TEMPORARY DRAINAGE PROPOSAL

APPLICATION SITE OF PROPOSED TEMPORARY SHOP AND SERVICES FOR A PERIOD OF 3 YEARS AT LOTs 247 (Part) & 248 (Part) on D.D. 385, SO KWUN WAT, TUEN MUN, NEW TERRITORIES

Application No.: A_TM-SKW_129

Project No.: ALPL/TDM/009
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2 Introduction

2.1 Background

This report presents the Drainage Proposal for supporting the Proposed Temporary Shop and Services for a period of 3 years at Lots 247 (Part) & 248 (Part) in D.D. 385, So Kwun Wat, Tuen Mun, New Territories.

2.2 Objectives of the Report

This report shall be prepared to include the following:

- Identify the potential drainage impact assessment from the proposed Application Site
- Recommend and implement all necessary measures to mitigate adverse drainage impacts arising from the application site

2.3 Report Structure

The report contains the following sections:

- Section 1 on Introduction;
- Section 2 on Development Proposal;
- Section 3 on Assessment Criteria;
- Section 4 on Potential Drainage Impact; and
- Section 5 on Conclusion.

3 Development Proposal

3.1 Location of the Application Site

The application Site is located within the So Kwun Wat, Tuen Mun, New Territories with an area of around 800m^2 and ground level varying between + 4.2mPD and + 3.9mPD. The layout plan is provided in **Appendix B**.

This application site is "Village Type Development" zoning, the type of application is the Temporary Use/Development in Rural Areas for a Period of 3 Years.

There are existing gullies vicinity of the application site, the location and site photos of the existing gullies are provided in **Appendix C**.

4 Assessment Criteria

4.1 Design Return Periods

The drainage system in the Application site is to collect surface flows and convey to the existing gullies and finally convey to downstream village drain. The recommended design return periods based on the flood levels for the various drainage systems depend on the drainage system, land use, hazard to public safety and community expectations. The recommended design return period is reproduced in Table 4-1 below:

DESCRIPTION	DESIGN RETURN PERIODS
Intensively Used Agricultural Land	2 – 5 Years
Village Drainage including internal Drainage System under a polder Scheme	10 Years
Main Rural Catchment Drainage Channels	50 Years
Urban Drainage Trunk System	200 Years
Urban Drainage Branch System	50 Years

Table 4-1 Recommended Design Return Periods based on Flood Levels

As per Section 3.1 of Guidance Notes on Road Pavement Drainage Design, drainage design for gullies arrangement shall be in principle be designed to accommodate a rainfall intensity for heavy rainstorms with a probability of 1 in 50 years occurrence to tally with the design return period for carrier drains.

Considered the application site do not locate at Tai Mo Shan area, West Lantau area and North District area, general application would be considered. For storm occurrence 1 in 50 years, the maximum intensity is 248mm/h. The maximum intensities are based on extreme intensities in 5 minutes duration in Table 2a of SDM (2018) plus 13.8% increase for consideration of climate change for the End of 21st Century scenario (2081-2100).

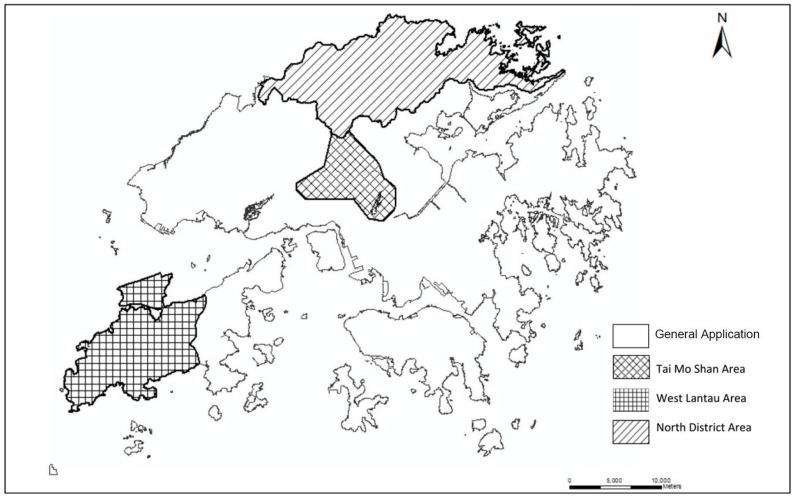


Figure 1 – Delineation of Rainfall Zones
(adopted from Figure 3 in SDM(2018))

4.2 Calculation Methodology for Gully Spacing

The design method adopted is based on CR 2. It is identical to the one in the 1994 version of Road Note 6 and 2010 version of Guidance Notes RD/GN/035.

For simplicity, a single formula (the one for intermediate gullies) is adopted, as regards terminal gullies which collect water from both sides. The unadjusted gully spacing is given by Equation below:

$$L_u = \left(\frac{0.01}{n}\right) \times \frac{A}{W}$$

where L_u = unadjusted gully spacing (m)
n = roughness coefficient (Table 4)
A = drained area[10] (m^2) (Chart 1A for Normal Roads and Chart 1B for expressways)
W = drained width (m)

The existing gullies with paved area collected the runoff by flat channel, hence the roughness coefficient shall be 0.013.

Road Surface	n
Concrete without flat channel	0.015
Concrete with flat channel	0.013
Bituminous Wearing Course	0.013
Precast block paving	0.015
Stone Mastic Asphalt (SMA) Wearing Course and Friction Course	0.016

Roughness Coefficients for Different Types of Road Surface

Based on the type of gully grating , reduction factor shall be applied for the designed gully spacing.

$$L = L_u \times (1 - RF_{grating}) \times (1 - RF_{debris}) \qquad (5)$$

where L = design gully spacing (m)
L_u = unadjusted gully spacing (m)
$RF_{grating}$ = reduction factor for gully efficiency (Table 5)
RF_{debris} = reduction factor for blockage by debris (Table 6)

From the observation on site, the existing gully grating type is GA1-450, $RF_{grating}$ shall be 0%. And the RF_{debris} was considered as 0%, because the application site not as the roadside gully, applicant shall routine clean the gully and keep the gully in full drainage capacity to prevent flooding.

From the above calculation, the required minimum gully spacing shall be from 9.6m to 9.0m, and the exiting spacing of gullies is 9m each, hence no additional gully would be newly constructed and affect the existing village drainage system.

5 Potential Drainage Impact

5.1 Existing Site Condition

The application Site is located within the So Kwun Wat, Tuen Mun, New Territories with an area of around 800m^2 and ground level varying between + 3.9mPD and + 4.2mPD.

5.2 Changes in Drainage Characteristics

Since the ground level of application site is slightly higher than the adjacent ground surface, or the adjacent land lots are fenced off with concrete wall with independent drainage system for the run off. No external catchment shall be considered in the calculation.

The characteristics of the sub-catchment areas are no change due to the proposed application, which keep the existing paved site area. The in sub-catchment is summarized in Table 5-1.

Grassland (m^2)	0
Paved Area (m^2)	800
External Catchment Area(m^2)	0
Total Catchment Area (m^2)	800

Table 5-1 Change in sub-catchment within the site

5.3 Potential Drainage Impact

The details of the proposed drainage works are illustrated in **Appendix C**.

To effectively convey stormwater away from the application site and minimize the potential impact to the drainage infrastructure of the village area, drainage works consists of existing gullies and flat channel, are proposed to convey the stormwater runoff to the existing drainage sustem.

The runoff within application site is collected by the flat channel along the middle of application site and convey to the existing gullies within the application site, the layout of existing gullies within the the application site as indicated in the **Appendix C**.

6 Construction Stage

6.1 Temporary Drainage Arrangements

Proper measures shall be taken to maintain the existing drainage characteristics of the catchment areas and to minimize drainage impacts associated with the construction works. The principal drainage impacts which are associated with construction of the works have been identified as follows:

(i) Erosion of ground materials;

(ii) Sediment transportation to existing downstream drainage system; and

(iii) Obstruction to drainage systems.

Regular inspections shall be carried out to ensure integrity of the works. These inspections shall cover works under construction as well as recently completed areas.

To ensure proper operation of the site drainage channels and desilting facilities, inspection of the perimeter drains shall be carried out on a weekly basis and the desilting facilities shall be cleaned on a daily basis.

If excavated materials are not possible to transport away the excavated material within the same day, the material should be covered by tarpaulin/impervious sheets. Stockpiles of construction materials (for examples aggregate, fill materials) of more than 50 m3 in an open area shall also be covered with tarpaulin or similar fabric during rainstorms.

All runoff discharged into the existing drainage system will be settled in a silt trap to ensure no sediment will be discharged into the channel. Silt traps will normally be provided along the site drainage immediately upstream of the proposed discharge point to the existing Site. The silt traps will be inspected daily and immediately after each rainstorm.

Liaison will be carried out with relevant parties regarding temporary drainage arrangements to ensure that the drainage system is functioning adequately.

7 Conclusions

7.1 Conclusions

The analyzed catchment area of 800m2 consists of the site area of the proposed Application Site only and no external catchment area had been identified.

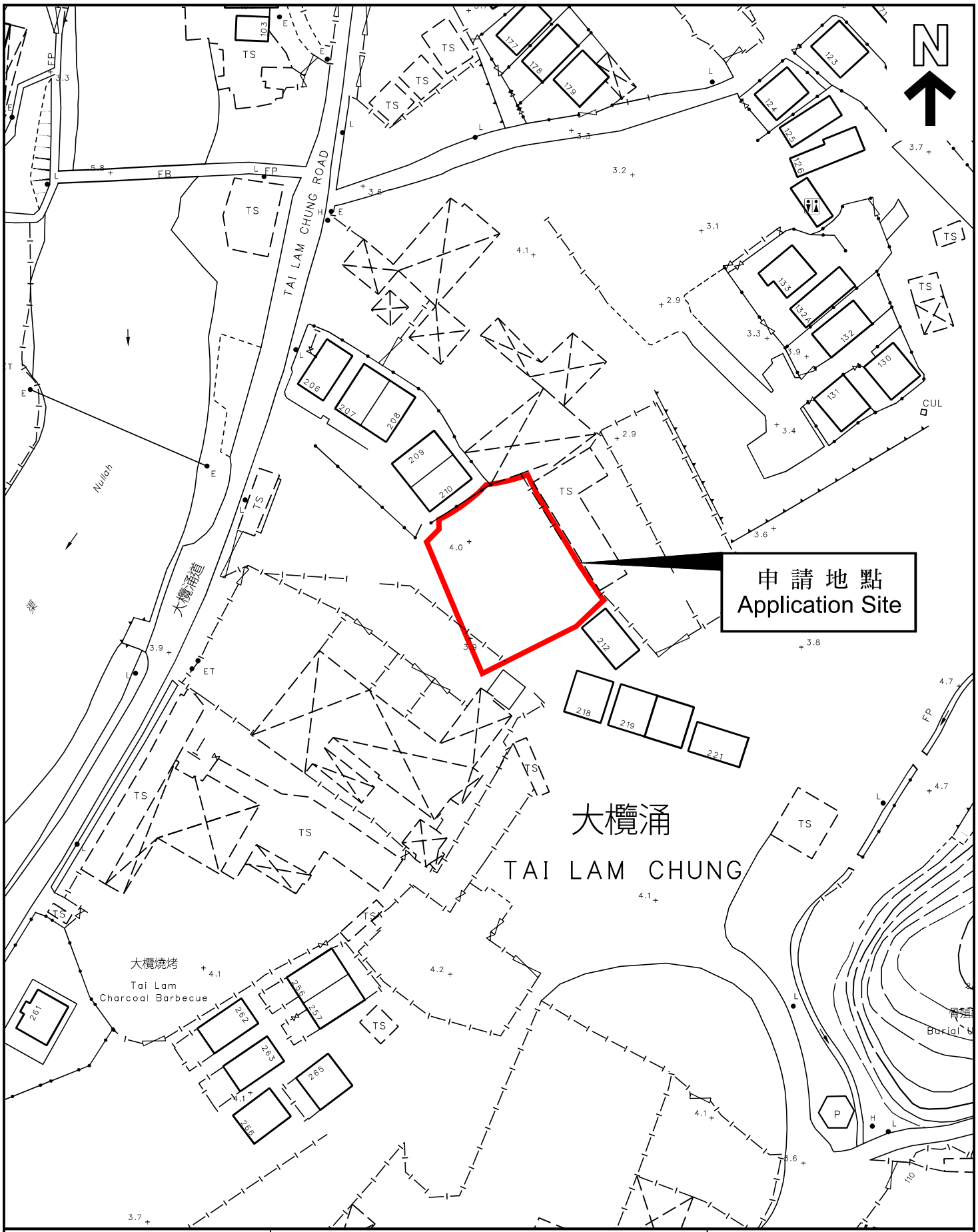
Existing flat channel and gullies are proposed to keep on site to convey runoff from the application site for collection. The proposed flat channels and gullies are located along the middle of the application site.

The assessment reviews the gullies have the sufficient spacing to cater for the drainage flow from the Application Site.

Mitigation measures are proposed during the construction period and to ensure that the existing drainage system within the site will not be affected during the construction stage.

APPENDIX A

SITE LAYOUT PLAN



本摘要圖於2024年9月2日擬備，
所根據的資料為測量圖編號
6-SW-19D 和 6-SW-24B
EXTRACT PLAN PREPARED ON 2.9.2024
BASED ON SURVEY SHEETS No.
6-SW-19D and 6-SW-24B

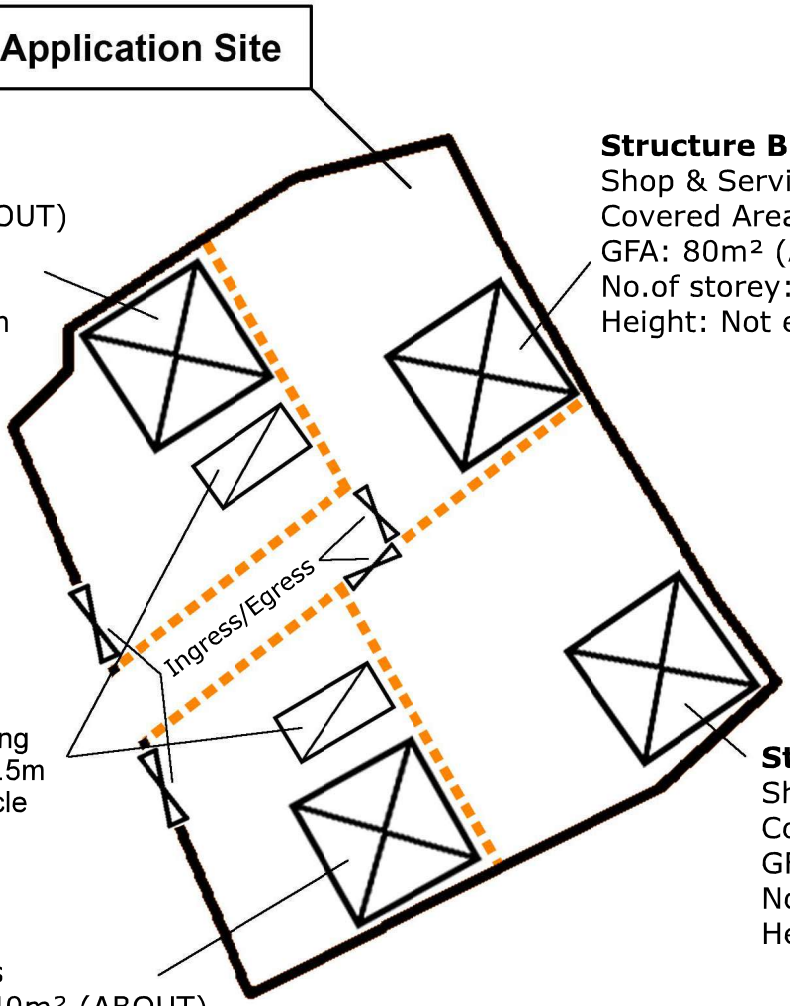
平面圖 SITE PLAN

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/TM-SKW/129

APPENDIX B

LAYOUT PLAN



Structure A
Shop & Services
Covered Area: 40m² (ABOUT)
GFA: 80m² (ABOUT)
No.of storey: 2
Height: Not exceeding 7m

Structure B
Shop & Services
Covered Area: 40m² (ABOUT)
GFA: 80m² (ABOUT)
No.of storey: 2
Height: Not exceeding 7m

2 loading/unloading spaces of 5m x 2.5m for van type vehicle

Structure C
Shop & Services
Covered Area: 40m² (ABOUT)
GFA: 80m² (ABOUT)
No.of storey: 2
Height: Not exceeding 7m

Structure D
Shop & Services
Covered Area: 40m² (ABOUT)
GFA: 80m² (ABOUT)
No.of storey: 2
Height: Not exceeding 7m

Allgain Land Planning
全堅土地規劃

Project 項目名稱:
Proposed Temporary Shop and Services for a Period of 3 Years at Lots 247 (Part) & 248 (Part) in D.D.385, So Kwun Wat,Tuen Mun, New Territories

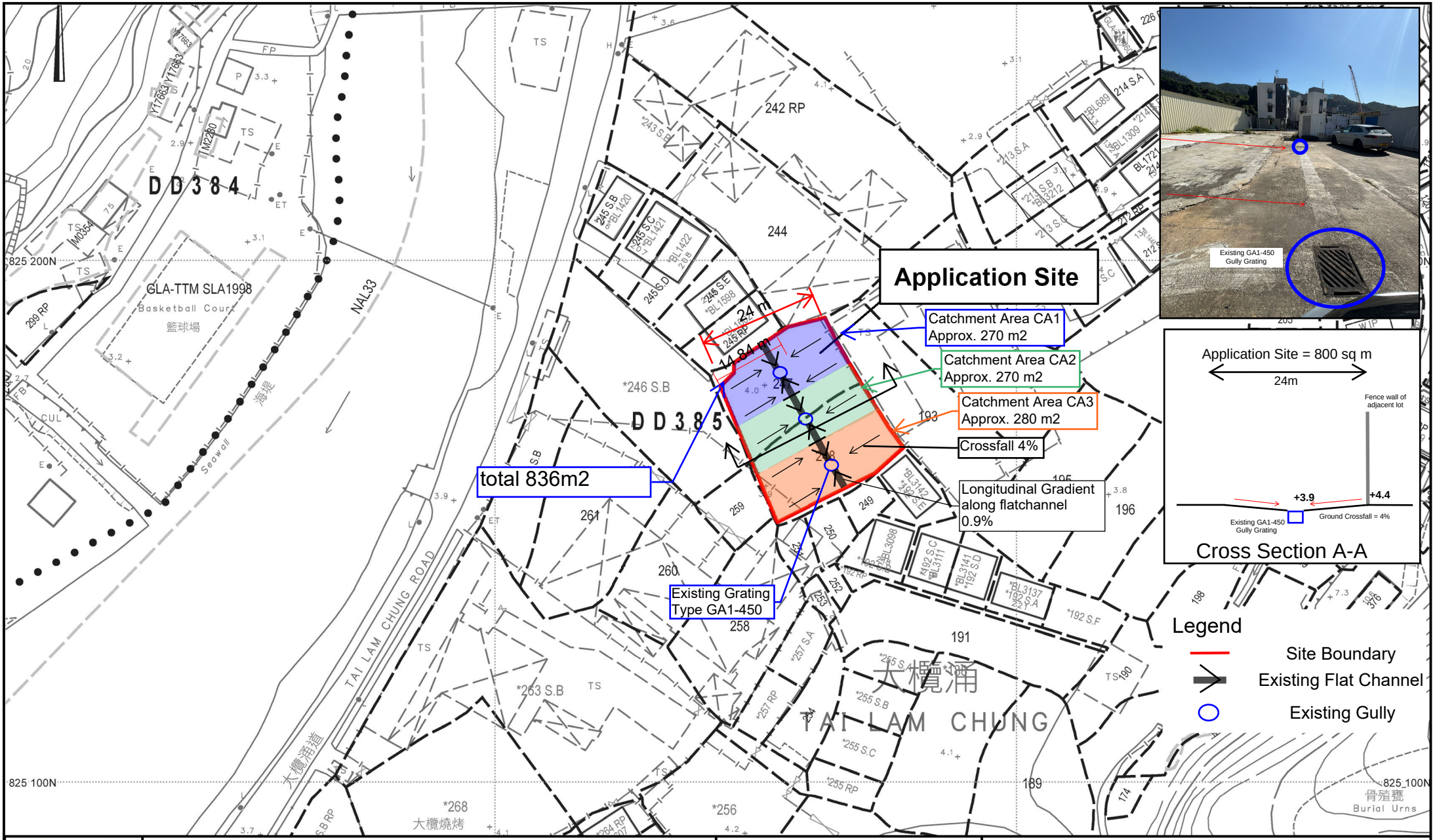
Drawing Title 圖紙標題:
Layout Plan

Drawing No. 圖號:
20240812

Remarks 備註:
- Loading/unloading for van type vehicle
- Structure
- Temporary fencing

APPENDIX C

PROPOSED DRAINAGE PLAN



Allgain Land Planning
全堅土地規劃

Project 項目名稱:

Proposed Temporary Shop and Services for a Period of 3 Years at Lots 247 (Part) & 248 (Part) in D.D.385, So Kwun Wat,Tuen Mun, New Territories

Drawing Title 圖紙標題:

Site Plan

Drawing No. 圖號:

20240812

Remarks 備註:

APPENDIX D

DESIGN CALCULATION OF THE PROPOSED DRAINAGE SYSTEM

PROJECT: *APPLICATION SITE OF PROPOSED TEMPORARY SHOP AND SERVICES FOR A PERIOD OF 3 YEARS AT SO KWUN WAT, TUEN MUN, NEW TERRITORIES*

JOB NO : *ALPL/TDM/009*

TITLE : ***Temporary Drainage Design Calculation***

Revision : *0*

Date : *15-Dec-24*

Prepare By: *JW*

DETERMINE THE CATCHMENT OF AREA

CA1	=	270	(m^2)
CA2	=	270	(m^2)
CA3	=	280	(m^2)

DETERMINE THE INLET TIME

Section	*A = Catchment of Area (m^2)*		*G_{long} Longitudinal Gradient*	*W Drained Width*	*X_{fall} Crossfall*	*n Roughness coeffcient*
1	*CA1*	*270*	*0.9%*	*12*	*4.0%*	*0.013*
2	*CA2*	*270*	*0.9%*	*12*	*4.0%*	*0.013*
3	*CA3*	*280*	*0.9%*	*12.5*	*4.0%*	*0.013*

Note: Roughness coeffcient refer to Table 4 of "Guidance Notes on Road Pavement Drainage Design" P.27

GULLY SPACING CHECKING

$$L_u = \left(\frac{0.01}{n}\right) \times \frac{A}{W}$$

Section	*A Drained Area (m^2)*	*L_u Gully Spacing (m)*
1	150	*9.6*
2	150	*9.6*
3	150	*9.2*

Note: *As Longitudinal Gradient >=0.5%, read drained area, A, from Chart 1A of "Guidance Notes on Road Pavement Drainage Design" P.34*

FACTORED GULLY SPACING CHECKING

$$L = L_u \times (1 - RF_{grating}) \times (1 - RF_{debris})$$

$RF_{grating}$=Reduction factor for gully efficiency, from Table 5 of "Guidance Notes on Road Pavement Drainage Design" P.27

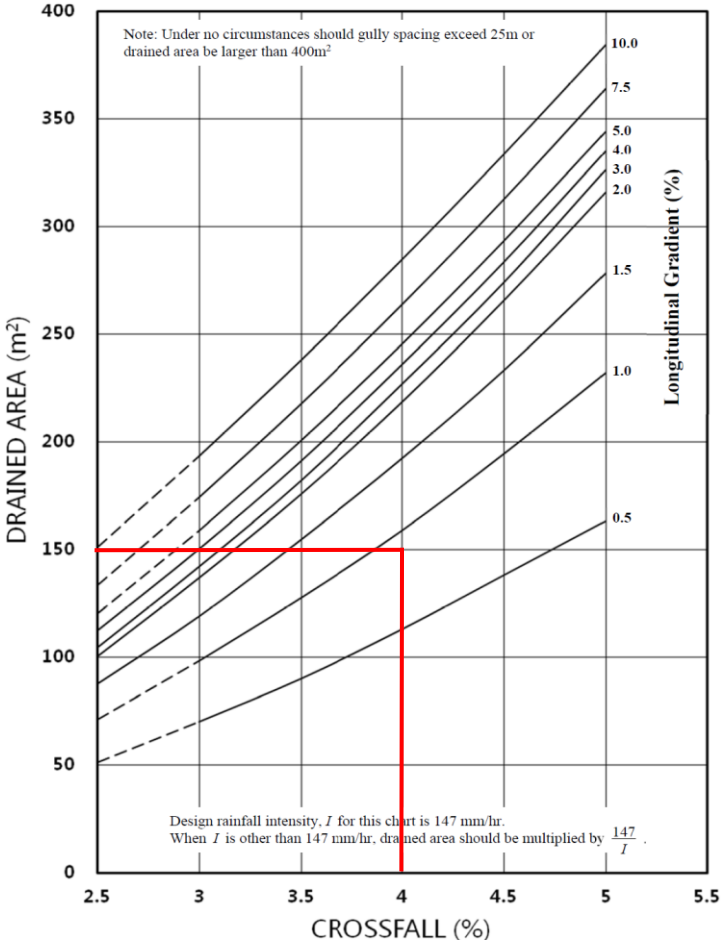
RF_{debris}=Reduction factor for blockage by debris, from Table 6 of "Guidance Notes on Road Pavement Drainage Design" P.27

Considered the site area not locate at roadside, RF_{debris} assumed as 0%

Section	*$Rf_{grating}$*	*L_u Gully Spacing (m)*
1	0%	*9.6*
2	0%	*9.6*
3	0%	*9.2*

For	section no.	1	, **Actual** Gully Spacing	=	**9.00**	m	< **9.6m, O.K.**
For	section no.	2	, **Actual** Gully Spacing	=	**9.00**	m	< **9.6m, O.K.**
For	section no.	3	, **Actual** Gully Spacing	=	**9.00**	m	< **9.2m, O.K.**

Design Chart 1A
General Calculation of Drained Area (Gradient ≥ 0.5%)



Road Surface	n
Concrete without flat channel	0.015
Concrete with flat channel	0.013
Bituminous Wearing Course	0.013
Precast block paving	0.015
Stone Mastic Asphalt (SMA) Wearing Course and Friction Course	0.016

Table 4: Roughness Coefficients for Different Types of Road Surface

Type of Grating	$RF_{grating}$
GA1-450	0%
GA2-325	15%

Table 5: Reduction Factors for Gully Efficiency

Roads / Road Sections		RF_{debris}
Expressways		
longitudinal gradient less than 0.5% & near sag points		15%
longitudinal gradient 0.5% or more	near amenity area or rural area	10%
	other sections	5%
Normal Roads		
longitudinal gradient less than 0.5%		20%
longitudinal gradient 0.5% or more	near sag points or blockage blackspot, e.g. streets with markets or hawkers	20%
	near amenity area or rural area	20%
	other sections	15%

Table 6: Reduction Factors for Blockage by Debris