Appendix 5 – Geotechnical Planning Review

Geotechnical Planning Review Report

S12A Rezoning Application for Ching To Yuen, at Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Sha Tin

Prepared for: Ching To Yeun Limited
25 September 2025

SMEC INTERNAL REF. 70761055

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Contents

Figures

Plates

Appendices

1. Introduction

1.1 Background

1.1.1 “Ching To Yuen” (“the Application Site” or “the Site”) owned by “Ching To Yeun Limited” (the Applicant) is located at the upper part of To Fung Shan, which is a traditional religious district in Shatin and is presently zoned “Green Belt” (“GB”) under the Draft Sha Tin Outline Zoning Plan No. S/ST/39. The Site is currently occupied by a single-storey columbarium building that can accommodate 6,396 niches, of which 2,993 niches have been sold.

1.1.2 The Applicant is submitting a planning application to the Town Planning Board (“TPB”) to rezone the Site from “GB” to "Other Specified Uses" annotated "Columbarium(3)" ("OU(Columbarium)3"), to allow the continued operation of the columbarium uses. To facilitate the continued operation of Application Site, some minor improvement works will be required to upgrade the overall environmental facilities of the Application Site.

1.1.3 Continuing operation of the Application Site can also help facilitate government’s commitment to provide columbarium facilities at suitable locations throughout Hong Kong to meeting the urgent demand for niche spaces resulting from an increase aging population.

1.1.4 In order to support the aforementioned planning application, SMEC Asia Limited Ltd (“SMEC”) has been appointed by the Applicant to prepare this Geotechnical Planning Review Report (“GPRR”).

1.2 Site Location

1.2.1 The Application Site is located at D.D. 186, To Fung Shan (**Figure 1**). The Lutheran Theological Seminary, Yau Oi Tsuen and To Fung Shan Christian Cemetery are Located to the south of this Site. To the east of the Site are Lin Yeun, Ten Thousand Buddhas Monastery, and Po Fook Memorial Hall. The Site is accessible from To Fung Shan Road via a local private access road.

1.3 Objectives of the Report

1.3.1 The objectives of this Geotechnical Planning Review Report are to:

i. Identify any existing geotechnical features and/or natural terrain located within or in close proximity that may potentially affect the Site;

ii. Carry out preliminary review/assessment of the features based on the available background/published information;

iii. Assess the geotechnical feasibility of the proposed development; and

iv. Recommend the need for further study based on the results of the preliminary assessment.

2. Site Descriptions

2.1 General

2.1.1 The Site, generally consisting of a single-storey columbarium building structure, a two-storey management office and some minor temporary structures, is situated on a local hilltop of the southeast facing natural hillsides in Shatin, the New Territories. There are five geotechnical features namely: 7SW-B/C231, three unregistered man-made slopes, referred as Slope 1, Slope 2 and Slope 3 and an unregistered retaining wall, which are considered as potentially affecting the Site due to their proximity and they are listed hereunder. The location of these features is shown in **Figure 2**. The SIMAR plans of the registered feature 7SW-B/C231 is enclosed in **Appendix A.**

2.1.2 According to Tables 5.1 - 5.4 of Geotechnical Manual for Slopes and Table 1 of Geotechnical Engineering Office ("GEO") Technical Guidance Note ("TGN") 15, the current facility groups at crest and toe of these features, as observed during the site reconnaissance; and the associated Consequence-to-Life ("CTL") categories are determined as summarised below.

Feature No.	Geometry	Current Facilliity Group at Crest	Current Facility Group at Toe	Current CTL	Maintenance Party
7SW-B/C231 (Sub-division 1-3)	Height: 3m Length: 150m Angle: 50°	Undeveloped Green Belt	Road with low vehicular or pedestrian traffic density	3	• DD186 Lot378RP • DD186 Lot375B • DD186 Lot375RP
Unregistered Slope 1	Height: 5m Length: 30m Angle: 45°	Occupied Building	Road with low vehicular or pedestrian traffic density	1	• DD186 Lot375A
Unregistered Slope 2	Height: 2m Length: 35m Angle: 40°	Occupied Building	Road with low vehicular or pedestrian traffic density	1	• DD186 Lot375A
Unregistered Slope 3	Height: 4m Length: 120m Angle: 30°	Occupied Building	Road with low vehicular or pedestrian traffic density	1	• DD186 Lot375A
Unregistered Retaining Wall	Height: 2m Length: 40m Angle: 90°	Road with low vehicular or pedestrian traffic density	Undeveloped Green Belt	3	• DD186 Lot375A

3. Desk Study

3.1 General

3.1.1 A review of the existing available geological and geotechnical data for the Application Site and its general vicinity has been carried out. The existing available data include the published geological data, achieved ground investigation data, Landslide Incident Record, Enhanced Natural Terrain Landslide Inventory dand the information related to the existing man-made features. A summary of the findings is presented hereunder.

3.2 Published Geology

3.2.1 According to the Hong Kong Geological Survey ("HKGS") Map Sheet 7 (scale 1:20,000) – Solid and Superficial Geology of Sha Tin (Edition II 2008), the Site is generally underlain by coarse-grained biotite granite. A northeast trending feldsparphyric granite dyke is present to the southeast of the Site. Presence of thick superficial deposits is not recorded at the study area or in its vicinity. An extract of HKGS Map Sheet 7 showing the general study area is presented in **Figure 3**.

3.3 Existing Ground Investigation (GI)

3.3.1 There is no available GI record identified within the Site area or in its immediate vicinity. The nearest available GI data is located at a plan distance of about 70-100m from the Site. They involve altogether 3 drillholes and 3 trial pits, which are summarised below:

Project	GI Contractor	Year	Relevant GI Stations
Ground Investigation Works for Slopes in Sha Tin District	Gold Ram Engineering & Development Limited	2000	• 2 Drillholes (25-DH1 & 25-DH2)
Ground Investigation Works for Feature No. 7SW-B/C211 (Portion) at No. 63 Yau Ot Tsuen, Tao Fung Shan, Sha Tin, N.T.	Times Geotechnical Engineering Limited	2003	• 1 Drillhole (BH1) • 1 Trial Pit (TP1)
Ground Investigation Works for Landslip Prevention and Mitigation Studies in 2012/2013 (Batch F)	Tysan Foundation Limited	2012	• 2 Trial Pits (TPE2 & TPE3)

3.3.2 The GI stations conducted by Gold Ram Engineering & Development Ltd. in 2000 and Times Geotechnical Engineering Limited in 2003 are situated on the downhill side at a plan distance of about 80 - 100 m, to the south of the study area. For the GI stations conducted by Tysan Foundation Limited under GEO Landslip Prevention and Mitigation ("LPM") Programme in 2012, they are located on the downhill natural terrain, at about 70 m to the east of the study area.

3.3.3 From the findings of the available GI data, the sub-surface profiles generally consisted of a layer of fill, varying from 0.2 m to 1.5 m thick, overlying colluvium or residual soil, ranging from 0.6 m to 3 m thick for colluvium and 0.3 m to 2.2 m thick for residual soil, which was in turn underlain by completely and highly decomposed granite; the rockhead was encountered at 9 m to 19 m below ground. The typical descriptions of the different materials are summarised as follows:

- Fill – Very soft, firm, slightly sandy clay with occasional fine angular gravel of quartz and occasional rootlets or clayey silty sand with some gravel

- Colluvium – Soft, slightly sandy silt/clay
- Residual Soil – Slightly find to coarse sand
- Saprolite – Extremely weak to weak, completely to highly decomposed medium to coarse grained granite with relict texture
- Rockhead – Moderately to very strong, moderately to slightly decomposed medium to coarse grained granite

3.3.4 Piezometers and standpipes were installed in the drillholes to measure the groundwater level, and the details are summarised as follows.

GI Year	GI Station	Installed Depth (m below ground)	Highest measured Groundwater Level (m below ground)
2000	25-DH1	19.5	Dry
2000	25-DH2	8.5	Dry
2003	BH1 (Lower)	18.5	Dry
2003	BH1 (Upper)	4	Dry

In general, the piezometers/standpipes were installed at depths varying from 4m to 19.5m below ground, within the strata of colluvium and completely/highly decomposed granite. Dry condition was revealed from the available monitoring records.

3.3.5 The Location of the existing GI is shown in **Figure 4**. A summary of the GI findings are enclosed in **Appendix B**. Two typical cross-sections (Section A-A and Section B-B) were generated based on the available GI information as shown in **Figure 5**-**Figure 6** to illustrate the inferred subsurface profiles encountered within the Site and adjacent features.

3.4 Past Landslide Record

3.4.1 According to the Landslide Incident Record, there is no landslide incident recorded within the Site area or at the adjacent geotechnical features. According to the Enhanced Natural Terrain Landslide Inventory ("ENTLI"), there are no recent landslides but only two relict landslides 07SWB0154E and 07SWB0155E recorded on the downhill natural terrain, to the east of the Site. The location of the recorded landslides is shown in **Figure 7**.

3.5 Boulder Inventory

3.5.1 From the territory wide Boulder Field Inventory, the study area is assigned as S7_726 indicating that the entire area is obscured by vegetation and hence boulders could not be identified.

3.6 Review of Aerial Photos

3.6.1 A review of the available aerial photos as extracted from Geotechnical Information Infrastructure ("GInfo") was carried out for the general study area. From the aerial photos, it is revealed that a series of field terraces, was formed prior to 1963 near the crest of a local hill. The Site, which consisted of a major columbarium structure with few minor structures, was constructed prior to 1963, on a levelled platform at the hilltop above the field terraces. The local access road, which connects the Site and To Fung Shan Road further downhill, was formed prior to 1963. Cut slope, 7SW-B/C231, was also formed along the uphill side of the access road. The field terraces appeared abandoned between 1963 and 1973 with the area covered with dense vegetation.

3.6.2 Modification was evident at the Site between 2004 and 2005. Some previous minor structures were demolished, and a staircase was constructed together with a non-registered fill slope at its flanks. The staircase connects the lower platform of the Site with the upper platform, where the major

columbarium building of the Application Site is located. It appears that a retaining wall was also constructed along the downhill side of the driveway. An office building was evident to the northwest of the columbarium building. A small planter wall with a minor fill slope was constructed to the west of the columbarium building, and a Landscape with water feature at the rear of the Application Site.

3.6.3 Subsequent to the modification between 2004 and 2007, the general Site area has remained the same over the years without any significant changes. The adjacent area is overgrown with dense vegetation without significant signs of distress or instability. The extracted relevant aerial photos are enclosed in **Appendix C**.

3.7 Previous Assessment Studies

3.7.1 There is no available record of any previous stability assessment/upgrading works on the existing geotechnical features, which are located within or in the vicinity of the Site.

3.7.2 GEO LPM Stage 2(H) Study (S2(H) R015/2013) and Stage 3(H) Study (S3(H) R004/2014) were carried out by AECOM Asia Co. Ltd. in 2011 and 2014 respectively under LPMit Agreement No. CE201/2011 (GE) for the adjacent natural terrain catchment 7SW-B/SA2, which is situated on the downhill side to the northeast of the Site. Under the Study, ground investigation was carried out and hazard models were established for assessing potential Open Hillslope Failure, Topographical Depression Failure, Channelised Debris Flow, Debris Flow, and Rock/ Boulder Fall.

3.7.3 The results of the analyses revealed potential natural terrain hazards, which might affect the downslope facilities. Detailed designs of the proposed mitigation work including soil nails, in-situ boulder stabilization and check dams were carried out under the Stage 3(H) Study. The construction of mitigation works was subsequently completed under the LPM Programme in 2017 to enhance the stability of the southern portion of the natural terrain catchment 7SW-B/SA2. The relevant information is extracted in **Appendix D**.

4. Site Reconnaissance

4.1 Field Work

4.1.1 Site reconnaissance was carried out on 15 September 2025 to inspect the general conditions of the Site as well as the adjacent geotechnical features and natural hillsides.

4.2 Application Site

4.2.1 The Application Site is located at D.D. 186 in To Fung Shan, Sha Tin, the New Territories. It is generally accessed via To Fung Shan Road from the south, which is connected to a local access road that leads directly to the Site. The Application Site mainly comprises a low-rise columbarium hall, a two-storey management office building and few minor structures, located on the few platforms, which were constructed at the crest of the natural hillside with some man-made features within and encircling the general site area. The various platforms of the Application Site are accessed via two staircases at the north-east and north-west portions from the driveway.

4.2.2 The buildings and structures at the top platform include the columbarium hall, storage shelters, a Landscape with water feature and sculptures at the front and back of the columbarium hall. There is a small planter wall feature with a minor fill slope located at mid-level platform. The existing toilets are located at the upper level of the two-storey management office building, which are accessed from the lowest platform level at the north-western portion of the Site. Several minor structures are also located within the lowest platform level, including storage rooms and a utility storeroom. The driveway level consists of the car parks, and a management office at the lower level of the abovementioned two-storey building.

4.2.3 Photos showing the general site area and the abovementioned defects are presented on **Plates 1** to **7**.

4.3 Geotechnical Features

4.3.1 In general, there are five geotechnical features including 7SW-B/C231, three unregistered man-made slopes, Slope 1, Slope 2, and Slope 3 and an unregistered retaining wall that are located within or in the proximity of the Site. General observations at these man-made slopes during the site inspection are summarised as follows. The relevant Photos of the corresponding slopes are given in **Plates 8** to **25**.

Existing Features	General Descriptions
7SW-B/C231 (Plate 8 to 9)	It is a north-west to south-west facing crescent shaped cut slope with the northern end portion located near the north-western boundary of the Site, and the remaining majority situated downhill, generally to the south-west of the Site, along the uphill side of the internal access road. The feature boundary as shown on Slope Information System (SIS), where a portion of the feature is within the site boundary, appears to be obsolete, since the management office building and driveway have been constructed along its footprint. As such the actual extent of the feature as observed during site reconnaissance is presented and referred to in the current study report. The feature is approximately 150 m long, 3 m high inclining at 50°. The slope along the access road was found to be in generally poor conditions, with slope failures, surface erosion, and locally steeply formed slopes evident. Several rock outcrops and boulders were evident along the feature, with some exhibiting significant undermining, potentially loose and hazardous. A generally south-west facing rubble retaining wall was observed adjoined at the south-west end of the office building. It was observed to be in front of the existing registered feature 7SW-B/C231 for approx. 9 m long and was measured to be 2.5 m high. Weephole probing resulted in probe depths of between 0.35 m and 0.4 m. No significant signs of distress were apparent, with only minor vegetation evident along its wall face. A rock outcrop was observed at the top of the southern wall end, and appeared to be stable.
Unregistered Slope 1 (Plate 10 to 13)	It is a north-west facing fill slope with a concrete staircase constructed across its western portion. The slope to the east of the staircase is situated immediately above the driveway at the northern portion of the Site and sits below the upper platform and the columbarium hall. The western slope portion is situated immediately above the lower platform in front of the toilets and at its crest rests the mid-level platform. The slope is approximately 5 m high, 30 m long, inclining at 25° to 45° at its eastern portion; and approximately 4 m high, 12 m long, inclining at 35° to 45° along its western section. An approx. 0.3 m thick planter wall of 1.5 m high was evident along its toe. The slope is lightly vegetated with a row of trees arranged along the lowermost areas of the eastern slope portion. A minor slope failure was evident at the toe of the eastern portion, with the scarp measuring 2.5m wide, 1 m high, and 0.3 m deep. Minor surface erosion was also evident along the lower portions of this slope.
Unregistered Slope 2 (Plate 14 to 15)	This non-registered feature is a south-west facing slope, situated between the upper and mid-level platforms. It is a fill slope approximately 2m high, 35m long, inclining at 30° to 40°. The surface is generally densely covered with vegetation in the forms of bushes and trees. An approx. 0.3m thick planter wall of 0.6m max. height was evident along its toe. No significant signs of distress or instability were evident along the slope during the site inspection, however severe cracks were observed at several locations on the planter wall along the toe.

Existing Features	General Descriptions
Unregistered Slope 3 (Plate 23 to 25)	This unregistered feature consists of some abandoned agricultural terraces, which are currently covered with dense vegetation. This man-made feature, which was probably formed prior to 1963 and abandoned in the 1970s, is approximately 120 m long and 4 m high, sloping at a gentle angle of 30°. It is situated directly downhill of the platform, encircling the Site from the southwestern to the eastern sides and it can be accessed via the platform from the crest. The general condition of the terrain was considered satisfactory without signs of distress or instability during site inspection.
Unregistered Retaining Wall (Plate 16)	It is a north facing retaining wall. The wall which is located on the downhill side of the driveway is approximately 2m high and 40m long. Since there is no adequate access to the retaining wall, the inspection was carried out at a vantage point at the crest. There is no weephole or surface channel on retaining wall. During inspection, there is no significant sign of distress or seepage evident at the wall.

4.4 Natural Terrain

4.4.1 The Site situated at the crest of a local hill with natural hillsides generally encircling the downhill of the Site. For the natural hillsides below the Site, they are overgrown with dense vegetation without proper trails; as such the hillsides could not be accessed easily for closer inspection during site reconnaissance. The general condition of the downhill natural terrain was therefore inspected from the Site at the crest, as well as alongside the access road to the west of the Site.

4.4.2 Site photos showing the natural terrain are presented on Plates 17 to 22.

5. Proposed Re-zoning Development

5.1.1 The Site is currently occupied by two buildings comprising a single-storey columbarium named Wai Tak Ancestral Hall (“慧德堂”), with 6,396 niches for storing a total 8,076 urns, located at the centre of the Site and a 2-storey management office at the north side of the Site. A temporary structure for storage use is located on the eastern side of the Site. There is also lower level ground, sculptures and landscaped area within the Site. A car parking area and shuttle bus drop off / pick up spaces are provided near the entrance.

5.1.2 Under the rezoning application, the majority of the existing columbarium structures will remain the same, except for the area adjacent to the office building, where portable toilets are proposed to replace the existing toilet. In view of the minor scale and nature of the proposed works, which will not involve any major excavation and foundation works, it is considered that the proposed works and the operation of the columbarium will not affect the adjacent geotechnical features or natural hillsides.

6. Geotechnical Review of Existing Features

6.1.1 There are altogether five geotechnical features located within or in close proximity of the Site. They include: 7SW-B/C231, three unregistered man-made slopes, Slope 1, Slope 2, Slope 3, and an unregistered concrete retaining wall. From the background information search, there is no record of any previous stability checking / upgrading works carried out on these existing features., According to the observations from the site reconnaissance, there was evidence of past instability and signs of erosion on the slope features. Since these features may potentially affect the proposed development due to their proximity, they should be further studied during the future stage. In order to develop a proper design ground model, it is recommended that a site-specific ground investigation (GI) should be carried out to provide sufficient geotechnical data for the stability checking of the features as well as the subsequent detailed design of mitigation / upgrading works, where deemed necessary.

6.1.2 Reference is made to Geotechnical Manual for Slopes, GEO Technical Guidance Note No. 15 ("TGN 15"), and Works Bureau Technical Circular No. 13/99 to determine, the Consequence-to-Life ("CTL") and Economic Consequence ("EC") categories of these features subsequent to the future development and the associated minimum FOS requirements are also derived, as summarised in the table below.

Feature No.	Current Facilliity Group at Crest	Current Facility Group at Toe	CTL Category	EC Category	Required FOS
7SW-B/C231 (Sub-division 1-3)	Undeveloped Green Belt	Road with low vehicular or pedestrian traffic density	3	A	1.4
Unregistered Slope 1	Occupied Building	Road with low vehicular or pedestrian traffic density	1	A	1.4
Unregistered Slope 2	Occupied Building	Road with low vehicular or pedestrian traffic density	1	A	1.4
Unregistered Slope 3	Occupied Building	Road with low vehicular or pedestrian traffic density	1	A	1.4
Unregistered Retaining Wall	Road with low vehicular or pedestrian traffic density	Undeveloped Green Belt	3	A	1.4

7. Natural Terrain Hazard Review

7.1.1 The Site is located at the crest of the natural hillsides. From the topographical setting of the general area, there is a narrow strip of natural terrain (about 30 m wide), which is located on the upslope, but much further north of the Site, separated by a relatively flat terrain of more than 50 m (Figure 8). Therefore, it does not satisfy the Alert Criteria for natural terrain hazard study under the guidelines of GEO Report No. 138. Any potential natural terrain hazard, which may emanate from this upslope terrain and affect the Site, is considered to be very low and insignificant.

7.1.2 On the downhill side, the Site is encircled by natural terrain, and as aforementioned, a large extent of the natural terrain to the northeast and east was already studied / assessed under previous LPMit Agreement No. CE20/2011 (GE) between 2011 and 2014, where natural terrain mitigation measures including soil nails, in-situ boulder stabilization and construction of check dams were carried out to stabilize the southern portion of the hillside catchment in 2017 (Figure 8). As such the potential for the occurrence of any major natural terrain hazards in this mitigated hillside catchment that would affect the Site on the upslope is considered relatively low.

8. Conclusions and Recommendations

8.1 Application Site

8.1.1 From the above preliminary geotechnical assessment, it is considered that the continued operation of the Application Site is geotechnically feasible. Significant geotechnical constraint that may adversely affect the Application Site is not evident from the available geotechnical data. The major concern is the presence of the geotechnical features in the vicinity, which may potentially affect the Site.

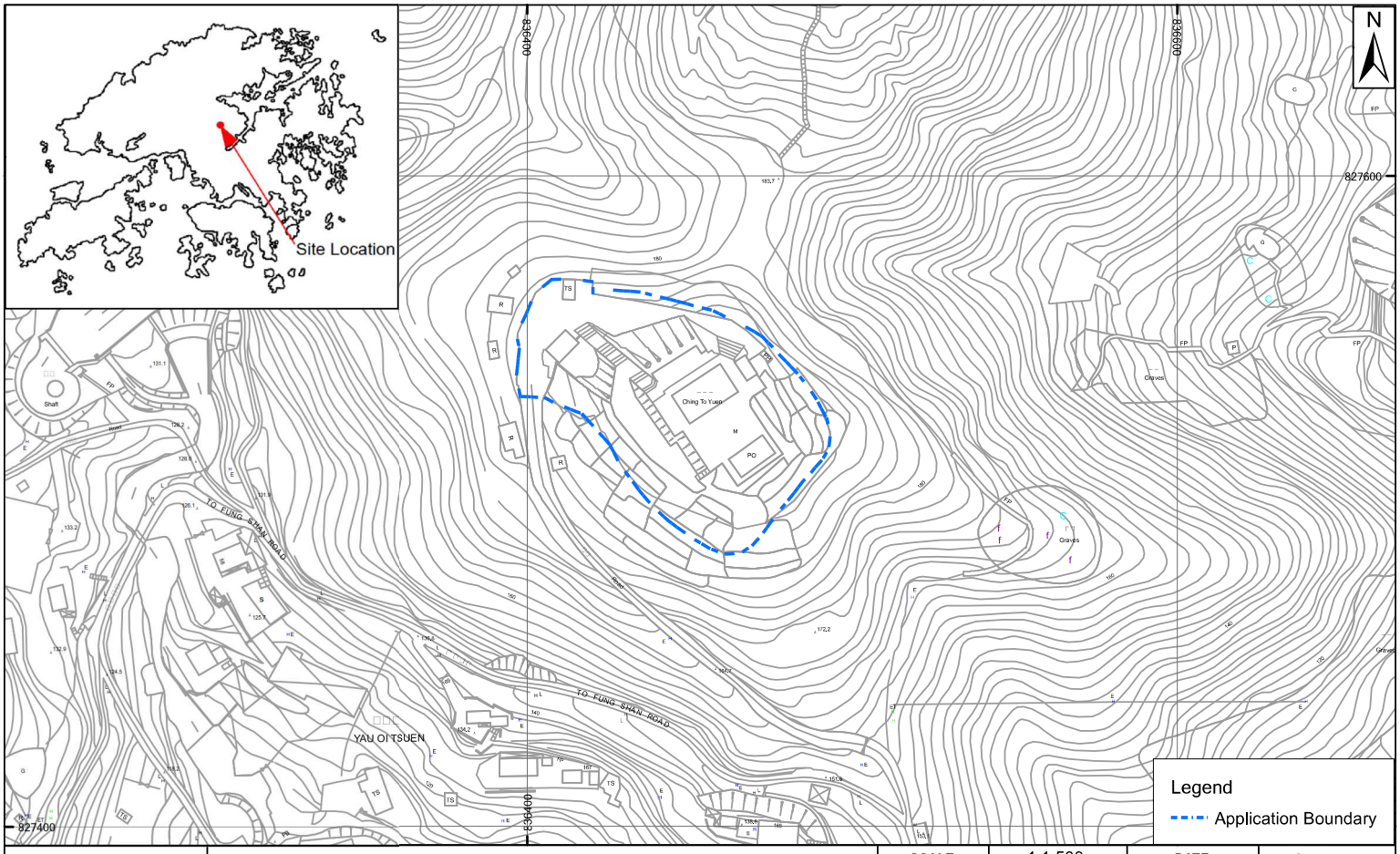
8.2 Geotechnical Features

8.2.1 There are five existing geotechnical features located within or in the vicinity of the Application Site. It is recommended that further study should be carried out and site-specific GI should also be carried out to facilitate the development of a proper design model to check the stability conditions of these features. Mitigation/upgrading works should be carried out to upgrade theses features to achieve adequate FOS, where deemed necessary.

8.3 Natural Terrain

8.3.1 From the above preliminary natural terrain hazard review study, it is concluded that the Application Site is not significantly affected by any upslope natural hillsides.

Figures



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Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin
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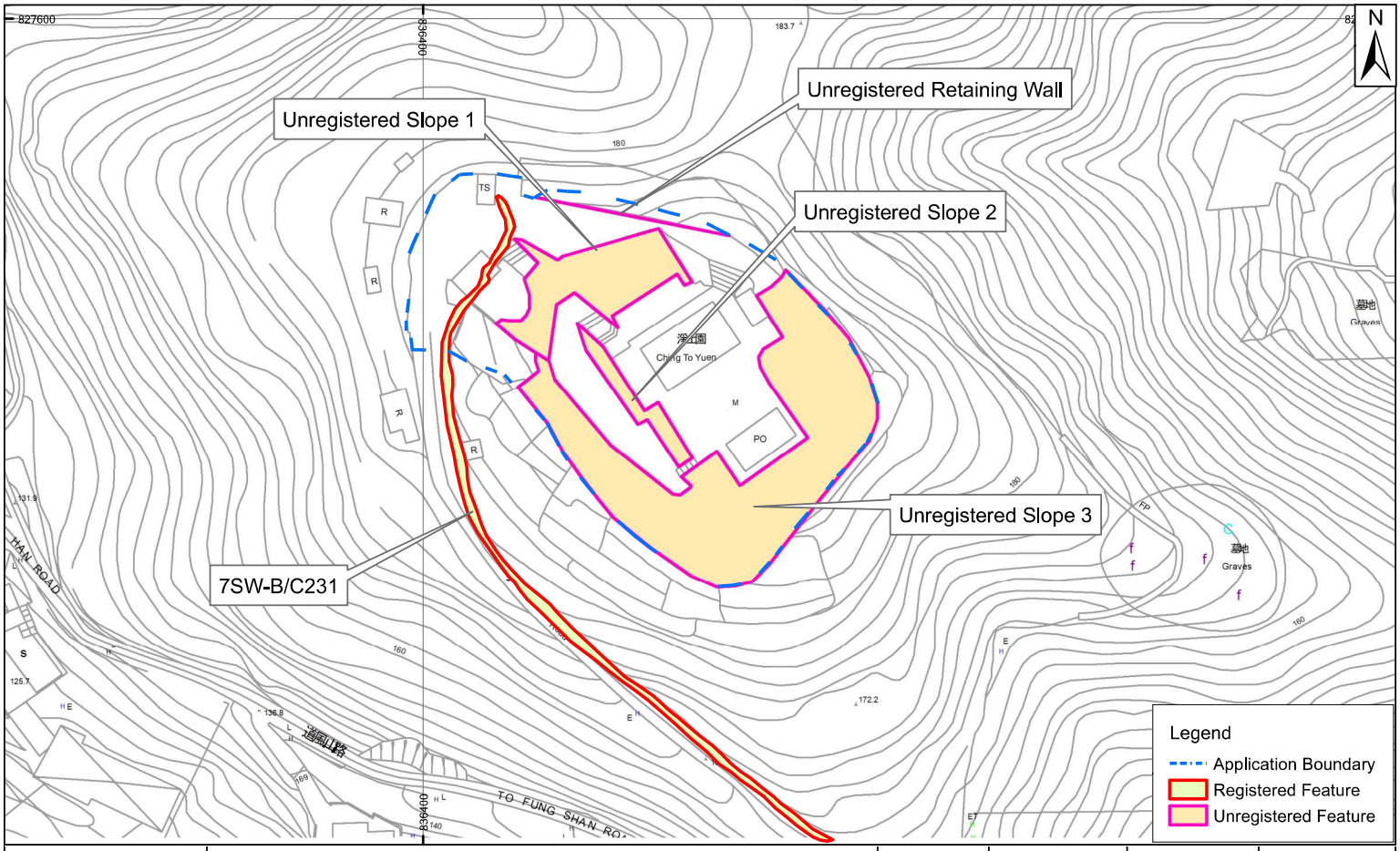
Site Location Plan

SCALE	1:1,500	DATE	Sep 2025
CHECK	PC	DRAWN	JL
JOB NO.	70761055	Figure 1	REV. B



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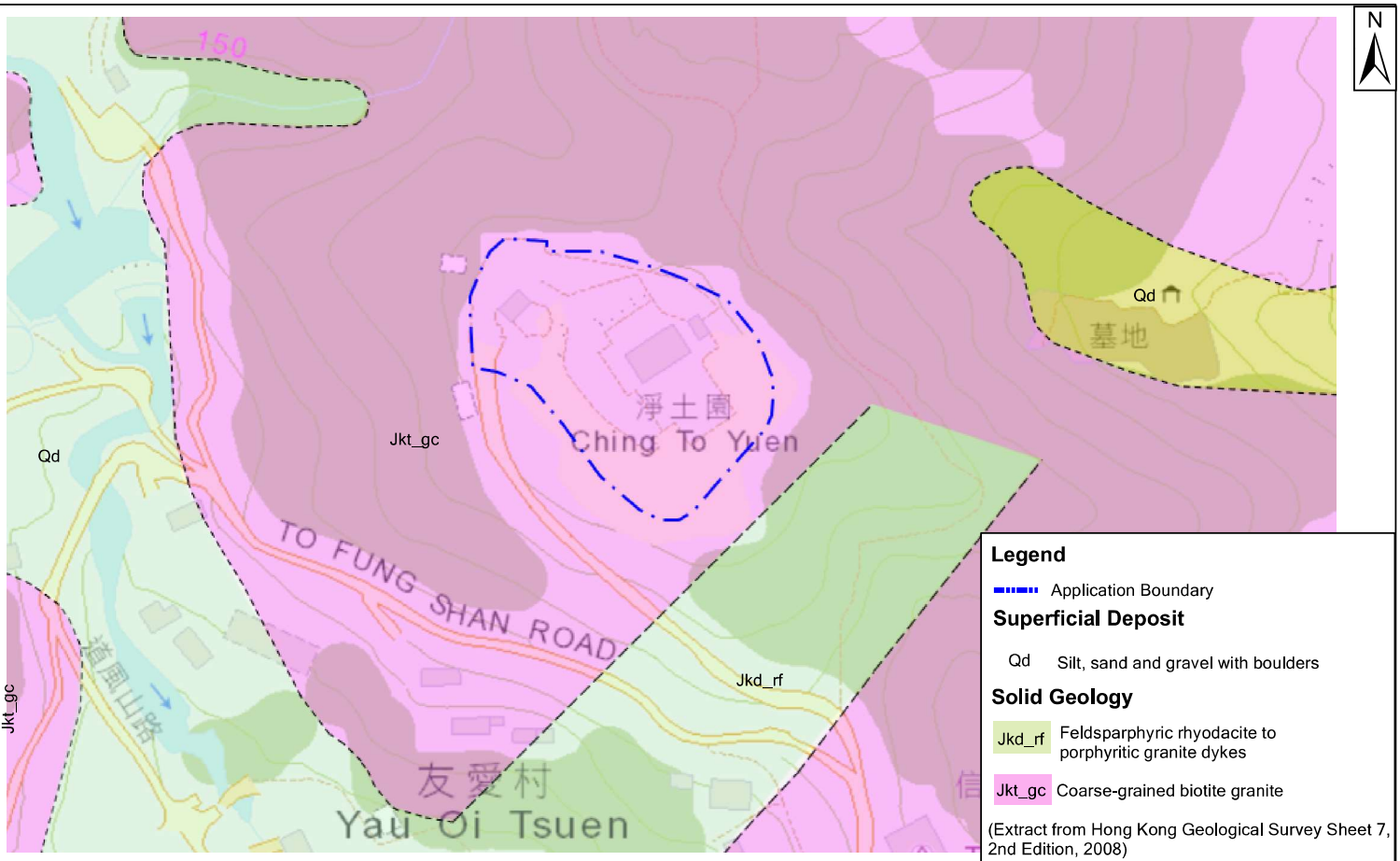
	Adjacent Feature Location Plan	CHECK: PC	DRAWN: JL
		JOB NO.: 70761055	Figure 2
			REV.: C



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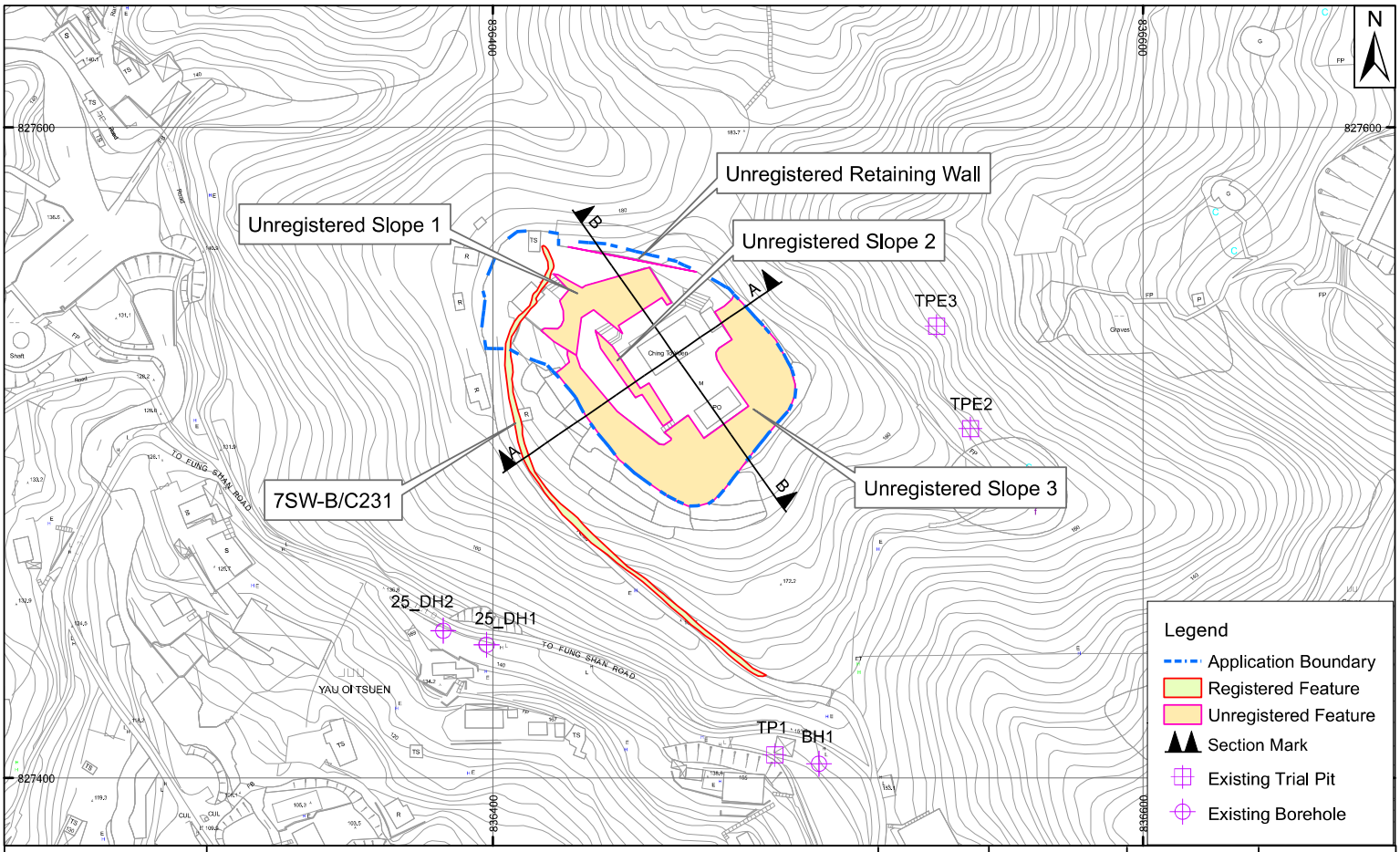
Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin
Geotechnical Planning Review Report

Extract of Published Geology Map

SCALE	N.T.S.	DATE	Sep 2025
CHECK	PC	DRAWN	JL
JOB NO.	70761055	Figure 3	REV. B



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Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin
Geotechnical Planning Review Report

Existing GI Location Plan

SCALE	1:1,500	DATE	Sep 2025
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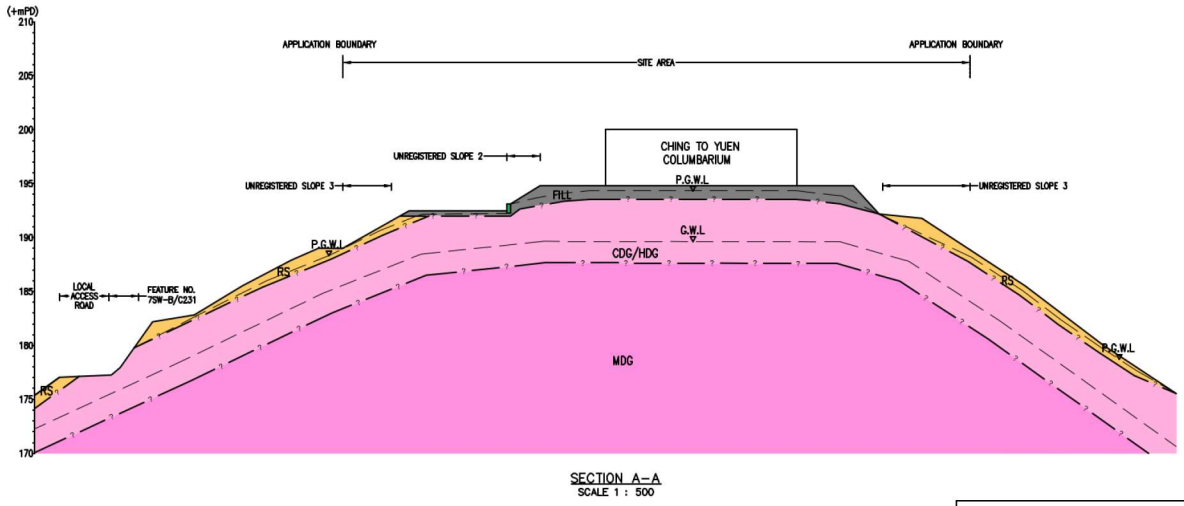
JOB NO.	70761055	Figure 4	REV. C



SECTION A–A
SCALE 1 : 500

Legend

G.W.L	Groundwater Level
P.G.W.L	Perched Water Level
?	Inferred Geological Profile
RS	Residual Soil
CDG/HDG	Completely Decomposed Granite/ Highly Decomposed Granite
MDG	Moderately Decomposed Granite

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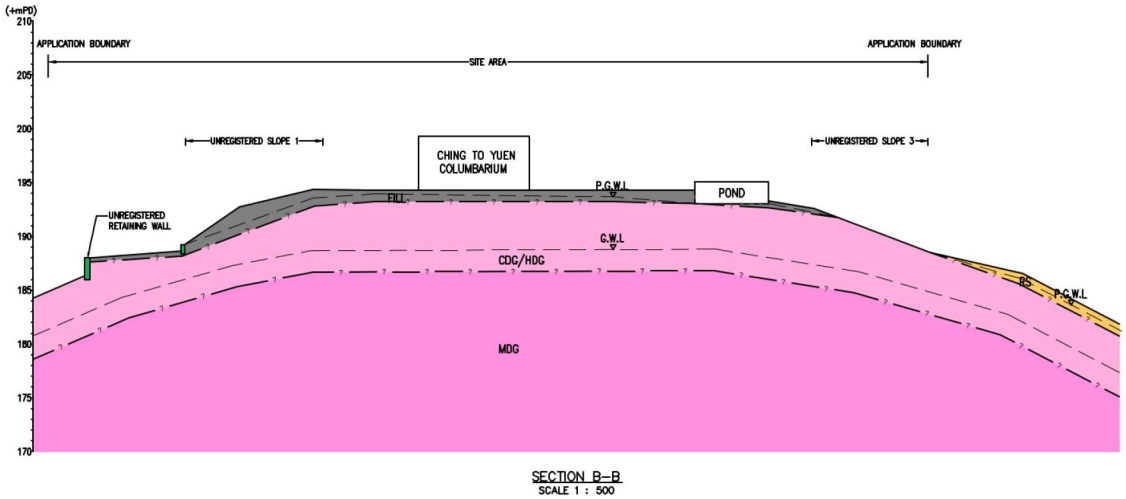
S12A Rezoning Application for Ching To Yuen, at
Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin
Geotechnical Planning Review Report
Geological Section A-A

SCALE	AS SHOWN@A4	DATE	Sep 2025
CHECK	PC	DRAWN	JL
JOB NO.	70761055	Figure 5	REV. B



SECTION B–B
SCALE 1 : 500

Legend

G.W.L	Groundwater Level
P.G.W.L	Perched Water Level
— ? —	Inferred Geological Profile
COLL	Colluvium
CDG/HDG	Completely Decomposed Granite/ Highly Decomposed Granite
MDG	Moderately Decomposed Granite

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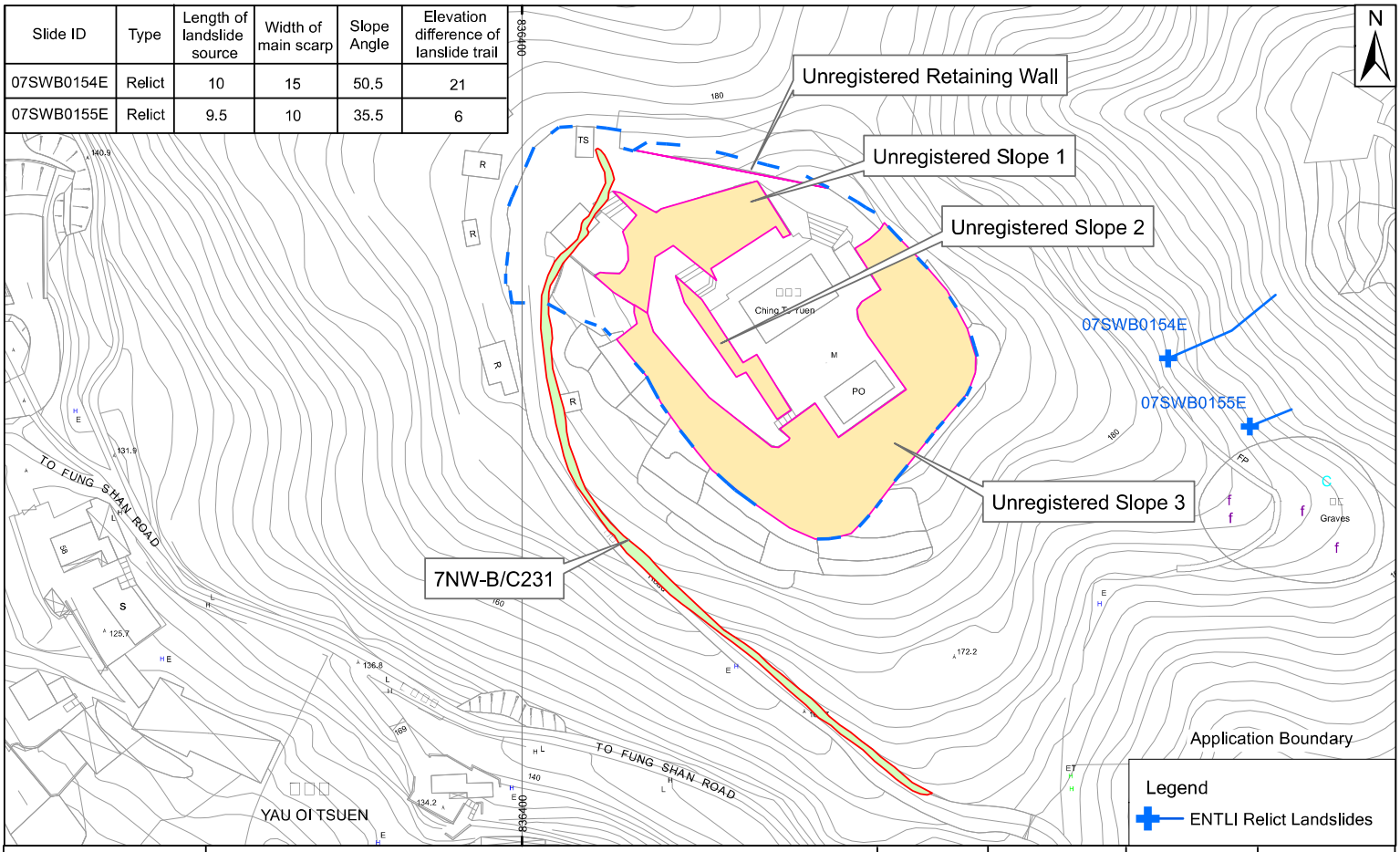
S12A Rezoning Application for Ching To Yuen, at
Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin
Geotechnical Planning Review Report
Geological Section B-B

SCALE	AS SHOWN@A4	DATE	Sep 2025
CHECK	PC	DRAWN	JL
JOB NO.	70761055	Figure 6	REV. B

Slide ID	Type	Length of landslide source	Width of main scarp	Slope Angle	Elevation difference of lanslide trail
07SWB0154E	Relict	10	15	50.5	21
07SWB0155E	Relict	9.5	10	35.5	6



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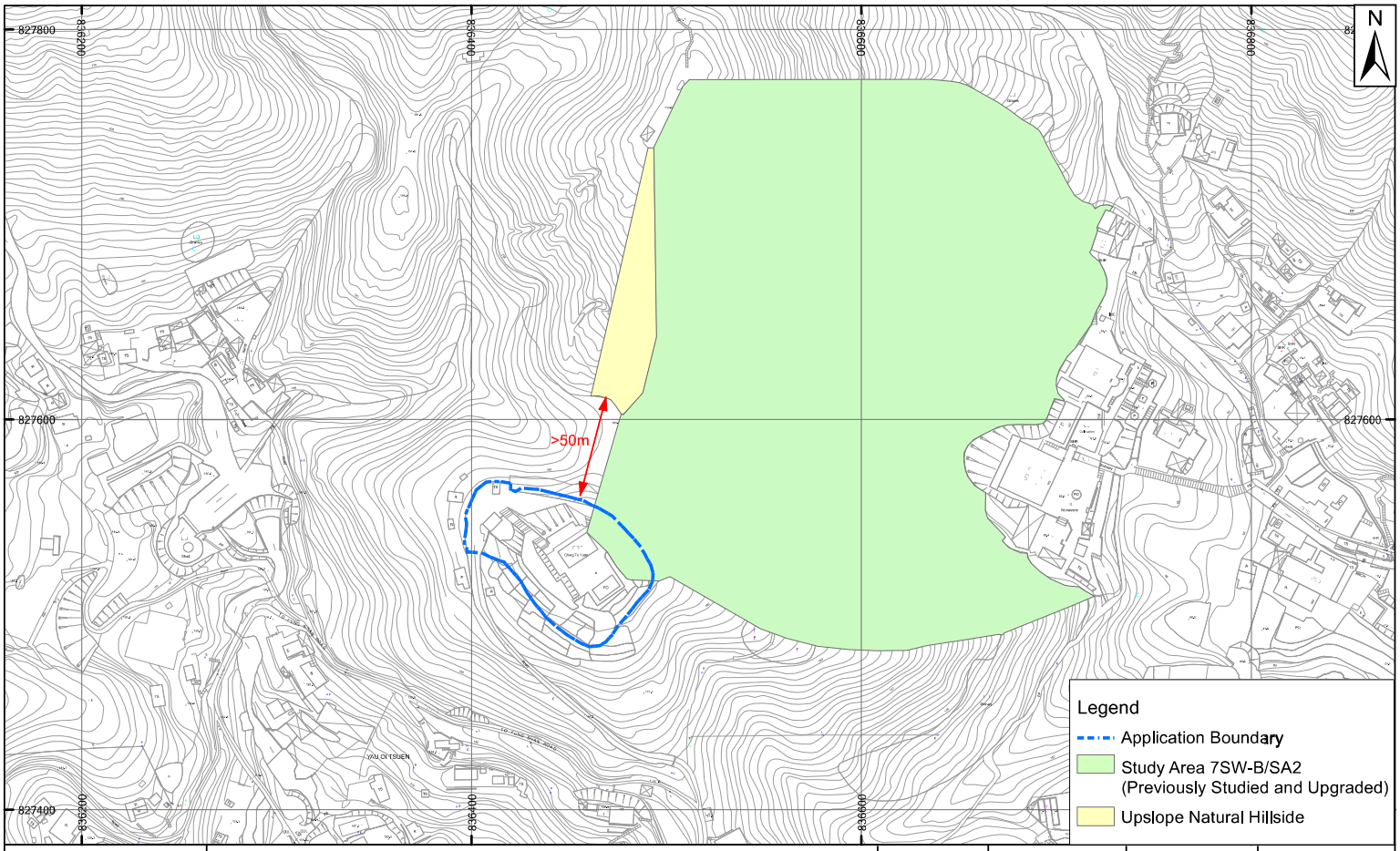
S12A Rezoning Application for Ching To Yuen, at
Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin
Geotechnical Planning Review Report

Recorded Past Landslides

SCALE	1:1,000	DATE	Sep 2025
CHECK	PC	DRAWN	JL
JOB NO.	70761055	Figure 7	REV. C



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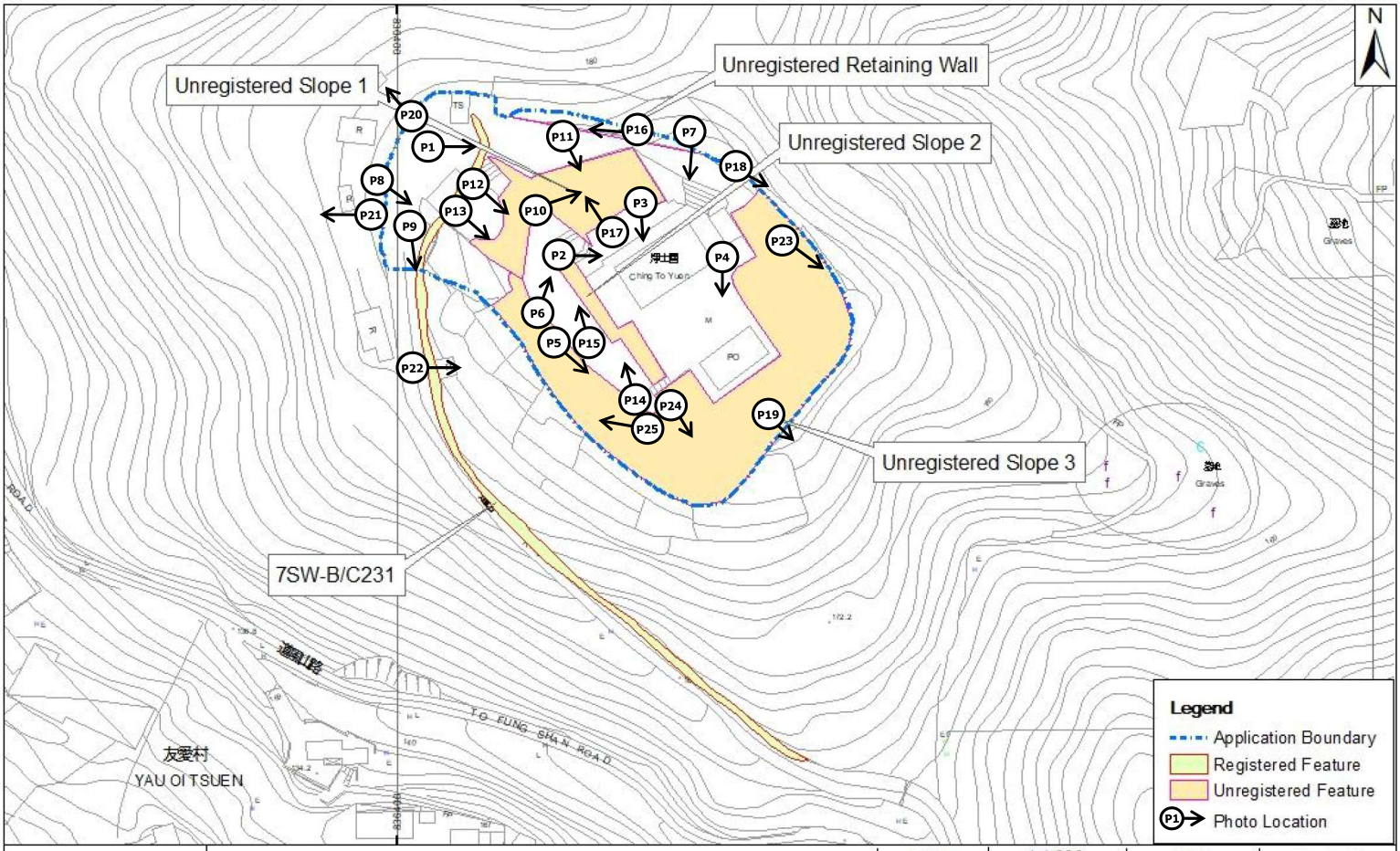
S12A Rezoning Application for Ching To Yuen, at
Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin
Geotechnical Planning Review Report

Adjacent Natural Terrain

SCALE	1:2,500	DATE	Sep 2025
CHECK	PC	DRAWN	JL
JOB NO.	70761055	Figure 8	REV. B

Plates



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S12A Rezoning Application for Ching To Yuen, at
Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin
Geotechnical Planning Review Report

Photo Location Plan

SCALE	1:1,000	DATE	Sep 2025
CHECK	PC	DRAWN	JL
JOB NO.	70761055	-	REV. C

Plate 1	General view of the office building and (facing east)

Plate 2	General view of top platform in front of the Columbarium Hall (facing east)

Plate 3	General view of the Columbarium Hall and top platform in front of Columbarium Hall (facing south)

Plate 4	General view of the top platform behind the Columbarium Hall (facing south)

Plate 5	General view of the Mid-level platform (facing south-east)

Plate 6	Evidence of ground subsidence at the mid-level platform (facing north-east)

Plate 7	General view of north-eastern staircase (facing south)

Plate 8	General view of northern portion of Feature No. 7SW-B/C231 (facing south-east)

Plate 9	General view of northern portion of Feature No. 7SW-B/C231 (facing south)

Plate 10	General view of eastern portion of Unregistered Slope 1 (facing east)

Plate 11	Minor slope failure at lower middle portion of Unregistered Slope 1 (facing south-east)

Plate 12	General view of middle portion of Unregistered Slope 1 (facing north-east)

Plate 13	General view of southern portion of Unregistered Slope 1 (facing south)

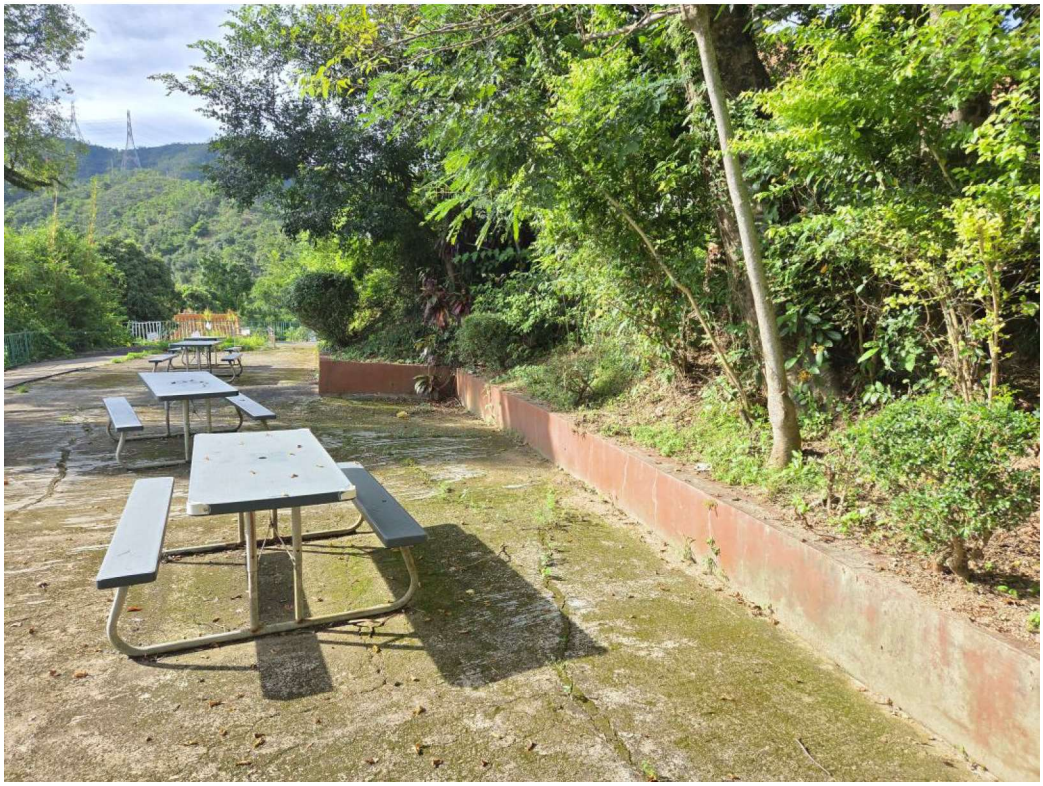


Plate 14	General view of south-eastern portion of Unregistered Slope 2

Plate 15	General view of north-western portion of Unregistered Slope 2

Plate 16	General view of Unregistered Retaining Wall

Plate 17	General view of uphill natural terrain from top platform in front of Columbarium (facing north)

Plate 18	General view of downhill natural terrain from eastern boundary of Site (facing south-east)

Plate 19	General view of downhill natural terrain from southern boundary of Site (facing south)

Plate 20	General view of downhill natural terrain from north-western boundary of Site (facing north-west)

Plate 21	General view of downhill natural terrain from western boundary of Site (facing west)

Plate 22	General view of downhill natural terrain to the south-west of the Site (facing east)

Plate 23	General view of north-eastern portion of Unregistered Slope 3 (facing south-east)

Plate 24	General view of south-eastern portion of Unregistered Slope 3 (facing south-east)

Plate 25	General view of Unregistered Slope 3 below the mid-level platform (facing north-west)

Appendix A SIMAR Plan of Registered Feature

Slope Maintenance Responsibility Report (7SW-B/C231)	ESTATE MANAGEMENT SECTION LANDS DEPARTMENT

List of Slope Maintenance Responsibility Area(s)

1	**7SW-B/C231**		**Sub-Division**	1
	Location	WITHIN DD186 LOTS375B, 375RP AND 378RP		
	Responsible Lot/Party	DD186 LOT378RP	**Maintenance Agent**	Not Applicable
	Remarks	Not Applicable		
2	**7SW-B/C231**		**Sub-Division**	2
	Location	WITHIN DD186 LOTS375B, 375RP AND 378RP		
	Responsible Lot/Party	DD186 LOT375B	**Maintenance Agent**	Not Applicable
	Remarks	Not Applicable		
3	**7SW-B/C231**		**Sub-Division**	3
	Location	WITHIN DD186 LOTS375B, 375RP AND 378RP		
	Responsible Lot/Party	DD186 LOT375RP	**Maintenance Agent**	Not Applicable
	Remarks	Not Applicable		

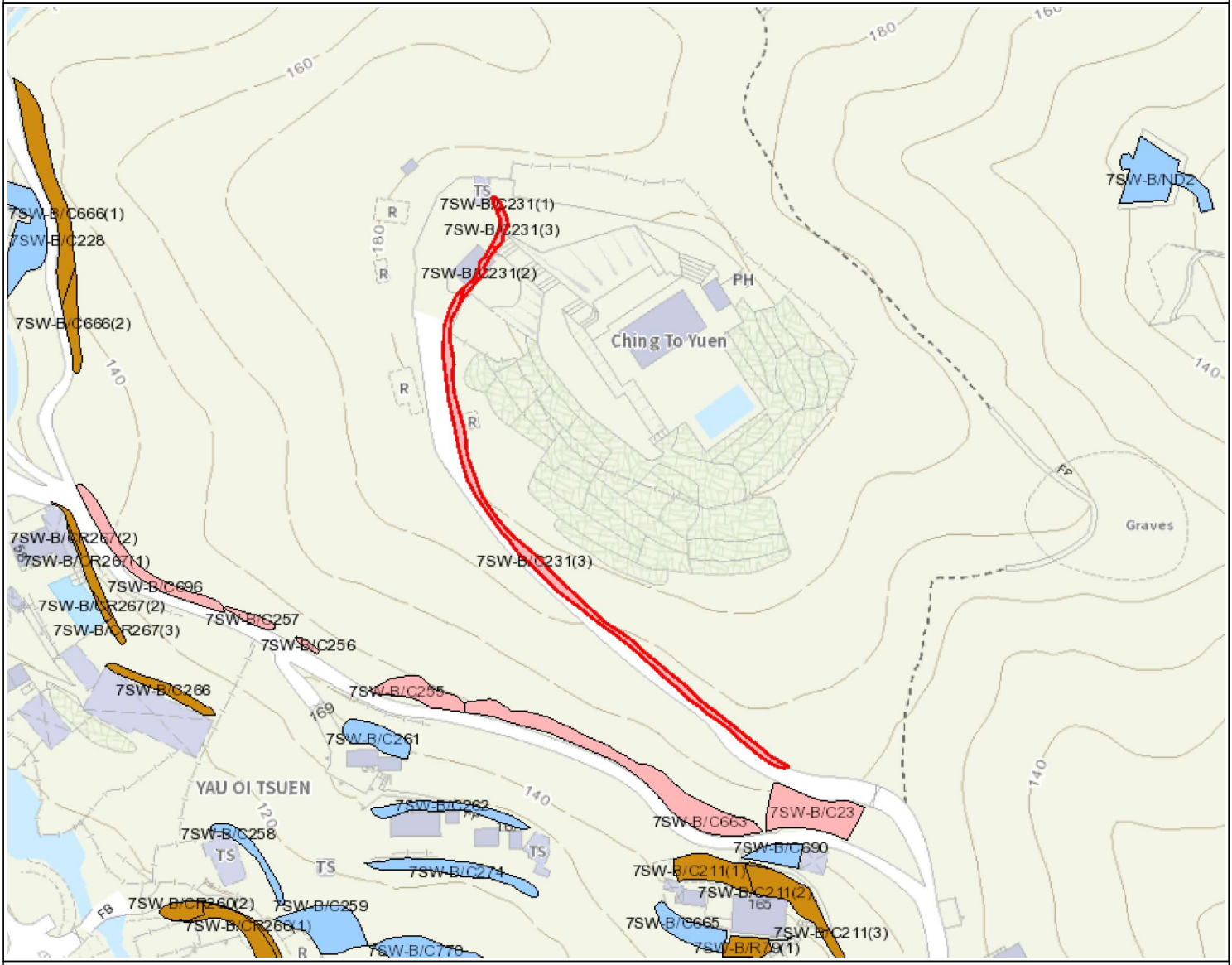
- End of Report -

Notes:

(i) The location plan in Annex is for identification purposes of slope(s) only.

(ii) The slope(s) as listed in the Slope Maintenance Responsibility Report may not be shown on the location plan in Annex.

Location Plan



Legend

- Slope Area(s)
- Search Location
- Slope(s) Maintained by Government
- Slope(s) Maintained by Private Party/Parties
- Slope(s) Maintained by Government and Private Party/Parties

ESTATE MANAGEMENT SECTION
LANDS DEPARTMENT

This Plan is **NOT TO SCALE** and intended for **IDENTIFICATION** only. All information shown on this plan **MUST** be verified by field survey.

Printed on: 17/09/2025

Appendix B Existing Ground Investigation Data

S12A Rezoning Application for Ching To Yuen, at Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin

Summary of Existing GI Data

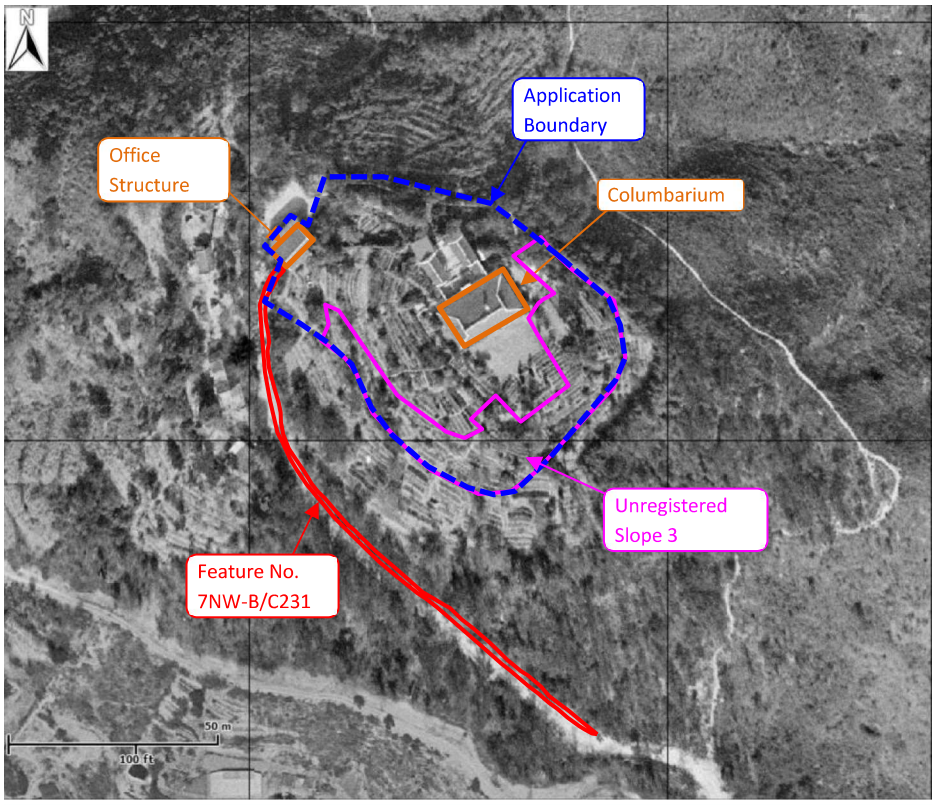
GIU	Contractor	Project Name	Year of Investigation	Investigation No.	Easting	Northing	Orientation	Ground Level (mPD)	Termination Depth (m)	Fill Thickness (m)	Colluvium Thickness (m)	Residual Soil Thickness (m)	Saprolite Thickness (m)	Rockhead Level (mPD)	Material
32598	Gold Ram Engineering & Development Ltd.	Ground Investigation Works for Slopes in Sha Tin District	2000	25-DH1	836398	827441.16	Vertical	142.16	20	1.5	-	-	18.5	-	Granite
				25-DH2	836383.15	827446.04	Vertical	139.93	14.39	1.5	-	2.2	5.4	130.83	Granite
56503	Times Geotechnical Engineering Limited	Ground Investigation Works for Feature No. 7SW-B/C211 (Portion) at No. 63 Yau Oi Tsuen, Tao Fung Shan, Shatin, N.T.	2003	BH1	836500.28	827404.43	Vertical	150.05	20	1.5	3	-	14.5	131.05	Granite
				TP1	836486.45	827406.91	Vertical	146.11	2	1.3	0.6	-	0.1	-	Granite
56812	Tysan Foundation Limited	Ground Investigation Works for Landslip Prevention and Mitigation studies in 2012/2013 (Batch F)	2013	TPE2	836547.28	827507.12	Vertical	158.17	3.8	0.2	-	1.6	2	-	Granite
				TPE3	836536.59	827538.92	Vertical	152.3	3.6	-	0.6	0.3	2.7	-	Granite

S12A Rezoning Application for Ching To Yuen, at Lot Nos. 374, 375 S.A and 375 S.B in D.D. 186, To Fung Shan, Shatin

Summary of Existing Groundwater Monitoring Records

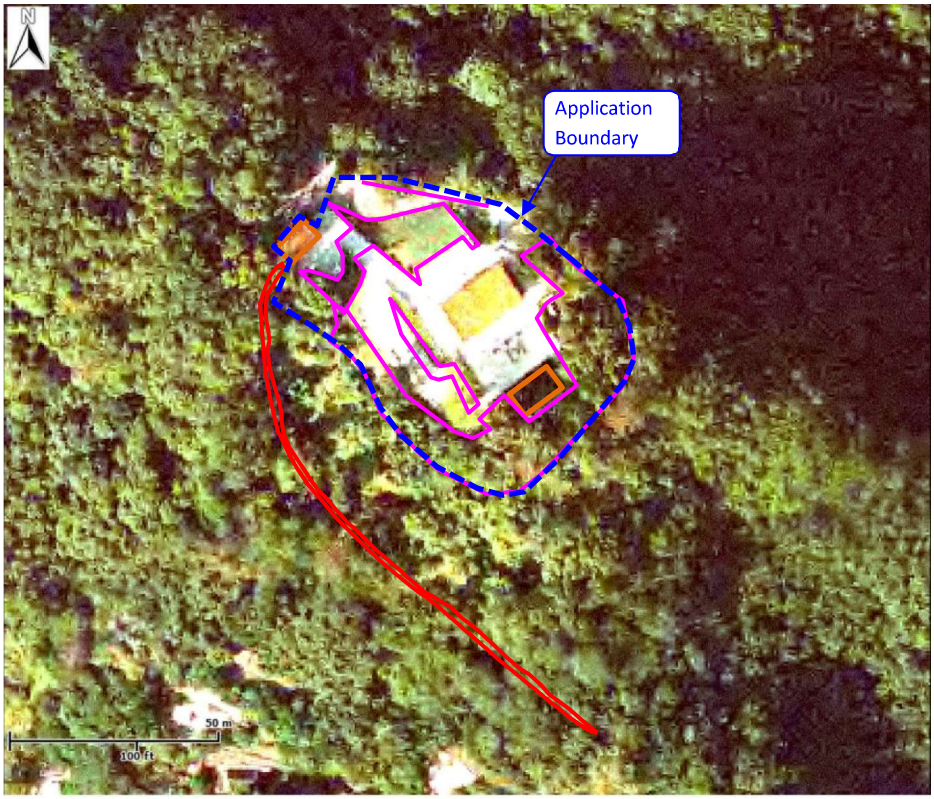
GIU Report No.	Drillhole No.	Type	Ground level (mPD)	Depth of Piezometer/ Standpipe Tip (mbgl)	Level of Piezometer/ Standpipe Tip (mPD)	Period of Monitoring		Highest Measured Groundwater Level (mbgl)	Geology of Response Zone
						From	To		
32598	25-DH1	Piezometer	142.16	19.5	122.66	05/08/2000	12/08/2000	Dry	Granite
	25-DH2	Piezometer	139.93	8.5	131.43	11/08/2000	18/08/2000	Dry	Granite
56503	BH1 (Lower)	Piezometer	150.05	18.5	131.55	24/01/2003	12/02/2003	Dry	Granite
	BH1 (Upper)	Standpipe	150.05	4	146.05	24/01/2003	12/02/2003	Dry	Colluvium

Appendix C Extracted Aerial Photos from GInfo



1963 Aerial Photograph

2005 Aerial Photograph



2007 Aerial Photograph

2014 Aerial Photograph

Appendix D

Extracts from Stage 3(H) Report on Adjacent Natural Terrain

Sparolitic soils were completely to highly decomposed coarse grained granite, and composed of dense to very dense, silty fine to coarse SAND with some subangular fine to coarse gravel sized rock fragments. Grade IV or better granite was encountered in two trial pits (Nos. C176-TP1 to C176-TP-2) and the slope surface strip and composed of weak to moderately strong and highly to moderately decomposed coarsed grained Granite.

Completely to highly decomposed granite is presented within all of the drillholes and trial pits. The saprolite was generally described as very dense, slightly silty fine to coarse sand.

The exploratory logs and a summary for the recent GI stations are presented in Appendix A and Table No. 1 respectively.

4.4 Groundwater Conditions

According to the existing ground investigation records, three standpipes were installed in boreholes which located at the lower hillslope portion of catchment E05 and recorded in the GIU Report No. 32625. For the standpipes installed at trial pits JO4-TP1 and JO4-TP5 at Catchment E03, groundwater readings were taken between 28/9/2000 and 7/10/2000 and were dry. For the standpipe no. JO4-TP7, the groundwater monitoring was carried out between 28/9/2000 and 07/10/2000 and the measured highest groundwater level was at 2.68 mbgl on 04/10/2000. The relevant groundwater monitoring records are summarized in Table 2.

According to the site specific GI record, ten piezometers and standpipes were installed at the toe of the Study Area at hillside catchments E01 to E04. The groundwater monitoring was carried out between April and October 2013. The highest measured groundwater level varies from 3m to 21m below ground level. The relevant groundwater monitoring records are summarized in Table 2.

A summary of the previous and recent highest measured main and perched groundwater levels is presented in **Appendix B**.

5. LABORATORY TESTING AND SHEAR STRENGTH PARAMETERS

5.1 Recent Laboratory Testing

Recent laboratory testing of soil samples for the Study Area was carried out by Soil & Material Engineering Co. Ltd. under Works Order No.GE201222/LT/028 of Contract No. GE/2012/22 in June 2013. The Laboratory testing consisted of moisture content, Atterberg limits and particle size distribution determinations and consolidated undrained triaxial compression tests. The results of the laboratory testing are summarized in **Table No. 3**.

5.2 Shear Strength Parameters

The p'-q plots based on the results of the recent laboratory testing results are produced to acquire the shear strength parameters for residual soil (RS), colluviums (COLL) and completely decomposed granite (CDG). The respective p'-q plots for the Study Area are presented in **Figure Nos. 5, 6** and **7** respectively. The design soil shear strength parameters adopted in the stability assessment and design of mitigation works for the Hillside Catchment are summarized as follows:-

Type of Soil/Rock	Unit Weight (γ) (kN/m^3)	Eff. Cohesion (c') (kPa)	Eff. Friction Angle (ϕ') (°)
RS	19	3	33
COLL	19	3	33
CDG	19	3	37

6 POTENTIAL NATURAL TERRAIN HAZARDS

Design event approach is adopted in accordance with the Enhanced Approach for dealing with natural terrain (TGN 36, GEO 2013). Based on the guideline, the hazard is assessed for each hillside catchment where the 'react-to-known-hazard' principle is met. Two levels of hazard mitigation are classified based on the type of potential hazard (i.e. CDF, TDF and OHF) and the facility affected. Level 1 hazard mitigation refers to primary protection based on empirical provisions, while Level 2 hazard mitigation requires enhanced measures designed by analysis.

The design requirement for each hillside catchment is assessed and the results are summarized in **Table 4b**. As mentioned in Section 7.2 of NTHS report, hillside catchments E02 (OHF), E03, E04 (OHF) and E05 do not meet the 'react-to-known hazard' principle, and hence, the assessment for design requirement is not required. Hillside catchments in E01, E02 (DF) and E04 (DF) are considered to have potential channelized debris flow and topographic depression failure hazards affecting the downslope facilities, Level 2 hazard mitigation is required for these catchments.

Hazard map extracted from the NTHS report is presented in **Figure No. 8.**

The natural terrain hazards identified within Study Area comprise predominately, channelized debris flow (CDF), topographic depression failure (TDF) and boulder fall (BF) hazards. The debris mobility assessment was estimated by using GEO-DMM ("Debris Mobility Model" Version 1.2). The assumed debris flow paths TDF1 to TDF3 and CDF4 are shown on **Figure No.9** with the output from the DMM summarized in **Table No.4** and **Table No. 4a.**

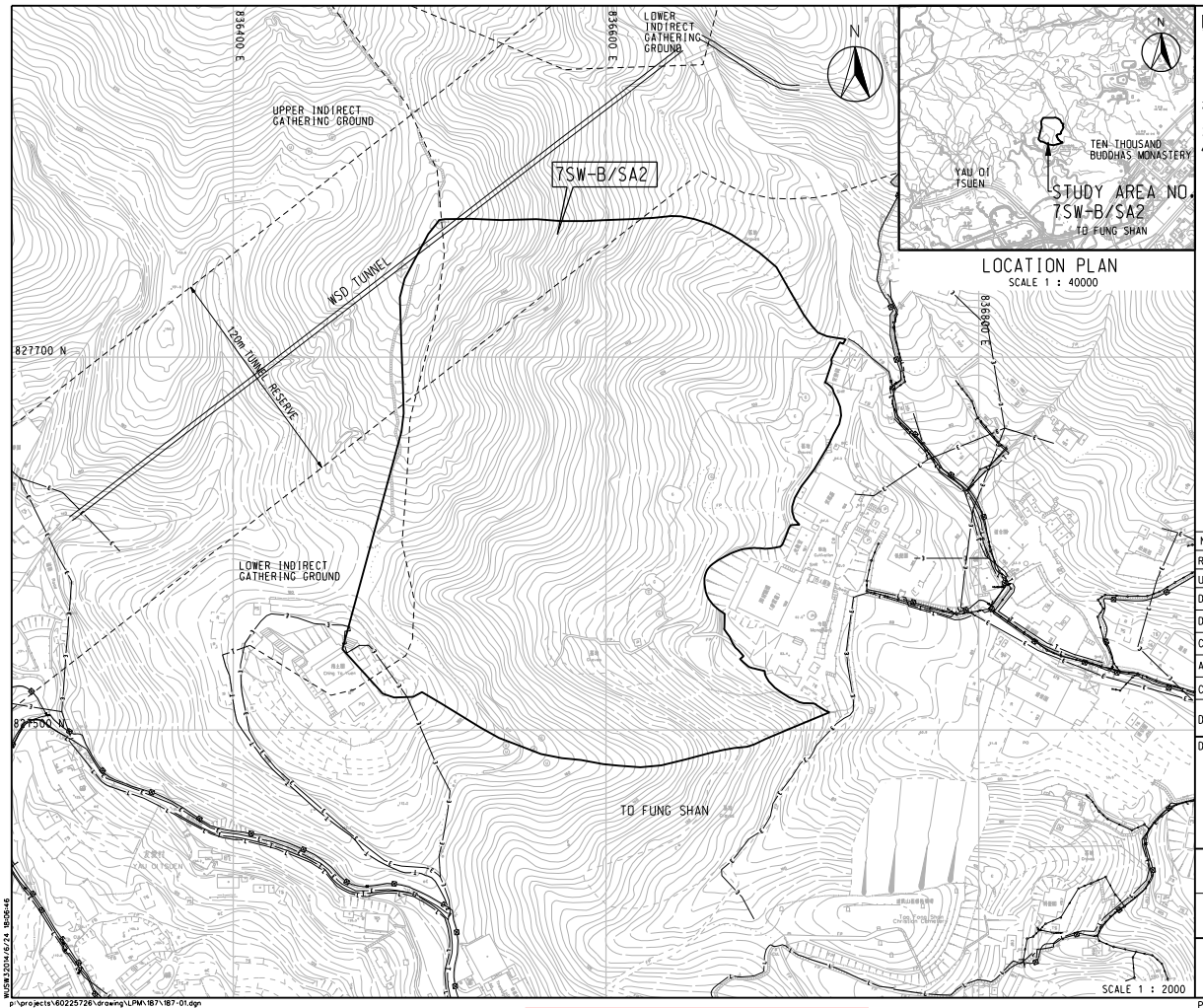
6.1 Open Hillslope Failure (OHF)

Hillside catchments E01, E02(DF) and E04(DF) are the area where there is a hazard of open hillside failures initiating and running into the distinct ephemeral drainage lines in topographic depressions as channelized debris flow or debris flow hazard. Thus the OHF is considered insignificant in these catchments.

6.2 Topographic Depression Failure (TDF)

Hillside catchments E02(DF) and E04(DF) are the two areas with topographic depressions where there is a hazard of open hillside failures initiating and running into the distinct ephemeral drainage line as debris flow hazard.

Dynamic mobility modelling using GEO's 2D-DMM (Version 1.2) has been undertaken to predict the extent of debris runout and barrier design parameters for this hazard model. The model was carried out using the Voellmy rheological model (Lo, 2000) with an



LOCATION PLAN
SCALE 1 : 40000

NOTES:

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LEGEND:

- STUDY AREA
- 82 — EXISTING CONTOUR LINE
- +82.0 EXISTING GROUND LEVEL
- EXISTING SLOPE
- EXISTING SEWER WATER DRAIN
- EXISTING FRESH WATER
- EXISTING ELECTRICITY CABLES
- EXISTING LIGHT CABLES
- EXISTING TELEPHONE CABLES

No.	Date	Description	Initial
REVISION			

Update	Name	Date
Designed	CTFT	02/14
Drawn	WZP	02/14
Checked	CWMY	02/14
Approved	PAC	02/14
Contract No.	GE/2014/04	-
Drawing No.	60225726/187-01	02/14

Drawing Title

Study Area No. 7SW-B/SA2

Pai Tau, Shatin

PLAN OF UTILITIES

GEOTECHNICAL ENGINEERING OFFICE

CEDD Civil Engineering and Development Department

AECOM

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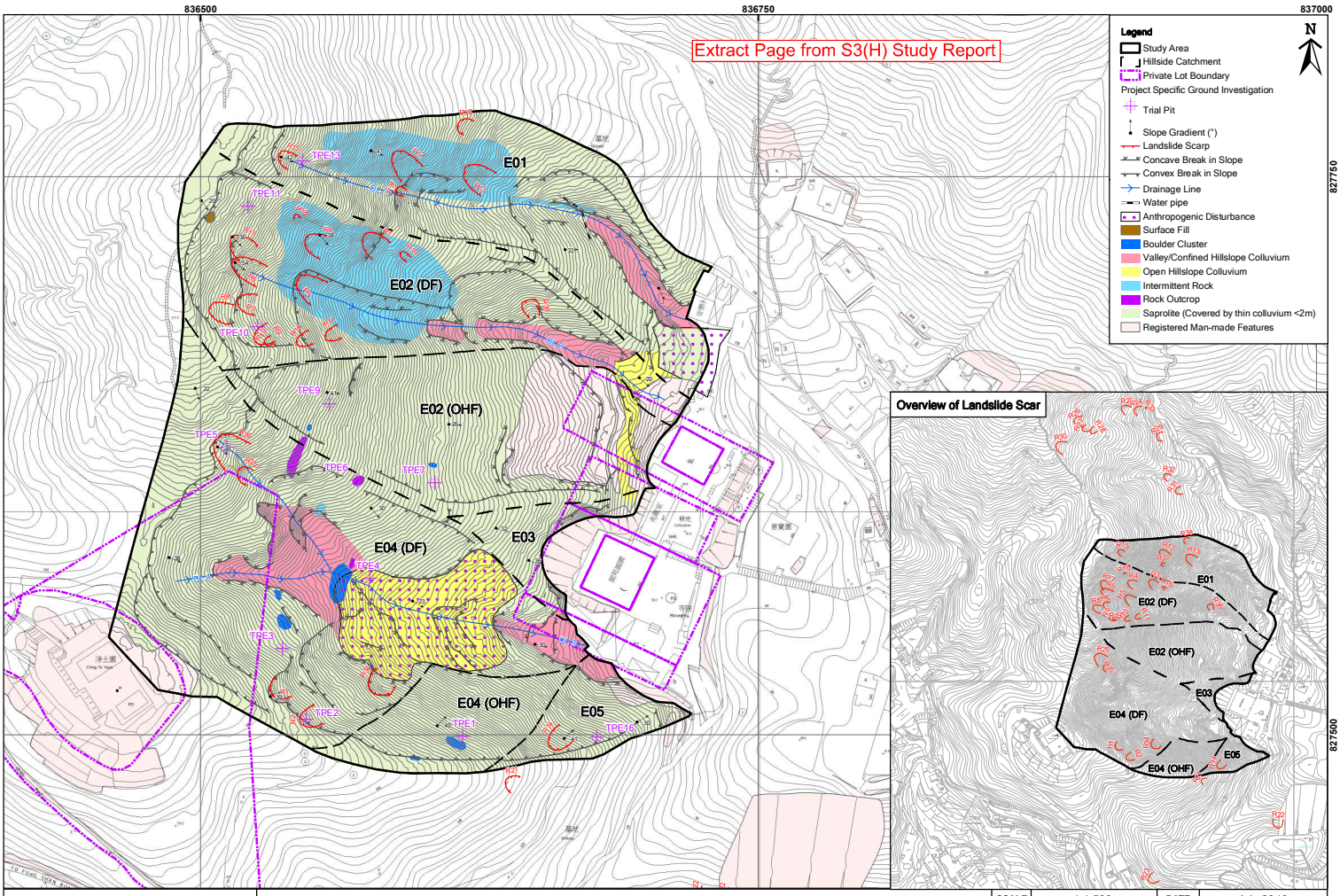
7SW15A.15B

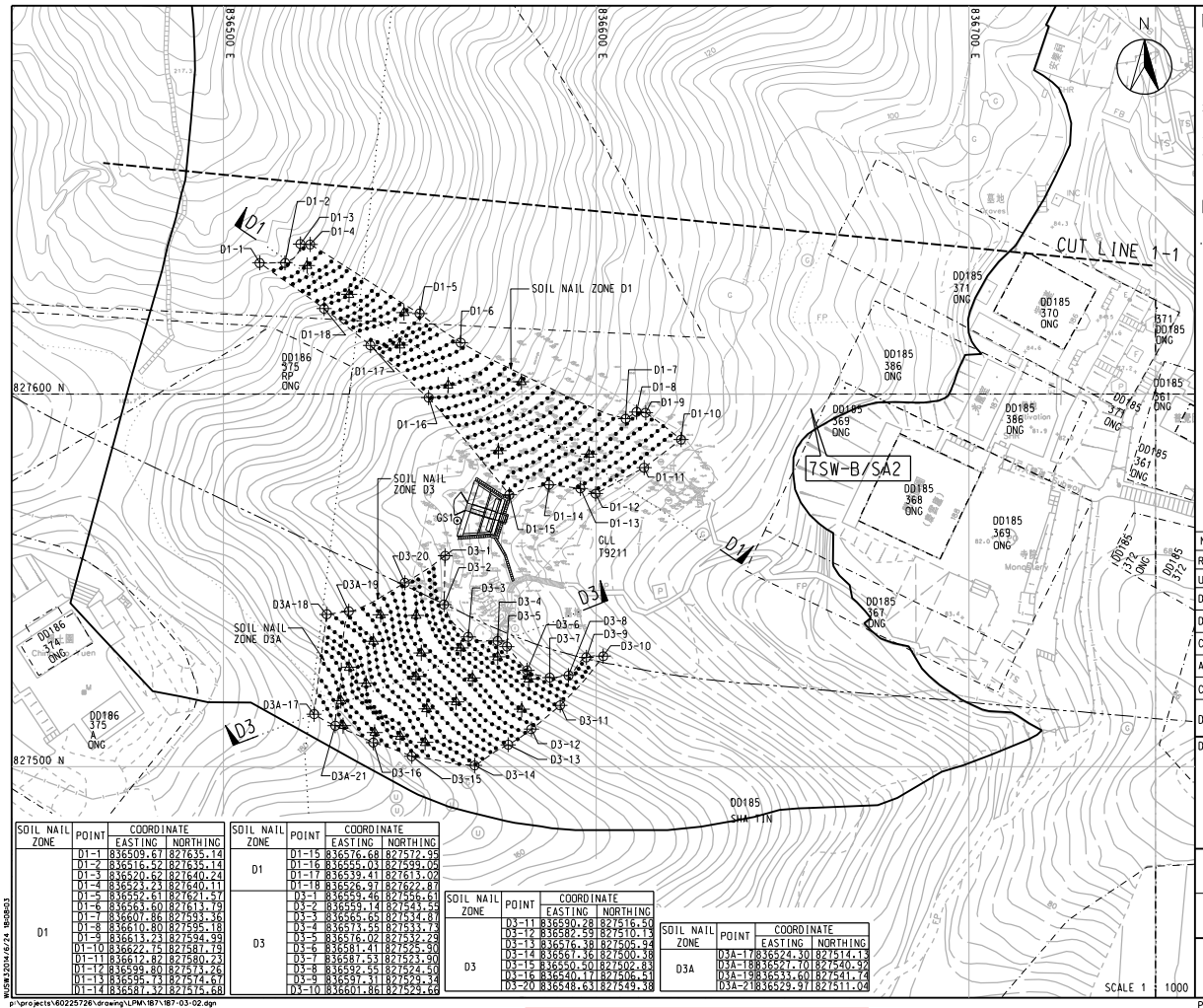


AECOM

Agreement No. CE 20/2011 (GE) Landslip Prevention and Mitigation Programme, 2011, Package F,
Landslip Prevention and Mitigation Works, Kowloon and New Territories East - Investigation, Design and Construction
Natural Terrain Hazard Study on Study Area 7SW-B/SA2 above Pai Tau, Shatin

Engineering Geological Map

SCALE	1:1,500	DATE	July 2013
CHECK	PYTL	DRAWN	JCMH
JOB NO.	60225726	FIGURE NO. 4	REV. 4



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4. DETAILED ROCK JOINT SURVEY SHOULD BE CARRIED FOR THE ROCK OUTCROP.

LEGEND:

- STUDY AREA BOUNDARY
- BOUNDARY BETWEEN DD185 AND DD186
- PAI TAU, TIN LIU, SHEUNG WO CHE & HA WO CHE BOUNDARY
- EXISTING CONTOUR LINE
- EXISTING GROUND LEVEL
- EXISTING SLOPE
- PRIVATE LOT BOUNDARY
- PROPOSED SOIL NAIL
- PROPOSED PULL-OUT TEST SOIL NAILS
- GS1 PROPOSED GROUND SETTLEMENT MARKER

No.	Date	Description	Initial
REVISION			

Update	Name	Date
Designed	CTFT	02/14
Drawn	WZP	02/14
Checked	CWMY	02/14
Approved	PAC	02/14
Contract No.	GE/2014/04	-
Drawing No.	60225726/187-03-02	02/14

Drawing Title

Study Area No. 7SW-B/SA2
Pai Tau, Shatin
PLAN OF WORKS
(SHEET 2 OF 3)

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CEDD Civil Engineering and Development Department

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SCALE 1 : 1000

SOIL NAIL ZONE	POINT	COORDINATE EASTING	COORDINATE NORTHING
D1	D1-1	836509.67	827635.14
	D1-2	836516.52	827635.14
	D1-3	836520.62	827640.24
	D1-4	836523.23	827640.11
	D1-5	836562.61	827621.57
	D1-6	836563.60	827613.79
	D1-7	836607.86	827593.36
	D1-8	836610.80	827595.18
	D1-9	836613.23	827594.99
	D1-10	836622.75	827587.79
	D1-11	836612.82	827580.23
	D1-12	836598.80	827573.26
	D1-13	836588.73	827574.67
	D1-14	836587.32	827575.68

SOIL NAIL ZONE	POINT	COORDINATE EASTING	COORDINATE NORTHING
D1	D1-15	836576.68	827572.95
	D1-16	836555.03	827599.09
	D1-17	836539.41	827613.02
	D1-18	836526.97	827622.87
D3	D3-1	836559.46	827566.61
	D3-2	836559.14	827543.55
	D3-3	836565.65	827534.87
	D3-4	836573.55	827533.79
	D3-5	836576.02	827532.29
	D3-6	836581.41	827525.90
	D3-7	836587.53	827523.90
	D3-8	836592.55	827522.53
	D3-9	836596.33	827524.33
	D3-10	836601.86	827529.66

SOIL NAIL ZONE	POINT	COORDINATE EASTING	COORDINATE NORTHING
D3	D3-11	836590.28	827516.50
	D3-12	836582.59	827510.13
	D3-13	836576.38	827505.94
	D3-14	836567.36	827500.38
	D3-15	836550.50	827502.83
	D3-16	836540.17	827506.51
	D3-20	836548.63	827549.38

SOIL NAIL ZONE	POINT	COORDINATE EASTING	COORDINATE NORTHING
D3A	D3A-17	836524.30	827514.13
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	D3A-19	836533.60	827541.74
	D3A-21	836529.97	827511.04

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Extract Page from S3(H) Study Report

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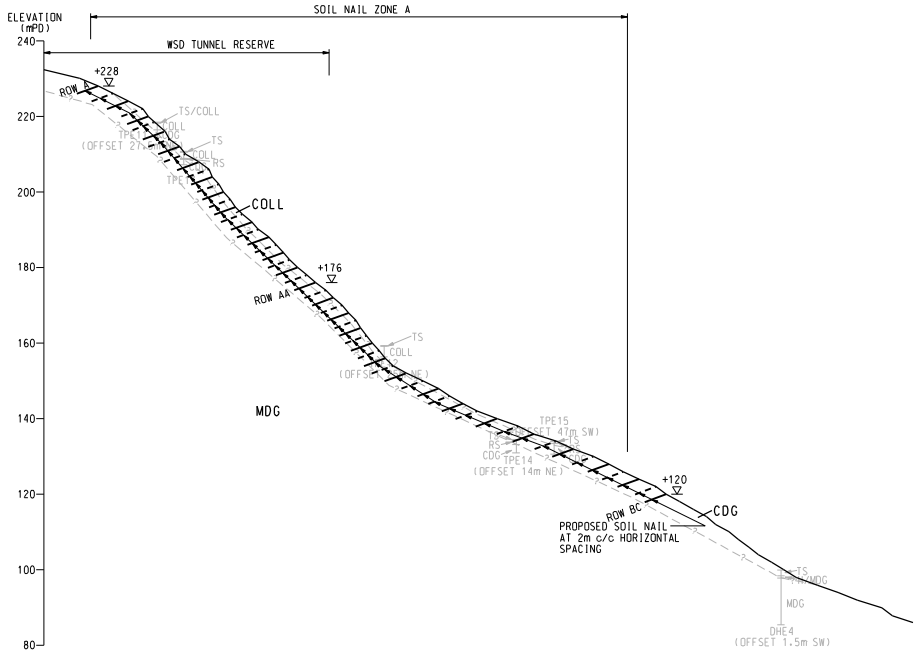

SECTION A-A

SCALE 1 : 1000

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No.	Date	Description	Initial
REVISION			

Update	Name	Date
Designed	CTFT	02/14
Drawn	WZP	02/14
Checked	CWMY	02/14
Approved	PAC	02/14
Contract No.	GE/2014/04	-
Drawing No.	60225726/187-04	02/14

Drawing Title

Study Area No. 7SW-B/SA2
Pai Tau, Shatin

SECTIONS

(SHEET 1 OF 4)

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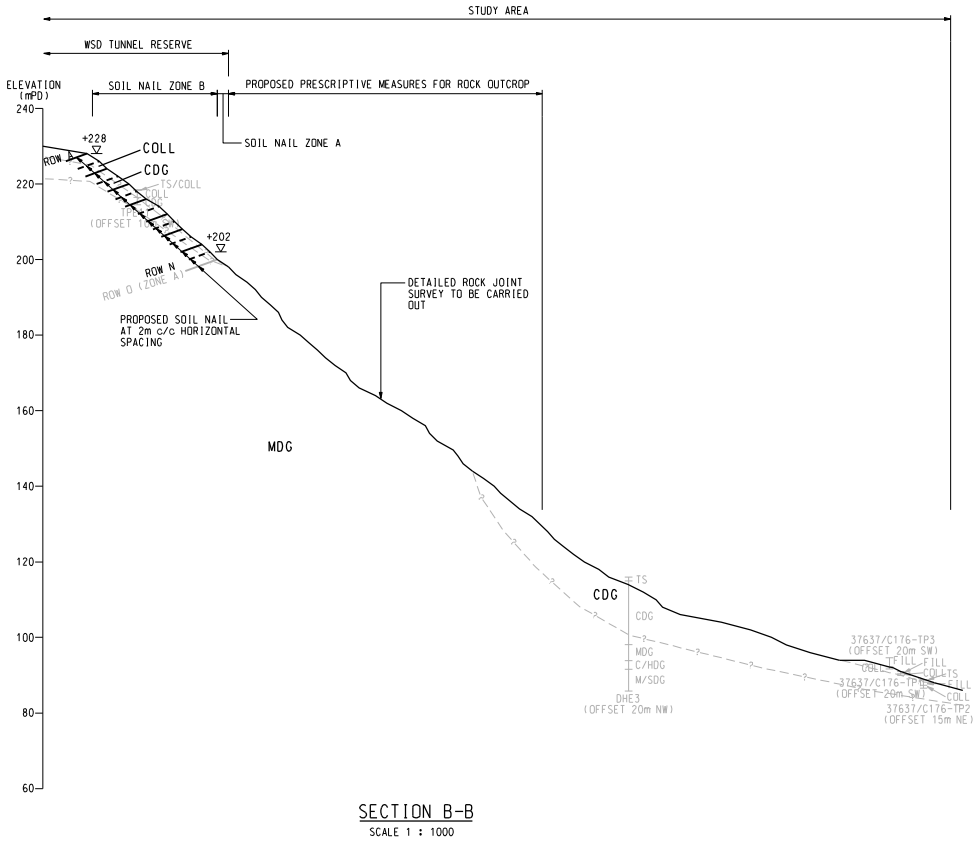

SECTION B-B

SCALE 1 : 1000

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS, STANDARD DRAWINGS, THE SPECIFICATIONS AND INSTRUCTIONS ISSUED BY THE ENGINEER.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. ALL LEVELS ARE IN METRES ABOVE P.D.

No.	Date	Description	Initial
REVISION			

Update	Name	Date
Designed	CTFT	02/14
Drawn	WZP	02/14
Checked	CWMY	02/14
Approved	PAC	02/14
Contract No.	GE/2014/04	-
Drawing No.	60225726/187-05	02/14

Drawing Title

Study Area No. 7SW-B/SA2
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SECTIONS

(SHEET 2 OF 4)

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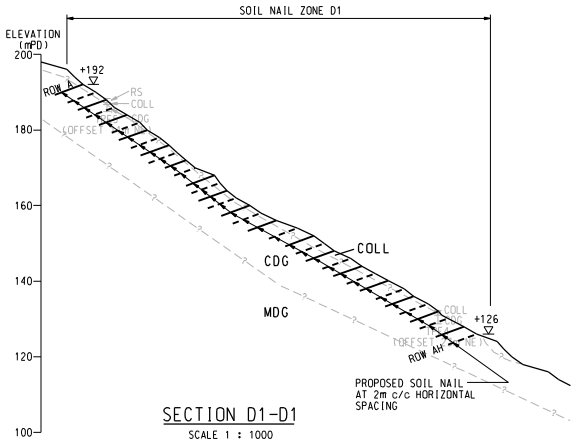

SECTION D1-D1

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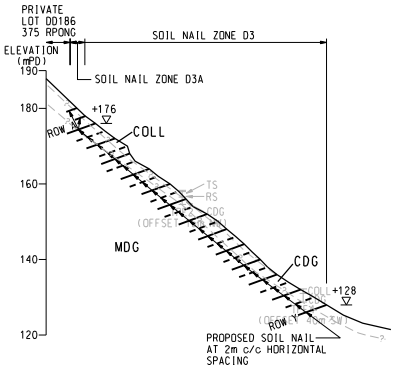

SECTION D3-D3

SCALE 1 : 1000

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1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS, STANDARD DRAWINGS, THE SPECIFICATIONS AND INSTRUCTIONS ISSUED BY THE ENGINEER.
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No.	Date	Description	Initial
REVISION			

Update	Name	Date
Designed	CTFT	02/14
Drawn	WZP	02/14
Checked	CWMY	02/14
Approved	PAC	02/14
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Drawing No.	60225726/187-06	02/14

Drawing Title

Study Area No. 7SW-B/SA2
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SECTIONS

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