

TOWN PLANNING BOARD

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the Town Planning Board on 7.10.2016**

**Study on Long-term Strategy for Cavern Development
Cavern Master Plan**

Study on Long-term Strategy for Cavern Development Cavern Master Plan

PURPOSE

1. The purpose of this paper is to brief Members on the draft Cavern Master Plan (CMP) prepared under the “Long-term Strategy for Cavern Development – Feasibility Study”.

BACKGROUND

2. Creating new land is essential to the development of Hong Kong in the long term and cavern development is one of the viable options under the multi-pronged strategy to increase land supply. The hilly terrain with strong rocks in Hong Kong is highly suitable for developing rock caverns, particularly in the urban fringe. There is proven local experience in cavern construction as demonstrated by various existing facilities built in Hong Kong, which also suggest that rock caverns can be a cost-effective solution in certain circumstances. Enhancing the systematic use of rock caverns can offer new opportunities for Hong Kong's long-term planning and development.

3. In March 2010, the Civil Engineering and Development Department (CEDD) undertook the “Enhanced Use of Underground Space in Hong Kong – Feasibility Study” (Cavern Feasibility Study) to explore the opportunities to enhance the effective use of land resources through the planned development of rock caverns. The study, completed in March 2011, demonstrated the broad viability of cavern development for a range of facility types and in different geographical areas. The study also identified key issues that would need to be addressed in developing caverns in a planned manner.

4. To follow up the findings of the Cavern Feasibility Study, the CEDD commenced the study on “Long-term Strategy for Cavern Development – Feasibility Study” (Strategic Cavern Study) in September 2012 for completion by 2016. The Study has outlined a holistic approach in planning and implementing cavern development, so as to render it a sustainable and innovative means for expanding land resources in the long term. One of the major tasks is to prepare a territory-wide CMP as a planning tool to facilitate cavern development in the territory.

BENEFITS AND LIMITATIONS OF CAVERN DEVELOPMENT

5. The benefits of cavern development are manifold. Relocation of suitable existing government facilities to rock caverns could release surface sites for other beneficial uses and could remove incompatible land uses by placing unpopular facilities in caverns. Rock caverns could also provide space to accommodate suitable new public and private sector facilities where there is shortage of available surface land, thereby reducing further land take and providing lower cost accommodation especially for land extensive uses. Rocks arising from cavern construction could also be used as aggregates to support the local construction industry.

6. Given that the development of rock caverns usually involves considerable capital investment and relatively long implementation time-frame, the pace and scale of land creation would not be comparable to other land development approaches such as rezoning, reclamation and site formation. The technical issues encountered could be more complicated. Cost-effectiveness may also vary significantly among cases. As such, the use of cavern development alone could not resolve the imminent problem of shortage of developable land. Under the Government’s multi-pronged approach in enhancing land supply to meet economic and social needs, it may serve as a sustainable source of long-term land supply to supplement other short- and medium-term land development options. It would call for a holistic strategy to gradually unleash the cavern development potential for wider application so as to maximise planning and development gains that could be yielded from this hidden land resource.

CAVERN MASTER PLAN

Objectives

7. The CMP serves as a planning tool and providing a broad strategic planning framework to guide and facilitate territory-wide cavern development in Hong Kong, although it is non-statutory. The objectives of the CMP are:

- (i) Facilitation of territory-wide cavern development – to delineate Strategic Cavern Areas¹ (SCVAs) that could facilitate wider application of cavern development in the territory;
- (ii) Promulgation of information – to disseminate and publicise information on SCVAs that could enable both government departments and private sector organisations to identify suitable cavern sites for their developments; and
- (iii) Optimal utilisation of SCVAs – to optimise the use of land resources through a pragmatic mechanism for managing cavern and other subsurface developments² in SCVAs, without compromising beneficial surface land use and developments.

Formulation of the CMP

8. The framework of the CMP has been developed by the CEDD in collaboration with Planning Department (PlanD). The CMP is composed of a territory-wide plan showing the location and boundary of all the SCVAs delineated with due consideration on the geological perspective and other relevant planning and technical information such as existing and committed transport infrastructure, key development areas,

¹ A Strategic Cavern Area is defined as an area that is easy to access and can accommodate multiple facilities in rock caverns to meet the need of development. The area should be sufficiently large and located at the urban fringe with supporting infrastructure network.

² Other subsurface developments refer to all underground development, such as railway/road and utility tunnels, but excluding caverns.

major environmental constraints and fire safety requirements. The plan is accompanied by an Explanatory Statement (ES) and a set of Information Notes (IN).

9. The ES is intended to provide the key information on the CMP including an updated list of potential land uses for cavern development. It sets out the objectives of the CMP, outlines the rationale and methodology of delineating SCVAs, and highlights key issues for implementation.

10. For each SCVA, an IN is provided to describe the characteristics, development potential as well as constraints of the area. This includes details of the geological, planning, environment and traffic characteristics and other key issues/constraints on cavern development. It also outlines the potential land uses and the extent of potential portal locations. A reference drawing is appended to each IN to illustrate the spatial context of the information provided.

11. A systematic approach has been developed and applied to identify suitable areas that satisfy all of the following key selection criteria of SCVA:

- (a) Suitable settings – the area should have favourable topography and geology for developing caverns;
- (b) Easy access – the area should be located at urban fringe and could be easily connected to the surrounding infrastructure network, either existing or committed, by constructing minor access roads;
- (c) Accommodating multiple facilities – the area should be suitably large with sufficient number of portal locations that could enable multiple cavern facilities to be developed; and
- (d) Meeting development needs – the area should be located in a region with demand for caverns to meet the needs of development, such as relocation of existing government facilities, urban development (e.g. provision of new

facilities to serve the new development areas or to support the expansion of existing urban areas/new towns) or private sector demand.

12. Forty-eight (48) SCVAs have been identified so far, covering a total area of approximately 4,500 hectares. There are 11 SCVAs on Hong Kong Island, 6 in Kowloon, and 31 in the New Territories (including 7 on Lantau Island). The size of individual SCVAs ranges from approximately 20 to 200 hectares. About 40% (i.e. 1,800 hectares) of the total SCVA area are within Country Parks and Special Areas (hereafter referred to as Country Parks), accounting for about 4% of the total area of Country Parks in the territory.

13. Under the CMP, SCVAs identified so far only represent areas that are found strategic for cavern development in terms of geological considerations and the current planning perspectives. They are not meant to be exhaustive because there may be other areas that could be suitable for cavern development but do not meet the selection criteria of SCVA in paragraph 11 above, e.g. relatively small hillsides that can merely accommodate a single facility or remote areas that are not easy to access.

14. The draft CMP is at **Annex I**. The draft ES, which provides a full description of the CMP, is at **Annex II**. A draft IN of an SCVA is at **Annex III** for illustration purposes. The CMP, ES and INs collectively serve to fulfil the objectives of facilitating territory-wide cavern development and promulgating essential information for project proponents both in the public and private sectors to identify suitable cavern sites for their development projects.

Interfacing Issues

15. The CMP does not exempt cavern development, no matter within or outside SCVAs, from any statutory requirements. All relevant statutory procedures, such as planning application under the Town Planning Ordinance, applications for approval of environmental impact assessment report and environmental permit under the Environmental Impact Assessment (EIA) Ordinance, etc., shall be complied with when

implementing cavern development projects. For cavern developments within Country Parks, project proponents must also seek the views and obtain consent of the Country and Marine Parks Authority, who may request further consultation with the Country and Marine Parks Board (CMPB) or its Country Parks Committee where appropriate.

Country Parks Matters

16. About 40% (i.e. 1,800 hectares) of the SCVAs are within Country Parks. The importance of conserving the natural environment and safeguarding the ecological integrity of Country Parks has been duly observed in formulating the CMP. A pragmatic approach has been adopted in delineating the SCVA boundary in the CMP. In consultation with the Agriculture, Fisheries and Conservation Department, areas of Country Parks that are known to have significant ecological or conservation value area excluded from the SCVAs. The delineation of potential portal locations has also avoided encroaching onto Country Parks to eliminate possible adverse environmental impacts.

17. Moreover, noting that many of the proposed SCVAs fall within Country Parks, the CEDD consulted the Country Parks Committee (CPC) under the CMPB on the CMP in its meeting on 6 May 2016. In the meeting, members in general had no adverse comment on the CMP and the initiative of developing caverns to expand the land resources of Hong Kong. Members noted the potential environmental impact of cavern development and the practical mitigation measures, which would be properly dealt with under the project-specific EIA process. Some members stressed that cavern development projects should be strategically planned and systematically implemented with due consideration given to the cumulative environmental impact and the enhanced use of excavated rock as a useful resource for the construction industry.

Planning Control and Outline Zoning Plan Matters

18. The CMP is intended to provide systematic guidelines for cavern development and the SCVAs identified are not exhaustive to possible cavern development in Hong Kong. Detailed planning and engineering

feasibility studies and assessments, such as environmental impact assessment and traffic impact assessment, should be conducted for development proposals in rock caverns on a case-by-case basis whether these are within or outside of SCVAs. Proponents for cavern development projects should follow the relevant statutory and administrative procedures/requirements at the implementation stage. Statutory planning procedures would only be initiated when concrete cavern development proposals with the support of technical feasibility study and implementation plan are available. Planning applications or amendments to Outline Zoning Plans submitted to the Town Planning Board will be assessed on individual merits.

Implementation

19. The CMP, together with the updated list of potential land uses for cavern development, will be incorporated into the relevant chapter of the HKPSG by PlanD to disseminate and publicise information on SCVAs that could enable both the Government and private sector organisations to identify suitable cavern sites for their developments. As the CMP is a broad strategic planning framework to facilitate territory-wide cavern development, detailed planning and engineering feasibility study should be undertaken to take forward individual cavern development on a case-by-case basis.

Promulgation

20. After briefing the relevant bodies, the draft CMP will be finalised and submitted to the Government for endorsement. The endorsed CMP will then be promulgated through the website of the CEDD and PlanD. The relevant Chapter of the HKPSG will be revised with incorporation of the CMP by PlanD.

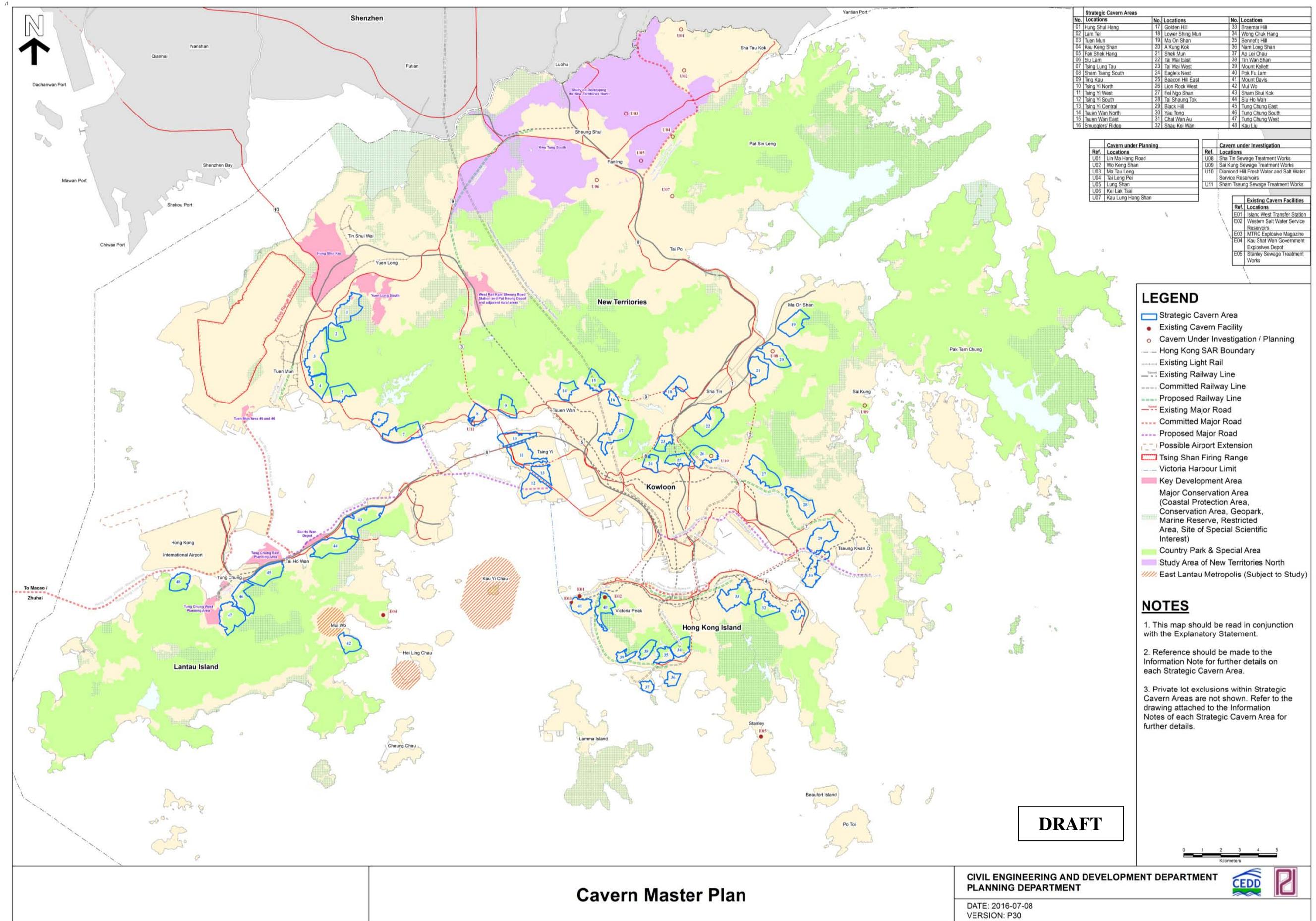
ADVICE SOUGHT

21. Members are invited to note the draft CMP as set out above.

ATTACHMENTS

Annex I	Draft Cavern Master Plan
Annex II	Draft Explanatory Statement
Annex III	Draft Information Note of SCVA No. 2

**Geotechnical Engineering Office
Civil Engineering and Development Department
October 2016**



DRAFT**CAVERN MASTER PLAN****EXPLANATORY STATEMENT****INTRODUCTION**

- (1) This Explanatory Statement is intended to provide the key information on the Cavern Master Plan prepared under the “Long-term Strategy for Cavern Development – Feasibility Study” (Strategic Cavern Study), which was completed in 2016.
- (2) The Cavern Master Plan is a planning tool providing a broad strategic planning framework to guide and facilitate territory-wide cavern development in Hong Kong. Areas that are considered strategic for accommodating multiple cavern facilities (referred to as Strategic Cavern Areas) to support future development need are delineated on the Cavern Master Plan. The Cavern Master Plan aims to make known these areas and their essential information to project proponents such that they can identify suitable cavern sites for their development projects. The Cavern Master Plan is non-statutory, only serving as user guidelines for cavern development and is not a blueprint for systematic development of caverns in all the identified Strategic Cavern Areas. Cavern development in Strategic Cavern Areas, including sizes and locations, would be subject to the need of individual development projects and detailed technical feasibility studies, and would be assessed on individual merits.
- (3) Attached to the Cavern Master Plan is a set of Information Notes with reference drawings which show the spatial context of each Strategic Cavern Area. The Information Notes indicate the broad potential land uses suitable for cavern development within the area and denote the extent of potential portal locations. The rationale of boundary delineation of each Strategic Cavern Area is also set out along with the key development opportunities and constraints.
- (4) The broad potential land uses set out in the Information Notes have made reference to the Hong Kong Planning Standards and Guidelines (HKPSG) on identification of land uses with potential for development in rock caverns.

BACKGROUND

- (5) Land is a scarce resource and there is a pressing need to increase the supply of land to sustain social and economic development. The hilly terrain and underlying geology of Hong Kong pose challenges as well as offer opportunities for development of the city. This setting has resulted in scarce supply of sizable developable flat land and has caused the built-up areas largely concentrating within the gently sloping foothills extending towards the shoreline and reclaimed land. Conversely, the hilly terrain underlain by massive hard igneous rocks (i.e. granitic and volcanic rocks), particularly in the urban fringe is suitable for developing rock caverns. Cavern development could be an alternative source of land supply in addition to the traditional land development approaches (e.g. large-scale reclamation and open-cut site formation), especially for the continued growth of the city and the increasing call to preserve the landscape, ecological and geological attributes of the territory.
- (6) Around the mid-1990s, a number of Government facilities in Hong Kong were purpose-built in rock caverns to meet the needs of the community while overcoming the lack of suitable surface sites at the locality, namely the Island West Transfer Station, Stanley Sewage Treatment Works and Kau Shat Wan Government Explosives Depot. In 2009, the University of Hong Kong constructed rock caverns to re-house the Western Salt Water Service Reservoirs in order to release land for the Centennial Campus development. These projects have demonstrated that rock caverns can be a cost-effective alternative, while yielding additional safety, environmental and security benefits. The Cavern Master Plan shows the location of these existing cavern facilities.
- (7) In March 2010, the Civil Engineering and Development Department (CEDD) commenced the “Enhanced Use of Underground Space in Hong Kong – Feasibility Study” (Cavern Feasibility Study) to take forward the initiative proposed by the Development Bureau in the 2009-10 Policy Agenda of launching strategic planning and technical studies to promote the enhanced use of rock caverns as part of Hong Kong’s pursuit of sustainable development.
- (8) An important outcome of the Cavern Feasibility Study was the development of a territory-wide cavern suitability map, which shows areas which are considered broadly suitable for cavern development from the geological perspective. Such areas account for about 64% of the total land area in Hong Kong. This map provides the basis for delineation of the Strategic Cavern

Areas in the Strategic Cavern Study. An overlay of the Strategic Cavern Areas on the cavern suitability map is included in **Plan A** of this Explanatory Statement. Reference should be made to the section on Geological Suitability in paragraphs (23) to (25) below.

- (9) The Cavern Feasibility Study was completed in March 2011 and recommended that policy steer be provided through the issue of technical circulars to lay down administrative requirements for Government departments to consider cavern option in early project planning stage, a framework be developed to encourage private sector participation in cavern development, and a strategy be formulated to relocate existing Government facilities to caverns to gradually release occupied surface land for other beneficial uses.
- (10) In the Chief Executive's 2011-12 Policy Address under "Policy on Land Development and Accumulation", the potential of re-provisioning the existing Government facilities in rock caverns was highlighted as one of the main innovative measures to expand Hong Kong's land resources. In the 2013 Policy Address, the Chief Executive further highlighted that rock cavern is a viable source of long-term land supply and stressed the need to conduct a study on the long-term strategy for cavern development with a view to preparing a rock cavern master plan. The scope of the Strategic Cavern Study, which commenced in late 2012, includes development of a long-term strategy for the planning and implementation of the cavern initiative.

BENEFITS OF CAVERN DEVELOPMENT

- (11) There are distinct benefits of the planned use of rock caverns towards Hong Kong's sustainable land development strategy. The land so released, particularly in the vicinity of urban areas, is a valuable resource and would assist in resolving some of the land incompatibility issues. These could include:
- a. Relocating suitable existing Government facilities to caverns thereby releasing the surface land;
 - b. Placing new facilities in caverns thereby reducing surface land take;
 - c. Reserving valuable cavern space for future developments and future expansion of cavern facilities;

- d. Housing “Not In My Backyard” (NIMBY) type facilities in caverns for minimising their nuisance to the community; and
- e. Providing other intangible benefits such as removing incompatible land uses in the community.

PURPOSE OF THE CAVERN MASTER PLAN

- (12) The long-term strategy for cavern development in Hong Kong, and in particular the development of a Cavern Master Plan, would provide a platform for a holistic approach in releasing the potential of cavern development, facilitating the establishment of a sustainable means of enhancing land supply and increasing land reserve for future development, as well as playing a strategic role and providing systematic guidelines for implementation of cavern development in the territory. Moreover, private sector participation should be an integral part of the future cavern development because many private sector facilities, such as warehousing/logistics and data centres, can benefit from the stable and secure setting offered by rock caverns. The Cavern Master Plan will give the basic information needed to consider the option of rock caverns for accommodating their facilities.
- (13) The objectives of the Cavern Master Plan include:
- a. Facilitation of territory-wide cavern development – to delineate Strategic Cavern Areas that could facilitate wider application of cavern development in the territory. Reference should be made to the sections on Strategic Cavern Areas in paragraphs (14) to (18) and Criteria for Delineation of Strategic Cavern Areas in paragraphs (19) to (48) below for further details;
 - b. Promulgation of information – to disseminate and publicise information on Strategic Cavern Areas that could enable both Government departments and private sector organisations to identify suitable cavern sites for their developments. Reference should be made to the section on Information Notes in paragraphs (49) to (51) below for further details; and
 - c. Optimal utilisation of Strategic Cavern Areas – to enhance the use of land resources through a pragmatic mechanism for managing surface, subsurface and cavern developments in Strategic Cavern Areas. Reference should be made to the section on Implementation in paragraphs

(52) to (61).

STRATEGIC CAVERN AREAS

- (14) A Strategic Cavern Area is defined as an area that is easy to access and can accommodate multiple facilities in rock caverns to meet the need of development. The area should be sufficiently large and located at the urban fringe with supporting infrastructure network. The following key selection criteria have been considered in identifying Strategic Cavern Areas:
- a. Suitable settings – the area should have favourable topography and geology for developing caverns;
 - b. Easy access – the area should be located at urban fringe and could be easily connected to the surrounding infrastructure network, either existing or committed, by constructing minor access roads;
 - c. Accommodating multiple facilities – the area should be suitably large with sufficient number of portal locations that could enable multiple cavern facilities to be developed; and
 - d. Meeting development needs – the area should be located in a region with demand for caverns to meet the needs of development, such as relocation of existing Government facilities, urban development (e.g. provision of new facilities to serve the new development areas or to support the expansion/upgrading of existing urban areas/new towns) or private sector demand.

The criteria for delineation of Strategic Cavern Areas are further elaborated in paragraphs (19) to (48) below.

- (15) The 48 Strategic Cavern Areas as delineated on the Cavern Master Plan cover a total area of approximately 4,500 hectares. There are 11 on Hong Kong Island, 6 in Kowloon, 24 in the New Territories and 7 on Lantau Island. The size of individual Strategic Cavern Areas range from approximately 20 to 200 hectares. Strategic Cavern Areas with a minimum area of 20 hectares are considered appropriate for the development of multiple facilities in cavern. The maximum size of Strategic Cavern Areas is somewhat dictated by the prescriptive fire safety requirements (see paragraphs (47) and (48)). Some

Strategic Cavern Areas are in close proximity to each other. They are not combined into larger Strategic Cavern Areas due to the presence of some topographic features (e.g. deep valley), geological features (e.g. major fault) or existing infrastructures (e.g. road tunnel) between them.

- (16) The total area of Strategic Cavern Areas does not represent the actual developable cavern space because provisions have to be made for features like buffer zones between individual facilities, intervening rock pillars for support and adits for portal access and inter-connection. Making an allowance for such provisions, the maximum usable footprint area is likely to be in the range of 1,120 to 1,800 hectares. Notwithstanding this reduction factor (i.e. 75% to 60% respectively), the usable area may be increased by constructing caverns at different elevations or by forming multiple floors within a single cavern (e.g. National Archives of Norway and National Library of Sweden).
- (17) Strategic Cavern Areas identified so far only represent areas that are found strategic for cavern development in terms of geological considerations and the current planning perspectives. They are not meant to be exhaustive because there may be other areas that could be suitable for cavern development but do not meet the selection criteria of Strategic Cavern Areas as given in paragraph (14) above, e.g. relatively small hillsides that can merely accommodate a single facility or remote areas that are not easy to access.
- (18) There are various locations being explored under other studies for housing new infrastructures in caverns to support Key Development Areas such as New Territories North, Fanling North and Kwu Tung. Since those areas do not meet the selection criteria of Strategic Cavern Area, they have been denoted as “Caverns under planning” on the Cavern Master Plan for reference. For those Government cavern projects under study, such as relocation of the Sha Tin Sewage Treatment Works, they have been denoted as “Caverns under investigation” on the Cavern Master Plan.

CRITERIA FOR DELINEATION OF STRATEGIC CAVERN AREAS

- (19) A number of factors have been considered to determine the locality, boundary, extent of potential portal locations and potential land uses of Strategic Cavern Areas shown on the Cavern Master Plan. These factors include terrain, geological suitability, land status, land use planning, infrastructural support, environmental constraints and fire safety requirements.

Terrain

- (20) Strategic Cavern Areas are to be located in hilly terrain with steep hillsides and shallow rock head, which offers a favourable site setting for cavern development. Steep hillsides could minimise the length of access tunnels required and hence reduce the extent of portal formation works. Shallow rock head could also provide adequate rock cover to support the development of sizable caverns. For example, terrain at Braemar Hill above North Point is considered to have suitable topography for cavern development. Similar topography could be found in quarry sites, e.g. Anderson Road Quarry, where rock is exposed and the quarry face provides convenient access for portal formation.
- (21) The preference for the potential portal locations is to be close to steep hillsides and/or have sufficient surrounding space for providing a staging area for cavern construction and for the siting of above ground structures to support cavern development. Typical above ground structures include ventilation and administration buildings.
- (22) The terrain conditions must be considered together with the geological suitability for the delineation of Strategic Cavern Areas. An overlay of the Strategic Cavern Areas on the terrain of Hong Kong is shown in **Plan B** where it can be seen that all Strategic Cavern Areas fall generally within hilly terrain.

Geological Suitability

- (23) The abundance of strong igneous rocks (i.e. granitic and volcanic rocks) in Hong Kong, which covers some 80% of the land area, offers an opportunity for placing facilities in rock caverns. The hilly areas at the urban fringes are particularly suitable for cavern development as they allow easy access into the ground to construct the caverns.
- (24) The cavern suitability map, which was prepared as part of the Cavern Feasibility Study, has been used to assist in delineating the boundary for each Strategic Cavern Area (see **Plan A**). Strategic Cavern Areas possess geological and spatial characteristics appropriate for cavern development, such as hilly terrain comprising strong rock. As a whole, about 64% of the total land area in Hong Kong is potentially suitable for cavern development, i.e. caverns are considered to be more easily developed in these areas.

(25) Strategic Cavern Areas are not included in areas below landfill sites and Scheduled Areas under the Buildings Ordinance where geotechnical difficulty of cavern development is high. Strategic Cavern Areas also avoid geological features which may adversely affect the constructability of caverns, such as major faults, and areas underlain by sedimentary and metamorphic rocks where the rock mass properties are considered less suitable for cavern development.

Land Status

(26) In general, development zones (e.g. residential zone, village type development zone), private lots and burial ground are excised from Strategic Cavern Areas at the time of formulating the Cavern Master Plan. Boundaries are defined to cover Government land and prevent extension into private land for ease of implementation. Nevertheless, some of this government land may be rezoned and disposed of in the future for private development. Suitable provisions would be incorporated in the lease conditions to safeguard the integrity of the Strategic Cavern Areas (see paragraphs (52) to (61) on Implementation).

(27) Due to the small scale of the Cavern Master Plan, there are small individual private lots located midway on the hillsides within some Strategic Cavern Areas. These small private lots are also excised from the Strategic Cavern Areas on the reference drawings and they would not physically pose constraints on the development potential of Strategic Cavern Areas, and vice versa.

Land Use Planning

(28) The spatial context of the surrounding land uses with the individual Strategic Cavern Areas has been considered in the identification of potential land uses.

(29) Some Strategic Cavern Areas are identified to serve the adjacent urban areas and new towns which have limited available surface land for expansion. These Strategic Cavern Areas will provide solution space for relocating existing and/or accommodating additional Government, Institution or Community facilities like service reservoirs in rock caverns in order to support the increasing demand of local residential communities. In areas with a concentration of commercial/industrial developments, land uses in rock caverns that support adjacent existing and planned economic activities have been considered, such as storage/warehousing facilities and data centres. Strategic Cavern Areas located in relatively remote and/or isolated locations are suitable for housing facilities considered to be of high safety risk or NIMBY in nature.

- (30) Proximity to Key Development Areas has also been considered in determining Strategic Cavern Area locations. This provides the opportunity for a more comprehensive approach of increasing available land for these development areas. Key Development Areas are identified on the Cavern Master Plan, including areas delineated for planning and development such as those covered under the Study for Housing Sites in Yuen Long South, Hung Shui Kiu New Development Area Study and Tung Chung New Town Extension Study.
- (31) Strategic Cavern Areas are not included in areas of impounding reservoirs or military land even though they might be highly suitable for cavern development from the geological perspective.
- (32) Demand for cavern development has also been established through consultation with the private sector. Consultations have been undertaken to identify spatially the demand trends for cavern development under different land uses, including warehousing/logistics facility, data centre, columbarium, vehicle parking, bus depot, retail/shopping arcade, oil storage, wine storage, electric substation, research/material testing laboratories and underground quarrying. This information has been considered in identifying Strategic Cavern Areas and their potential land uses.
- (33) Reference has also been made to the HKPSG in identifying the potential land uses for Strategic Cavern Areas. The HKPSG sets out the broad land uses with the potential for development in rock caverns. Reference should be made to **Appendix I** for the land uses specified in the HKPSG as potentially suitable for cavern development and the additional potential land uses being recommended for inclusion in the HKPSG.

Infrastructural Support

- (34) Connectivity to the existing and planned major infrastructure is one of the key factors in the determination of the location and the potential land uses for Strategic Cavern Areas. The proximity to and capacity of existing as well as planned infrastructure, such as highways and railways, has supported the potential of certain land uses to be accommodated within Strategic Cavern Areas and has also been considered in the delineation of their boundaries.
- (35) The adjacent road network has also been reviewed in terms of forecast capacity to assist in the identification of potential land uses with regards to the surrounding infrastructure. Land uses which would typically generate larger

traffic volumes, such as warehousing, have only been considered for recommendation where the surrounding infrastructure has reasonable residual capacity. The need for any upgrading of the existing infrastructures to support particular types of land use is highlighted in the respective Information Notes as appropriate.

- (36) In addition to considering proximity to the existing road network, the proximity to MTR stations and other modes of public transport has also been taken into account in the identification of potential land uses which will require easy access by staff and/or the general public.
- (37) The location of existing and planned underground infrastructure, including tunnels, has also been considered in the delineation of Strategic Cavern Area boundaries. The boundaries of Strategic Cavern Areas would be at a reasonable distance away from existing and planned underground infrastructure on similar elevations in order to provide a buffer zone to reduce potential impact to these infrastructures. Those tunnels that are located at different elevations with sufficient buffer would not be avoided since they would unlikely pose any insurmountable constraint on future cavern developments in the Strategic Cavern Areas. The respective Information Notes of each Strategic Cavern Area has also highlighted the interface issues with the existing and planned underground infrastructure, should there be any within the Strategic Cavern Area.

Environmental Constraints

- (38) Environmental issues have been an important consideration in the development of the Cavern Master Plan. A range of environmental factors have been considered when determining the boundary for each Strategic Cavern Area. Major conservation areas have been used as the basis for consideration of environmental and heritage related factors. These include, but are not limited to, constraints such as Conservation Areas, Coastal Protection Areas, Sites of Cultural Heritage and Sites of Special Scientific Interest. The identification of potential portal locations has avoided encroaching onto Country Parks and Special Areas (hereafter referred to as Country Parks), conservation areas, valuable woodland, watercourses and other ecologically significant areas and sensitive parts of the natural environment as far as practicable to avoid possible adverse environmental, ecological and landscape impacts on these areas.

- (39) Based on the cavern suitability map, about 64% of the total area in Hong Kong is considered suitable for cavern development. Some 55% of this land is located within the statutory protected Country Parks, development below which would require the consent from the Country and Marine Parks Authority who may request for further consultation with the Country and Marine Parks Board or its Country Parks Committee where appropriate. Given this high proportion, it is inevitable that most Strategic Cavern Areas identified encroach onto Country Parks in varying degrees (see **Plan A**). As a whole, about 40% (i.e. 1,800 hectares) of the total area of Strategic Cavern Areas are within Country Parks, accounting for about 4% of the total Country Parks area.
- (40) Cavern construction, including rock excavation, rock support and waterproofing works, and implementation of environmental mitigation measures, is an established technology. Numerous underground infrastructures have been built below Country Parks, for example, road tunnels such as Lion Rock, Tate's Cairn and Tai Lam Tunnel as well as numerous railway, water, drainage and cable tunnels. There are over 160 km of underground infrastructure within Country Parks. Given the similar engineering practice in construction of tunnels and caverns, these examples provide reference that cavern developments underneath Country Parks could be acceptable provided that they are in compliance with the statutory requirements and appropriate engineering measures are implemented to mitigate the potential adverse environmental impacts.
- (41) The Cavern Master Plan does not exempt any cavern development projects, either within or outside Strategic Cavern Areas, from the statutory requirements, including applications for approval of environmental impact assessment (EIA) report and environmental permit under the Environmental Impact Assessment Ordinance (EIAO). For developing caverns within Country Parks, project proponents must seek the views and obtain consent of Country and Marine Parks Authority, who may request for further consultation with the Country and Marine Parks Board or its Country Parks Committee where appropriate. All projects must be justified on their own merits of developing caverns within Country Parks.
- (42) Rock cavern development is a Designated Project under the EIAO. The environmental acceptability of a cavern development projects, its potential environmental impacts, including cumulative environmental impacts, arising from the construction and operation of a cavern development and its associated facilities, and environmental mitigation or compensation measures required

shall be determined on an individual project basis in the EIA under the EIAO requirements.

- (43) Environmental constraints relevant to each Strategic Cavern Area are included in the corresponding Information Notes (reference should be made to the section on Information Notes in paragraphs (49) to (51) below for further details). For example, noise, air, ecologically and visually sensitive receivers/areas should be considered in the selection of potential portal locations where there may be adverse impacts on these areas during construction and/or operation of the cavern project. Project proponents should also endeavour to locate surface supporting infrastructures of the cavern projects, such as ventilation shafts and administration buildings, outside major conservation areas and Country Parks as far as practicable. If such encroachment cannot be avoided, project proponents should justify the need, seek approvals from the relevant authorities and incorporate suitable environmental mitigation measures in the cavern scheme.
- (44) Graded historic buildings and declared monuments located within or close to Strategic Cavern Areas, which may pose constraints on cavern development, are highlighted in the respective Information Notes. Project proponents must comply with the statutory requirements on heritage conservation for cavern development works where appropriate and consult the Antiquities and Monuments Office of the Leisure and Cultural Services Department if necessary.
- (45) A Strategic Environmental Assessment (SEA) was carried out as part of the Strategic Cavern Study and provided environmental information on the Cavern Master Plan. The SEA Report of the Strategic Cavern Study strategically address the environmental aspects of cavern development, including potential environmental impacts that may be induced by cavern development, recommendations of environmental design and mitigation measures for cavern development proposals to make reference and development of an environmental guideline on cavern development for future reference in conducting an EIA study of individual cavern project. The SEA Report is available on the websites of the CEDD (<http://www.cedd.gov.hk/xxx>) and the Environmental Protection Department (<http://www.epd.gov.hk/xxx>).
- (46) The detail of site and facility specific environmental protection measures to be incorporated in the design and any other further environmental implications will be subject to EIA study under the EIAO. Project proponents will

normally be required to set up and carry out an environmental monitoring and audit (EM&A) programme to ensure compliance with the conditions stipulated in the environmental permits, assess the effectiveness of the recommended mitigation measures and identify any further need for additional mitigation measures or remedial action. Where appropriate, post-construction monitoring including ecological, landscape and groundwater monitoring may need to be implemented for cavern development projects in sensitive areas (e.g. Country Parks) to allow comparison with baseline data before works commencement. The build-up of experience and monitoring data would help to establish a scientific basis to address potential knowledge gap regarding the long-term ecohydrological impact of cavern development. Furthermore, ecological compensation and enhancement programme could be implemented as part of the cavern projects.

Fire Safety Requirements

- (47) In accordance with the Guide to Fire Safety Design for Caverns jointly published by the Building Authority and Fire Services Department in 1994, the total horizontal distance of escape route inside caverns should not be excessive. For certain uses of caverns as described in the above Guide, a maximum distance of 750m may be permitted under the prescriptive fire safety requirements of the Guide. For other proposed uses not covered by the Guide or proposals with maximum travel distance exceeding 750m, the fire safety design should comply with the performance requirements specified in Section 2 of Part A of the Code of Practice for Fire Safety in Buildings 2011.
- (48) In the case where the boundary of Strategic Cavern Area is not constrained by other restrictions such as terrain, geological suitability, land status and environmental constraints, it is considered reasonable to confine its extent to a maximum distance of 800 m (i.e. 750 m plus 50 m buffer zone) from the potential portal locations. Such confinement could provide a rational size of cavern development area where conventional fire engineering and evacuation strategy design could be adopted. It is still possible to develop caverns beyond this limit but it would require specific fire safety design and installations using fire engineering approach as specified in Part G of the Code of Practice for Fire Safety in Buildings 2011.

INFORMATION NOTES

- (49) Information Notes set out the characteristics of and constraints on each Strategic Cavern Area. This includes details of the geological, planning, environment and traffic characteristics and other key issues/constraints on cavern development. It also outlines the potential land uses and the extent of potential portal locations. A brief description is also provided for the geographical context of the Strategic Cavern Area as well as a description of how the Strategic Cavern Area boundary has been delineated.
- (50) Appended to the Information Notes is a reference drawing which provides the spatial context of each Strategic Cavern Area.
- (51) The potential land uses are identified through a review of the issues noted in the section on Land Use Planning in paragraphs (28) to (33) above.

IMPLEMENTATION

- (52) Strategic Cavern Areas are valuable land resources. This alternative source of long-term land supply should be managed in a judicious manner. Synergy effect on cavern development in Strategic Cavern Areas including the optimal utilisation of cavern space and economies of scale should be pursued through better integration with other surface (e.g. site formation works) and subsurface (e.g. tunnels) developments within the Strategic Cavern Areas.
- (53) The Cavern Master Plan provides a strategic planning framework to guide and facilitate territory-wide cavern development in Hong Kong. The Cavern Master Plan should be referenced to alongside the HKPSG in the course of planning and engineering studies, preparation/revision of town plans and development control for surface, subsurface and cavern developments in the territory. Due consideration should also be given to relocating existing facilities and/or placing new facilities in rock caverns when opportunity arises in order to release surface sites for other beneficial uses, reduce surface land take and remove incompatible land uses.
- (54) The Sub-committee on Cavern Development under the Committee on Planning and Land Development is responsible for vetting proposals of new developments that encroach onto Strategic Cavern Areas. This provision, which is intended to strive for the best use of Strategic Cavern Areas for the

overall benefits of Hong Kong, should be applied in a pragmatic manner when dealing with projects that would have an impact on the cavern development potential of Strategic Cavern Areas. The following general principles should be adopted:

- a. It should optimise the utilisation of Strategic Cavern Areas.
- b. It should enable beneficial surface and subsurface developments in Strategic Cavern Areas while safeguarding the cavern development potential of the Strategic Cavern Areas.
- c. It should facilitate integrating cavern development with other surface and subsurface developments in Strategic Cavern Areas to bring about synergy effect whenever possible.

- (55) The vetting mechanism is stipulated in the Development Bureau Technical Circular (Works) No. XX/XX. The Sub-committee on Cavern Development will vet development proposals involving either government projects or land disposal proposals (including lease modification or land exchange) that encroach onto or fall within Strategic Cavern Areas, including surface, subsurface and cavern development proposals, and recommend suitable provisions for optimising the use of the Strategic Cavern Areas.
- (56) The Information Notes as described in paragraphs (49) to (51) above should be used to facilitate the early stage development of proposals for cavern development and provide a summary of information on the characteristics of Strategic Cavern Areas including reference drawings which show potential development opportunities for and constraints on each Strategic Cavern Area.
- (57) The Cavern Master Plan is intended to provide systematic guidelines for cavern development and the Strategic Cavern Areas identified are not exhaustive to possible cavern development in Hong Kong. Detailed planning and engineering feasibility studies and assessments, such as environmental impact assessment and traffic impact assessment, should be conducted for development proposals in rock caverns on a case-by-case basis whether these are within or outside of Strategic Cavern Areas. It also does not exclude the possibility of private land owners from exploring cavern development potential within land under their ownership and land not delineated in the Cavern Master Plan.

- (58) Proponents for cavern development projects should follow the relevant statutory and administrative procedures/requirements at the implementation stage. Planning applications or amendments to Outline Zoning Plans submitted to the Town Planning Board will be assessed on individual merits. Other relevant statutory requirements, such as applications for approval of EIA report and environmental permit under the EIAO, consent from the Country and Marine Parks Authority and any specific land lease conditions will need to be fulfilled as required.
- (59) The Cavern Master Plan will be reviewed and updated periodically taking account of changing circumstances and development needs.
- (60) The Cavern Master Plan, Explanatory Statement and the accompanying Information Notes are also available on the websites of Planning Department (<http://www.pland.gov.hk/xxx>) and Civil Engineering and Development Department (<http://www.cedd.gov.hk/xxx>).
- (61) For public enquiry, please contact the Planning Department or the Geotechnical Engineering Office of the Civil Engineering and Development Department:

Technical Services Section
Planning Department
17/F, North Point Government Offices
333 Java Road,
Hong Kong

Planning Division
Geotechnical Engineering Office
Civil Engineering and Development Department
11/F, Civil Engineering and Development Building
101 Princess Margaret Road
Homantin, Kowloon
Hong Kong

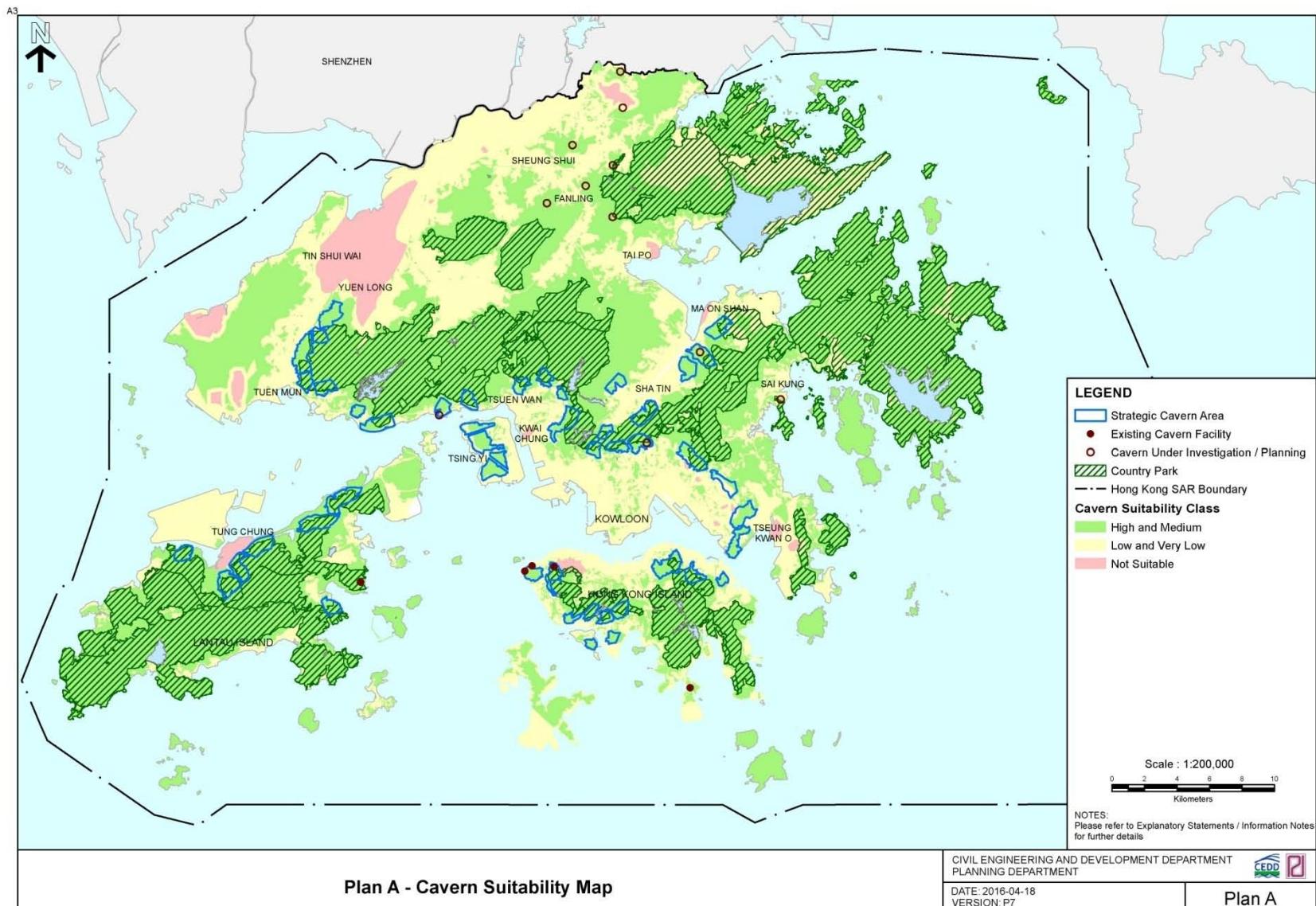
APPENDIX I

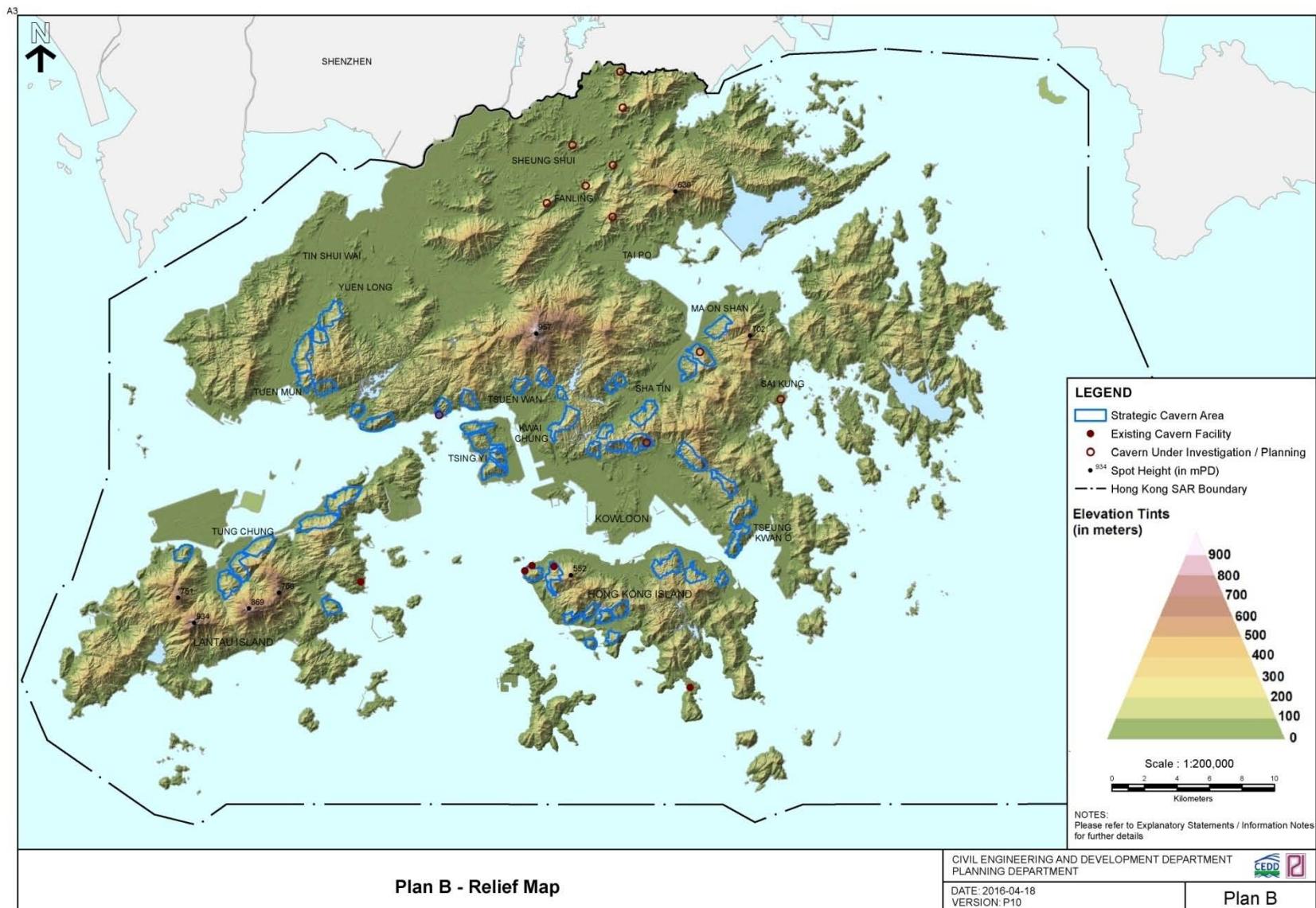
LAND USES WITH POTENTIAL FOR DEVELOPMENT IN ROCK CAVERNS

Table 1. Land Uses with the Potential for Cavern Development

Land Use Category	Potential Land Uses from HKPSG (Existing)	Other Potential Land Uses (Proposed to be added to HKPSG)
Commercial	Retail	Food/Wine storage Food and beverage
Industrial	Industry LPG bulk storage Oil bulk storage Storage/Warehousing	Data centre Research/Testing laboratories Container storage
Government/ Institution/ Community and Other Specified Uses	Civic centre Columbarium/Mausoleum/Mortuary Incinerator Leisure/Sports centre Refuse transfer facility Sewage/Water treatment plant Service reservoir Slaughterhouse Transport connections & networks Wholesale market	Archives Vehicle parking Cultural/Performance venue Explosives depot/magazine Indoor swimming pool/complex Maintenance depot Vehicle (including bus) depot Recreational complex Underground quarrying
Public Utilities	Power station	Public utility installation

Note: Potential land uses should be assessed on a case-by-case basis on their suitability for cavern development in consultation with the relevant bureaux/departments having regard to, amongst others, safety, operational and financial considerations.



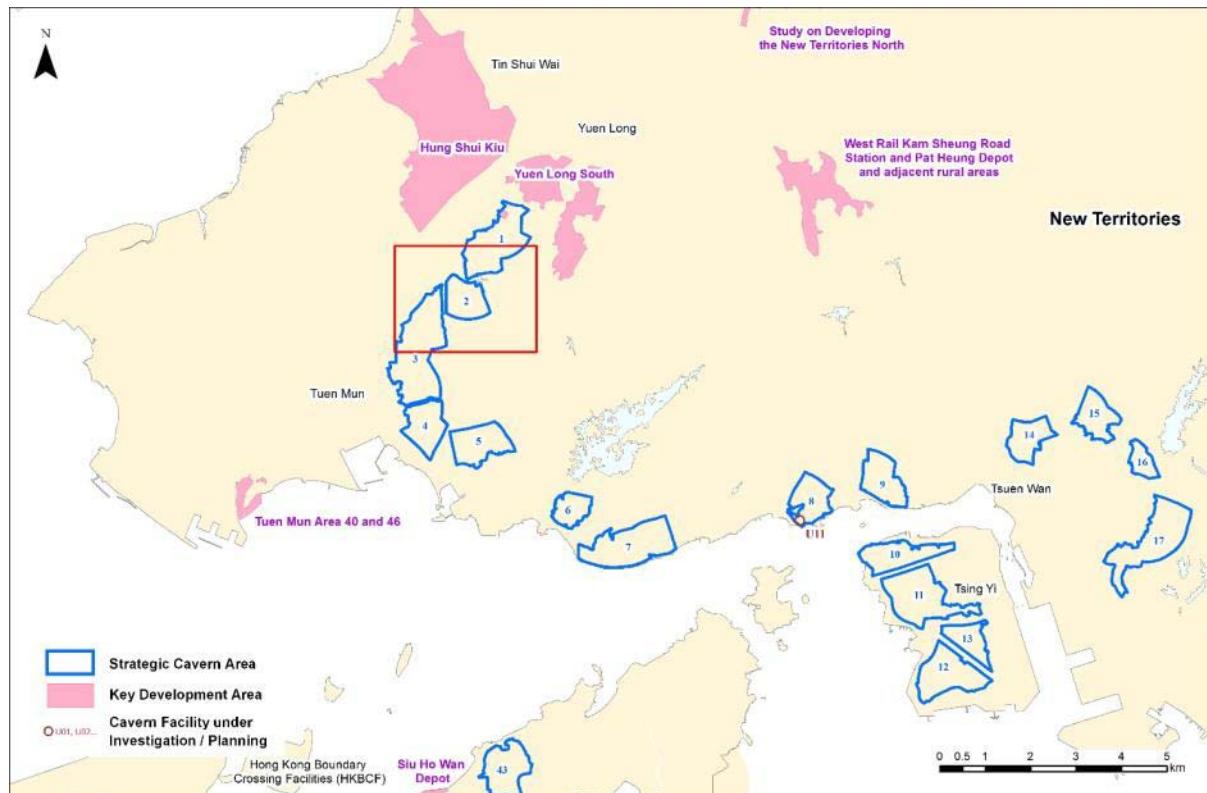


DRAFT**CAVERN MASTER PLAN – INFORMATION NOTE****STRATEGIC CAVERN AREA NO. 02 – LAM TEI**

This Information Note describes the characteristics, key development opportunities and constraints of Strategic Cavern Area No. 02 (Lam Tei SCVA). It indicates the potential land uses suitable for cavern development within the area, but would not pre-empt other possible land uses put forward by project proponents with justifications. It also denotes the extent of potential portal locations. The spatial context of the SCVA is illustrated in the Reference Drawing appended to this Information Note.

Reference should be made to the Explanatory Statement of the Cavern Master Plan for its background and purposes, as well as the definition and delineation criteria of Strategic Cavern Area.

1. Location Plan



2. Strategic Cavern Area Details

Outline Zoning Plan:	Lam Tei & Yick Yuen
Area:	69.8 ha
Maximum elevation in SCVA:	+293 mPD
Minimum elevation in SCVA:	+31 mPD

3. District Context

Location

This SCVA is located in the western part of the New Territories. To the north and northeast of the SCVA are the Hung Shui Kiu New Development Area (HSKNDA) and Yuen Long South Potential Development Area (YLSPDA) respectively. The northern part of Tuen Mun New Town is located to the west of the SCVA. The SCVA encroaches onto Tai Lam Country Park at its southern and eastern portions.

The SCVA is generally hilly with maximum elevation of about +293 mPD. It partially overlaps in the northern side with the Lam Tei Quarry, which has been scheduled to cease operation in 2022. The Preliminary Land Use Study for Lam Tei Quarry and the Adjoining Areas is scheduled to commence in Q2 2016. In the proximity of the SCVA, there are a number of key Government, Institution or Community (G/IC) facilities, including Yuen Long Fresh Water Service Reservoir and Yuen Long Water Treatment Works (about 700 m to the north of the SCVA boundary), Tuen Mun Fresh Water Primary Service Reservoir (about 250 m to the west of the SCVA boundary), Tuen Mun Water Treatment Works (about 700 m to the west of the SCVA boundary) and Lingnan University (about 600 m to the west of the SCVA boundary). The areas to the north and northwest of the SCVA are mainly residential developments including a number of local village settlements, the nearest of which is Fu Tei Ha Tsuen (about 300 m to the northwest of the SCVA boundary).

Access

The SCVA is accessed from its northern edge via the access road on the west of Lam Tei Quarry that connects to Fuk Hang Tsuen Road. Regional connections could be routed through the nearby Yuen Long Highway, Tuen Mun Highway and Castle Peak Road, which are located to the north and northwest of the SCVA.

The MTR Light Rail Transit runs along Castle Peak Road and the nearest station is Lam Tei Station, which is around 1 km to the northwest of the SCVA. Siu Hong Station of the MTR West Rail Line is located about 1.3 km to the west of the SCVA, which connects Lam Tei to Kowloon. An additional MTR West Rail Line station is being planned at the Hung Shiu Kiu NDA under the respective study, which is about 2 km to the northwest of the SCVA boundary.

Land Use Zoning

Under the Approved Lam Tei & Yick Yuen Outline Zoning Plan (OZP) No. S/TM-LTYY/8, the northern part of the SCVA is zoned “Green Belt” and “Other Specified Uses” annotated “(Quarry)”, which is essentially part of the Lam Tei Quarry. The remainder of the area is not covered by any Statutory Plan and is designated as country park. The zoning of the surrounding areas includes “Green Belt” and isolated “G/IC” to the west, with the rest being the Tai Lam Country Park.

For details of the latest land use zonings, please refer to the Town Planning Board website (<http://www.tpb.gov.hk>).

There is currently no existing or planned cavern facility within the SCVA.

4. Summary of Characteristics of Strategic Cavern Area

4.1 Boundary

The northern boundary of the SCVA is defined by the southern quarry face of Lam Tei Quarry. The eastern and western boundaries of the SCVA are defined by the Lam Tei Irrigation Reservoir, the Hung Shui Hang Irrigation Reservoir, the connecting rivers and valley topography. The southern boundary of the SCVA is extended to a distance of 800 m from the extent of potential portal locations to satisfy the prescriptive fire safety requirements.

4.2 Geology

The solid geology of the SCVA is fine-grained granite, which belongs to Tai Lam Granite. The SCVA is within a rock type suitable for cavern development with a number of geological features, such as faults and isolated dykes, identified within and in areas surrounding the SCVA. The excavated fine-grained granite within the SCVA is suitable for reuse as construction aggregate.

Further geological information of the SCVA can be found in the published 1:20,000-scale Geological Map Sheet 6 (Yuen Long) published by the Geotechnical Engineering Office, Civil Engineering and Development Department.

4.3 Planning

The SCVA is close to the existing urban development (Tuen Mun New Town) and the proposed key development areas (Lam Tei Quarry, HSKNDA and YLSPDA). There is demand for land in these areas to support potential urban expansion as well as proposed new developments. The surrounding area is also well connected by several highways and railways to the rest of the territory.

The northern part of Tuen Mun New Town, located to the west of the SCVA, is a local hub of high-density residential developments, e.g. Fu Tai Estate, mixed with G/IC facilities (e.g. hospitals, water treatment works, service reservoirs, schools, etc.). The SCVA will be able to provide the solution space to support potential expansion of Tuen Mun New Town, for example, by relocating some of the suitable government facilities into caverns thereby releasing surface land for other beneficial uses, e.g. residential developments and community facilities. This could also help to improve the quality of the built environment for more effective utilisation of land resources in Tuen Mun New Town.

The SCVA is immediately adjoining Lam Tei Quarry, which has been scheduled to cease operation in 2022. Project proponents should take into account the findings of the Preliminary Land Use Study for Lam Tei Quarry and the Adjoining Areas. The development of the SCVA could be integrated with that of Lam Tei Quarry to bring about greater synergy effects and opportunities for future development. The SCVA could also be used to house those supporting infrastructure facilities that are required by the key development areas in Hung Shui Kiu and Yuen Long South. In particular, it is considered suitable for housing ‘Not In My Backyard’ (NIMBY) type facilities, such as refuse transfer station or sewage treatment works, to minimise the nuisance to the community.

Given the convenient access provided by the quarry site, there is a potential to carry out underground quarrying in the SCVA if there is a significant time lapse between the cessation of surface quarry operation and planned development of Lam Tei Quarry. The afteruse of the cavern space formed by underground quarrying should be taken into account at its planning and operation stage. The cavern so formed could be utilised to support future development of Lam Tei Quarry and its adjoining area.

4.4 Environment

Key environmental constraints on cavern development in the SCVA are the nearby school (e.g. Lingnan University), residential areas (e.g. Fu Tei Ha Tsuen), surrounding burial grounds, as well as water courses passing through and in close proximity (i.e. Hung Shui Hang and Lam Tei irrigation reservoirs). In addition, two traditional burial grounds and the Fu Tei Ha Tsuen Site of Archaeological Interest are located at the northwest of the SCVA. A significant portion of the SCVA also encroaches onto Tai Lam Country Park and partly encroaches onto the Water Gathering Grounds. These environmental constraints should be taken into account in cavern development proposals under the Environmental Impact Assessment Ordinance (EIAO) and other relevant ordinances, such as the Country Parks Ordinance, which may impose restrictions to the cavern projects. Project proponents are required to take into account the potential environmental constraints when planning each cavern development project and undertaking the environmental impact assessment under the EIAO to determine its environmental acceptability, potential environmental impacts and environmental mitigation measures required.

4.5 Traffic

Currently, the only direct access to the SCVA is through Lam Tei Quarry, which is further connected to Castle Peak Road through Fuk Hang Tsuen Road. The future development of Lam Tei Quarry, the proposed Tuen Mun Eastern Bypass and proposed Route 11 should provide access roads to the SCVA. In this regard, the development of the SCVA could be integrated with that of the Lam Tei Quarry and proposed major road network to minimise the interfacing issues. Project proponents can refer to the latest available information, including road layout, to bring about greater synergy for future development. Road widening along Fuk Hang Tsuen Road may be needed to cope with the additional traffic demand from the development of the SCVA.

The SCVA is connected to the Tuen Mun New Town by local roads. The SCVA is also connected to Yuen Long Highway and Kong Sham Western Highway via the Lam Tei Interchange, which is 1.3 km to the northwest of the SCVA boundary. This allows for road network connection to the northwest New Territories, Shenzhen and in the future, Lantau via the Tuen Mun – Chek Lap Kok Link.

The proposed possible alignment of Tuen Mun Eastern Bypass and Route 11 which link to Yuen Long and Lantau Island may encroach onto the SCVA. The development of the SCVA shall consider the proposed traffic network as well.

4.6 Other Key Issues / Constraints on Cavern Development

There are pylons and overhead power lines running above the SCVA. In addition, a Water Supplies Department tunnel, the Tai Lam Chung Supply Tunnel to the Tuen Mun Water Treatment Works, is approximately 400 m southwest of the southwestern boundary of the SCVA. Owing to elevation difference, the pylons, overhead power lines and the tunnel would not pose any conflicts or insurmountable constraints to the cavern development within the SCVA.

Conversely, there will be interfacing issues in case the development of the SCVA could not be integrated with that of Lam Tei Quarry. Project proponents should take into account the future development and potential land uses of Lam Tei Quarry under the preliminary land use study by the Government.

5. Potential Land Uses

The potential land uses for the SCVA are as follows:

Land use*	Description
Service reservoir	<p>With the significant population growth planned for the adjacent key development areas, such as Lam Tei Quarry, Hung Shui Kiu (estimated to be about 215,000 population upon full development) and Yuen Long South (estimated to be about 80,200 upon full development), as well as the potential expansion of Tuen Mun New Town, additional infrastructure facilities, such as service reservoirs, may be needed.</p> <p>Existing service reservoirs are found in the vicinity of the SCVA. Expansion and/or relocation of these facilities may be considered necessary.</p>
Sewage/Water treatment plant	<p>For the same reason as described above, additional infrastructure facilities, such as sewage/water treatment plants, may be needed.</p> <p>The extent of potential portal locations of this SCVA is not adjacent to existing residential developments, which may minimise the possible adverse environmental impacts on the adjacent residential neighbourhood.</p>

Land use*	Description
Refuse transfer station	<p>For the same reason as described above, additional infrastructure facilities, such as refuse transfer stations, may be needed.</p> <p>The extent of potential portal locations of this SCVA is not adjacent to existing residential developments, which may minimise the possible adverse environmental impacts on the adjacent residential neighbourhood.</p>
Underground Quarrying	<p>The SCVA is adjoining the Lam Tei Quarry site, the site setting and its convenient access are favourable for underground quarrying operation. The rock type is suitable for aggregate production. There is a potential for underground quarrying if there is a significant time lapse between the cessation of surface quarry operation and planned development of Lam Tei Quarry. If the implementation could be synchronised and integrated with that of the future Lam Tei Quarry development, adverse impacts resulting from both developments may be minimised.</p> <p>There is a steady demand for aggregate production in Hong Kong and it is more sustainable to produce aggregate locally than import. The underground space so created could also be utilised to support future development of Lam Tei Quarry and should be taken into account at its planning and operation stage.</p>

Note: Zoning amendment/planning application may be required to facilitate the pursuit of the above potential land uses.

* Upon the recommendations of the Preliminary Land Use Study for Lam Tei Quarry and the Adjoining Areas, the list of potential land uses to be accommodated in the SCVA should be updated.

6. Extent of Potential Portal Locations

The SCVA is accessed from the existing quarry face at the southern side of Lam Tei Quarry which could provide easy access into the hillside for cavern development. The future development of Lam Tei Quarry should provide access roads to serve the cavern facilities. Multiple portals could be formed on the quarry face at different elevations as needed. Project proponents shall consider the latest design and capacity of the traffic network and assess whether road upgrades are required to support traffic induced by the activities associated with the cavern developments. There is no natural terrain hazard affecting the extent of potential portal locations.

The extent of the potential portal locations is shown on the Reference Drawing. Project proponents should carry out further studies on identifying specific locations of portals for the proposed cavern development.

7. Concluding Remarks

The SCVA presents an opportunity for locating suitable land uses in rock cavern to serve the neighbouring existing and proposed residential communities (e.g. by housing service reservoirs). It also has the potential to house ‘NIMBY’ facilities (e.g. sewage treatment plants) to minimise the nuisance to the community. The SCVA could integrate with the development of Lam Tei Quarry by accommodating underground quarrying which will provide local rock resources. Project proponents for cavern development should take due consideration of the existing and proposed residential developments, environmentally sensitive features, accessibility for cavern development including the proposed Tuen Mun Eastern Bypass and Route 11, and findings of the Preliminary Land Use Study for Lam Tei Quarry and the Adjoining Areas, to minimise the interfacing issues and bring about greater synergy and opportunities.

8. Notes

The Cavern Master Plan and all supporting documents do not exempt any cavern development projects from the relevant statutory and planning requirements. Information including the potential land uses and the extent of potential portal locations indicated in this Information Note should serve as reference materials only. In formulation of development proposals, project proponents should conduct the necessary studies and assessments relevant to each project stage. Reference should be made to the “Implementation” section of the Explanatory Statement of the Cavern Master Plan for further details.

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