



**Water Supplies Department
The Government of the Hong Kong Special Administrative Region**

Integration of Siu Ho Wan and Silver Mine Bay Water Treatment Works

PROJECT PROFILE

June 2006

CONTENTS

	Page No.
1. BASIC INFORMATION	1
2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME	2
3. POSSIBLE IMPACT ON THE ENVIRONMENT	3
4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT	6
5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS.....	7
6. USE OF PREVIOUSLY APPROVED EIA REPORTS	10

Appendices

- Appendix I Location Plan
- Appendix II Proposed Mains Laying Works at Siu Ho Wan Water Treatment Works
- Appendix III Proposed Mains Laying Works at Silver Mine Bay Water Treatment Works
- Appendix IV Longitudinal Profile of Proposed Fresh Water Transfer Tunnel
- Appendix V Location of Sensitive Receivers

1. BASIC INFORMATION

1.1 Project Title

- 1.1.1 Integration of Siu Ho Wan and Silver Mine Bay Water Treatment Works (which is hereafter referred to as the “Project”)

1.2 Purpose and Nature of the Project

- 1.2.1 At present, fresh water supply to Tung Chung, Tai Ho, Siu Ho Wan, Discovery Bay, Hong Kong International Airport and Disney Theme Park at North Lantau is provided solely from Siu Ho Wan Water Treatment Works that has a nominal capacity of 150,000m³/day. There is no alternative source of supply to these areas. Existing development and future tourist attractions planned in North Lantau are vital to the economy and tourism industry of Hong Kong. To reduce the risk of water supply interruptions, it is essential to provide an alternative source of fresh water supply to these areas.
- 1.2.2 The purpose of this Project is to integrate the water supply systems of Siu Ho Wan and Silver Mine Bay Water Treatments Works to enable the transfer of 150,000m³/day of fresh water from Silver Mine Bay Water Treatment Works to North Lantau if needed and the transfer of 150,000m³/day of fresh water from Siu Ho Wan Water Treatment Work to Silver Mine Bay for supply to Mui Wo, Outlying Islands and Hong Kong West as an alternative source to reduce the risk of water supply interruptions.
- 1.2.3 The scope of the Project comprises the followings:
- Construction of a fresh water transfer tunnel, approximately 7.1km long with 2m inside diameter (2.8m outside diameter) from Siu Ho Wan Water Treatment Works to Lai Chi Yuen Tsuen at Silver Mine Bay;
 - Laying of water mains from the north portal of the transfer tunnel to Siu Ho Wan Water Treatment Works; and
 - Laying of water mains from the south portal of the transfer tunnel to Silver Mine Bay Water Treatment Works.

1.3 Name of Project Proponent

- 1.3.1 Water Supplies Department (WSD)

1.4 Location of Project and Scale of Project and History of Site

- 1.4.1 The project site is located at Lantau Island between Silver Mine Bay and Siu Ho Wan. The location and longitudinal profile of the proposed water transfer tunnel and water mains are shown in Appendices I, II, III and IV.
- 1.4.2 The proposed water mains to be laid within Siu Ho Wan Water Treatment Works falls within an area zoned “Other Specified Uses” annotated for “Water Treatment Works” in the Siu Ho Wan Layout Plan No. L/I-SHW/1.
- 1.4.3 The proposed tunnel portal at Siu Ho Wan will be located at the boundary of the

proposed Lantau North Lantau (Extension) Country Park. The proposed water transfer tunnel will then pass through the proposed Lantau North (Extension) Country Park, Lantau North Country Park and Lantau South Country Park.

- 1.4.4 The proposed tunnel portal at Lai Chi Yuen Tsuen falls within an area zoned “Green Belt” in the Mui Wo Fringe Outline Zoning Plan No. S/I-MWF/6. The proposed water main to be laid within Silver Mine Bay Water Treatment Works is zoned as G/IC.
- 1.4.5 The proposed fresh water transfer tunnel between Siu Ho Wan and Silver Mine Bay will be constructed by Tunnel Boring Machine Tunnelling Method or Drill and Blast Tunnelling Method or a combination of the two methods. The environmental effects of these methods will be examined in the EIA study. The proposed temporary works area is located near the tunnel portal at Siu Ho Wan Water Treatment Works in order to minimize nuisances to the surrounding environment. After excavation of the tunnel, the steel pipeline will be placed into position in sections in the tunnel and welded together. Cast-in-situ concrete lining will be constructed between the steel pipeline and tunnel face. The proposed fresh water mains at Siu Ho Wan and Silver Mine Bay will be laid using the conventional method of trench excavation and backfilling. The estimated total quantity of excavated materials is approximately 60,000m³, which comprises mainly rock fragments.

1.5 Number and Types of Designated Projects to be Covered by the Project Profile

- 1.5.1 One designated project is covered by this project profile. The project profile was prepared in accordance with Annex 1 of the Technical Memorandum on the Environmental Impact Assessment Process (EIAO-TM). This Project is classified as Designated Project (DP) under the category Q.1 of schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) Cap. 499 as the proposed alignment of the fresh water transfer tunnel falls within the boundaries of the North Lantau (Extension) Country Park, the existing North Lantau Country Park and the Lantau South Country Park.

1.6 Name and Telephone Number of Contact Person

- 1.6.1 Mr. Lawrence P.W. POON, Senior Engineer/Consultants Management (1), Water Supplies Department
Telephone No.: 2634 3502

2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Responsibilities of Parties

- 2.1.1 WSD is the Project Proponent with overall responsibility for the planning, design, construction and operation of the Project. The Project Proponent will commission Consultant(s) to undertake the engineering design and to conduct an Environmental Impact Assessment (EIA) study. The project will be undertaken by Contractor(s) to be appointed by the Project Proponent at the subsequent stage.

2.2 Project Time Table

- 2.2.1 Investigation and detailed design consultants will be appointed in September 2006 and October 2008 respectively. The investigation and detailed design of the Project will be carried out between September 2006 and May 2009. Tendering of the construction works will be carried out between May and October 2009. Construction is tentatively scheduled to commence in October 2009 for completion in March 2012.
- 2.2.2 Interaction with broader programme requirements or other proposed/committed projects (all of which are subject to confirmation by the relevant project proponents) that shall be considered in the EIA study include:
- Lantau Logistic Park Development
 - Infrastructure connecting the Hong Kong-Zhuhai-Macao Bridge with NLH
 - Transport hub on top of the existing Siu Ho Wan MTR Depot.
 - Extension of the Siu Ho Wan Water Treatment Works
 - Upgrading works for Siu Ho Wan Sewage Treatment Works
 - Salt water pumping station intake at Ta Pang Po
- 2.2.3 In particular, the construction of water supply facilities for the Lantau Logistics Park will take place at similar time in adjacent area. The relevant cumulative impacts will be thoroughly examined in the EIA study.

3. POSSIBLE IMPACT ON THE ENVIRONMENT

3.1 Construction Phase

The likely environmental impacts of the proposed works that may arise during the construction phase are described below:

Noise

- 3.1.1 The main potential construction noise impacts will be related to the noise emitted from the powered equipment and machineries such as tunnel boring machines, breakers, excavators, lorries and cranes. The noise sensitive receivers in the vicinity of the construction sites (particularly near both tunnel portals and the pipe connections to the water treatment works) as listed in Table 4.1 may be affected by the construction works.
- 3.1.2 With the adoption of the recommended mitigation measures such as using silent equipment and noise barriers during the construction phase, it is expected that the potential impacts will be reduced to acceptable levels in accordance with the Technical Memorandum on EIAO Process requirements.

Air Quality

- 3.1.3 Dust will be generated from the construction activities, in particular from the site formation of the tunnel portals and the removal of the excavated spoil. The resident sensitive receivers as listed in Table 4.1 may be affected.

Water Quality

- 3.1.4 The key potential water quality impact resulting from the construction works will be mainly related to construction site runoff and drainage, debris, refuse and liquid spillages from general construction activities and sewerage effluent from the construction workforce. Appropriate mitigation measures in accordance with the Water Pollution Control Ordinance and the Technical Memorandum “Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters” will be adopted.

Waste Management

- 3.1.5 Wastes generated from the construction works are likely to include site wastes, workforce wastes, chemical wastes, construction and demolition materials, and excavated materials. Such wastes generated by the construction activities will be properly collected, handled and disposed of according to the Waste Disposal Ordinance.

Ecology

- 3.1.6 This Project is likely to cause concern on the ecological aspect as the proposed alignment of the fresh water transfer tunnel falls within the boundary of the country park area. However, the proposed tunneling construction method for the Project will avoid any disturbance or adverse impact on the ecologically sensitive areas within the country parks.
- 3.1.7 The southern end of the proposed tunnel will be terminated at the boundary of Lai Chi Yuen Tsuen in the vicinity of the existing Silver Mine Bay Portal. The proposed fresh water pipeline between the Portal and the Silver Mine Bay Water Treatment Works will be laid in parallel and alongside the existing DN1200 raw water supply pipeline. Such arrangement will avoid extensive removal or transplantation of trees and minimize any significant impacts on vegetation cover. However, measures to minimize the tree felling impacts and to preserve as many trees (in particular *Ficus variegata* var. *chlorocarpa*) as possible will be proposed in the EIA study.
- 3.1.8 The proposed northern tunnel portal will be located adjacent to the existing Siu Ho Wan Raw Water Tunnel Portal. The proposed fresh water pipeline will leave the Portal and follow the existing access road to the Siu Ho Wan Water Treatment Works. It is anticipated that there will be no significant impact to ecology during the installation of pipeline.
- 3.1.9 The proposed temporary works area is currently covered with trees and vegetation and also there is a stream course/culvert running beneath it. During the construction phase, it is expected that there will be impact to the ecology but the impact will be locally confined. The impact to the trees and stream course/culvert will be assessed and appropriate mitigation measures will be recommended, where necessary, under the EIA study.

Landscape and Visual

3.1.10 The potential sources of landscape and visual impacts associated with the construction phase of the proposed works include site clearance and excavation works that involve the removal of existing vegetation and trees. Road users and the nearby residents and workers may be affected. Such impact will be addressed in the landscape and visual impact assessment to be carried out under the EIA study.

Cultural Heritage

3.1.11 There are some historic villages near the project area such as Lung Mei Hang, Pak Ngan Heung, Tai Tei Tong and Luk Tei Long. However, no adverse cultural heritage impact will be anticipated during construction.

Hazard to Life

3.1.12 The Silver Mine Bay and Siu Ho Wan Water Treatment Works are classified as Potentially Hazardous Installations (PHI) due to the use of liquid chlorine on site. Since part of the construction works would be carried out within the Consultation Zones of the two water treatment works, a preliminary assessment has been conducted to study the hazards associated with the Project. In carrying out the assessment, the guidelines issued by the Coordinating Committee on Land-use planning and control relating to the PHI and EIAO TM Annex 4 are applicable.

3.1.13 The proposed works will involve tunnelling construction, laying of fresh water mains between tunnel portals and the water treatment works, and connection of the proposed fresh water pipelines with existing fresh water pipelines at the treatment works. The proposed arrangement will facilitate the transfer of only fresh water between Siu Ho Wan and Silver Mine Bay Water Treatment Works. No additional chlorination facilities are therefore required.

3.1.14 The potential hazards associated with different construction methods of the water transfer tunnel will be thoroughly examined under the EIA study.

3.1.15 The construction of the pipeline alignment will be located within the consultation zones of the two water treatment works. The risks to the construction workers within these zones are:

- Large leaks of the chlorine store; and
- Small leaks outside the chlorine store.

3.1.16 The leaks of the chlorine store may be due to the rupture of chlorine drums or collapse of chlorine store. The leaks may also be caused by accidents during truck maneuvering and unloading the chlorine drums.

3.2 Operational Phase

The likely environmental impacts of the proposed works that may arise during the operational phase are described below:

Landscape and Visual

- 3.2.1 Landscape and visual impacts during operation will result from the formation of two tunnel portal structures, one at Silver Mine Bay while the other at Siu Ho Wan. With appropriate landscaping and rehabilitation of the disturbed land, no significant visual/landscape impacts due to the Project will be anticipated.

Hazard to Life

- 3.2.2 The pipeline is defined as a confined space and any work that is required to be undertaken inside it will be regulated by the Factories & Industrial Undertakings (Confined Spaces) Regulation. Only fresh water will be transported inside the pipeline and hence, the major hazards that are appropriate will include the following:
- an oxygen deficient atmosphere;
 - free flowing liquids;
 - excessive heat;
 - ground movements/earthquakes (unlikely); and
 - large rodents and wild animals (also unlikely).
- 3.2.3 The threats against the safety and health of workers will include:
- loss of consciousness arising from an increase in body temperature caused by heat stress in the environment;
 - loss of consciousness or asphyxiation arising from the lack of oxygen;
 - drowning arising from an increase in the level of liquid;
 - pipeline collapse; and
 - disease/infection.

4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

- 4.1 The Siu Ho Wan Water Treatment Works is located at the north of Lantau Island at an elevation of +30mPD, approximately 100m south of North Lantau Expressway. Adjacent to the southwest is the Siu Ho Wan Sewage Treatment Works. No other sensitive receiver is found in the vicinity of the Siu Ho Wan Water Treatment Works.
- 4.2 The Silver Mine Bay Water Treatment Works is located at the east side of Lantau Island, south of Silver Mine Bay at an elevation of +88mPD. There are some main settlements such as Lai Chi Yuen Tsuen, Wan Tsai, Round Table Village, etc near this water treatment works.
- 4.3 The proposed fresh water transfer pipeline commences at the Siu Ho Wan Water Treatment Works after a short length of buried pipe at a portal site adjacent to the existing raw water tunnel portal. The pipe tunnel runs through the proposed Lantau North (Extension) Country Park, the northeast corner of the Lantau Country Park, Lantau South Country Park and the green belt areas at Lai Chi Yuen in the western and southern fringes of the Mui Wo. A short section of buried pipe will be laid from Lai Chi Yuen Tsuen to Silver Mine Bay Water Treatment Works. The area is of rural character with existing well-wooded hillslopes and natural features. The four

recognized villages and four Residential (Group D) sites in the western fringe of Mui Wo are found to the east of the pipeline alignment according to the Mui Wo Fringe Outline Zoning Plan No. S/I-MWF/6.

- 4.4 The identified existing and planned sensitive receivers that may be affected by the proposed Project are summarized in Table 4.1. The locations of these receivers are shown in Appendix V.

Table 4.1 Summary of Representative Sensitive Receivers

No.	Sensitive Receiver	Type	Proposed Work of Environmental Concern
1	Siu Ho Wan Sewage Treatment Works	Existing sewage treatment works	Construction of tunnel portal and removal of excavated material from tunnel. Laying of pipeline from portal to Siu Ho Wan Water Treatment Works.
2	Siu Ho Wan Water Treatment Works	Existing water treatment works	
3	Proposed Lantau North (Extension) Country Park	Proposed country park	Construction of steel lined tunnel between Siu Ho Wan and Silver Mine Bay Water Treatment Works.
4	Lantau North Country Park	Existing country park	
5	Lantau South Country Park	Existing country park	
6	Green Belt Areas in Mui Wo Fringe	Existing green belt	
7	Lung Mei Tsuen Lung Mei Hang	Existing settlements	
8	Pak Ngan Heung, Mui Wo Kau Tsuen, Tai Tei Tong, Luk Tei Tong	Existing recognized villages	
9	Residential sites at Wo Tin, Pak Ngan Heung, Tsoi Yuen Tsuen, near Mui Wo Kau Tsuen, to the south of Tai Tei Tong and south-east of Luk Tei Tong villages	Planned residential sites	
10	Lai Chi Yuen Tsuen	Existing settlement	Construction of tunnel portal. Laying of pipeline from portal to Silver Mine Bay Water Treatment Works
11	Wan Tsai	Existing settlement	
12	Round Table Village	Existing settlement	

5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS

5.1 Mitigation Measures

During Construction Phase

Noise

5.1.1 The following construction mitigation measures are proposed for the construction works:

- Use of silenced type of power mechanical equipment;
- Reduction in the number of operating plant and equipment on site;
- Implementation of good house-keeping and maintenance program of the plant;
- Use of noise barriers, where necessary; and
- Use of acoustic enclosures for the power mechanical plant.

Air Quality

5.1.2 To minimize potential dust generated during the construction phase, appropriate dust control measures should be implemented in accordance with the requirements in the Air Pollution Control (Construction Dust) Regulation. These measures will include: -

- Adoption of good site practices;
- Avoid practices likely to raise dust level;
- Frequently clean and damp down stockpile and dusty areas of the site;
- Reduce drop height during material handling;
- Impose a vehicle speed restriction of 15km/h within the site;
- Regular plant maintenance to minimize exhaust emission;
- Sweep up dust and debris at the end of each shift; and
- Use of ready mixed concrete to avoid installation of on-site concrete batching plant.

Water Quality

5.1.3 During the construction phase, surface run-off would be controlled by the provision of suitable drainage services and sedimentation facilities to eliminate high levels of suspended solids from site discharge. Good site management practice should ensure that construction impacts on water quality are kept to minimum.

5.1.4 Sewage arising from construction activities will be connected to public sewerage system and thus no adverse impact will be expected. Water quality control measures recommended in the ProPECC Note PN 1/94 Construction Site Drainage will be implemented during construction phase to ensure prior collection, treatment and disposal of effluent arising from construction activities.

Waste Management

5.1.5 The waste generated by construction activities will be properly collected and disposed of according to the Waste Disposal Ordinance. The amount of construction waste generated will be minimised as far as possible. In addition, the mitigation measures are recommended for implementation as follows:

- Require the contractor to implement appropriate measures to minimize the generation of Construction and Demolition (C&D) materials and to reuse and recycle C&D materials;
- Control the disposal of public fill and C&D wastes to designated public filling

- facility and landfills respectively through a trip ticket system; and
- Record the disposal, re-use and re-cycling of C&D materials for monitoring purposes.

Ecology

- 5.1.6 The proposed sites at each of the two tunnel portals are scattered with trees and vegetations. It is expected that some trees would likely be affected during the construction phase. The trees would be preserved as far as possible in accordance with ETWB TC No. 29/2004. Proposals of tree felling/transplanting/replanting will be prepared during the EIA study.

Landscape and Visual Impact

- 5.1.7 The tunnelling construction and pipelaying works are unlikely to cause significant landscape impacts. However, the formation of the temporary tunnel boring machine launch site near the Siu Ho Wan Water Treatment Works will result in a loss of trees and woodland. Such clearance of the existing trees may also have potential visual impacts on the road users and the nearby residents and workers. The mitigation measures may include but not limited to the followings:

- Careful design of the project with an aim to preserving and protecting as many trees as possible is required; and
- Disturbed lands should be re-graded and re-vegetated with trees to compensate the anticipated tree loss.

Hazard to Life

- 5.1.8 The following active and passive measures are proposed to reduce the risk of chlorine leakage with respect to the construction workers:

Active Measures

- Limitation of working hours, number of workers in the vicinity of the water treatment works; and
- Suspension of construction work during chlorine deliveries.

Passive Measures

- Ensure correct operation of chlorine leak detection system;
- Construction of chlorine barrier between chlorine store and the pipeline construction area; and
- Enhanced emergency response arrangements, e.g. provision of audible alarms, toxic refuge, training, evacuation procedures etc.

- 5.1.9 A more in-depth hazard assessment will be undertaken in the EIA study. In addition, the original Quantitative Risk Assessment conducted on the water treatment works sites will be reviewed to consider the additional risks posed on the construction workers during the EIA study.

During Operational Phase**Hazard to Life**

5.1.10 To secure safety and health of the staff for pipeline maintenance, a safe system of work should be established as defined in the Code of Practice for Safety and Health at Work in Confined Spaces. For example, a safe system of work will include the following:

- A competent person to carry out a confined workplace risk assessment;
- Ensure that all safety precautions are carried out;
- Issue of safety certificates stating that all necessary precautions have been taken;
- Ensure work to be undertaken by certified workers only;
- Use of approved breathing apparatus and other protective equipment;
- Formulate and implement emergency procedures; and
- Provide instructions training and advice to all workers.

5.1.11 The above measures will be considered to ensure employee safety during maintenance and inspection. In addition, the following measures will be considered:

- Natural/mechanical ventilation;
- Means of escape;
- Emergency lighting; and
- Communication/alarm system.

5.1.12 As the pipeline will not be able to be inspected during operation and will need to be drained and isolated prior to allow access, personnel with the inspection responsibilities will need to be specially trained and certified with respect to working in confined spaces to be allowed to enter the pipeline.

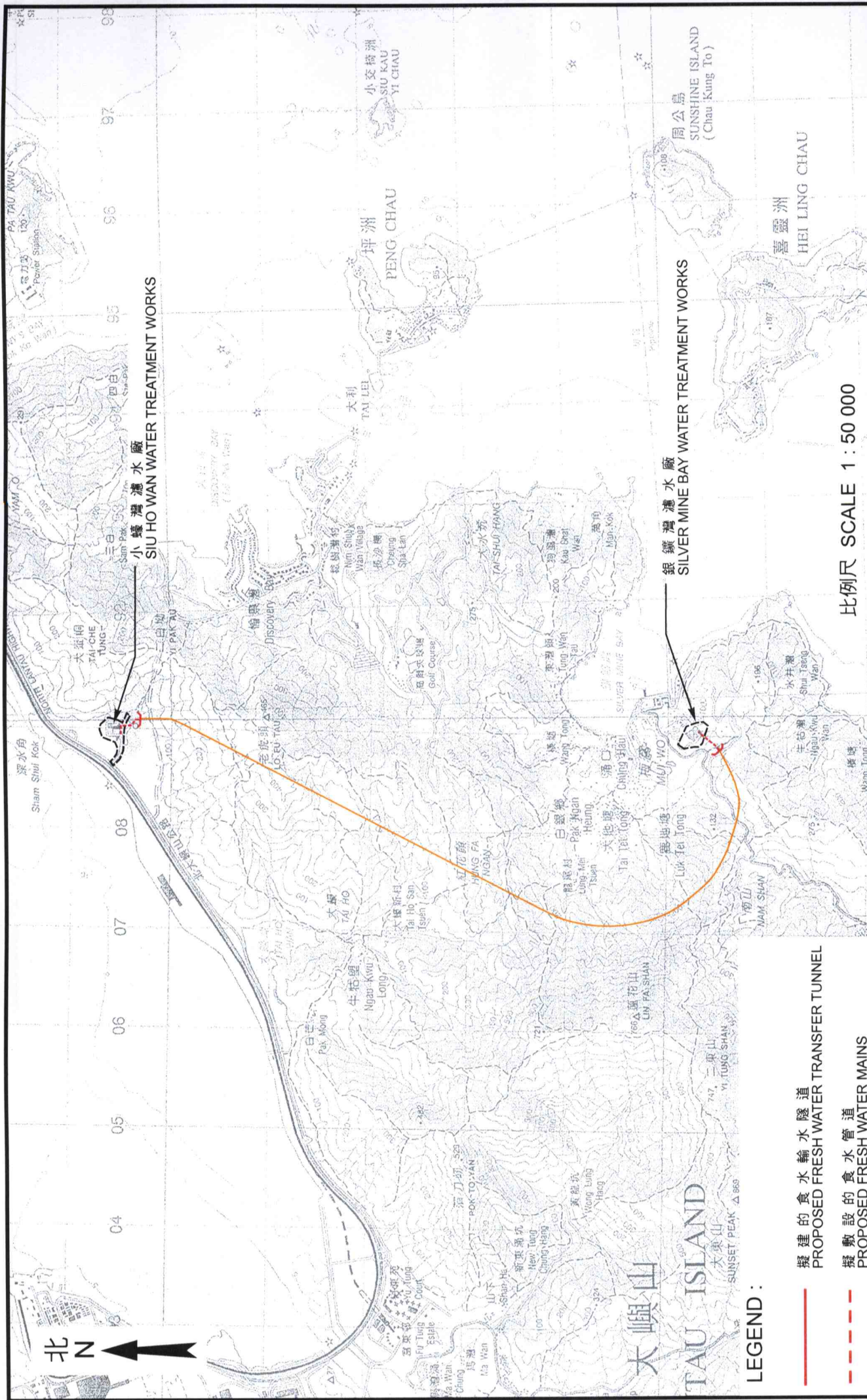
5.2 Possible Severity, Distribution and Duration of Environmental Effects

5.2.1 Potential environmental impacts identified will mainly be associated with the construction period (a period of about 30 months). As such, the effects are considered to be temporary and short term. With the implementation of appropriate mitigation measures, no insurmountable environmental impacts are expected.

6. USE OF PREVIOUSLY APPROVED EIA REPORTS

6.1 No previous EIA Report has been approved and submitted for this Project. However, the following previously approved report is relevant and will be referred to in the study:

- Extension of Siu Ho Wan Water Treatment Works: Investigation - EIA Report



小蠔灣濾水廠
SIU HO WAN WATER TREATMENT WORKS

銀鑛灣濾水廠
SILVER MINE BAY WATER TREATMENT WORKS

比例尺 SCALE 1 : 50 000

LEGEND :

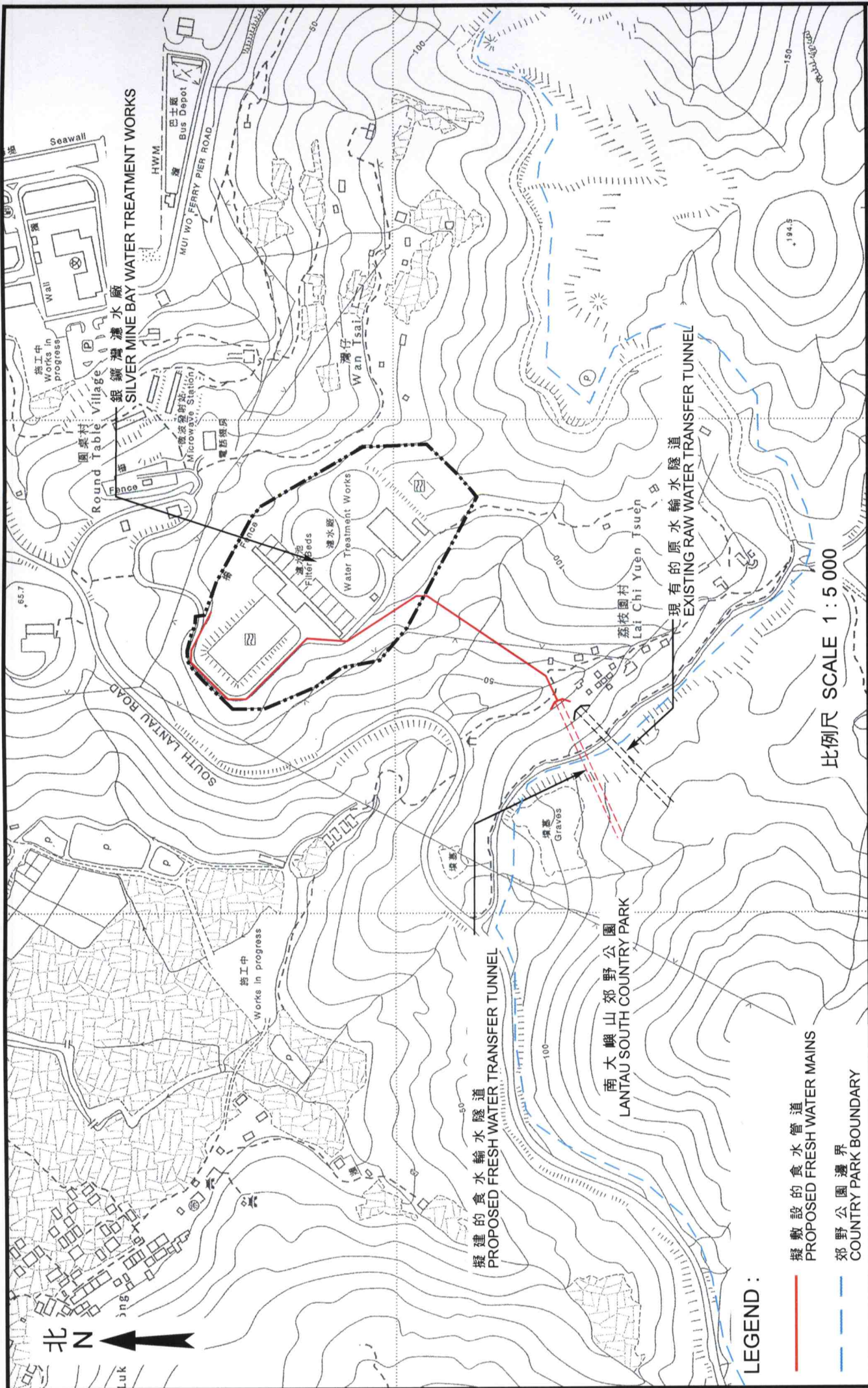
- 擬建的食水輸水隧道
PROPOSED FRESH WATER TRANSFER TUNNEL
- - - 擬敷設的食水管道
PROPOSED FRESH WATER MAINS

小蠔灣濾水廠及銀鑛灣濾水廠的整合工程 — 位置圖
INTEGRATION OF SIU HO WAN AND SILVER MINE BAY WATER TREATMENT WORKS - LOCATION PLAN



水務署
WATER SUPPLIES DEPT.

草圖編號 SK 1
SKETCH NO.




比例尺 SCALE 1 : 5 000

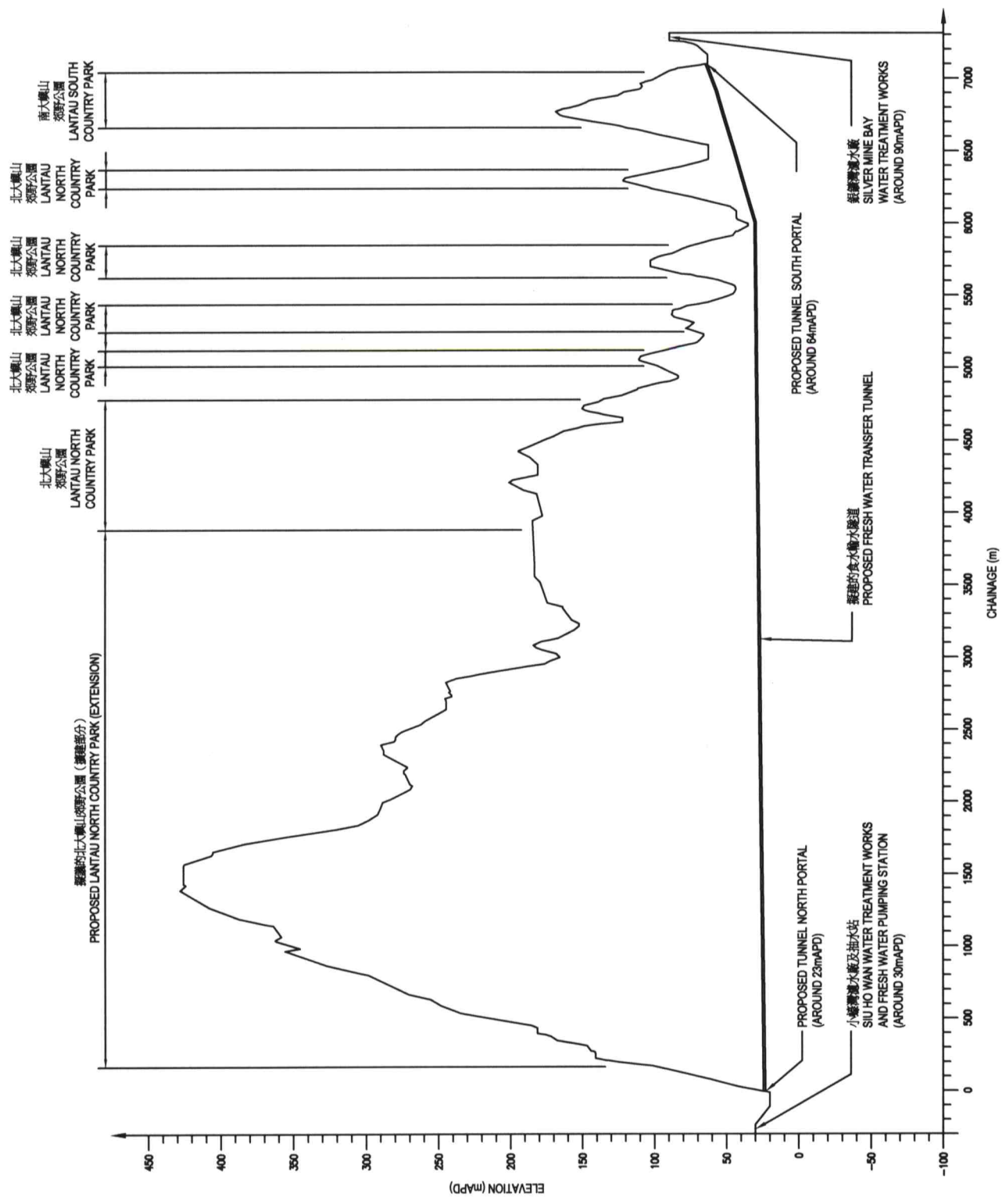
LEGEND :

- 擬敷設的食水管道
PROPOSED FRESH WATER MAINS
- - - 郊野公園邊界
COUNTRY PARK BOUNDARY

小蠔灣濾水廠及銀鑛灣濾水廠的整合工程 — 銀鑛灣濾水廠擬建的輸水幹管敷設工程
 INTEGRATION OF SIU HO WAN AND SILVER MINE BAY WATER TREATMENT WORKS -
 PROPOSED MAINS LAYING WORKS AT SILVER MINE BAY WATER TREATMENT WORKS

 水務署
WATER SUPPLIES DEPT.

草圖編號 SK 3
SKETCH NO.



小蠔灣濾水廠及銀鑛灣濾水廠的整合工程－擬建食水輸水隧道的縱斷面圖
INTEGRATION OF SIU HO WAN AND SILVER MINE BAY WATER TREATMENT WORKS -
LONGITUDINAL PROFILE OF PROPOSED FRESH WATER TRANSFER TUNNEL

