



Enhancing Land Supply Strategy

RECLAMATION OUTSIDE VICTORIA HARBOUR and **ROCK CAVERN DEVELOPMENT**

Executive Summary on Final Report
for Rock Cavern Development



Civil Engineering Development
Department

**Agreement No. 9/2011 Increasing
Land Supply by Reclamation and
Rock Cavern Development cum
Public Engagement - Feasibility
Study**

Executive Summary on Final Report
for Rock Cavern Development

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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1 Introduction

1.1 Project Background

On 30 June 2011, the Civil Engineering and Development Department (CEDD) commissioned Ove Arup and Partners HK Ltd. (Arup) as the Consultant to undertake this Feasibility Study to strive for an enhanced land supply strategy by focusing on two land supply methods, i.e. reclamation outside Victoria Harbour on an appropriate scale and rock cavern development. The Study includes a two-stage Public Engagement exercise to gauge public views and foster public's understanding and acceptance of the issues.

Land demand is influenced by various factors, including demographic change, economic performance, property market, Government policy, social needs, public expectations and nature conservation, etc. These factors and their influence to the land demand are difficult to predict, especially in relation to the long-term demand. Owing to the scarce resources of developable land in Hong Kong, ever changing land demand and the long lead time required for land production, it is the prime objective of the Government to increase the supply of developable land as a long-term strategy to cope with future development needs and to capture windfall opportunities in the fast changing market.

The Government is currently relying on rezoning, redevelopment, land resumption and redevelopment of ex-quarry sites as the major methods to supply land. However, these methods have their own challenges and problems and have been significantly affecting the Government to supply land in a timely manner. While the Government will continue to make use of these existing land supply methods, the Government is actively pressing ahead with two other land supply methods which are not commonly used in recent years, including reclamation and rock cavern development.

1.2 Objectives of Assignment

The main objectives of the assignment are to:

- a) conduct a territory-wide site search in Hong Kong to identify potential reclamation outside Victoria Harbour and rock cavern development sites to be taken forward for more detailed study based on broad technical and environmental assessment;
- b) launch a two-stage Public Engagement exercise to engage the public regarding increasing the land supply by reclamation outside Victoria Harbour on an appropriate scale and rock cavern development.

1.3 Purpose of Report

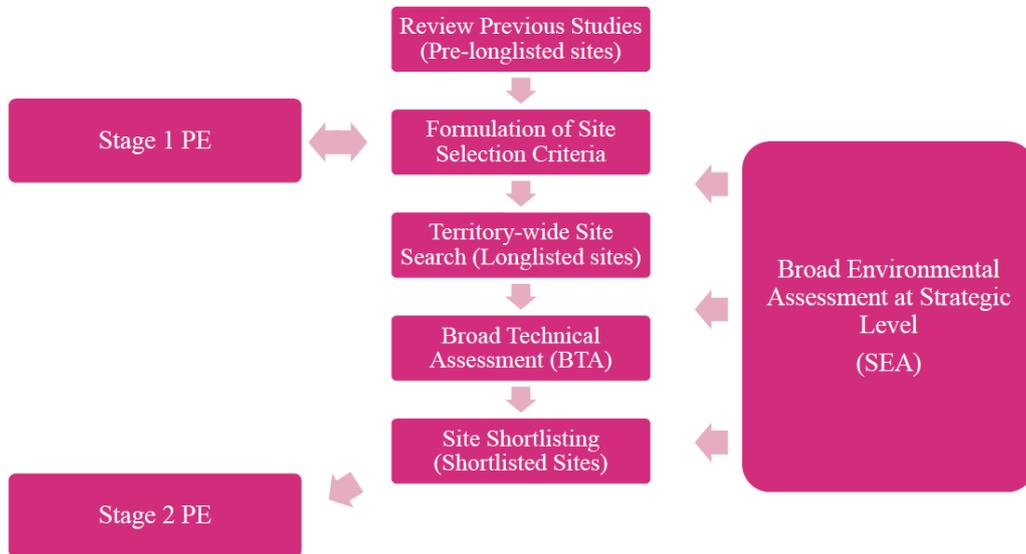
The purpose of this Final Report (Executive Summary) is to provide a brief summary on the works undertaken under the Study and the final outcome of the selection of potential rock cavern development sites.

1.4 Disclaimer

Any proposals pertaining to the extent, shape, land use, transport infrastructure, etc. for the reclamation and rock cavern development sites shown in any report, are solely hypothetical assumptions for the purpose of broad technical assessment and strategic environmental assessment only. They do not represent the extent, shape and land use and transport infrastructure to be implemented in future regardless of whether the sites are selected for further study or not. Indeed, all these development parameters will be developed based on future feasibility study, statutory process including the Environmental Impact Assessment Ordinance (EIAO), Town Planning Ordinance (TPO), etc. and public consultation.

2 Overall Site Selection Methodology

The site selection process carried out under this Study is broadly illustrated below:



Main tasks include:

- a) review of previous studies and constraints for identification of pre-longlisted sites;
- b) Stage 1 Public Engagement for formulation of initial site selection criteria (SSC);
- c) selection of longlisted sites from the pre-longlisted sites based on the initial SSC;
- d) refined Site Selection Criteria after Stage 1 PE;
- e) broad technical assessment (BTA) for the longlisted sites;
- f) site shortlisting based on the findings of BTA, refined SSC after Stage 1 PE and SEA to shortlist sites for consultation in PE2 and further detailed study; and
- g) Stage 2 Public Engagement to consult the public on the shortlisted sites.

Broad environmental assessments at a strategic level (SEA) were also carried out to provide environmental input for the entire site selection process.

3 Review of Previous Studies and Constraints

The selection criteria used in a previous Cavern Study (Agreement No. CE 66/2009 (GE) - Enhanced Use of Underground Space in Hong Kong) were chosen to identify the type of facility that can be built underground. It also includes the general suitability of land nearby to house the original facility and whether there are good connections and perceived environmental benefits of transferring the facility underground.

The ranked list of 445 sites developed in the previous Cavern Study is used as the starting point for the site search. These 445 sites were developed from the stocktaking exercise carried out in the Cavern Study and were ranked based on the criteria used in the previous study. The stocktaking was undertaken with the aim to:

- identify existing and planned above-ground government facilities that have the potential for rock cavern development
- to collect information on these facilities including: location, site area, capacity and plans for expansion / re-provision.

The types of facilities that were part of the stocktaking are cited in the Table 1 Chapter 12 of the Hong Kong Planning Standards and Guidelines (HKPSG):

- Civic centre
- Columbarium / Mausoleum / Mortuary
- Incinerator
- Indoor games/Sports hall
- Refuse transfer facility
- Sewage/Water treatment plant
- Service reservoir
- Slaughterhouse
- Transport connections & networks
- Wholesale market

As rock cavern development is highly dependent on technical feasibility. A preliminary assessment was carried out on the sites to determine if there was any overriding reason that could not be further considered. Reasons such as minimum site area, reservoir location, planned or recently completed facilities, fixed location due to Harbour Area Treatment Scheme (HATS) dropshaft are considered. Based on the above constraints and considerations and the review of previous cavern studies, a total of 78 pre-longlisted rock cavern development sites were identified. These sites are shown in **Figure 1**.

4 Stage 1 Public Engagement and Formulation of Site Selection Criteria (SSC)

The Stage 1 Public Engagement (PE1) was conducted between November 2011 and March 2012. The aim of PE1 was to seek public views on land supply by reclamation outside Victoria Harbour and rock cavern development, and the site selection criteria.

To enhance the public awareness of the PE1 exercise and to encourage public participation, a series of PE activities including public forums and roving exhibitions were organized. The consultation document, PE1 Digest, was widely disseminated to the public at various outlets including District Offices, roving exhibition counters and public forums. A web version of the PE1 Digest and a promotional video was uploaded onto the Study website.

A set of SSC initially formulated through collaboration with various government departments in a Value Management Workshop (I) was put forward for discussion in PE1.

The proposed SSC were found to be largely agreeable to the general public. For reclamation, the impacts on environment and local community are identified as being relatively more important than SSC, while for rock cavern development, the social impact, environmental impact and engineering feasibility are considered relatively more important among others. The SSC include:

Guiding Principles	For Reclamation	For Rock Cavern Development
Social Harmony & Benefits	<i>Impact on local community</i>	Social benefits at the releasing site upon relocation of existing facilities
	Site location and accessibility	<i>Social impact at the cavern development site</i>
	Meeting local needs	
Enhanced Environmental Performance	<i>Environmental impacts</i>	<i>Environmental impacts at the cavern development site</i>
	Environmental benefits	Environmental benefits in the vicinity of the releasing site upon relocation of existing facilities
Economic Efficiency & Practicality	Cost effectiveness	Cost effectiveness
	Planning flexibility	Specific requirements of facilities
	Engineering feasibility	<i>Engineering feasibility</i> Suitability of relocation based on existing facility status

Other major views, in particular for rock cavern development, collected during Stage 1 Public Engagement are summarized as follows:

- a) There was broad support for establishment of land reserve;

- b) There was broad consensus that more land required to meet the needs for providing more housing and community facilities, improving the living environment and enabling infrastructural development;
- c) There was broad support for a six-pronged approach for enhancing land supply;
- d) Impacts on the environment and local communities are the most important site selection criteria;
- e) There was broad support on rock cavern development, with some concerns on engineering feasibility and use of caverns.

The Stage 1 Public Engagement Report and Executive Summary can be found on the Study website <http://www.landsupply.hk>.

5 Selection of Longlisted Sites

5.1 Methodology

In view of the large amount of pre-longlisted sites, a longlisting exercise was carried out which was indeed a screening process to select a smaller batch of sites from the pre-longlist for further study. In the longlisting exercise, each pre-longlisted sites were subject to preliminary evaluation. Then each initial SSC is graded as A, B or C based on the preliminary assessment. These grades only provide a simplified basis for broad comparison but do not represent any absolute scoring of the sites. In this broad comparison of the sites, the more grade As that are identified for the site then the more suitable it is likely to be for further study under this Assignment. A total of 78 pre-longlisted rock cavern development (RCD) sites were thus identified.

5.2 Initial Site Selection Criteria

5.2.1 Social Benefits at the releasing site upon relocation of existing facilities

This criterion considers the social benefits that could be brought to the area around the RCD-releasing site. Issues that are considered in the exercise include the demand for space in the area surrounding the releasing site and the current land use of the releasing site. As an example, areas that are perceived as having higher demand for land are considered more suitable for relocation. However, if the current land use has a social benefit, such as a sport or recreation facility (e.g. sports ground above a reservoir) the site is seen as less favourable for relocation from a social viewpoint.

5.2.2 Social Impact at the cavern receiving site

This criterion considers the social impact that could be brought to the RCD-receiving site. Issues that are considered in the ranking exercise are the facility type that will be relocated to the area. As an example relocating a Not-In-My-Back-Yard (NIMBY) facility to a densely populated area will be ranked relatively lower due to its adverse impact to the nearby local community.

5.2.3 Environmental Benefits in the vicinity of the releasing site upon relocation of existing facilities

This criterion considers the environmental benefits that could be brought to the area around the RCD-releasing site. Undesirable facilities (e.g. refuse transfer stations, sewage treatment works) that can be relocated to cavern developments will provide large environmental benefits to the area. Facilities that currently have little impact on the environment will provide less benefit by relocating them (e.g. freshwater service reservoirs, saltwater service reservoirs).

5.2.4 Environmental Impacts at the cavern receiving site

This criterion considers the environmental impacts that could be brought to the area around the RCD-receiving site. This is determined by the proximity of the site to environmentally sensitive areas such as country parks, Sites of Special Scientific Interest and conservation areas.

5.2.5 Engineering Feasibility

This criterion considers the engineering aspects of the cavern construction and facilities relocation works. Issues that are considered in the exercise include ground condition and constraints of nearby connection.

Ground condition will affect the ease of cavern construction and hence the suitability of facilities relocation. It relates to a general review of the topography that may be suitable for cavern development in the vicinity.

5.2.6 Cost Effectiveness

The larger the area that the existing facility occupies then the greater the potential cost benefit of releasing the land for other uses.

5.2.7 Facility Specific Requirements

This criterion considers any facility specific requirements such as operation and maintenance requirements that may require special space-saving and operational technology in addition to general engineering requirements.

5.2.8 Suitability of Relocation based on existing facility status

The status of the facility is based upon that as reported by the various government departments. It was considered that there was greater merit in considering the facility for placement into a cavern if it was to be replaced / expanded or upgraded or if there were plans for a new facility.

5.3 Longlisted Sites

The pre-longlisted rock cavern development sites have been evaluated under each of the initial SSC outlined above. 21 rock cavern development sites are selected to form the longlisted sites as shown in **Figure 2**.

6 Broad Technical Assessment (BTA)

Broad technical assessments were carried out for the longlisted sites, which included the following key aspects:

- a) land use, urban planning and urban design;
- b) geotechnical appraisal;
- c) broad environmental assessment;
- d) traffic impact assessment;
- e) civil works (e.g. water, drainage, sewage, etc.);
- f) sustainability assessment;
- g) implementation, construction and costing.

Any proposals pertaining to the extent, shape, land use, transport infrastructure, etc. for the rock cavern development sites shown in any report, are solely hypothetical assumptions for the purpose of broad technical assessment and strategic environmental assessment only. They do not represent the extent, shape and land use and transport infrastructure to be implemented in future regardless of whether the sites are selected for further study or not. Indeed, all these development parameters will be developed based on future feasibility study, statutory process including EIAO, TPO, etc. and public consultation.

7 Site Shortlisting

7.1 Methodology

Site shortlisting is to select shortlisted sites from the longlist by qualitative assessment based on the results of BTA and the refined SSC. This shortlisting process is to select sites that have higher potential for consultation with the public in PE2 and further detailed study. The detailed feasibility of any of these sites will need to eventually go through separate feasibility study, statutory process including EIAO, TPO, etc. and public consultation.

A qualitative review of the sites was undertaken which summarise the potential constraints and issues for each site. Mitigation measures are also suggested.

With reference to the feedback from PE1, the shortlisting exercise initially considered the environmental and local community constraints as well as the engineering feasibility associated with each site as these are considered by the public to be the three crucial criteria.

The selected sites are then assessed with reference to other key considerations revealed from the Broad Technical Assessment. These may include but are not limited to development potential and adjacent planning.

A qualitative assessment was then completed by assessing the potential impacts and proposing mitigation measures for each of the influencing factors outlined in the review.

The shortlisted sites were taken forward for consultation in PE2, while the remaining sites may be studied further if opportunities arise in the future.

Priority is given to relocation of those NIMBY facilities near urban or developed areas, thus creating synergy with the surrounding areas. It avoids selecting those facilities already with recreational or leisure uses as far as possible. Owing to technical constraints or unavailability of suitable cavern sites, the feasibility of relocating some large facilities such as water treatment works should be subject to further studies.

7.2 Summary of Shortlisted Sites

Based upon the site shortlisting exercise, the following three pilot schemes for rock cavern development are shortlisted:

- (1) Sai Kung Sewage Treatment Works;
- (2) Sham Tseng Sewage Treatment Works;
- (3) Diamond Hill Fresh Water and Salt Water Service Reservoirs.

These shortlisted sites for rock cavern development were taken forward for consultation in PE2, while the remaining sites may be studied further if opportunities arise in the future.

The following section provides a qualitative description of each of the shortlisted sites, summarising the potential constraints and issues with reference to the Broad Technical Assessment undertaken for each site.

7.2.1 Sai Kung Sewage Treatment Works

Sai Kung Sewage Treatment Works is at approximately +6mPD elevation. Key issues for this site include:

- Potential interface issues with the adjacent marine helipad and industrial workshops
- Potential ecological impact on Tsiu Hang Special Area

Major opportunities and constraints of this site is shown in **Figure 3**.

7.2.2 Sham Tseng Sewage Treatment Works

Sham Tseng Sewage Treatment Works is at approximately +5mPD elevation. Key issues for this site include:

- Potential interface issues with the nearby Garden Bakery factory, and road traffic noise from Castle Peak Road

Major opportunities and constraints of this site is shown in **Figure 4**.

7.2.3 Diamond Hill Fresh Water and Salt Water Service Reservoirs

Diamond Hill Fresh Water Service Reservoir is adjacent to the Diamond Hill Salt Water Reservoir. They are at approximately +89mPD elevation. Key issues for this site include:

- Chimney emission from the nearby hospitals, and road traffic noise from the adjoining roads

Major opportunities and constraints of this site are shown in **Figure 5**.

8 Stage 2 Public Engagement

Stage 2 Public Engagement (PE2) was conducted between 21 March 2013 and 21 June 2013. The aim of PE2 was to seek public views on the possible land uses for the shortlisted sites as well as the areas of concern to be addressed in future technical studies.

To enhance the public awareness of the PE2 exercise and to encourage public participation, a series of PE activities including public forums and roving exhibitions were organized. The consultation document, PE2 Digest, was widely disseminated to the public at various outlets including District Offices, roving exhibition counters and public forums. A web version of the PE2 Digest was uploaded onto the Study website.

The Panel on Development of the Legislative Council was consulted on 23 April 2013. Government representatives attended a Special Meeting of the Panel on 1 June 2013 to listen to the views of the deputation. Seven District Councils, in which constituencies the five potential reclamation sites and three rock cavern development sites and the possible artificial islands are located, were also consulted, amongst other stakeholders including green groups, local concerns groups and residents' groups.

The Stage 2 Public Engagement Report and Executive Summary can be found on the Study website <http://www.landsupply.hk>.

Public views on initiatives of rock cavern development was expressed under PE1 and mentioned in the Section 4.

Key findings from PE2, in particular for rock cavern development, include:

- a) As for the three shortlisted sites for rock cavern development, residential development (in particular public rental housing), public parks, and recreational or leisure facilities were three possible land use that received the most support. Major concerns about the pilot schemes were mainly related to the environment, transportation and safety.

9 Conclusion

Three rock cavern development sites have been selected under this Study through a site selection process, which include:

- a) identification of pre-longlisted sites based on review of previous studies and constraints;
- b) selection of 21 longlisted sites from the pre-longlisted sites based on the initial SSC consulted in Stage 1 Public Engagement;
- c) broad technical assessments (BTA) for the 21 longlisted sites;
- d) site shortlisting to shortlist 3 potential rock cavern development sites from the 21 longlisted sites based on the refined SSC and the findings of BTA for further detailed study;
- e) Broad environmental assessments at a strategic level were carried out to provide environmental input for the entire site selection process.

The three shortlisted rock cavern development sites are:

- (1) Sai Kung Sewage Treatment Works;
- (2) Sham Tseng Sewage Treatment Works;
- (3) Diamond Hill Fresh Water and Salt Water Service Reservoirs.

These shortlisted rock cavern development sites were taken forward for consultation in PE2, while the remaining sites may be studied further when opportunities arise in the future.

It is worth to highlight that throughout the entire site selection process under the Study, different environmental and other technical issues of all the sites assessed, including the shortlisted sites, have been identified. It is important that the shortlisted sites are required to go through feasibility study, statutory process including EIAO, TPO, etc. and public consultation for the shortlisted rock cavern development sites in future to confirm their acceptability.

The government may carry out further detailed studies, statutory process including EIAO, TPO, etc. and public consultation for the shortlisted rock cavern development sites, during which the development parameters, cavern releasing sites location, mitigation measures, etc. will be developed and further discussed with the public.

Figures

Figure 1 Pre-longlisted RCD sites

Figure 2 Recommended Longlisted Sites for Rock Cavern Development

Figure 3 Development Constraints and Opportunities (Sai Kung Sewage Treatment Works)

Figure 4 Development Constraints and Opportunities (Sham Tseng Sewage Treatment Works)

Figure 5 Development Constraints and Opportunities (Diamond Hill Fresh Water and Salt Water Service Reservoirs)