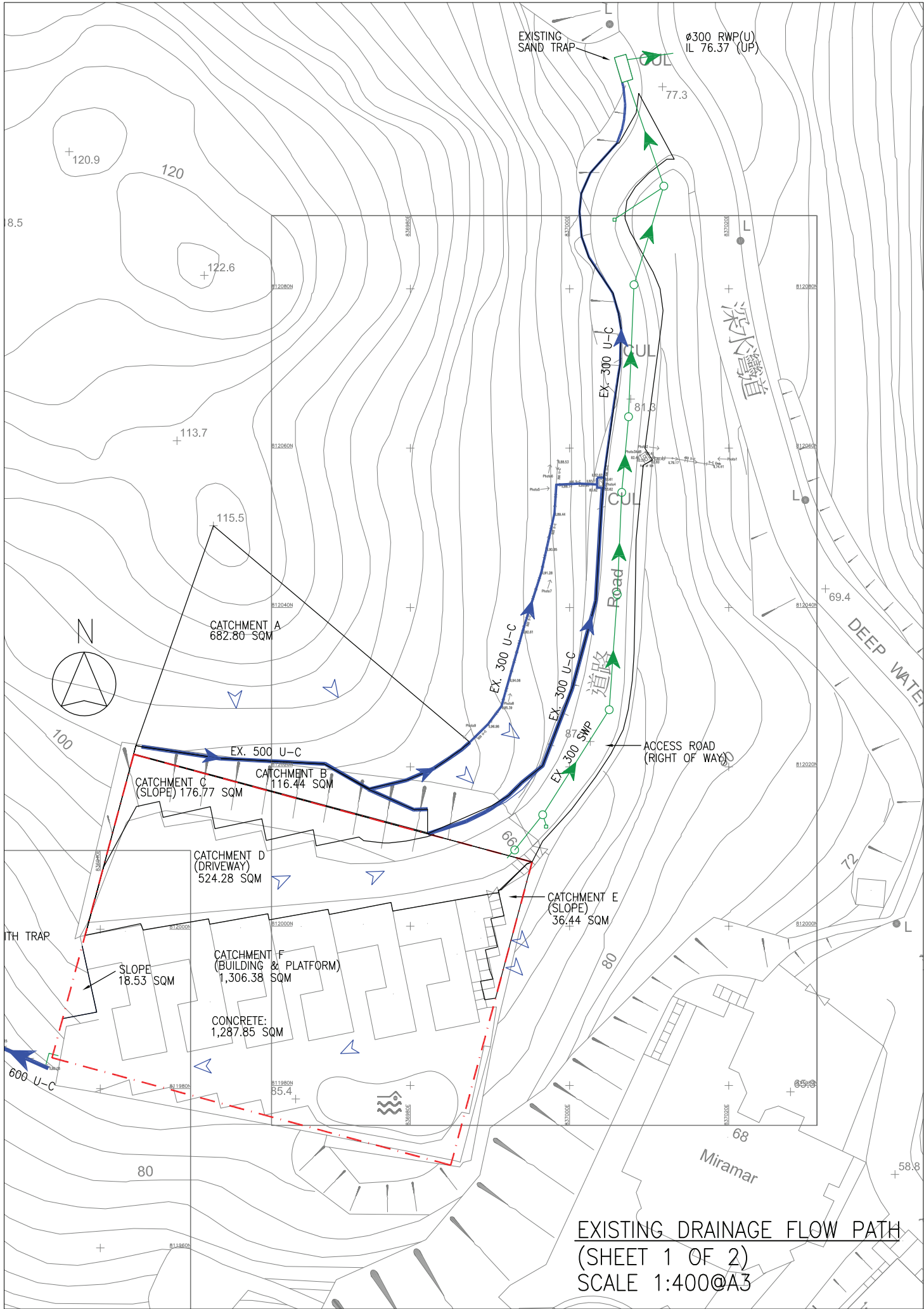
End of Report

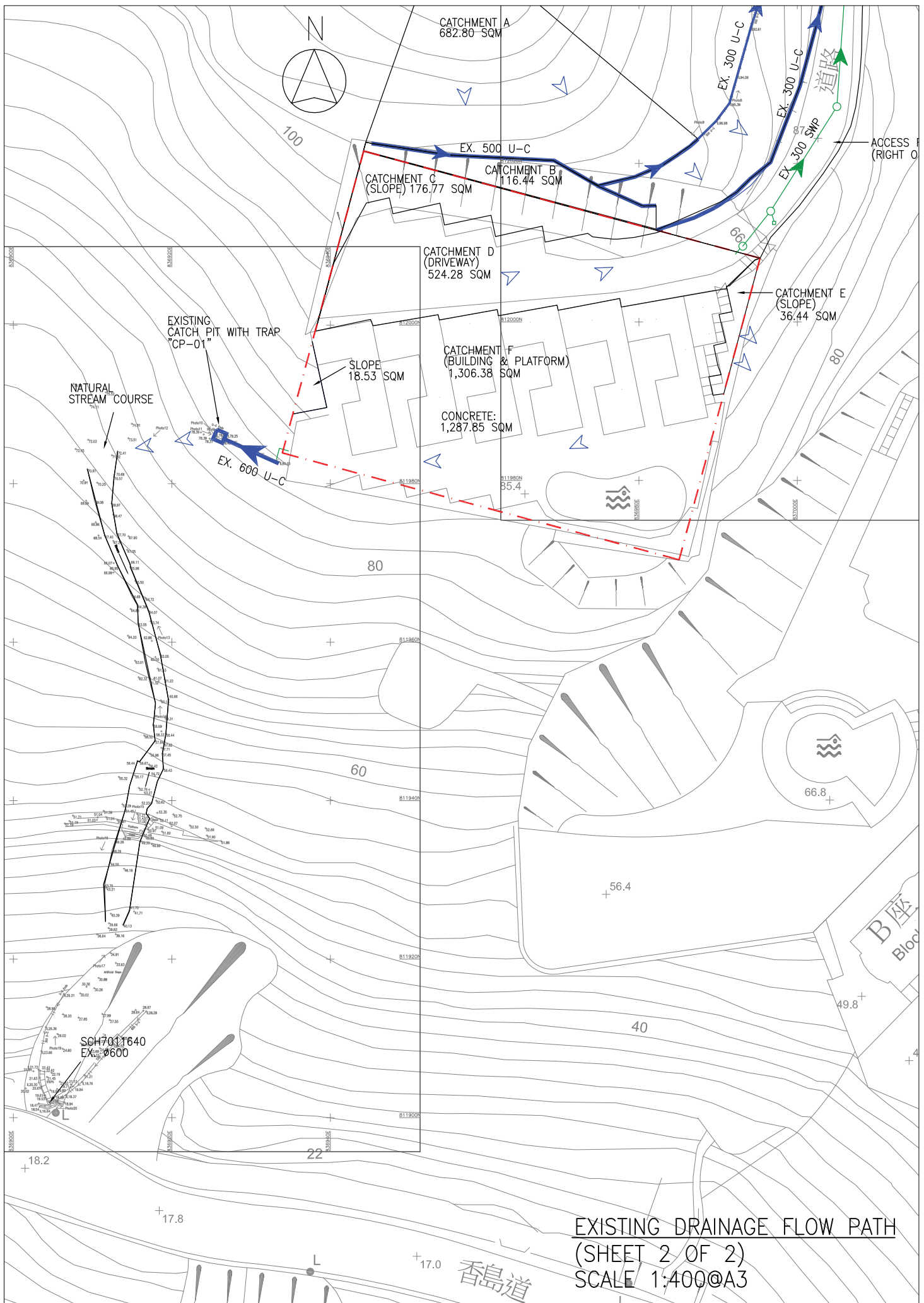
Appendix I - Site Location Plan



SITE LOCATION PLAN
SCALE 1:500@A3

Appendix II – Existing Drainage Flow Path





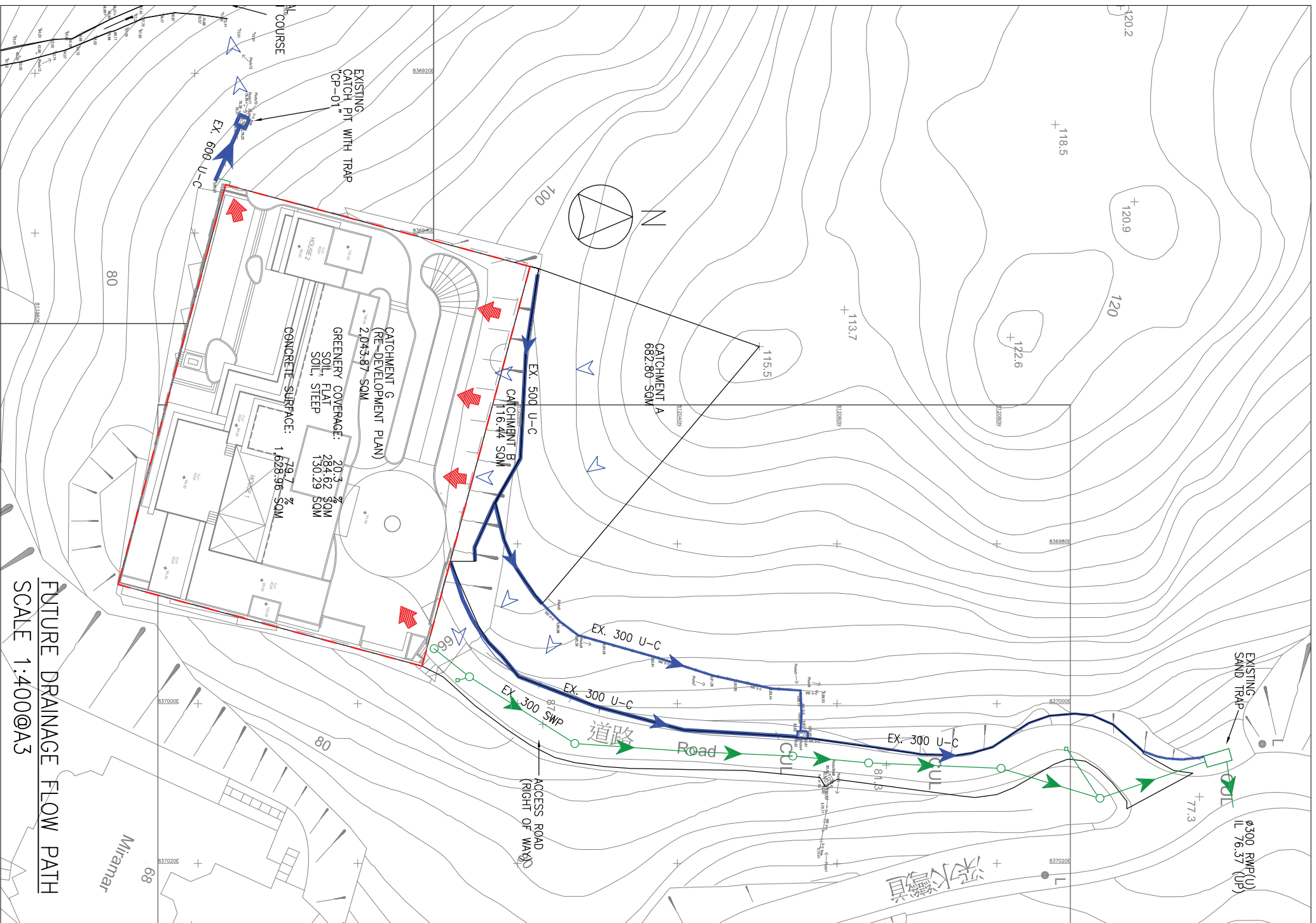
EXISTING DRAINAGE FLOW PATH
(SHEET 2 OF 2)
SCALE 1:400@A3

Appendix III – Evaluation of Runoff from Catchments (Existing)

Proposed Residential Re-development at 66 Deep Water Bay Road, Hong Kong
Evaluation of Runoff from Catchments (Existing)

Catchment Ref:	Location	Area (m2)	Surface Condition	Catchment Coefficient	Rainfall Intensity (mm/hr)	Rainfall Inc. Factor (End of 21 Cen)	Flowrate (L/s)	Discharge Point
A	Northern Slope	682.80	Steep Slope (Heavy Soil)	0.35	218	16.0%	16.8	Access Road (East)
B	Northern Slope	120.86	Steep Slope (Heavy Soil)	0.35			3.0	
C	Site (North Portion) Slope	176.77	Steep Slope (Heavy Soil)	0.35			4.3	
D	Site (North Portion) Driveway	524.28	Concrete	0.85			31.3	
E	Site (East Portion) Slope	36.44	Steep Slope (Heavy Soil)	0.35			0.9	Slope (East), and downstream RBL 667 & Ext.
F	Site (South Portion) Building	1287.85	Concrete	0.85			76.9	Ex. 600mm U-channel (Southwest)
		18.53	Steep Slope (Heavy Soil)	0.35			0.5	

Appendix IV – Future Drainage Flow Path



FUTURE DRAINAGE FLOW PATH
SCALE 1:400@A3

Appendix V – P Evaluation of Runoff from Catchments (Future)

Proposed Residential Re-development at 66 Deep Water Bay Road, Hong Kong
 Evaluation of Runoff from Catchments (Post-redevelopment)

Catchment Ref:	Location	Area (m2)	Surface Condition	Catchment Coefficient	Rainfall Intensity (mm/hr)	Rainfall Inc. Factor (End of 21 Cen)	Flowrate (L/s)	Discharge Point
A	Northern Slope (Government)	682.80	Steep Slope (Heavy Soil)	0.35	218	16.0%	16.8	Access Road (East)
B	Northern Slope (Government)	120.86	Steep Slope (Heavy Soil)	0.35			3.0	Ex. 600mm U-channel on Slope (Southwest)
G	Site (After Re-development)	2,043.87						
	Greenery	284.62	Flat, Soil	0.2			4.0	
		130.29	Steep Slope (Heavy Soil)	0.35			3.2	
	Concrete	1,628.96	Concrete	0.85			97.3	