

**Approved Section 16 Planning
Application for the Proposed
Temporary Private Vehicle
Park and Shop & Services for a
Period of 3 Years in
“Village Type Development”
zone, Lot 3307 in D.D. 120 and
Adjoining Government Land,
Tai Tong, Yuen Long
Drainage Proposal**

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 277952

Ove Arup & Partners Hong Kong Ltd
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
www.arup.com

ARUP

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1 Introduction

1.1 Background

Ove Arup & Partners Hong Kong Ltd is conducting a Drainage Proposal to comply with the planning conditions of the Approved Section 16 Planning Application for the Proposed Temporary Private Vehicle Park and Shop & Services at Lot 3307 in D.D. 120 and Adjoining Government Land, Tai Tong, Yuen Long . This Planning Application also includes a proposed access road at government land next to the proposed car park for connecting the car park to Sham Chung Road.

The Application Site is located within a "Village Type Development" ("V") zone on the Draft Tai Tong Outline Zoning Plan No. S/YL-TT/20.

1.2 Objectives

The objective of this report is to provide an assessment of the impact of storm water flow generation as a result of the proposed temporary private vehicle park at the Application Site on the connecting public drainage system adjacent to the Application Site and to propose mitigation measures (if any). This report is also to provide drainage design of the proposed drainage works for the Application Site.

This Drainage Proposal is prepared referring to the DSD guideline: *Technical Note to prepare a "Drainage Submission" relating to applications for temporary change of land use such as temporary storage area, car parks, workshops small factories...etc. under S.16 of the Town Planning Ordinance* ("The Guideline").

2 Project Outline

2.1 Subject Development

The Application Site is located at Tai Tong, Yuen Long, bounded by Tai Tong Road at east, a vacant government land at south. The north and west boundary of the Application Site is next to private village land. Site location plan is shown in **Appendix A - Plan 1** and basic development parameters are appended in below **Table 2.1**:

Development Parameters	Existing Site (Lot 3307, for proposed Private Vehicle Park)	Government Land (for proposed Access Road)	Proposed Private Vehicle Park	Proposed Access Road at Government Land
Area (m ²)	650	60	650	60
% of Hard-paved Area/ Unpaved Area	Hard-paved Area: 0% Unpaved Area: 100%	Hard-paved Area: 100% Unpaved Area: 0%	Hard-paved Area: 100% Unpaved Area: 0%	Hard-paved Area: 100% Unpaved Area: 0%
Statutory Land Use Zoning	"V"	"V"	"V"	"V"

Table 2.1 Summary of Development Parameters



Satellite Photograph of the Application Site

2.2 Project Interface

No foreseeable interaction or conflict with other development projects in the vicinity of the Application Site was identified when this drainage proposal was conducted.

3 Existing Drainage

3.1 Existing Drainage Network

The Application Site is a vacant land with vegetation. Surface run-off from the Application Site is collected by a 600D U-channel within the vacant government land next to the Application Site south boundary. This 600D U-channel is running along the Application Site south boundary towards west and it is collecting stormwater from existing village houses and finally discharge to a nullah along Sham Chung Road via a flap valve.

Detailed existing drainage network information is shown in **Plan 2 of Appendix A**.

The site investigation photo record of the existing drainage condition is presented in **Appendix A**.

The catchment associated with the existing drainage system were identified based on the existing topography. Catchment Plans of existing Site and proposed development are shown in **Appendix B**.

The capacity checking of existing drainage system is presented in **Appendix C Table 1**.

4 Assumptions and References

4.1 Climate Change

Climate change is taken into account in existing drainage system capacity check calculation. 10.4% Rainfall intensity increase for mid 21st century (2041-2060) is included referring to SDM 2018, table 28.

4.2 Desilting

Referring to SDM 2018 section 9.3(a), 10% reduction in flow area is adopted in capacity checking of pipe/channel for taking into account of the effects to flow capacity due to materials deposited on the pipe/channel bed.

5 Local Drainage Impact Assessment for the Proposed Development

5.1 Assessment Results

The whole site area will be changed from unpaved to hard paved for the Proposed Temporary Private Vehicle Park and Shop & Services Development. The capacity of existing 600D U-channel on the south of the Application Site has been checked to include additional surface run-off from the Application Site due to the increase of hard paved area of the Site. The capacity checking of existing 600D U-channel is presented in **Appendix C Table 2** and the checking result shows that there is no adverse impact by the change in catchment characteristic.

5.2 Proposed Drainage System

Surface run-off from the private vehicle park is intercepted by a 150mm kerb along car park perimeter and discharge to a proposed 300D U-channel at private vehicle park entrance via 1: 80 fall at ground level and finally discharges to the existing 600D U-channel via a 300Ø connection pipe. The proposed 300D U-channel is covered with heavy duty grating at the run-in/out. Capacity checking of the proposed 300D perimeter U-channel is presented in **Appendix C Table 3**.

The proposed drainage system is presented in **Appendix D**.

5.3 Flooding Susceptibility

The proposed site ground level is approximately around +8.6mPD which is much higher than the design extreme sea level of 1 in 200 return period which is +4.77mPD referring to DSD storm drainage manual Table 8. On the other hand,

there is no record of flood blackspot found for the Application Site or the adjacent area. There is slim chance of the Application Site been affected by backwater effect under extreme weather .

6 Conclusion

Capacity of the existing public drainage system adjacent to the Proposed Temporary Private Vehicle Park and Shop and Services has been checked. The hydraulic capacity of the existing 600D U-channel on the south of the Application Site along Sham Chung Road is sufficient.

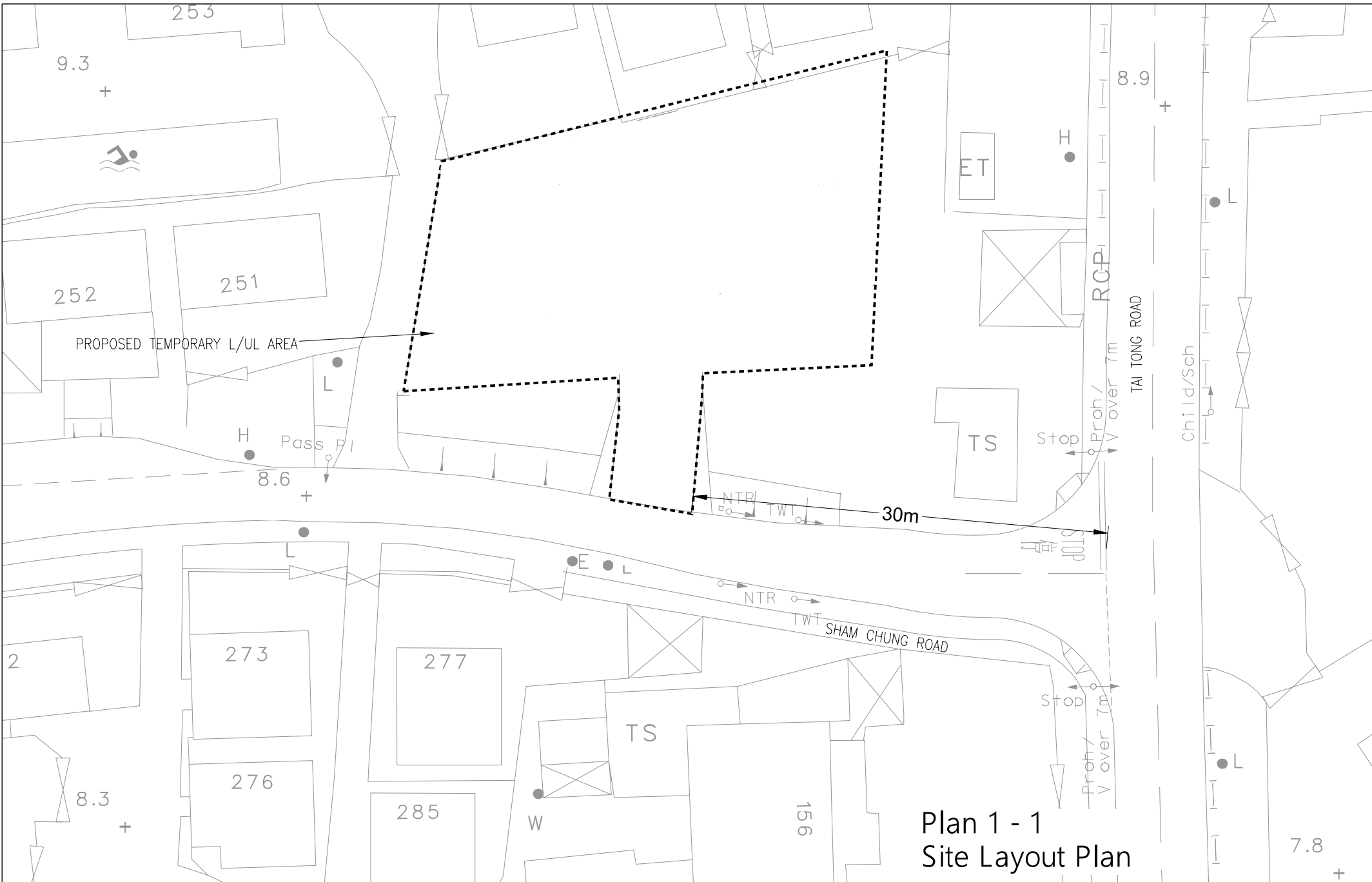
A 300D U-channel is proposed to collect surface run-off from the Application Site and connects to the existing 600D U-channel via a proposed 300ø precast concrete pipe.

There is slim chance of the Application Site been affected by backwater effect under extreme weather.

Appendix A

Plans

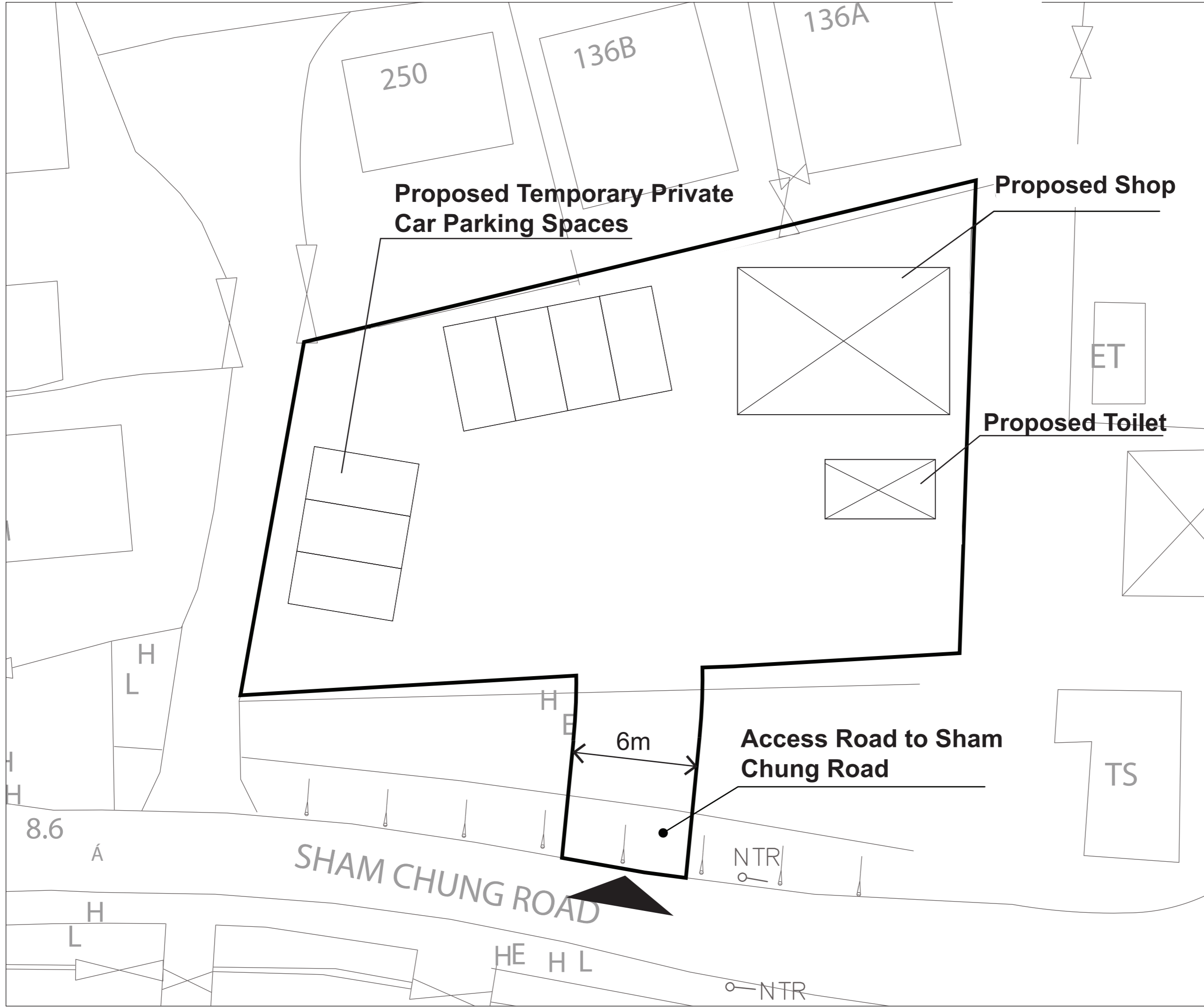
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Plan 1 - 1
 Site Layout Plan

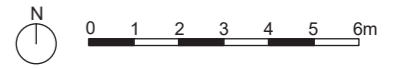
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Date	Scale	Drawing Title			
30DEC20	1:250 @ A3	REVISED LAYOUT PLAN			
Drawn	Job No.				
KPHW					

FIGURE 1



Lengend:

-  Application Site
-  Access from Sham Chung Road
-  Proposed Ticket Office & Shop



Rev	Description	By	Date

Consultant

ARUP

Contract No. and Title

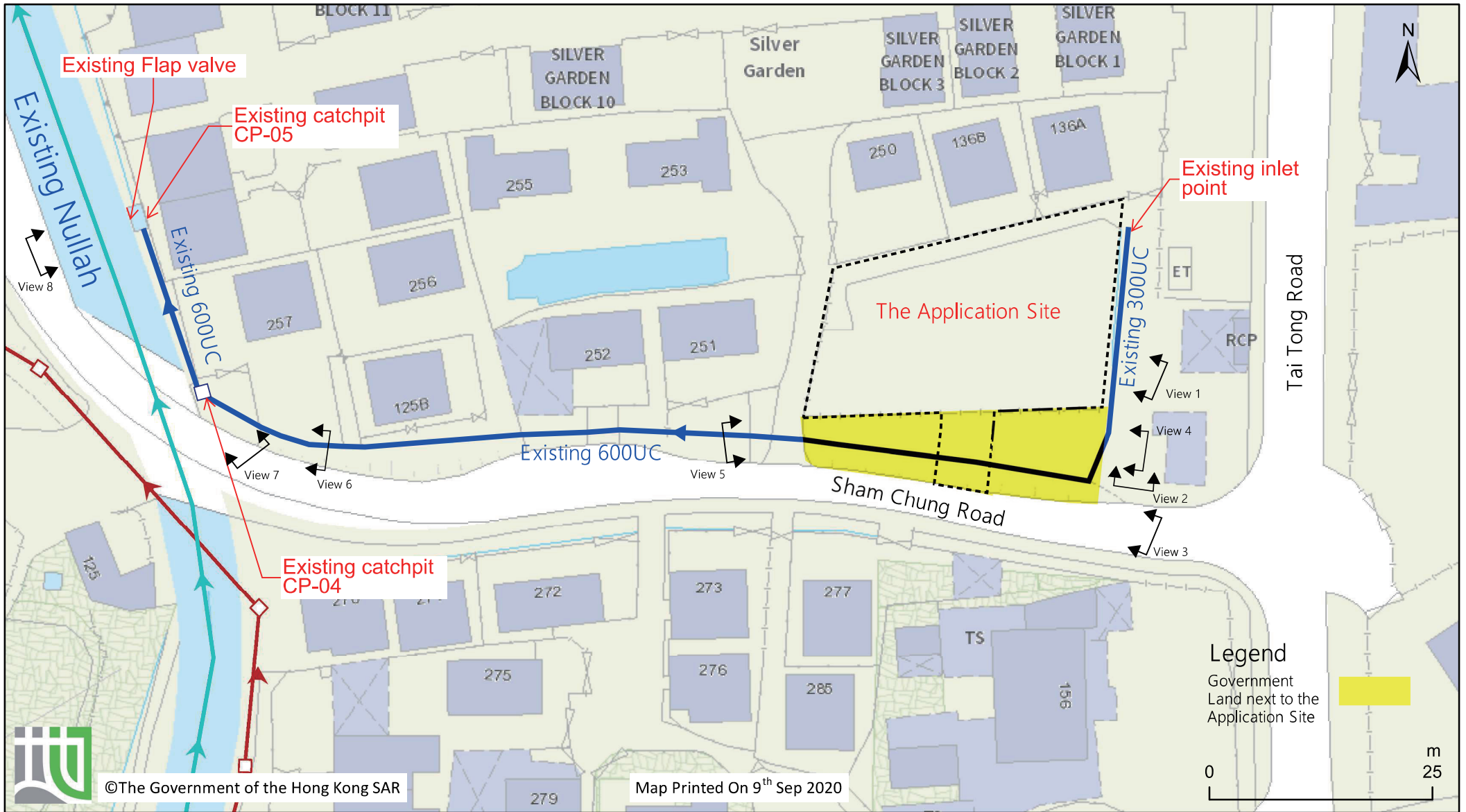
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Plan 2
Existing Drainage Network





View 5



View 6



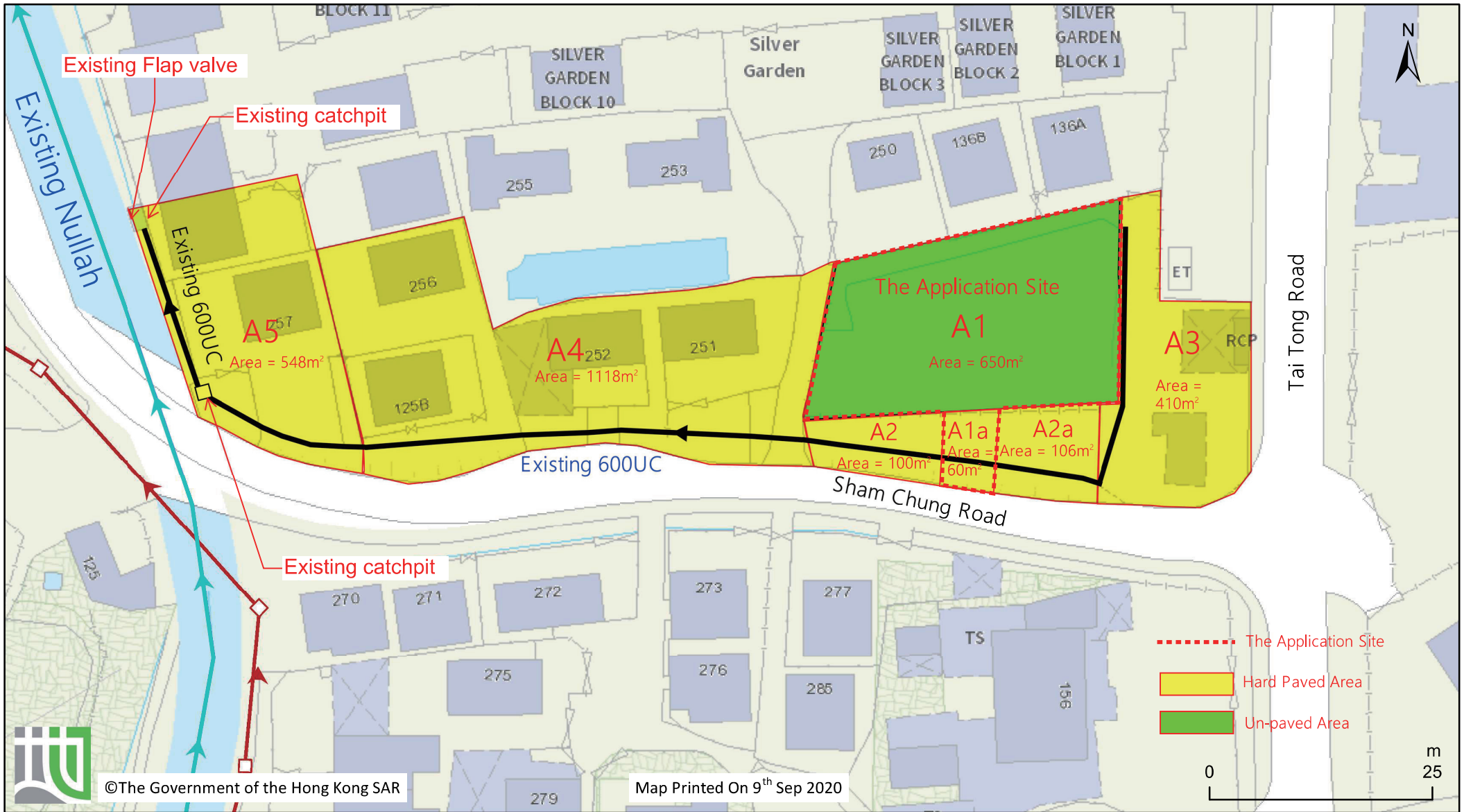
View 7



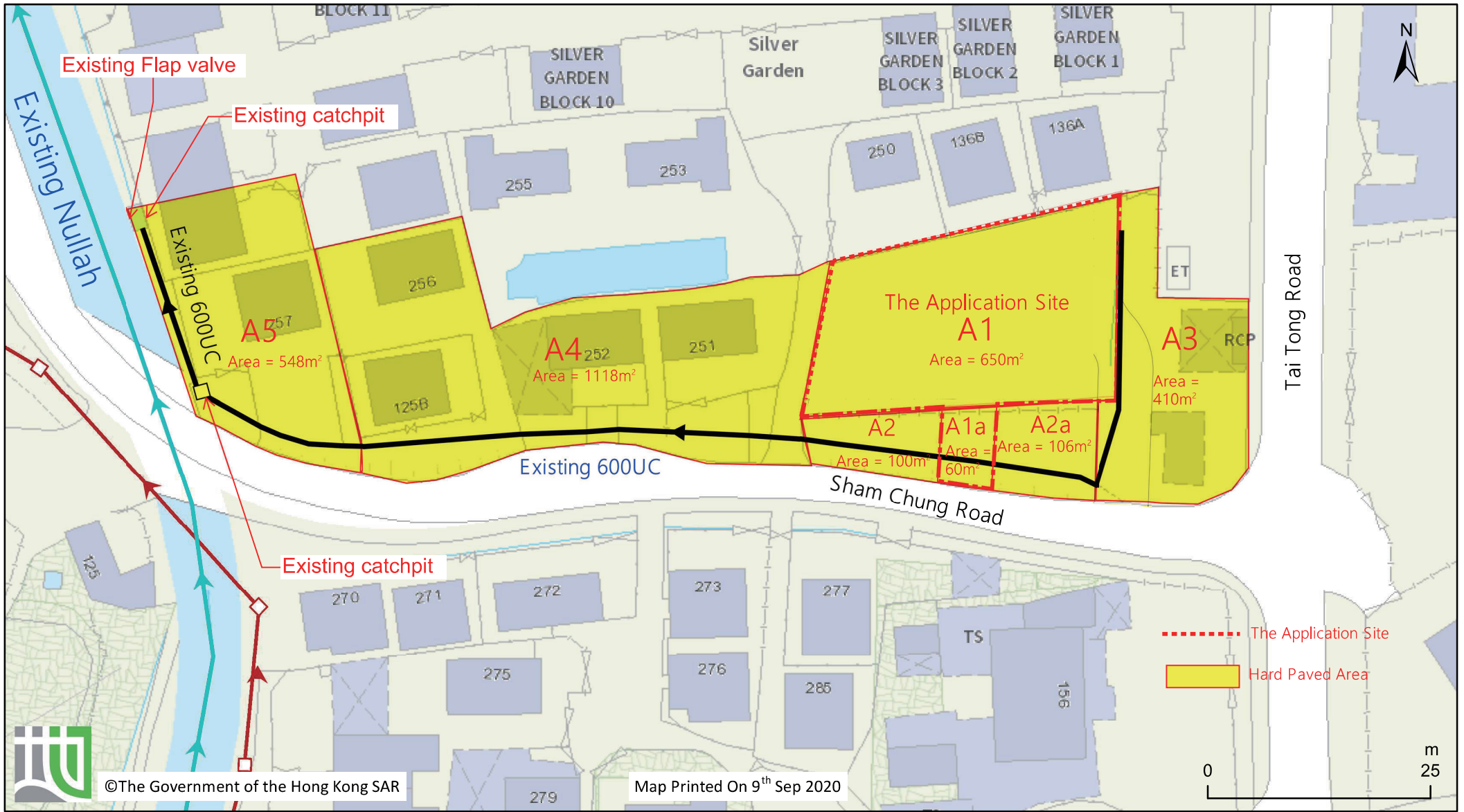
View 8

Appendix B

Catchment Plan



Existing Drainage Catchment Plan



Proposed Drainage Catchment Plan

Appendix C

Drainage Capacity Checking Calculation

Appendix D

Proposed Drainage Scheme

Drainage Proposal

Capacity Checking for Existing Drainage

Runoff Coeff., C = 0.95 (Paved)
0.25 (natural grass land)

Return Period = 50 years Urban Drainage Branch Systems

Rainfall Intensity, I = a / (T_c + b)^c (Gumbel solution)

T = 50 years
where : a = 451.3 (Table 3, Stormwater Drainage Manual, Fifth Edition)
b = 2.46
c = 0.337

Inlet Time, T₀ = 0.14465 L / H^{0.2} / A^{0.1} (Bransby Williams Equation)

where : L = Longest distance measured on the line of natural flow between the submit and the point under consideration (m)
H = Average slope (m per 100m)
A = Sub-catchment area (m²)

Peak Runoff, Q = IA
Pipe Capacity Q_p = VA

$$\bar{V} = -\sqrt{32gRS_f} \log \left[\frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS_f}} \right]$$

Climate Change Factor (%) = 10.40% (Table 28, Stormwater Drainage Manual, for rainfall increase at Mid 21st Century 2041 – 2060)

Roughness Coeff., Ks = 0.60 mm (By Colebrook-White Equation) (Circular Box culvert / pre-cast concrete pipe)

Ks = 3.30 mm (channel, Trowel finish)

Kinematic Viscosity, u = 0.0000012 m²/s
Acceleration due to gravity, g = 9.81 m/s²

Table 1 Capacity Checking of Existing 600D U-channel on the South of the Site to Collect Flows from Existing Site (T = 50 years)

Contributing Catchment	Area (m ²)			Accumulated Factored Area A, (m ²)	L (m)	H (m/100m)	T ₀ (min.)	T _r (min.)	T _c (min.)	I (mm/hr)	I incl. Climate C (mm/hr)	Q (m ³ /s)	Upstream Stormwater Manhole Ref	Downstream Stormwater Manhole Ref	Existing Downstream Drainage														
	steep natural slope	flat grassland	Paved												size of channel / culvert / pipe			US GL (mPD)		Invert Level (mPD)		Slope (S)	A (m ²)	P (m)	R = A/P (m)	32gRS _f (m ² /s ²)	Capacity (m ³ /s)	Velocity (m/s)	Flow %
															width (m)	height (m)	Length (m)	US	DS										
A3			410	390	-	-	2.00	0.24	2.24	267.95	295.82	0.03	Existing inlet point	CP-01a(EX.)	0.30	-	30.00	8,700	8,400	7,800	0.0200	0.07	0.72	0.10	0.63	0.15	2.11	21%	
A1		650		2387	-	-	2.24	0.16	2.39	265.01	292.57	0.19	CP-01a(EX.)	CP-04 (EX.)	0.60	-	18.00	8,100	7,500	7,380	0.0067	0.29	1.44	0.20	0.42	0.55	1.92	35%	
A1a			60																										
A2			100																										
A2a			106																										
A4			1,118																										
A5			548																										
				2387	-	-	2.39	0.73	3.12	252.78	279.07	0.19			0.60	-	84.00	8,500	7,380	6,820	0.0067	0.29	1.44	0.20	0.42	0.55	1.92	33%	
				2387	-	-	3.12	0.17	3.30	250.18	276.20	0.18	CP-04 (EX.)	CP-05 (EX.)	0.60	-	20.00	8,500	6,820	6,687	0.0067	0.29	1.44	0.20	0.42	0.55	1.92	33%	

Drainage Proposal

Capacity Checking for Proposed Drainage

Runoff Coeff., C = 0.95 (Paved)
0.25 (natural grass land)

Return Period = 50 years Urban Drainage Branch Systems

Rainfall Intensity, I = a / (T_c + b)^c (Gumbel solution)

T = 50 years
where : a = 451.3 (Table 3, Stormwater Drainage Manual, Fifth Edition)
b = 2.46
c = 0.337

Inlet Time, T₀ = 0.14465 L / H^{0.2} / A^{0.1} (Bransby Williams Equation)

where : L = Longest distance measured on the line of natural flow between the submit and the point under consideration (m)
H = Average slope (m per 100m)
A = Sub-catchment area (m²)

Peak Runoff, Q = IA

Pipe Capacity Q_p = VA

$$\bar{V} = -\sqrt{32gRS_f} \log \left[\frac{k_s}{14.8R} + \frac{1.255V}{R\sqrt{32gRS_f}} \right]$$

Climate Change Factor (%) = 10.40% (Table 28, Stormwater Drainage Manual, for rainfall increase at Mid 21st Century 2041 – 2060)

Roughness Coeff., Ks = 0.60 mm (By Colebrook-White Equation) (Circular Box culvert / pre-cast concrete pipe)

Ks = 3.30 mm (channel, Trowel finish)

Kinematic Viscosity, u = 0.0000012 m²/s

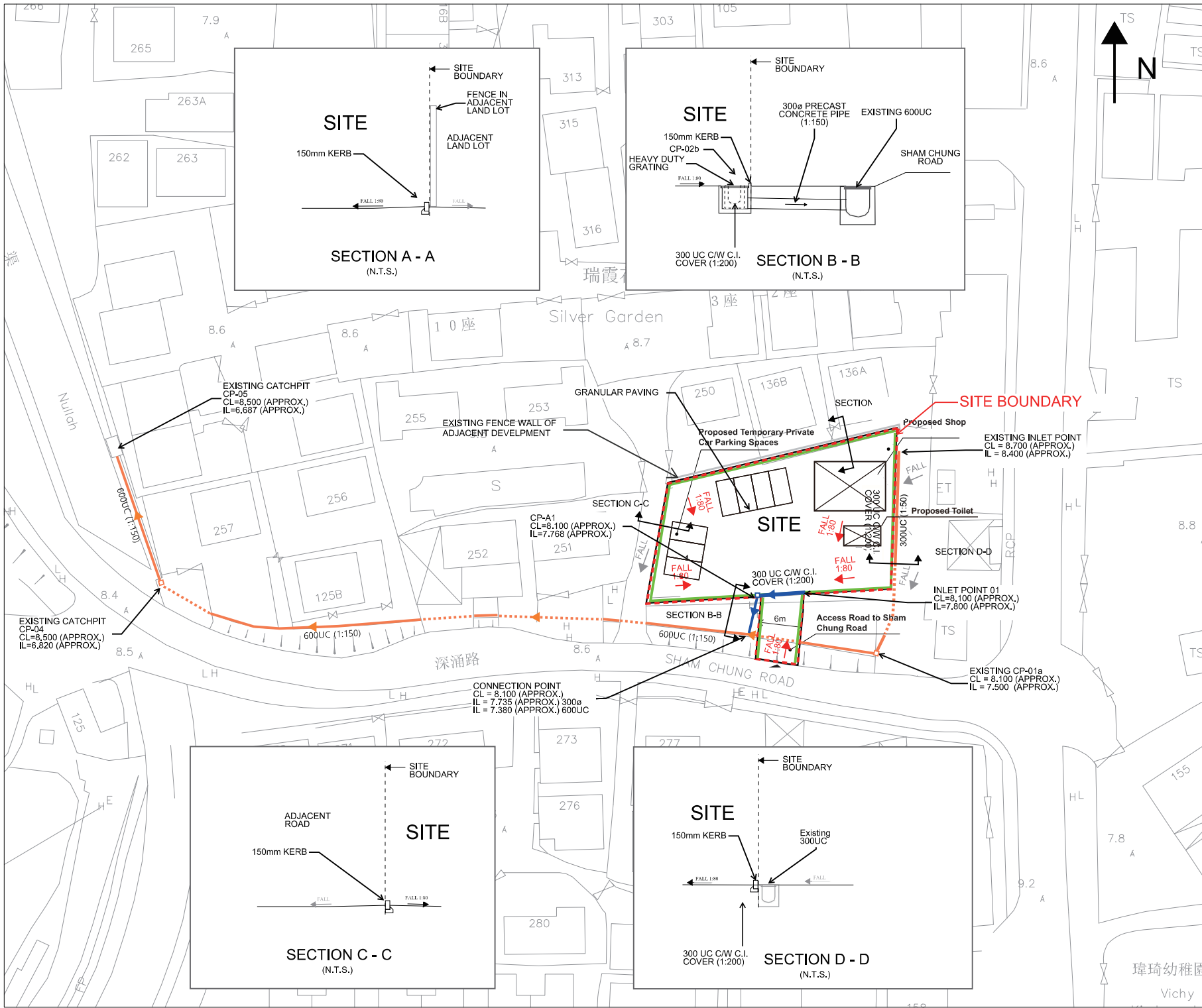
Acceleration due to gravity, g = 9.81 m/s²

Table 2 Capacity Checking of Existing 600D U-channel on the South of the Site to Collect Flows from Proposed Temporary Car Park (T = 50 years)

Contributing Catchment	Area (m ²)			Accumulated Factored Area A, (m ²)	L (m)	H (m/100m)	T ₀ (min.)	T _r (min.)	T _c (min.)	I (mm/hr)	I incl. (mm/hr)	Q (m ³ /s)	Existing Downstream Drainage																
	steep natural slope	flat grassland	Paved										Upstream Stormwater Manhole Ref	Downstream Stormwater Manhole Ref	size of channel / culvert / pipe			US GL (mPD)	Invert Level		Slope (S)	A (m ²)	P (m)	R = A/P (m)	32gRS _f (m ³ /s ²)	Capacity (m ³ /s)	Velocity (m/s)	Flow %	
															width (m)	height (m)	Length (m)		US (mPD)	DS (mPD)									
A3			410	390	-	-	2.00	0.24	2.24	267.95	295.82	0.03	Existing inlet point	CP-01a(EX.)	0.30	-	30.00	8,700	8,400	7,800	0,0200	0.07	0.72	0.10	0.63	0.15	2.11	21%	
A1			650	2842	-	-	2.24	0.16	2.39	265.01	292.57	0.23	CP-01a(EX.)	Connection point	0.60	-	18.00	8,100	7,500	7,380	0,0067	0.29	1.44	0.20	0.42	0.55	1.92	42%	
A1a			60																										
A2			100																										
A2a			106																										
A4			1,118																										
A5			548																										
				2842	-	-	2.39	0.73	3.12	252.78	279.07	0.22	Connection point	CP-04 (EX.)	0.60	-	84.00	8,500	7,380	6,820	0,0067	0.29	1.44	0.20	0.42	0.55	1.92	40%	
				2842	-	-	3.12	0.17	3.30	250.18	276.20	0.22	CP-04 (EX.)	CP-05 (EX.)	0.60	-	20.00	8,500	6,820	6,687	0,0067	0.29	1.44	0.20	0.42	0.55	1.92	39%	

Table 3 Capacity Checking of Proposed Drainage System in the Proposed Temporary Car Park (T = 50 years)

Contributing Catchment	Area (m ²)			Accumulated Factored Area A, (m ²)	L (m)	H (m/100m)	T ₀ (min.)	T _r (min.)	T _c (min.)	I (mm/hr)	I incl. (mm/hr)	Q (m ³ /s)	Existing Downstream Drainage															
	steep natural slope	flat grassland	Paved										Upstream Stormwater Manhole Ref	Downstream Stormwater Manhole Ref	size of channel / culvert / pipe			US GL (mPD)	Invert Level		Slope (S)	A (m ²)	P (m)	R = A/P (m)	32gRS _f (m ³ /s ²)	Capacity (m ³ /s)	Velocity (m/s)	Flow %
															width (m)	height (m)	Length (m)		US (mPD)	DS (mPD)								
A1			650	618	-	-	2.00	0.10	2.10	270.58	298.72	0.05	Inlet point 01	CP-A1	0.30	-	6.50	8,100	7,800	7,768	0,0050	0.07	0.72	0.10	0.16	0.08	1.05	67%
				618	-	-	2.10	0.08	2.18	268.98	296.95	0.05	CP-A1	Connection point	0.30	-	6.50	8,100	7,768	7,735	0,0050	0.07	0.72	0.10	0.16	0.10	1.33	53%



LEGEND

PROPOSED DRAINAGE	
PROPOSED CATCHPIT	
EXISTING CHANNEL	
EXISTING CHANNEL WITH DECKING	
EXISTING CATCHPIT	
PROPOSED 150mm KERB	



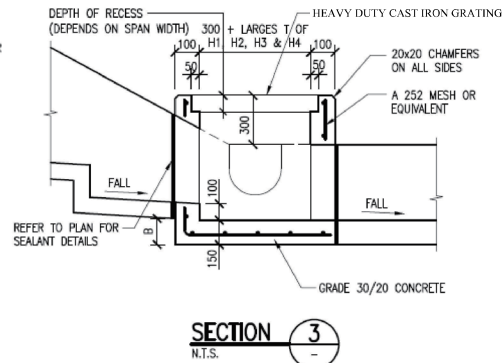
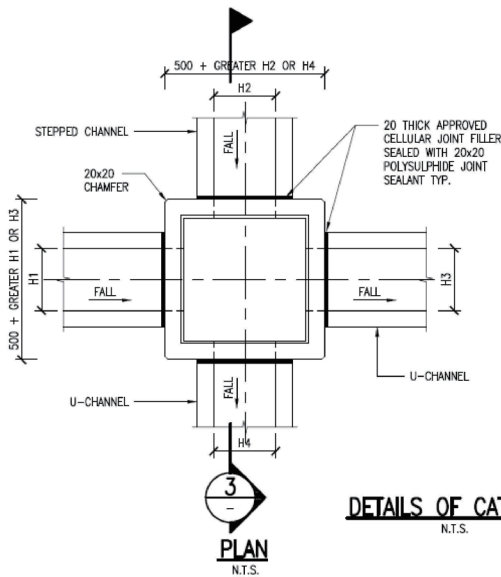
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Rev	Description	By	Date
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ARUP			

Contract No. and Title
PROPOSED PRIVATE VEHICLE PARK AND SHOP & SERVICES FOR A PERIOD OF 3 YEARS AT LOT 3307 IN D.D. 120 AND ADJOINING GOVERNMENT LAND, TAI TONG, YUEN LONG

Drawing title
PROPOSED DRAINAGE PLAN AND SECTIONS

Drawing no. DR-01		Rev. -	
Drawn CW	Date Aug 2020	Checked CC	Approved CC
Scale 1:500 @ A3		Status	

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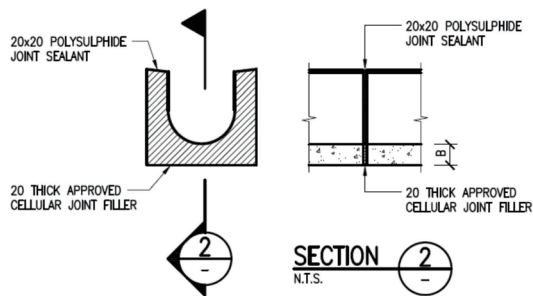
DIMENSIONS FOR CATCHPIT

NOMINAL SIZE (LARGEST OF H1, H2, H3, & H4)	B
300-600	150
675-900	175
1000	200

DETAILS FOR U-CHANNEL
N.T.S.

DIMENSIONS AND REINFORCEMENT FOR U-CHANNELS

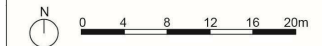
NOMINAL SIZE H	T	B	REINFORCEMENT
≤ 300	75	100	A252 MESH PLACED CENTRALLY AND T=100 WHEN E>650
375 - 600	100	150	A252 MESH PLACED CENTRALLY
675 - 900	100	175	A252 MESH PLACED CENTRALLY
1000	100	200	A252 MESH PLACED CENTRALLY



**EXPANSION JOINT FOR U-CHANNELS/
STEPPED CHANNELS**
N.T.S.

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. CONCRETE SURFACE FINISH SHALL BE CLASS U2, F2 OR BRUSHED FINISHED AS APPROPRIATE.
3. ALL MESH REINFORCEMENT SHALL COMPLY WITH RELEVANT BRITISH STANDARDS INCLUDING BS4482, BS4483, BS4466 AND BS4102.
4. CONCRETE GRADE OF ALL CATCHPITS TO BE GRADE 30D/20.
5. CONCRETE GRADE OF ALL CHANNELS TO BE GRADE 20D/20.
6. SPACING OF EXPANSION JOINT IN CHANNELS, TO BE 10 METERS MAXIMUM.
7. JOINTS FOR CHANNELS TO BE ON THE SAME ALIGNMENT.



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PROPOSED PRIVATE VEHICLE PARK AND SHOP & SERVICES FOR A PERIOD OF 3 YEARS AT LOT 3307 IN D.D. 120 AND ADJOINING GOVERNMENT LAND, TAI TONG, YUEN LONG			
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