Appendix I

Drainage Appraisal

Apr 2024

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Drainage Appraisal

1.Introduction

1.1 Background

- 1.1.1 The applicant seeks planning permission from the Town Planning Board (the Board) to use Lots 1338 S.A, 1338 S.B, 1338 S.C and 1338 S.D in D.D. 117, Tai Tong, Yuen Long, New Territories (the Site) for 'Proposed Temporary Warehouse (Excluding Dangerous Goods Godown) with Ancillary Facilities for a Period of 3 Years and Associated Filling of Land' (Proposed Development).
- 1.1.2 This Drainage proposal is to support the planning application for the proposed use.

1.2 The Site

- 1.2.1 The Application Site area is about 1,835m², and it situates beside Tai Tong Road to the north and near the roundabout between Tai Tong Road and Kiu Hing Road. The site is partly occupied by existing structures, abandoned dried pond and grassland.
- 1.2.2 The Application Site is surrounded by woodland, temporary structures and roads. It is generally flat with existing ground level is approx. +13.9 mPD and it is proposed to be filled up to +14.1 mPD after the Proposed Development.
- 1.2.3 The site location plan is shown in **Figure 1**.
- 1.2.4 There is an existing village drain /ditch surrounding the application site at east and south (namely Village Drain A). Existing drainage record plan is shown in **Figure 2** for reference. Catchment Plan is shown in **Figure 4** for reference.
- 1.2.5 Proposed Development Layout plan from is shown in **Appendix B** for reference.

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2. Development Proposal

2.1 The Proposed Development

2.1.1 The total site area is approximately 1,835m². The indicative development schedule is summarized in **Table 1** below for technical assessment purpose.

Proposed Development	
Total Site Area (m ²)	1,835
Assume all proposed site area as paved	1,835
area after development for assessment	1,000
purpose (m ²)	

Table 1 - Key Development Parameters

3. Assessment Criteria

3.1.1 The Recommended Design Return Period based on Flood Level from SDM (Table 10) is adopted for this DIA. The recommendation is summarized in **Table 2** below.

Description	Design Return Periods
Intensively Used Agricultural Land	2 – 5 Years
Village Drainage Including Internal	10 Years
Drainage System under a polder	
Scheme	
Main Rural Catchment Drainage	50 Years
Channels	
Urban Drainage Trunk System	200 Years
Urban Drainage Branch System	50 Years

Table 2- Design Return Periods under SDM

3.1.2 The proposed village drainage system intended to collect runoff from the internal site and discharge to existing nearby public drainage system. 1 in 10 years return period is adopted for the drainage design.

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- 3.1.3 stormwater drainage design will be carried out in accordance with the criteria set out in the Stormwater Drainage Manual published by DSD. The proposed design criteria to be adopted for design of this stormwater drainage system and factors which have been considered are summarised below.
 - 1. Intensity-Duration-Frequency Relationship The Recommended Intensity-Duration-Frequency relationship is used to estimate the intensity of rainfall. It can be expressed by the following algebraic equation.

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

The site is located within the HKO Headquarters Rainfall Zone. Therefore, for 10 years return period, the following values are adopted.

a =
$$471.9$$

b = 3.02
c = 0.397

2. The peak runoff is calculated by the Rational Method i.e. $Q_p = 0.278CiA$

where Q_p = peak runoff in m³/s C = runoff coefficient (dimensionless) i = rainfall intensity in mm/hr A = catchment area in km²

3. The run-off coefficient (C) of surface runoff are taken as follows:

Paved Area: C = 0.95
 Unpaved Area: C = 0.35

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4. Manning's Equation is used for calculation of velocity of flow inside the channels:

Manning's Equation:
$$v = \frac{R^{\frac{1}{6}}}{n} R^{\frac{1}{2}} S_f^{\frac{1}{2}}$$

Where,

V = velocity of the pipe flow (m/s)

S_f = hydraulic gradient

n = manning's coefficient

R = hydraulic radius (m)

5. Colebrook-White Equation is used for calculation of velocity of flow inside the pipes:

Colebrook-White Equation:
$$\overline{v} = -\sqrt{32gRS} \log(\frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS_f}})$$

where,

V = velocity of the pipe flow (m/s)

 S_f = hydraulic gradient k_f = roughness value (m)

v = kinematics viscosity of fluid

D = pipe diameter (m) R = hydraulic radius (m)

Drainage Appraisal

4. Proposed Drainage System

- 4.1.1 There is an existing village drain /ditch (namely Village Drain A, please refer to Figure 2 and Figure 4) surrounding the application site at east and south. Internal drainage system is proposed to collect the runoff from the application site and discharge to the existing village drain at the north.
- 4.1.2 After the development, the original runoff to the east and south of Village Drain A would be reduced. It is anticipated that there is positive impact to the Village Drain A.
- 4.1.3 The alignment, size, levels, and gradient of the proposed Uchannels are shown in Figure 3.
- 4.1.4 The design calculations of proposed channels are shown in **Appendix A**.

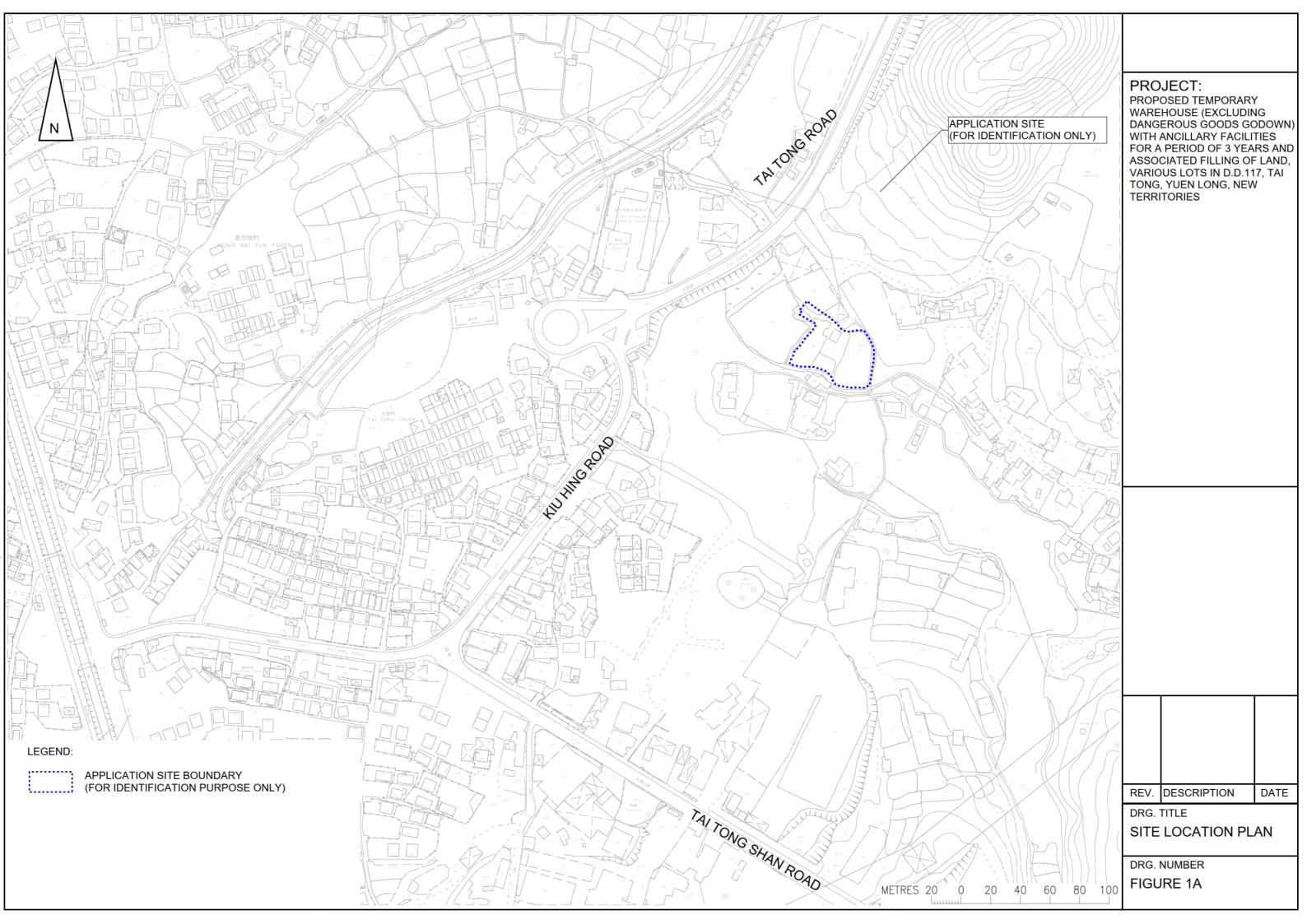
5. Conclusion

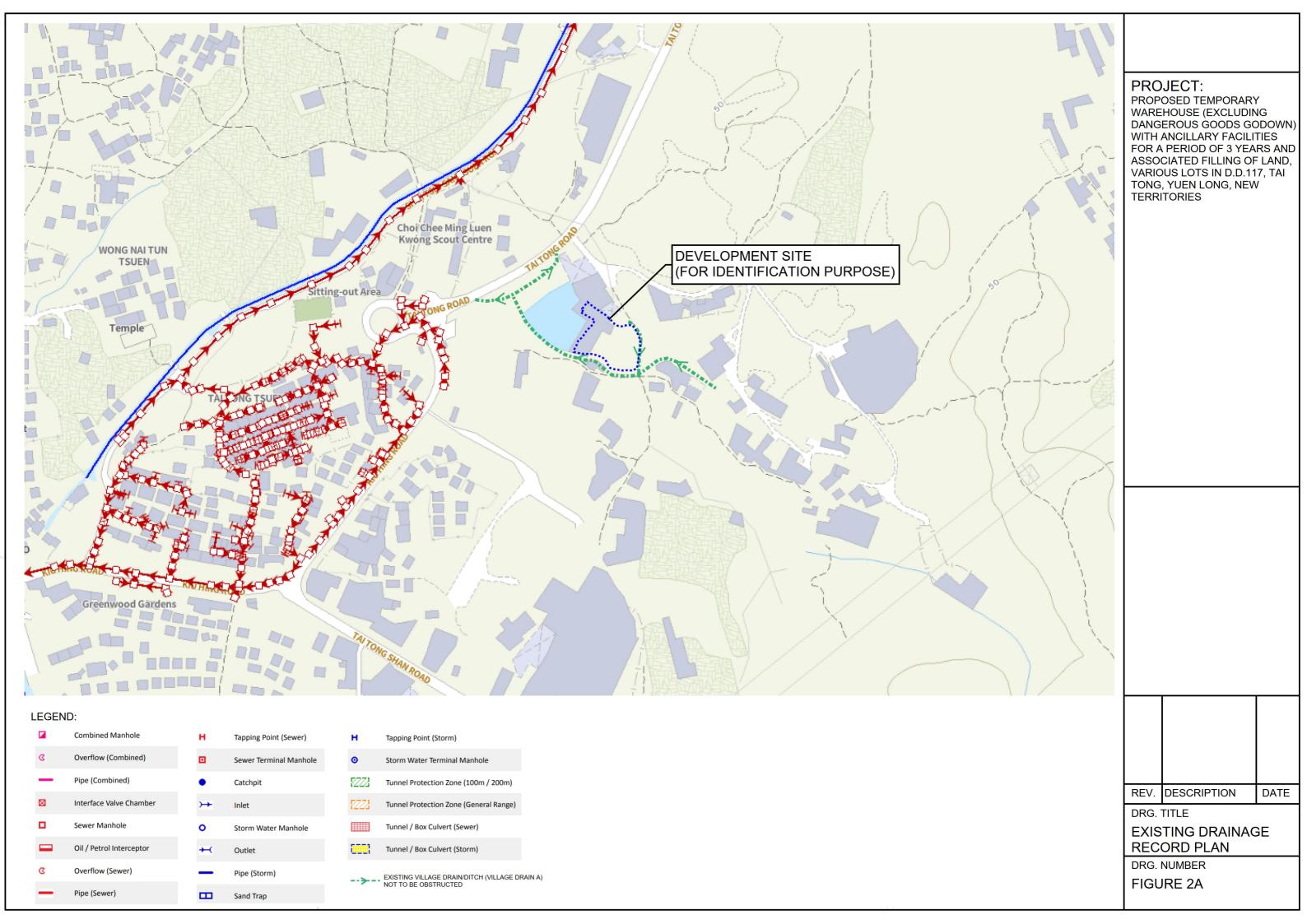
- 5.1.1 A drainage appraisal has been conducted for the Proposed Development. The surface runoff from the Application Site will be collected by the proposed perimeter Uchannel and discharge to the existing channel at the north of the site.
- 5.1.2 With the proposed drainage system, it is anticipated that there will be no significant drainage impact to the area after the implementation of the development.

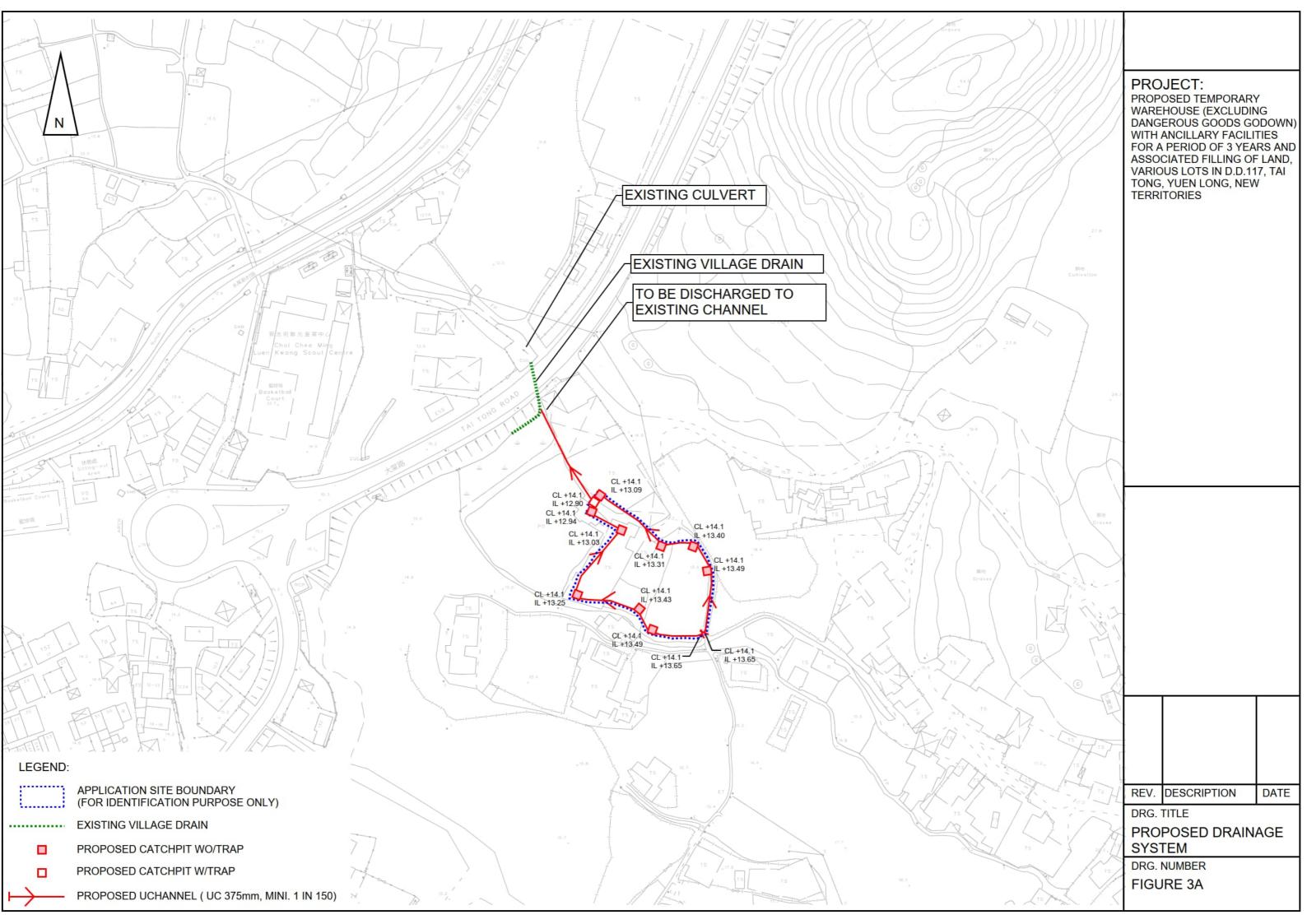
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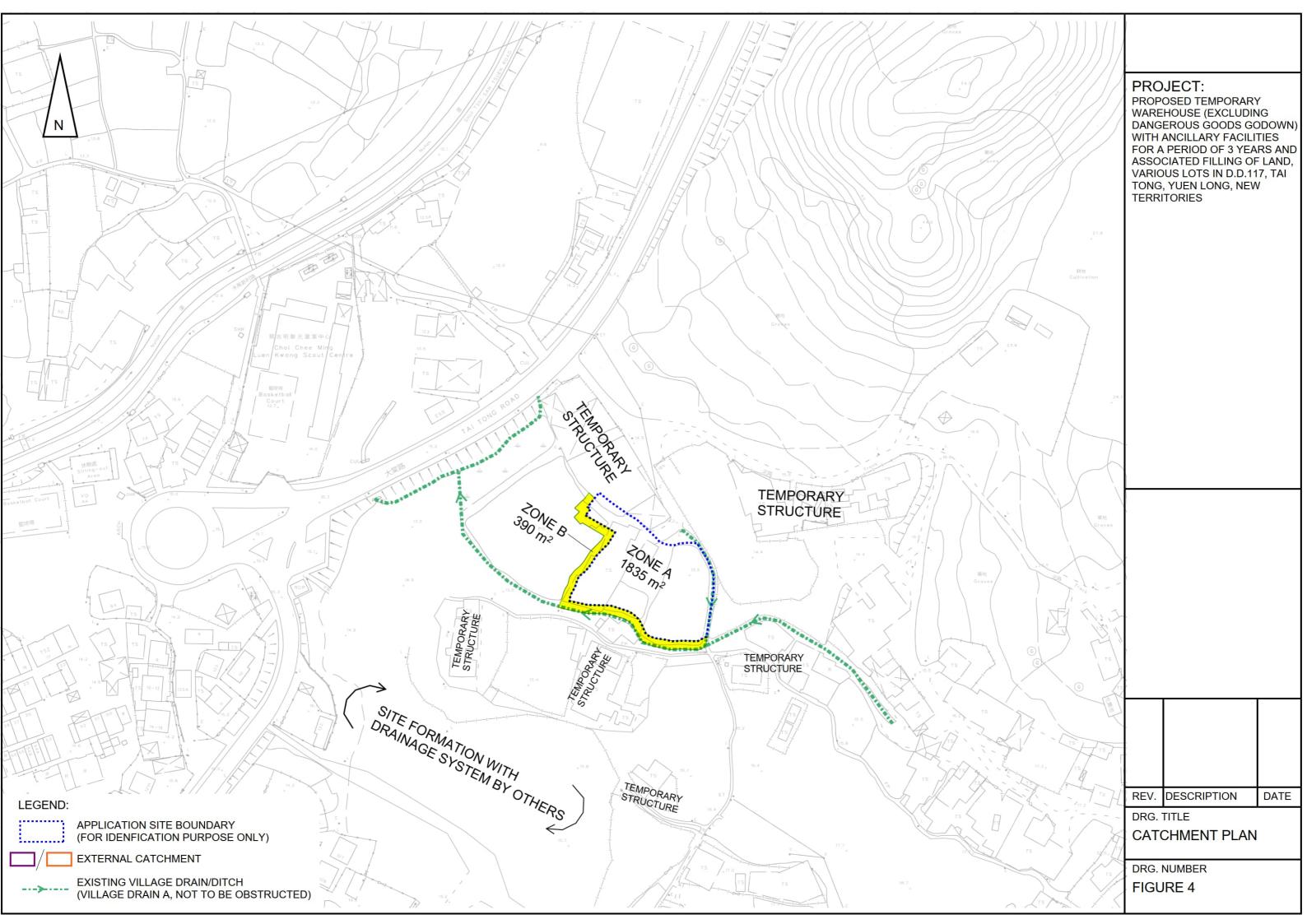
Page | 5

FIGURES









Appendix

Appendix A - Channel Design

U Channel 1 (Zone A + B)

Utilization

Runoff Estimation				
Design Return Period		1 in	10	years
Paved Area	1835 + 390 x 1 =		2225	(m2)
Unpaved Area			0	(m2)
Total Equivalent Area	2225 x 0.95 + 0 x 0.35 =		2114	(m2)
Rainfall Intensity, I *			206	mm/hr
Design Discharge Rate, Q	0.278 x 2114 x 206 / 1000000 =		0.121	m3/s

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

U Channel			
Channel Size		375	(mm)
Gradient	1 in	150	
Velocity		1.50	m/s
Capacity		0.188	m3/s

0.121 / 0.188 = **64.51** %

OK (assume 10% siltation, utilization less than 90%)

Appendix B - Proposed Development Layout Plan

APPLICATION SITE AREA : 1,835 m² COVERED AREA : 1.539 m² (ABOUT) UNCOVERED AREA : 296 m² (ABOUT) PLOT RATIO (ABOUT) SITE COVERAGE : 84 % (ABOUT)

WAREHOUSE (EXCL. D.G.G.) SITE OFFICE, WASHROOM, FS WATER TANK AND PUMP ROOM 1,539 m² (ABOUT) 3,078 m² (ABOUT)

GFA

3,078 m² (ABOUT)

COVERED

1,539 m² (ABOUT)

AREA

TOTAL

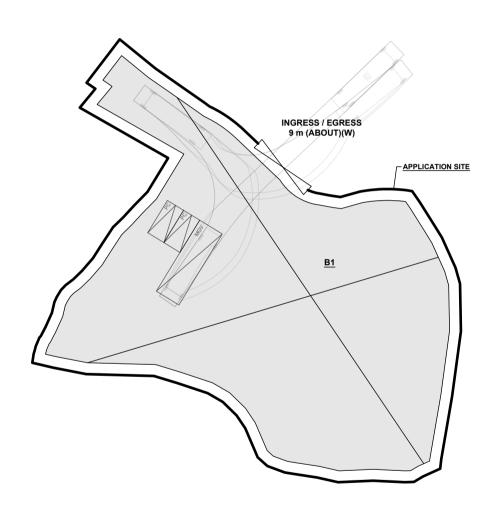
BUILDING

HEIGHT

13 m (ABOUT)(2-STOREY)

D.G.G. - DANGEROUS GOODS GODOWN







PROPOSED TEMPORARY WAREHOUSE (EXCLUDING DANGEROUS GOODS GODOWN) WITH ANCILLARY FACILITIES FOR A PERIOD OF 3 YEARS AND ASSOCIATED FILLING OF LAND

VARIOUS LOTS IN D.D.117, TAI TONG, YUEN LONG, NEW TERRITORIES

1:500 @ A4

MN 3.4.2024 PEV/ISED BY

WG. TITLE

LAYOUT PLAN DWG NO PLAN 4

LEGEND

APPLICATION SITE STRUCTURE PARKING SPACE (PC) LOADING/UNLOADING SPACE (MGV)

INGRESS / EGRESS

PARKING AND LOADING / UNLOADING PROVISIONS

NO. OF PRIVATE CAR PARKING SPACE

DIMENSION OF PARKING SPACE : 5 m (L) x 2.5 m (W)

NO. OF L/UL SPACE FOR MEDIUM GOODS VEHICLE : 2 DIMENSION OF L/UL SPACE

NO. OF STRUCTURE DOMESTIC GFA

NON-DOMESTIC GFA

BUILDING HEIGHT

NO. OF STOREY

: 3,078 m²

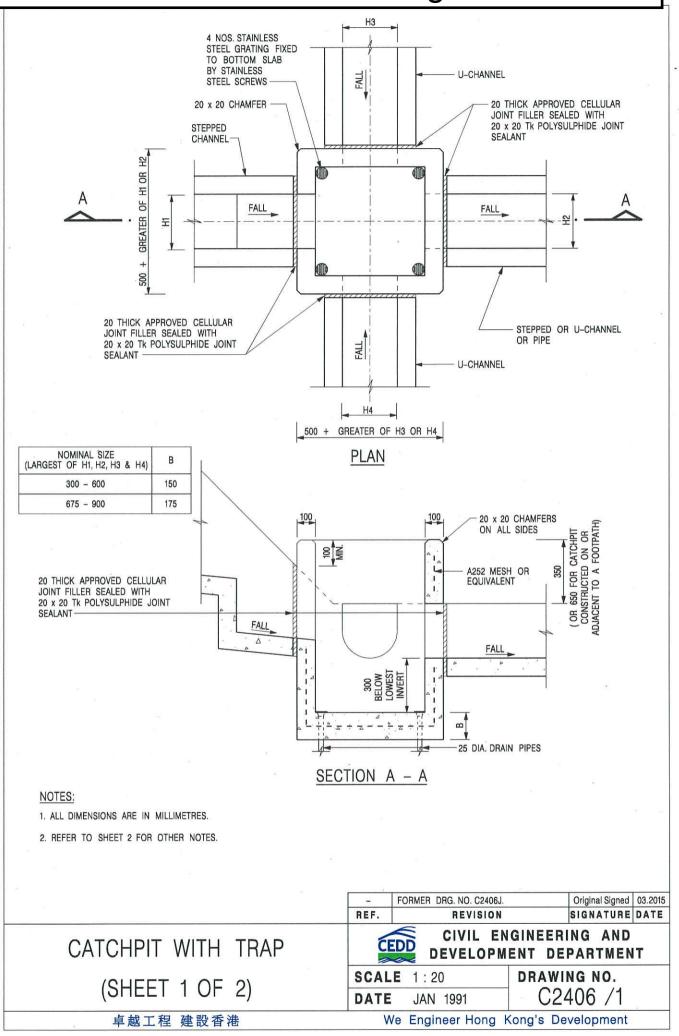
: 13 m

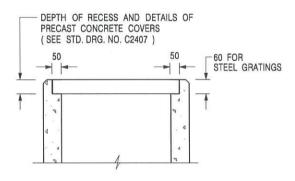
(ABOUT)

(ABOUT)

: 11 m (L) x 3.5 m (W)

Appendix C - Reference Drawings





ALTERNATIVE TOP SECTION FOR PRECAST CONCRETE COVERS / GRATINGS

NOTES:

- 1. ALL DIMENSIONS ARE IN MILLIMETRES.
- 2. ALL CONCRETE SHALL BE GRADE 20 /20.
- 3. CONCRETE SURFACE FINISH SHALL BE CLASS U2 OR F2 AS APPROPRIATE.
- 4. FOR DETAILS OF JOINT, REFER TO STD. DRG. NO. C2413.
- 5. CONCRETE TO BE COLOURED AS SPECIFIED.
- UNLESS REQUESTED BY THE MAINTENANCE PARTY AND AS DIRECTED BY THE ENGINEER, CATCHPIT WITH TRAP IS NORMALLY NOT PREFERRED DUE TO PONDING PROBLEM.
- 7. UPON THE REQUEST FROM MAINTENANCE PARTY, DRAIN PIPES AT CATCHPIT BASE CAN BE USED BUT THIS IS FOR CATCHPITS LOCATED AT SLOPE TOE ONLY AND AS DIRECTED BY THE ENGINEER.
- FOR CATCHPITS CONSTRUCTED ON OR ADJACENT TO A FOOTPATH, STEEL GRATINGS (SEE DETAIL 'A' ON STD. DRG. NO. C2405 /2) OR CONCRETE COVERS (SEE STD. DRG. NO. C2407) SHALL BE PROVIDED AS DIRECTED BY THE ENGINEER.
- 9. IF INSTRUCTED BY THE ENGINEER, HANDRAILING (SEE DETAIL 'J' ON STD. DRG. NO. C2405 /5; EXCEPT ON THE UPSLOPE SIDE) IN LIEU OF STEEL GRATINGS OR CONCRETE COVERS CAN BE ACCEPTED AS AN ALTERNATIVE SAFETY MEASURE FOR CATCHPITS NOT ON A FOOTPATH NOR ADJACENT TO IT. TOP OF THE HANDRAILING SHALL BE 1 000 mm MIN. MEASURED FROM THE ADJACENT GROUND LEVEL.
- 10. MINIMUM INTERNAL CATCHPIT WIDTH SHALL BE 1 000 mm FOR CATCHPITS WITH A HEIGHT EXCEEDING 1 000 mm MEASURED FROM THE INVERT LEVEL TO THE ADJACENT GROUND LEVEL. AND, STEP IRONS (SEE DSD STD. DRG. NO. DS1043) AT 300 c/c STAGGERED SHALL BE PROVIDED. THICKNESS OF CATCHPIT WALL FOR INSTALLATION OF STEP IRONS SHALL BE INCREASED TO 150 mm.
- FOR RETROFITTING AN EXISTING CATCHPIT WITH STEEL GRATING, SEE DETAIL 'G' ON STD. DRG. NO. C2405 /4.
- SUBJECT TO THE APPROVAL OF THE ENGINEER, OTHER MATERIALS CAN ALSO BE USED AS COVERS / GRATINGS.

REF.	REVISION	SIGNATURE	DATE
-	FORMER DRG. NO. C2406J.	Original Signed	03.2015
Α	MINOR AMENDMENT.	Original Signed	04.2016

CATCHPIT WITH TRAP (SHEET 2 OF 2)

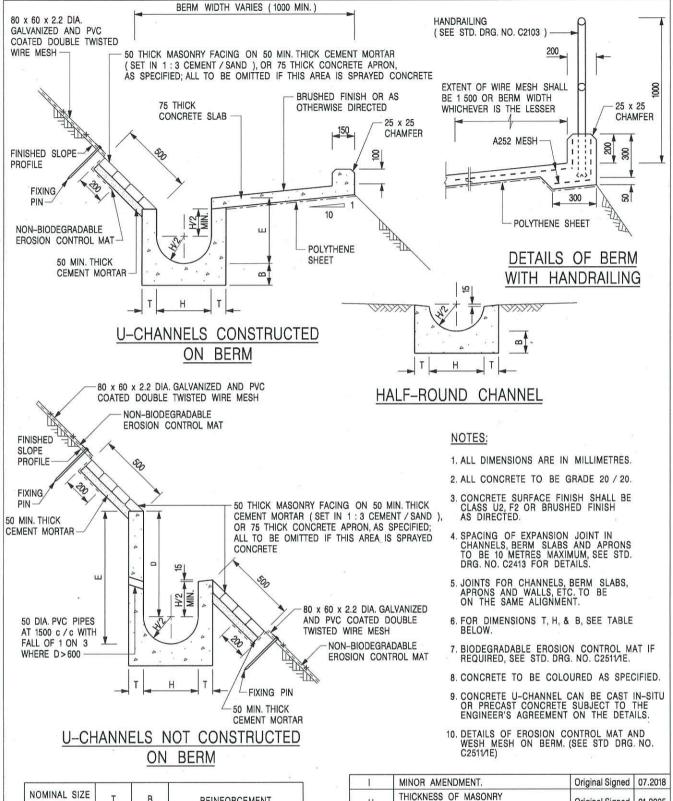


CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1:20 **DATE** JAN 1991

drawing no. C2406 /2A

卓越工程 建設香港



NOMINAL SIZE H	T	В	REINFORCEMENT
300	80	100	A252 MESH PLACED CENTRALLY AND T=100
375 - 600	100	150	WHEN E>650
675 - 900	125	175	A252 MESH PLACED CENTRALLY

REF.	REVISION	SIGNATURE	DATE
В	MINOR AMENDMENTS.	Original Signed	3.94
С	150 x 100 UPSTAND ADDED AT BERM.	Original Signed	6.99
D	MINOR AMENDMENT.	Original Signed	08.2001
E	DRAWING TITLE AMENDED.	Original Signed	11.2001
F	GENERAL REVISION.	Original Signed	12.2002
G	MINOR AMENDMENT.	Original Signed	01.2004
Н	THICKNESS OF MASONRY FACING AMENDED.	Original Signed	01.2005
1	MINOR AMENDMENT.	Original Signed	07.2018

DETAILS OF HALF-ROUND AND U-CHANNELS (TYPE A -WITH MASONRY APRON)

卓越工程 建設香港

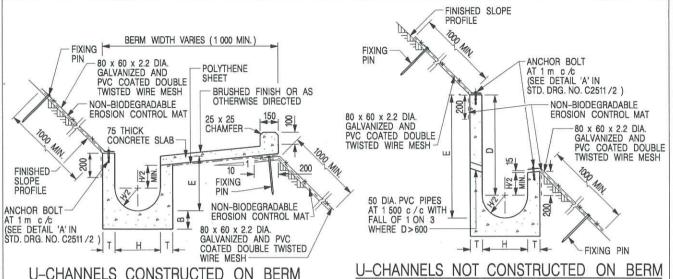
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CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1:25

DATE JAN 1991

C2409l



U-CHANNELS CONSTRUCTED ON BERM WITH NON-BIODEGRADABLE EROSION CONTROL MAT U-CHANNELS NOT CONSTRUCTED ON BERM WITH NON-BIODEGRADABLE EROSION CONTROL MAT

BIODEGRADABLE

EROSION CONTROL MAT

07.2018

12.2017

01.2005

12.2002

08 2001

6.99

3.94

10.92

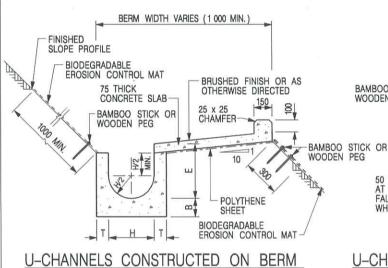
DATE

Original Signed

SIGNATURE

FINISHED SLOPE PROFILE

ш



WITH BIODEGRADABLE

EROSION CONTROL MAT

BAMBOO STICK OR WOODEN PEG

U-CHANNELS NOT CONSTRUCTED ON BERM

WITH BIODEGRADABLE

EROSION CONTROL MAT

NOTES:

- 1. ALL DIMENSIONS ARE IN MILLIMETRES.
- 2. ALL CONCRETE TO BE GRADE 20 /20.
- 3. CONCRETE SURFACE FINISH SHALL BE CLASS U2, F2 OR BRUSHED FINISH AS DIRECTED.
- SPACING OF EXPANSION JOINT IN CHANNELS, BERM SLABS AND APRONS TO BE 10 METRES MAXIMUM, SEE STD. DRG. NO. C2413 FOR DETAILS.
- 5. JOINTS FOR CHANNELS, BERM SLABS, APRONS AND WALLS, ETC. TO BE ON THE SAME ALIGNMENT.
- 6. FOR DIMENSIONS T, H, & B, SEE TABLE BELOW.
- 7. FOR TYPICAL FIXING PIN DETAILS, SEE STD. DRG. NO. C2511/2.
- 8. MINIMUM SIZE OF 25 x 50 x 300mm SHALL BE PROVIDED FOR WOODEN PEG.
- MINIMUM SIZE OF 10mm DIAMETER WITH 200mm LONG SHALL BE PROVIDED FOR BAMBOO STICK.
- 10. THE FIXING DETAILS OF NON-BIODEGRADABLE AND BIODEGRADABLE EROSION CONTROL MATS ON EXISTING BERM SHALL REFER TO STD. DRG. NO. C2511/1.

NOMINAL SIZE H	Ţ	В	REINFORCEMENT
300	80	100	A252 MESH PLACED
375 - 600	100	150	CENTRALLY AND T=100 WHEN E>650
675 - 900	125	175	A252 MESH PLACED CENTRALLY

	DETAILS	OF	HALF-I	ROUN	D AND	
	U-CHAN	NELS	S (TYP	ЕВ-	- WITH	
I	FROSION	COL	NTROI	MAT	APRON	1)

6
CEDD
CEDD
nac

Н

G

F

E

D

C

В

A

REF.

BAMBOO STICK OR WOODEN PEG

50 DIA. PVC PIPES AT 1 500 c/c WITH FALL OF 1 ON 3

WHERE D>600

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE DIAGRAMMATIC
DATE JAN 1991

MINOR AMENDMENT.

MINOR AMENDMENT

GENERAL REVISION.

MINOR AMENDMENT.

MINOR AMENDMENT.

MINOR AMENDMENT

FIXING DETAILS OF BIODEGRADABLE

150 x 100 UPSTAND ADDED AT BERM

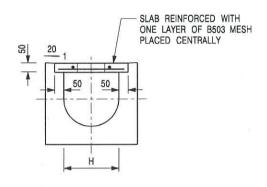
REVISION

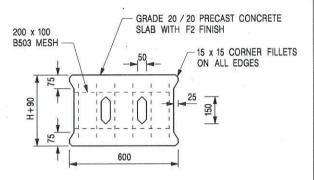
EROSION CONTROL MAT ADDED.

DIMENSION TABLE AMENDED

C2410

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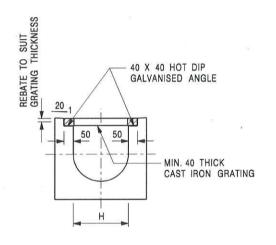


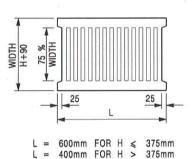
<u>PLAN OF SLAB</u>

TYPICAL SECTION

U-CHANNELS WITH PRECAST CONCRETE SLABS

(UP TO H OF 525)





TYPICAL SECTION

CAST IRON GRATING

(DIMENSIONS ARE FOR GUIDANCE ONLY, CONTRACTOR MAY SUBMIT EQUIVALENT TYPE)

U-CHANNEL WITH CAST IRON GRATING

(UP TO H OF 525)

NOTES:

- 1. ALL DIMENSIONS ARE IN MILLIMETRES.
- 2. H=NOMINAL CHANNEL SIZE.
- ALL CAST IRON FOR GRATINGS SHALL BE GRADE EN-GJL-150 COMPLYING WITH BS EN 1561.
- 4. FOR COVERED CHANNELS TO BE HANDED OVER TO HIGHWAYS DEPARTMENT FOR MAINTENANCE, THE GRATING DETAILS SHALL FOLLOW THOSE AS SHOWN ON HyD STD. DRG. NO. H3156.

REF.	REVISION	SIGNATURE	DATE
Α	CAST IRON GRATING AMENDED.	Original Signed	
В	NAME OF DEPARTMENT AMENDED.	Original Signed	01.2005
С	MINOR AMENDMENT. NOTE 3 ADDED.	Original Signed	12.2005
D	NOTE 4 ADDED.	Original Signed	06.2008
E	NOTES 3 & 4 AMENDED.	Original Signed	

COVER SLAB AND CAST IRON GRATING FOR CHANNELS

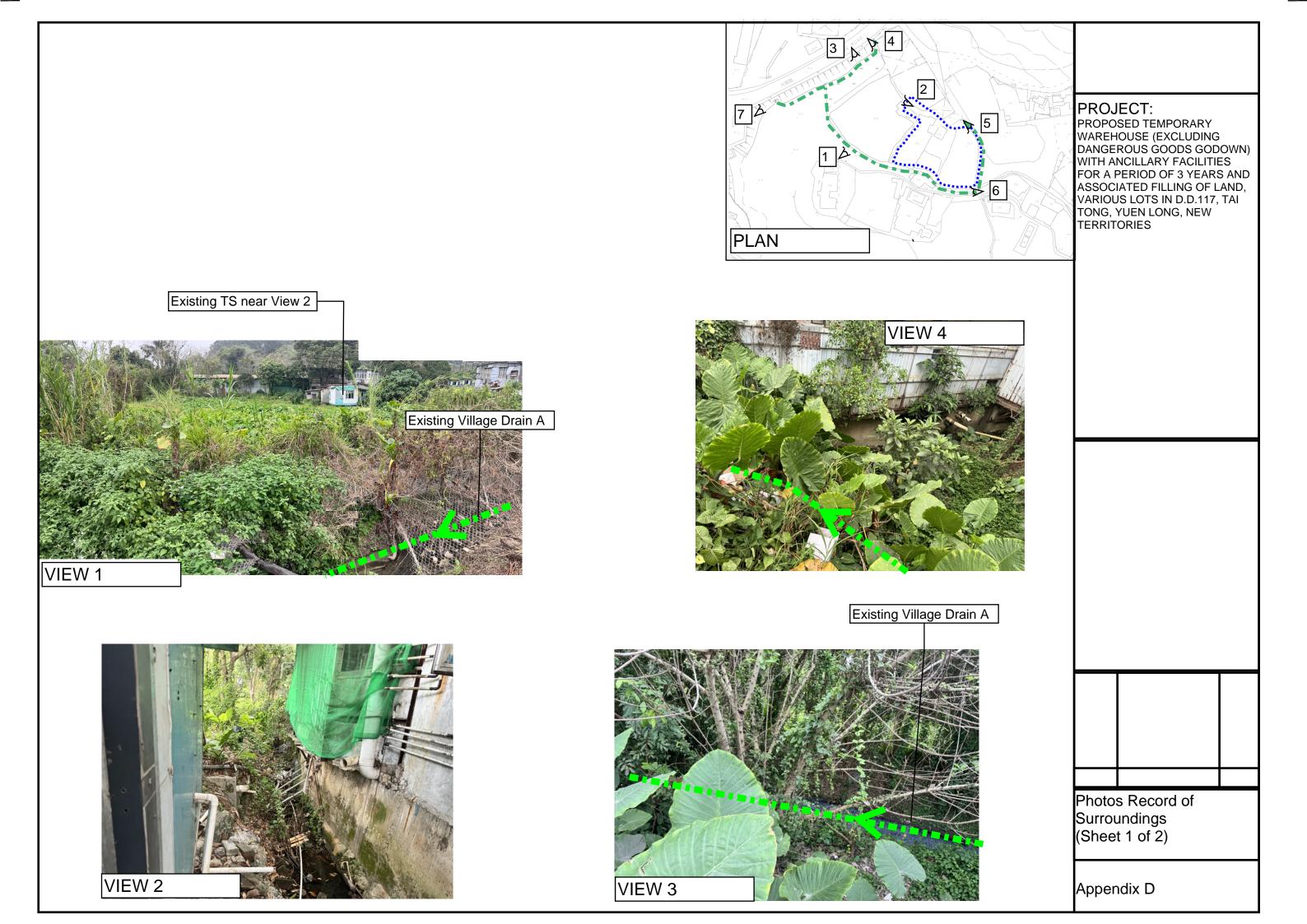


CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

 SCALE
 1:20
 DRAWING NO.

 DATE
 JAN 1991
 C2412E

卓越工程 建設香港

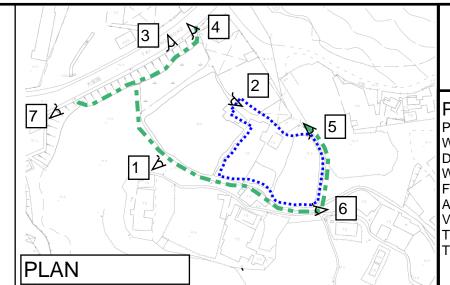




VIEW 5



VIEW 6



PROJECT:
PROPOSED TEMPORARY
WAREHOUSE (EXCLUDING
DANGEROUS GOODS GODOWN)
WITH ANCILLARY FACILITIES
FOR A PERIOD OF 3 YEARS AND
ASSOCIATED FILLING OF LAND,
VARIOUS LOTS IN D.D.117, TAI
TONG, YUEN LONG, NEW
TERRITORIES



VIEW 7

Photos Record of Surroundings (Sheet 2 of 2)

Appendix D

