

GEO Technical Guidance Note No. 12 (TGN 12)
The Designated Area of Northshore Lantau

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1. SCOPE

- 1.1 This Technical Guidance Note (TGN) outlines the establishment of the Designated Area of Northshore Lantau and the relevant technical recommendations.
- 1.2 Any feedback on this TGN should be directed to Chief Geotechnical Engineer/Planning and Development of the GEO.

2. TECHNICAL POLICY

- 2.1 The technical guidelines promulgated in this TGN were agreed by GEO's Geotechnical Control Conference (GCC) by circulation in June 2003.

3. RELATED DOCUMENTS

- 3.1 EGS (Asia) Limited (1997). *Tung Chung New Town Gravity Survey – Phase II, Final Report*. (GIU Ref. 27425)
- 3.2 EGS (Asia) Limited (1998). *Study of Ground Condition at Tung Chung New Town, Offshore Gravity Survey – Final Report*. (GIU Ref. 28792)
- 3.3 EGS (Asia) Limited (1999a). *Tung Chung New Town Offshore Gravity Survey Additional Interpretation – Phase II, Final Report*. (GIU Ref. 30471)
- 3.4 EGS (Asia) Limited (1999b). *Northshore Lantau Development Feasibility Study Magnetic and Gravity Survey – Final Report*. (GIU Ref. 30489)
- 3.5 EGS (Asia) Limited (2021). *Geophysical Survey at Tung Chung (East) New Town Extension – Final Report*. (GIU Ref. 69669)
- 3.6 Fyfe, J.A., Shaw, R., Campbell, S.D.G., Lai, K.W. & Kirk, P.A. (2000). *The Quaternary Geology of Hong Kong*. Geotechnical Engineering Office, Civil Engineering Department, 209 p.
- 3.7 Gillespie, M.R., Humpage, A.J. & Ellison, R.A. (1998). *The Geology of Tung Chung New Town*. (GIU Ref. 30195)
- 3.8 Lam Geotechnics Limited (1999). *Northshore Lantau Development Feasibility Study Marine Ground Investigation*. (GIU Ref. 30023)
- 3.9 Sewell, R.J. and Kirk, P.A. (2002). *Geology of Tung Chung and Northshore Lantau Island*. Hong Kong Geological Survey Sheet Report No. 6, Geotechnical Engineering Office, Civil Engineering Department, 91 p.

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- 3.10 Tse, T.K., Tang, D.L.K. & Tam, C.K. (2023). *An Investigation of Complex Ground Conditions at Tung Chung New Town Extension (East), Lantau (Geological Report No. 1/2023)*. Geotechnical Engineering Office, Civil Engineering and Development Department, 115 p.

4. DEFINITIONS

- 4.1 Nil.

5. TECHNICAL RECOMMENDATIONS

- 5.1 The extent of the Designated Area of Northshore Lantau is shown in Figure 1 (Annex TGN12 A1).

- 5.2 The Designated Area is underlain by locally complex geological conditions that require due attention to be given to the potential problems associated with high-rise buildings and other structures involving deep foundations.

- 5.3 In assessing ground conditions at sites where deep foundations are planned within the Designated Area, attention should be given to the potential occurrence of complex geological conditions, and if they occur, whether they may adversely affect the proposed development. The complex geological conditions include some, or all, of the following:

- (i) anomalously deep rockhead, locally in excess of 160 m below ground level, in the deeply weathered, mainly intrusive igneous rocks comprising medium-grained granite and dykes of rhyolite,
- (ii) metasedimentary rocks and their weathering products: the metasedimentary rock sequences, in addition to sandstone and siltstone, may contain carbonate and carbonate-bearing rock, including marble, that have weathered to give rise to cavities, cavity-fill deposits and residual soil, all of which contribute to the complex ground conditions, and
- (iii) superficial deposits, typically between 10 and 150 m thick, that consist mainly of gravel, sand and mud, but also include siltstone and, locally, boulders: these occupy depressions in the subcrop surface, most of which lie directly above or adjacent to metasedimentary rocks and cavity-fill deposits. They extend to considerable depth and may be soft, loose, or weakly lithified. Their presence can be used to indicate other complex ground potentially in the vicinity at deeper levels.

There is a general correlation between the presence of the large metasedimentary blocks and the intensity and depth of weathering in the adjacent intrusive igneous rocks. In places, the interface between the fresh and weathered rock is very steep.

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- 5.4 The following additional ground conditions are often contributory to the complex geological conditions listed in 5.3 and should also be assessed:
- (i) steep gradients on rockhead, and
 - (ii) faulting.
- 5.5 In site investigations for developments with deep foundations within the Designated Area, the following items are recommended to facilitate the identification of the complex geological conditions:
- (i) During the initial phase of ground investigation, emphasis should be directed to developing a representative geological and hydrogeological model rather than testing. The ground investigation should focus on examining and logging the profile in detail, with emphasis placed on identifying the extent of soft, loose and weakly lithified sediments, metasedimentary rock, including marble, and the depth and local variability of rockhead.
 - (ii) Commonly used ground investigation techniques (drilling and seismic reflection profiling) have limitations in identifying very localised areas of complex geological conditions within the Designated Area, particularly for the early stages of the site investigation. However, detailed geophysical (gravity) surveying of the reclamation site (EGS, 1997, 2021) and offshore (EGS, 1998, 1999a, 1999b) has proved to be a useful technique for identifying locations of deeply weathered zones and its application should be considered as a supplement to, and a basis for planning, drillholes.
 - (iii) A “logging guide” (in Sewell and Kirk, 2002) has been developed to assist drilling contractors and consultants in describing complex core materials within the Designated Area, and is accompanied by a detailed description of the geology of Tung Chung New Town, and the adjoining offshore area of Northshore Lantau.
- 5.6 The complex geological conditions may affect development costs, construction programmes and the geotechnical input required to manage foundation risk. Therefore, adequate resources, time and technical input should be provided to ensure that foundations in the Designated Area are properly designed and constructed. To this end, geotechnical input from an experienced geotechnical engineer who is familiar with the complex geological conditions of the Designated Area would be invaluable to the project team.

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6. ANNEX

6.1 TGN12 A1 – Small-scale Location Plan of the Designated Area.

(Raymond W M Cheung)
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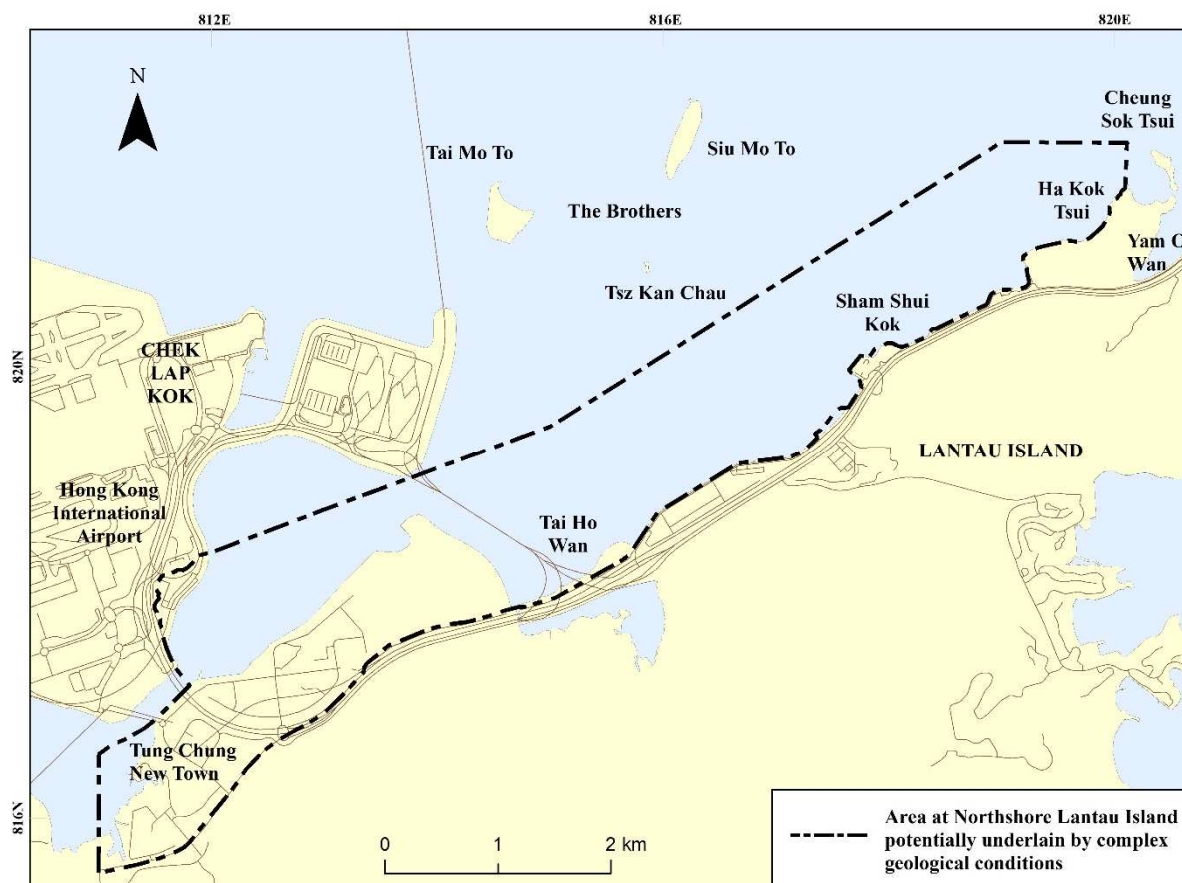


Figure 1 – Small-scale Location Plan of the Designated Area