Information Note 31/2025 **August 2025**

Rock Cavern Development in Hong Kong

Key Messages: The geological setting of Hong Kong is favourable to rock cavern development, which has been identified as a viable source of long-term land supply in Hong Kong. The Government has established policy on rock cavern development and the associated technical guidelines have been promulgated by the Geotechnical Engineering Office (GEO) to facilitate the implementation of cavern development projects in Hong Kong.

Introduction

Rock caverns are large man-made spaces in rock. Hong Kong's steep hilly terrain with strong rocks possesses good potential for territory-wide cavern development, particularly in the urban fringe. Existing rock caverns housing numerous facilities in Hong Kong and other places have already articulated the benefits of rock cavern development, and demonstrated that rock caverns can be a viable source of long-term land supply.

Benefits of Rock Caverns

Since the 1990s, there have been a number of purposely built rock caverns for housing different Government facilities, including Stanley Sewage Treatment Works, Island West Transfer Station and Kau Shat Wan Government Explosives Depot. Housing these municipal facilities inside rock caverns can result in less visual, air, noise and other nuisance to the adjacent community.

In the early 2000s, Western Salt Water Service Reservoirs were relocated to rock caverns in the hillside at the back of the University of Hong Kong in order to free up land for the Centennial Campus development. This is another successful example of using rock caverns for housing municipal facilities. In addition, this project demonstrated that relocating suitable existing facilities inside rock caverns can release valuable surface sites for other beneficial uses.

The applications of rock caverns are even more versatile and popular overseas. For example, the Norwegians created rock caverns to house their national archives and the Swedish developed a data centre in a rock cavern. Underground quarrying is also not uncommon overseas. For example, the underground quarrying operations in Switzerland incorporate ancillary business activities, e.g. rock processing within the rock caverns formed by the quarrying activity. This mode of quarrying operation achieves multiple benefits including (i) avoidance of nuisance as a result of surface quarrying and the ancillary business activities and (ii) creation of rock cavern space as part of the quarrying operations.

There are also other tangible and intangible benefits of rock cavern development. For example, the excavated rock materials obtained from the cavern construction can be processed for use by other construction projects. Rock caverns also act as a shelter, providing highly stable environments in terms of temperature, humidity and vibration, and providing a highly secured environment.

Rock Cavern Development Projects in the Pipeline

Rock cavern development projects usually involve higher initial capital investment and relatively longer implementation time-frame compared with surface development. With due consideration of the above, a pragmatic approach has been adopted with a view to maximising the benefits of rock cavern development while maintaining cost-effectiveness of the relevant projects.

Some key rock cavern development projects in the pipeline are listed below:

Housing existing facilities or new facilities inside rock caverns

- Relocation of Sha Tin Sewage Treatment Works to Caverns
- Joint Cavern Development at Anderson Road Quarry Site, which covers the Relocation of Public Works Central Laboratory to Caverns and the Building of Government Records Service's Archives Centre in Caverns
- Relocation of Diamond Hill Fresh Water and Salt Water Service Reservoirs to Caverns

Underground quarrying

- Underground Quarrying at Lam Tei, Tuen Mun.

Technical Support to Rock Cavern Development in Hong Kong

The GEO has been working closely with relevant bureaux and government departments to facilitate the development of rock caverns in Hong Kong. The GEO also provides technical assistance, e.g. preliminary geological appraisals and technical feasibility studies, to different government cavern projects. Furthermore, a number of technical guidance documents on cavern engineering have been promulgated by the GEO.

Cavern Master Plan

This shows Strategic Cavern Areas (SCVAs) identified in the territory that are suitable for rock cavern development for meeting the existing or future community needs of the adjoining districts. The Plan serves as a reference for project proponents of rock cavern developments.

https://www.cedd.gov.hk/eng/our-projects/topics-in-focus/index-id-27.html

Geoguide 4 : Guide to Cavern Engineering (2nd Edition)

It presents a recommended standard of good practice for the civil engineering aspects of rock cavern developments in Hong Kong, and serves as a reference document for non-specialists involved in the planning and administration of cavern projects.

https://www.cedd.gov.hk/eng/publications/geo/geoguides/geo-g4/index.html

Hong Kong Planning Standards and Guidelines, Chapter 12

It includes planning standards and guidelines of rock cavern developments. Key planning considerations and potential land uses of rock caverns are provided. It serves as a reference document for the planning study of cavern projects.

https://www.pland.gov.hk/file/tech_doc/hkpsg/full/pdf/ch12.pdf

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