

Appendix D: Revised Pages of GPRR

records were updated by the department on 10th August 2021. By the date of this GPRR submission, no unfavourable condition/records were found.

#### **4.4 Existing Registered Retaining Wall**

There is no existing registered retaining wall observed within or in the vicinity of the Site.

#### **4.5 Existing Surrounding Structures**

There are no existing surrounding structures observed in the vicinity of the Site.

#### **4.6 Surrounding Utilities**

According to the enquiry records to CLP in early 2022, five electricity poles are observed from the desk studies and marked on the drawings. Only three of them, however, can be identified on site. In the submission to CLP, four of them will be proposed to be relocated and the TX No.246602 will be kept unchanged.

The enquiry records are enclosed in Appendix D for easy reference.

## 4.7 Surrounding Natural Terrain

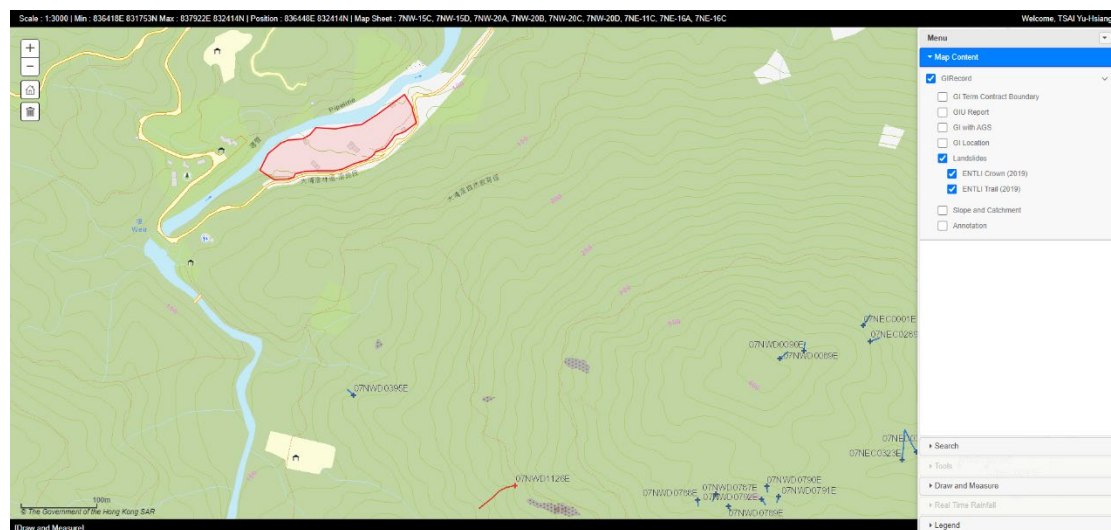
As stated in the Section 2.1, the Tai Po Kau Nature Reserve is at the south of the Site and a natural terrain is observed upsloping southward. Since the Site may be affected by the potential landslide risks, an assessment on the natural terrain was carried out in this report. Several information found at “Geotechnical Information Infrastructure” are found useful before carrying out the assessment. According to Figure 4, Two hilltops are observed at the south of the Site with the lower hilltop level at +185.3mPD while the higher one is at +407.4mPD.



*Figure 4 – Hilltops at the south*

### Enhanced Natural Terrain Landslide Inventory (ENTLI)

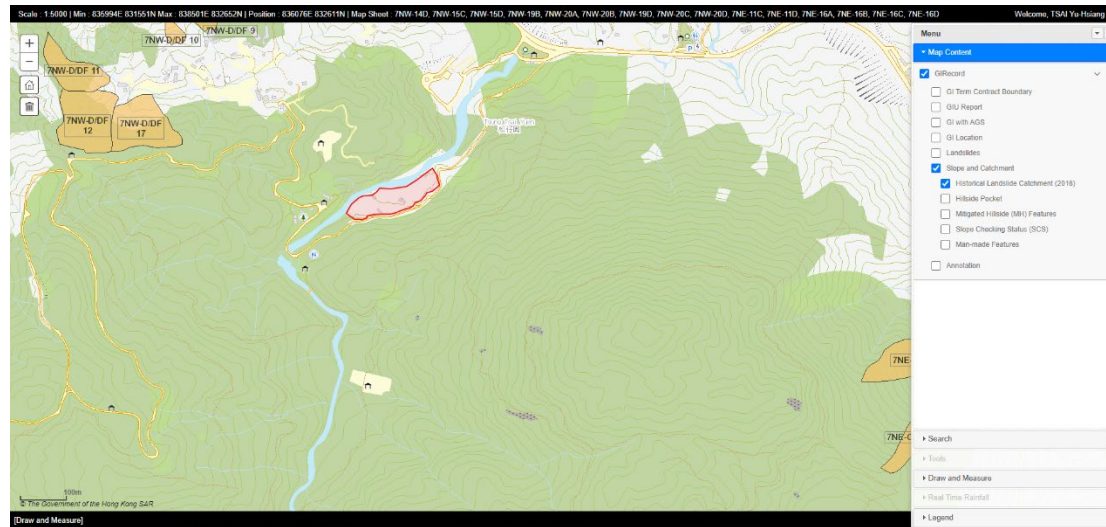
According to the ENTLI, a few landslide records was found near the +407.4mPD hilltop. The Crowns and Trails indicates that the landslides tend to go at the further southward direction.



*Figure 5 – ENTLI Crowns and Trails*

### Historical Landslide Catchment (2016, HLC)

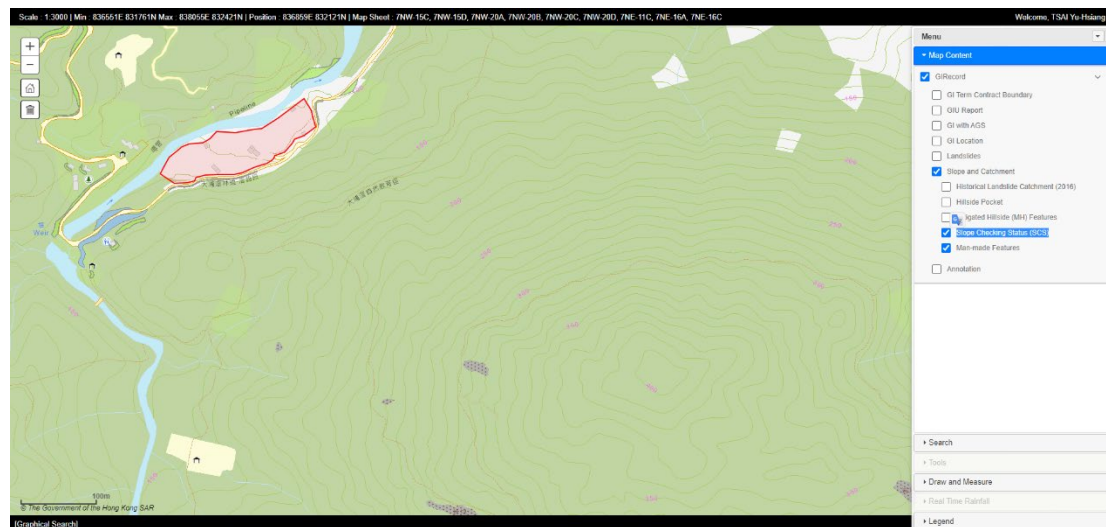
According to the HLC, No historical landslide catchment was found in the vicinity of the Site.



*Figure 6 – Historical Landslide Catchment (2016)*

### Slope Checking Status (SCS)

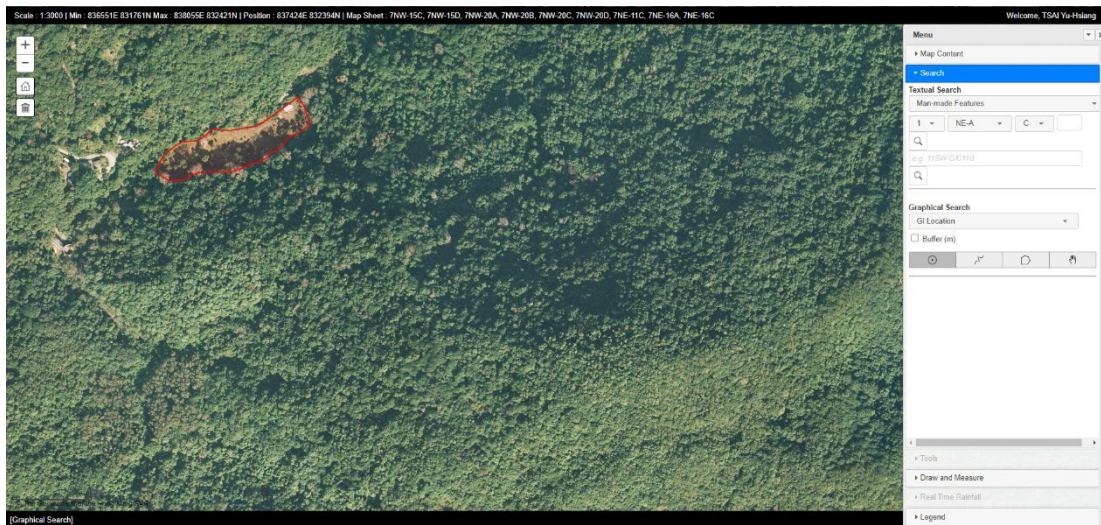
According to the SCS, No slope checking status is found in the vicinity of the Site.



*Figure 7 – Slope Checking Status*

## Ortho Photo

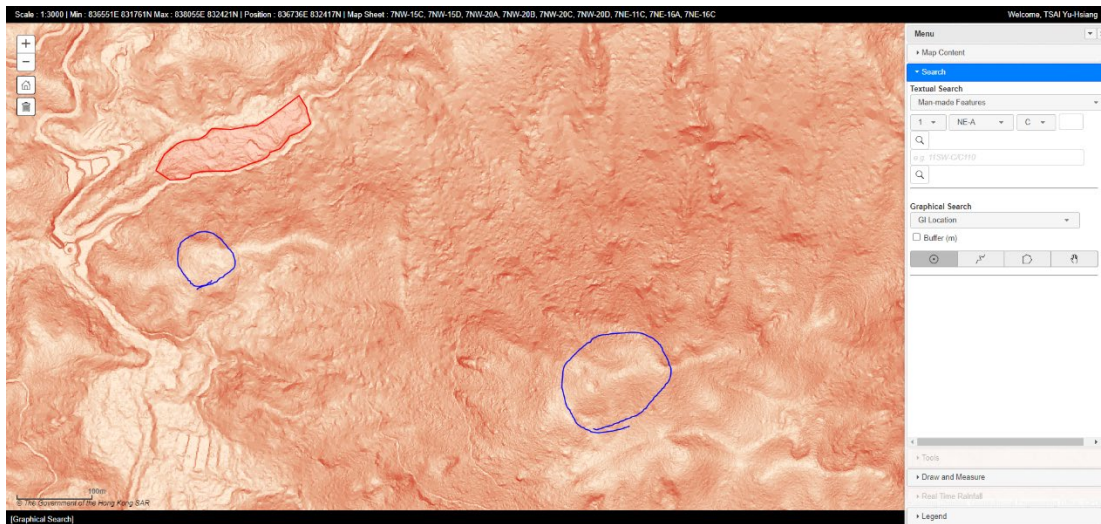
According to all Ortho Photos available on the “Geotechnical Information Infrastructure” from 1963 to 2018, No abnormal landslide signs are observed.



*Figure 8 – Year 2018 Ortho Photos*

## Slope Gradient LiDAR

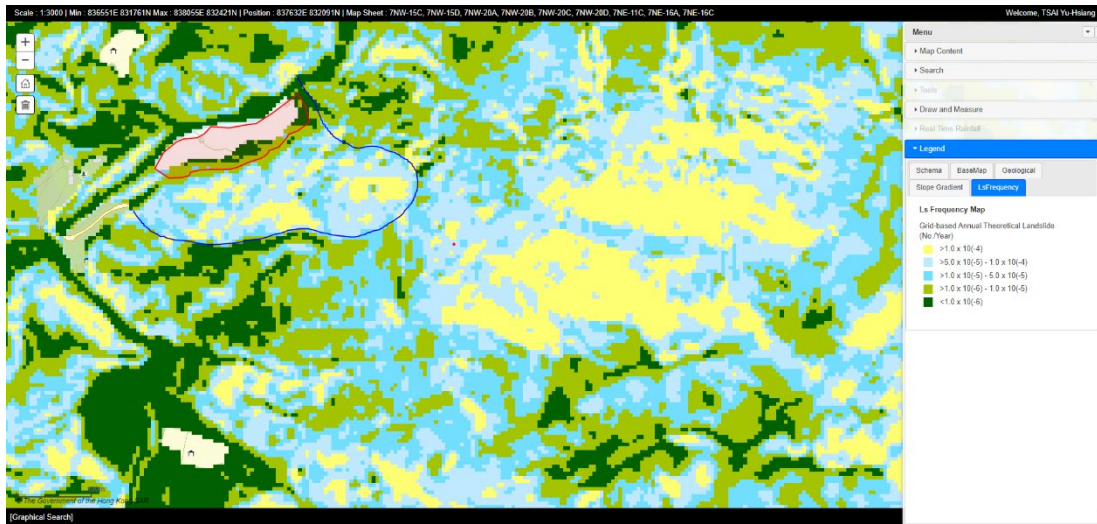
According to the available LiDAR records, those two hilltops are found in the map and no obvious landslide marks are observed.



*Figure 9 – Slope Gradient LiDAR*

### Ls Frequency Map

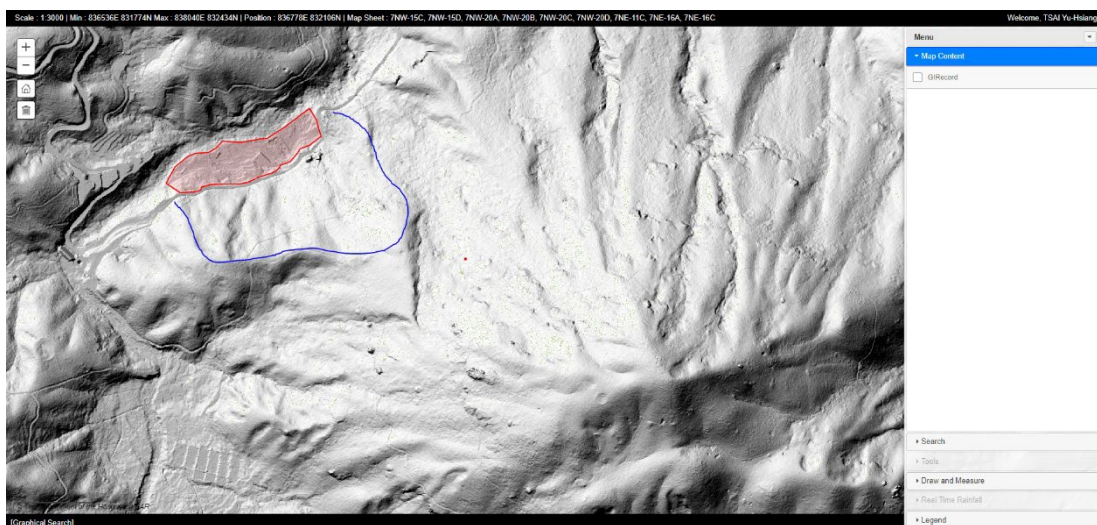
Ls Frequency Map shows the Grid-based Annual Theoretical Landslide (No./Year) in the vicinity of the Site. A bunch of frequency of  $1.0 \times 10^{-4}$  No./Year grids (in yellow) are found in the vicinity of the Site, which is obviously the potential landslide areas. The “Screening of Sites Subject to Natural Terrain Hazards” according from Section 2.3.2 to Section 2.3.4 in GEO Report No. 138 shall be performed to determine the requirement and extent of the Natural Terrain Hazard Study (NTHS).



*Figure 10 – Ls Frequency Map*

### Hillshade

Hillshade map also shows the slope of the ground surface, and it indicates the extent of NTHS similarly.



*Figure 11 – Hillshade*

### Necessity of Natural Terrain Hazard Study

Based on the extent indicated from the Ls Frequency Map and Hillshade map, three slope angles were verified as below:

Route	Length	Height	Angle ( ° )
1	102.93	68	33.45
2	94.60	62.0	33.24
3	101.69	65.3	32.71

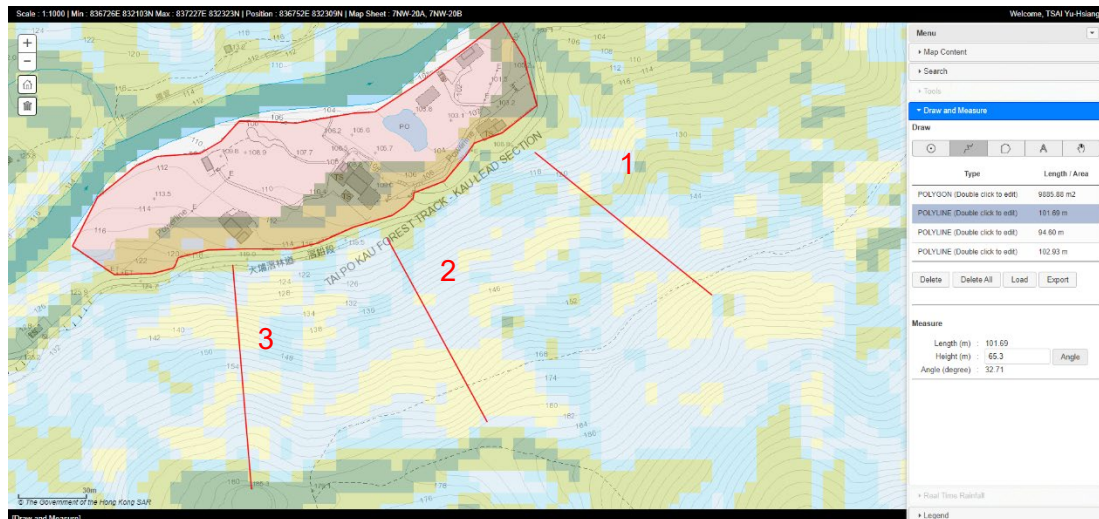


Figure 12 – Slope Angle Verification

According to GEO Report No. 138, Guidelines for Natural Terrain Hazards Studies, although the Site does not satisfy the “In-principle Objection Criteria”, an NTHS is still required when fulfil the following “Alert Criteria”:

*“Where there is natural terrain outside the site, but within the same catchment, that is at an angular elevation of 20° or more from the site **and** where there is ground sloping at more than 15° within 50 m horizontally upslope of the site boundary, provided that there is a credible debris flow path to the site.”*

Therefore, since the site is within 50m from the toe of natural terrain, a Natural Terrain Hazard Study (NTHS) is considered required to study the hazards and identify any mitigation measures required for the proposed Site. The extent shall follow the blue lines in Figure 10 & 11.

## **5) POTENTIAL GEOTECHNICAL IMPACTS**

Based on the preliminary review of the geological conditions including the loading from the proposed buildings and surrounding natural terrain and slopes, shallow foundations with appropriate slope strengthening works or deep foundations are considered feasible.

### **5.1 Option 1: Shallow Foundation – Footings**

Footings would transmit loads to the seated soil stratum. Since the proposed developments are all at a lower level to the adjacent 2 geotechnical features. It is considered no adverse geotechnical impact will be imposed to the surrounding slopes. After this GPRR submission, upgrading works will be assessed if necessary / required at the GAR submission stage.

### **5.2 Option 2: Deep Foundation – Mini-piles**

In order to prevent the transmission of loads onto the possible relatively weak / soft soil stratum in the vicinity of the Tai Po Kau Forest Stream, the founding level of the deep foundations should be extended below the rockhead level. Therefore, deep foundations, in the form of rock-socketed mini-piles are considered feasible.

### **5.3 Surrounding Geotechnical Features**

Stability, integrity and condition of the existing 2 registered features, 7NW-D/C245 and 7NW-D/C415, will have to be checked during the design stage of the proposed development. Any changes in the condition of the feature (e.g. Ground profile, surcharge, G.W.T., etc.) should be considered in the detail design stage. After the detail check, upgrading works if required will be proposed at the GAR submission stage. For the features outside the lot boundary, any adverse effect on the proposed development will also be considered at the GAR submission stage.



## **6) RECOMMENDATIONS**

### **6.1 Further Investigations**

Site-specific Ground Investigation works and Natural Terrain Hazard Study will be carried out to ascertain the ground conditions and validate the geotechnical assumptions.

The details of features, 7NW-D/C245 and 7NW-D/C415 will be further investigated and verified.

### **6.2 Foundation Design**

Either footings or mini-piles will be considered to suit the proposed development and any adverse effect will be taken into account, or vice versa.

### **6.3 Drainage System Design**

Permanent drainage system shall also be proposed. Runoff from the surroundings will be collected and discharged to the new / existing channels via catch-pits, manholes, before discharging into the existing public storm water drainage system.