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1 INTRODUCTION

1.1 PROJECT BACKGROUND

The Planning and Engineering Feasibility Study for Sham Tseng Development (STD) commenced in 15 April 1998 having been commissioned by the Civil Engineering Office, Civil Engineering Department (CED). A Sham Tseng Development Feasibility Study (STDFS) and Sham Tseng Further Additional Studies (STFAS) were conducted in 1983 and 1985, respectively. These studies concluded that a reclamation between the former San Miguel Brewery Site and Anglers' Beach could be carried out. The preferred development layout of the STDFS was incorporated into the Tsuen Wan West Outline Development Plan No. D/TWW/2 that was endorsed by the Development Progress Committee in August 1987.

In mid-1994, the "Task Force on Land Supply and Property Prices" recommended that the reclamation site in Sham Tseng should be developed for residential use to increase residential flat supply. It also recommended that more land for Government, institution or community (G/IC) facilities and district open space should also be introduced to address the district shortage.

The Territorial Development Strategy Review, which was released for public consultation in July 1996, indicated that the housing supply in approved town plans and programmes would not be adequate to meet the estimated housing demand after 2000 / 2001. In order to increase the housing supply as well as the aspirations of local residents for G/IC facilities and district open space, CED has investigated and examined the planning and engineering feasibility of enlarging the size of the reclamation from the original proposal of 6 ha up to approximately 25 ha between the proposed Ting Kau and Sham Tseng Sewage Treatment Works and Tsing Lung Tau.

The Sham Tseng Development Project (hereafter referred to as the Project) is currently proposed to comprise an approximately 15.2 ha of reclamation along the coast between the proposed Ting Kau and Sham Tseng Sewage Treatment Works and Tsing Lung Tau. The reclamation is intended to provide land for residential development to meet the estimated housing demand after 2000 / 2001 and to address the district shortages of G/IC facilities and district open space.

1.2 STUDY PROGRAMME

The Assignment has been divided into two separate stages. Each stage was scheduled to last for nine months. Stage 1 which commenced in April 1998 involved initial planning and engineering studies, environmental planning input followed by broad assessment of associated environmental impacts of the Project and proposed preliminary mitigation measures to confirm the acceptability of the impacts. The Planning - Stage 1 Report was issued in December 1998.

Stage 2 of the study commenced in April 1999. It examined in more detail the engineering works including the preparation of the preliminary design, reviewed and updated the recommendations of Stage 1 Study, and undertook detailed assessment of the associated environmental impacts of the Project and recommended the detailed environmental mitigation measures and monitoring and audit requirements.

1.3

OBJECTIVES OF THE EIA STUDY

As stated in the Study Brief (the *Brief*), the objectives of the EIA Study are as below:

- to describe the Project and associated works together with the requirements for carrying out the Project;
- to identify and describe the elements of the community and environment likely to be affected by the Project, and / or likely to cause adverse impacts upon the Project, including both the natural and man-made environment;
- to identify and quantify emission sources and determine the severity of impacts on sensitive receivers and potential affected uses;
- to identify and quantify any environmental impacts associated with the future land uses of the proposed reclamation and recommend appropriate mitigation measures;
- to identify and quantify any potential losses or damage to flora, fauna and natural habitats;
- to identify and quantify the potential ecological and fisheries impacts associated with the Project;
- to identify existing landscape and visual quality in the Study Area so as to evaluate the landscape and visual impacts of the Project;
- to propose the mitigation measures so as to minimise pollution, environmental disturbance and nuisance during construction and operation of the Project;
- to identify, predict and evaluate the residual (that is, after practicable mitigation) environmental impacts and cumulative effects expected to arise during the construction and operation phases of the Project in relation to the sensitive receivers and potential affected uses;
- to identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operation of the Project which are necessary to mitigate these impacts and reduce them to allowable levels within established standards / guidelines;

- to identify and justify the need for environmental monitoring and audit and to define the scope of the requirements necessary to ensure the implementation and the effectiveness of the environmental protection and pollution control measures adopted;
- to investigate the extent of side-effects of proposed mitigation measures that may lead to other forms of impacts;
- to identify constraints associated with the mitigation measures recommended in the Assignment;
- to identify any additional studies necessary to fulfil the objectives to the requirements of this EIA Study; and
- to check if the proposed waterworks fall within the Potential Hazard Installations (PHI) consultation zone and recommend mitigation measures notwithstanding that the proposed works may be outside the Site.

1.4

CONSIDERATIONS OF ENVIRONMENTAL IMPACT ASSESSMENT ORDINANCE

Under the Environmental Impact Assessment Ordinance (EIAO), Environmental Permits (EPs) are issued prior to the construction of a Designated Project (DP). Under the EIAO, a person shall not construct or operate a DP listed in the Schedule 2 without an EP for the project unless it is exempt under Section 9(2) of the Ordinance.

The STD Project comprises an engineering feasibility study of an urban development project with a Study Area covering more than 20 ha and is, therefore, considered as a DP under item 1 of Schedule 3 "Major Designated Projects Requiring Environmental Impact Assessment Reports". The Project contains various Schedule 2 DPs that under the EIAO require EPs to be granted by EPD before they may be either constructed or operated. *Table 1.4a* summarises the four individual Schedule 2 DPs in this Project.

Table 1.4a *Schedule 2 Designated Projects involved in the Sham Tseng Development under the EIAO*

Designated Project	EIAO Reference	Remarks
Reclamation works (15.2 ha)	Schedule 2, Part I, C.1	Reclamation more than 5 ha in size including dredging of marine basin, pier structures and berthing facilities
Sham Tseng Bypass	Schedule 2, Part I, A.1	A primary distributor
Sewage Pumping Station (with installed capacity more than 4500 m ³ per day)	Schedule 2, Part I, F.3	With an installed capacity of more than 2000 m ³ per day and a boundary less than 150 m from the planned residential area and schools
Underpass below Castle Peak Road (about 370 m long)	Schedule 2, Part I, A.9	It is a road fully enclosed by decking above and by structure on the sides for more than 100 m

It is understood that CED intend to apply for EPs for the construction of the 15.2ha reclamation, construction and operation of the Sham Tseng Bypass, the underground sewage pumping station and the Castle Peak Road Underpass with reference to the assessment undertake in this EIA Final Report.

Other Project infrastructural works that are not considered as DPs comprise:

- Sewage Treatment Facilities for Sham Tseng Development (STFSTD) is not considered as a DP under Schedule 2, Part I, F.2 as the installed capacity will be about 4600 m³ per day (less than the 5000 m³ per day as specified in the EIAO).
- The construction and operational impacts of the planned sewage outfall, which has been assessed and reported in the *Final Assessment Report, Ting Kau and Sham Tseng Sewerage Scheme, EIA (1995)*, has been registered under the EIAO (EIA-077/BC). The proposed combined sewage outfall, which replaces the planned sewage outfall to handle additional sewage loading from the population above the STD, will not generate further adverse environmental impacts during construction and operation. Thus, it is not considered as a 'material change' under the EIAO.

2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The proposed site for the reclamation and associated works is at Sham Tseng in the New Territories ([Figure 2.1a](#) refers). The site is bounded to the east by land reclaimed for the proposed Ting Kau and Sham Tseng Sewage Treatment Works (TKSTSTW) and to the west by Dragon Beach. To the north lies Sham Tseng township. The proposed reclamation area is about 15.2 ha.

2.2 DEVELOPMENT REQUIREMENTS, SCOPE AND BENEFITS

Section 1.1 described the background to the Sham Tseng Development (STD) Project. The proposed reclamation of Sham Tseng is targeted to ease the housing supply shortfall after 2000/2001. In this regard, it is important that the development proposals optimise the development potential and supply of residential units without compromising the principles of sustainability and compatibility of adjacent land uses.

The scope of the proposed Project comprises the following:

- reclamation of about 15.2 ha of land using public filling materials and / or sand fill material supplied by the Contractors;
- construction of 1100 m seawall;
- construction of Sham Tseng Bypass (about 2400 m) including connections to the proposed widening of Castle Peak Road;
- construction of about 875 m long waterfront promenade integrated with and located above the Sham Tseng Bypass;
- construction of a government complex (as compensation of existing Anglers' Beach) to accommodate a Leisure Centre, with swimming pool and other sports facilities, and social welfare facilities;
- construction of sewage treatment facilities with a flow capacity of about 4600 m³ per day based on chemically enhanced primary treatment;
- construction of a sewage pumping station and sewerage pipework;
- construction of about 450 m of nullah and infrastructure drainage works;
- construction of about 900 m of access roads;
- construction of a footbridge;

- construction of a stub pier to replace an existing 'kaito' pier;
- diversion of an existing 200 mm diameter submarine water pipeline and extension of a 300 mm diameter water main adjacent to Castle Peak Road;
- construction of a Public Transport Terminus (PTT) and a public toilet; and
- construction of environmental mitigation measures, including roadside noise barriers.

It is estimated that the capacity of the planned TKSTSTW will not be able to handle the additional sewage discharge from the development above the STD. Sewage Treatment Facilities for Sham Tseng Development adjacent to the planned TKSTSTW is therefore proposed.

It is also estimated that a new sea front salt water pumping station will be installed in the new reclamation area to provide salt water for flushing to the development above the STD and also the existing Sham Tseng and Tsing Lung Tau areas.

2.2.1 *Development and Planning*

In April 1998, the Consultants commenced the Stage 1 Study for STD. In August 1998, a review of the findings of Stage 1 Study was held and it was concluded that the 16.3 ha reclamation layout was the preferred option, based on which planning of STD would proceed. In September 1998, a Working Group session was held among concerned departments to discuss the Bypass issues and agreed that the waterfront alignment was the preferred option pending resolution of the interface with the committed TKSTSTW. In December 1998, a Steering Group Meeting was held to discuss and finalise the Planning - Stage 1 Report which was issued in December 1998.

Stage 2 of the Study commenced in April 1999. In October 1999, a Steering Group Meeting was held to discuss and finalize the Planning - Final Report, and the finalized Planning - Final Report was issued in January 2000.

In selecting the preferred options of the reclamation area and the Bypass alignment, the following main issues have been considered:

Reclamation

- marine safety of the Ma Wan Fairway; and
- the extent of environmental impact in terms of water quality, air quality, noise and marine ecology taking account of the size and scale of the reclamation.

Sham Tseng Bypass

- the engineering feasibility;
- the potential noise and air quality impacts and mitigation measures required for the Bypass;
- the planning constraints associated with the Bypass alignment; and
- the landtake of the reclaimed land that is reserved for TKSTSTW and Electricity Sub-station (ESS).

Figure 2.2a shows five reclamation layout options considered in Stage 1 Study. The various options could provide an area of land varying from 6 ha to 25 ha. These options were evaluated during the study in August 1998. The preferred option of the reclamation layout (Option 1) provides an optimum solution to satisfy the essential criteria including community acceptance, marine safety, land production, environmental and traffic impact, infrastructure issues and urban design.

Figure 2.2b shows the four bypass alignment options that were considered. While Routes 1A and 2A are the inland alignment options and Route 4A is the waterfront alignment option, Route 3A is a combined inland and waterfront alignment option. These options were evaluated after the preferred option of the reclamation layout had been determined. The preferred Sham Tseng Bypass (Route 4A) maximises the development potential of the reclamation site while minimising environmental impacts.

As indicated in the Master Development Plan (MDP) in *Figure 2.2c*, STD will provide land for housing development, the majority of which will be for private housing and the rest for Home Ownership Scheme (HOS) or Public Sector Participation Scheme (PSPS). The potential environmental impact, including noise from road traffic and kaito pier, odour and industrial emissions from the TKSTSTW & STFSTD and the Garden Bakery have been considered. The environmental planning guidelines specified in the *Hong Kong Planning Standards and Guidelines* (HKPSG) have been observed in formulating the MDP. More than 50 m buffer distances between the planned Comprehensive Development Area (CDA) at Area 5 and the STFSTD at Area 6 have been reserved to minimise the potential noise and odour impacts. A buffer distance of more than 100 m is also provided between the reprovisioned kaito pier at the Marine Basin and the residential towers of Area 2. In addition, the residential towers at the CDA sites at Areas 4 and 5 and the residential development at Area 2 are protected from adverse road traffic noise impact along the proposed Sham Tseng Bypass by the semi-enclosure formed by the promenade above the Bypass. This promenade will extend from the Open Space at Area 6 to the western end of the reclamation.

The target plot ratio for residential site is 5 in line with those adopted by the CDA sites in Area 4 & 5 and the building height is restricted to 220 mPD. To address the existing shortfall of G/IC facilities, STD will provide land for the development of schools, water supplies facilities, social welfare facilities, a public transport terminus, etc, together with a 1 ha reserve for Ting Kau & Sham Tseng Sewage Treatment Works Expansion. STD will provide a government complex with a Leisure Centre with swimming pools to compensate the loss of Anglers' Beach. In addition, STD will provide land to meet the identified shortfall of district open space.

In a review held in July 1999, the proposed reclamation area was reduced to 15.2 ha as shown in [Figure 2.2c](#) to provide an enlarged Marine Basin to allow for a better environment and proper manoeuvring of large katis. *Section 2.4* will further discuss the findings of Planning – Final Report. The development layout developed in Stage 1 has been refined in Stage 2 taking into consideration the findings of the more detailed technical assessments.

2.2.2 *Development Benefits*

The Project will achieve both economic, social and environmental benefits for the local population and the economy of the Hong Kong SAR, in particular the construction industry. These benefits include:

Economic and Social Benefits

- Meeting housing demand of the local area and the SAR;
- Provision of two primary schools and a secondary school on the reclamation to address the district shortfall;
- Provision of a total 1.76 ha of land to meet district open space requirements; and
- Provision of the proposed Bypass to relieve traffic conditions along Castle Peak Road and Sham Tseng Township.

Environmental Benefits

- Buffer distances between the planned sensitive receivers and the air pollution / noise sources have been reserved in the MDP to minimise the air quality / noise impact upon the sensitive receivers;
- A comprehensive and well integrated landscape and open space framework will be provided by the reclamation. This will enhance the image of Sham Tseng as a prestigious and vibrant residential area and improve the overall environment and quality of life of the township;

- The promenade semi-enclosing the proposed Sham Tseng Bypass will not only protect the residential towers (which are behind the promenade) from the road traffic noise along the Bypass, but also provide a waterfront public open space for leisure and better landscaping;
- The proposed Sham Tseng Bypass will remove through traffic from Castle Peak Road in the vicinity of Sham Tseng township and will offer a more pleasant environment to the existing local resident particularly on noise and air quality;
- Traffic noise impact may affect approximately 575 residential dwellings. However, around 250 dwellings would be protected and also around 250 dwellings would be benefited by the recommended noise mitigation measures;
- Noise generated by the fixed plant during their operation is restricted to comply with the EIAO-TM criteria at the relevant NSRs;
- Water quality mitigation measures for the construction of the reclamation were specified in terms of operational constraints (for example, limiting the rate of dredging and filling, defining the construction sequence for the reclamation and filling behind the seawall) to ensure no adverse impact;
- The Projects's reclamation will require a large amount of fill material and therefore offer a very good opportunity to utilise the public fill generated in the SAR. The use of public fill will not only alleviate the demand for virgin fill material but also reduce the pressure of disposing inert Construction and Demolition Material at the strategic landfills;
- Sewerage Impact Assessment carried out indicates that the committed Ting Kau and Sham Tseng Sewage Treatment Works (TKSTSTW) will have limited spare capacity to cater for future development on the proposed reclamation. In the circumstances, a 1 ha. site has been reserved for extension of the planned sewage treatment works, which is essential for providing additional treatment capacity to cater for the need of the future development of Sham Tseng and its adjacent area; and
- Currently, there is no salt water supply for the Sham Tseng area and fresh water is being used for flushing. This is considered to be a waste of our precious water resources. The reclamation will create land for provision of a salt water pumping station for supplying salt water to the Sham Tseng area.

2.3

STUDY AREA

According to the requirements of the *Brief*, various key environmental issues to be addressed have different definitions of the Study Area. They are:

- *Marine Water Quality Impact*: The Study Area covers the eastern part of Pearl River Estuary, East Lamma Channel, West Lamma Channel, and Tathong Channel (*Figure 2.3a*);
- *Noise Impact Assessment*: The boundary of the Study Area will be 300 m outside the boundary of the reclamation site (the Site) (*Figure 2.3b*);
- *Air Quality Impact Assessment*: The boundary of the Study Area will be 500 m outside the boundary of the Site (*Figure 2.3b*);
- *Landscape and Visual Impact*: The boundary of the Study Area for Landscape Impact Assessment should include all areas within 500 m outside the boundary of the Site, while the Study Area for the Visual Impact Assessment should be defined by the visual envelope;
- *Marine Ecological Impact and Fisheries Impact*: The boundary of the Study Area is the shaded region shown in *Figure 2.3c*.

2.4

PROJECT DESIGN

As shown in *Figure 2.2c*, the MDP accommodates the waterfront Bypass alignment. The MDP includes a main podium open space in the geographical centre of the STD and a major open space at the western portion of the reclamation.

The MDP has the following characteristics:

- three school sites south of the Lido Garden (Area 3);
- a government complex that include a Leisure Centre, social welfare facilities (such as a Hostel for Moderately Mentally Handicapped (HMMH) and a Hostel for Severely Mentally Handicapped (HSMH) and a Day Activity Centre) at the eastern portion of the proposed reclamation and adjacent to the TKSTSTW reclamation (Area 6);
- a TKSTSTW Expansion at Area 6;
- an open space at the western end of the proposed reclamation (Area 1);
- podium open space (Area 4) adjacent to the school sites near the CDA at the former San Miguel Brewery (Area 5) site;
- a Residential Home Care for the Elderly at Area 5;

- a 30 m wide waterfront promenade above the proposed Bypass;
- decked nullahs for landscaping/recreational purposes connect to waterfront promenade;
- a salt water pumping station meeting the prevailing Water Supplies Department (WSD) standard located at the west of the reclamation near the waterfront (Area 1);
- an underground sewage pumping station at Area 4;
- a refuse collection point (RCP) at Area 6;
- open space in Area 6;
- two 30 m wide non-building areas, one for the proposed twin 300 mm diameter and another for the existing 200 mm diameter water mains, both of which will provide fresh water to Ma Wan;
- a Public Transport Terminus (PTT) below the podium of the residential development site at Area 4;
- a public toilet (PT) within the PTT at Area 4;
- commercial complex with post office in Area 4;
- a marine basin with katio pier (Area 1) at the west of the reclamation more than 100 m away from the nearest housing developments;
- about 4470 flats and 14 010 residents within the housing developments above the STD.

2.5

CONSTRUCTION OF THE PROJECT

Table 2.5a summarises the major activities undertaken during the construction of the STD.

Table 2.5a Major Activities undertaken during the Construction of the STD

Construction Activity	Key Environmental Issues
Seawall construction (including dredging)	Noise, water quality impact, solid waste, landscape
Reclamation (including sand and public filling)	Noise, water quality impact, solid waste, air quality impact, landscape and visual impact
Construction of Marine Basin, Pier Structure and Berthing Facilities	Noise, water quality impact, landscape
Construction of West and East Nullahs and Decking	Noise, water quality impact
Construction of Three Box Culverts for the Extension of Existing Outfalls	Noise, air quality impact
Construction of Elevated Bypass	Noise, air quality impact, landscape and visual impact
Construction of Promenade and Bypass Underneath	Noise, air quality impact, visual impact
Construction of Sewage Treatment Facilities for Sham Tseng Development	Noise, air quality impact
Construction of Underground Sewage Pumping Station	Noise
Construction of Salt Water Pumping Station	Noise, air quality impact, visual impact
Construction of the Castle Peak Road Underpass	Noise, air quality, landscape and visual impact

2.6 OPERATION OF THE PROJECT

Table 2.6a summarises the major activities undertaken above the STD during operation.

Table 2.6a Major Activities undertaken during the Operation of the STD

Facilities / Infrastructure	Nature of Activity	Potential Environmental Issue
Three schools	Education	Sewage discharge, refuse generation, noise sensitive users
Government Complex (including a Leisure Centre)	Recreation	Sewage discharge, active air sensitive user
Bypass	Roadwork	Traffic noise and traffic exhaust gas emission source
WSD salt water pumping station	Flushing water intake	Noise from pump house
Public Transport Terminus with public toilet	Public transport	Traffic exhaust gas emission and traffic noise
Marine basin	Katio and ferry services	Ferry noise source
Residential development	Housing	Sewage discharge, refuse generation, noise and air sensitive receiver
Sewage Treatment Facilities for Sham Tseng Development	Sewage treatment	Operational noise, odour and water quality impacts

Facilities / Infrastructure	Nature of Activity	Potential Environmental Issue
Sewage pumping station	Sewage diversion	Noise and odour from pump house
Refuse collection point	Refuse collection and waste loading of refuse collection vehicles	Noise, odour, sewage generation
Social Welfare Facilities (including HMMH, HSMH and Day Activity Centre)	Social welfare services	Sewage and waste, air and noise sensitive users
Commercial complex with post office	Commercial activities	Commercial waste and sewage
Residential Care Home for the Elderly	Social welfare service	Sewage and waste, noise and air sensitive receiver
Open space	Recreation and leisure	-

2.7 WORKS PROGRAMME

Reclamation is assumed to be carried out in four phases (*Figure 2.7a*). The proposed construction works programme, which incorporates the recommended water quality mitigation measures (*Section 3.7.1*), is shown in *Table 2.7a*. The reclamation is scheduled to start construction in November 2004 and be completed by December 2008. According to the Preliminary Implementation Programme for development on the STD, the construction of the proposed Sham Tseng Bypass will be completed by August 2012. The construction of the residential development in Area 2 will be completed by August 2012, while the private residential development will be completed in approximately 2013/2014.

Table 2.7a Proposed Construction Programme for Development on STD

Item	From	To
Reclamation Phase 1	November 2004	March 2006
Reclamation Phase 2	November 2005	January 2008
Reclamation Phase 3	March 2006	October 2007
Reclamation Phase 4	May 2006	December 2008
East Nullah Wall /Deck Construction	November 2006	October 2007
West Nullah Wall/Deck Construction	October 2006	October 2007
Infrastructural Works	November 2005	August 2012

2.8 "WITHOUT THE PROJECT" SCENARIO

In terms of community living, without the proposed reclamation at Sham Tseng, the Sham Tseng township will lack a comprehensive plan for balanced development and improved lifestyle. Without the STD, many common facilities will be absent from the local area such that the local residents are deprived of convenient access to community and recreational services as well as open space for relaxation. Without this Project, the recommendation of the "Task Force on Land Supply and Property Prices" for reclamation site in Sham Tseng to be developed for residential use to increase residential flat supply will not be fulfilled.

Additionally, not proceeding with the Project will have an adverse impact on achieving the SAR's flat production programme. Other consequences are:

- there will be a shortfall of primary and secondary schools in Tsuen Wan West if the Project does not proceed;
- there will be a shortfall of district open space in Tsuen Wan West if the Project does not proceed;
- without the provision of the proposed Sham Tseng Bypass, traffic conditions along Castle Peak Road in Sham Tseng Township will not be relieved;
- the development potential in the district cannot be optimised if land is not made available for the sewage treatment facilities; and
- a public filling site will not be made available if the reclamation does not proceed. This may lead to a shortfall of public filling capacity in the SAR.

2.9

CONCURRENT PROJECTS

Table 2.9a summarises the external concurrent projects that will be undertaken simultaneously during the construction of the STD. Most of the projects are more than 500 m away from the Project and cumulative impact of air quality and noise from construction are, therefore, considered minimal.

Table 2.9a *Projects that May be Undertaken Simultaneously with the STD*

Project	Year of Construction	Nature of Project	Remark
Green Island Reclamation	2002 - 2012	Residential, infrastructural developments	Reclamation layout and programme being reviewed
Tsuen Wan Bay Further Reclamation ⁽¹⁾	2008-2014	Essentially residential developments	Reclamation layout and programme being reviewed
Route 10	2001 - 2006	Roadworks	-
Castle Peak Road Widening	Sept 2001 to Dec 2004 (Not including Extension of Time)	Roadworks	-
Container Terminal No. 9 (CT9)	2000 - 2004	Port development	-
North Lantau and South Tsing Yi Disposal Ground Backfilling	No fixed schedule	Backfilling of marine borrow areas	Backfilling works may concur with marine dredging works of other projects
Sand Borrowing of West Sulphur Channel	Under the construction schedule of CT9	Sand Borrowing (for CT9)	-

Project	Year of Construction	Nature of Project	Remark
Penny's Bay Reclamation Stage I	2000-2002	Essentially for recreation and tourism	-
Penny's Bay Reclamation Stage II	2002-2005 ⁽²⁾		
Water Supply to the STD	2008 - 2012	Construction of service reservoir, salt water pumping station and water mains	Programme being reviewed

- (1) Reclamation Programme being reviewed.
- (2) Based on the latest tentative construction programme of Penny's Bay Reclamation

The EIA - Final Report has provided an assessment of the potential environmental impacts associated with the construction and operation of the Sham Tseng Development, based on the latest information available. The principal findings of this Report are summarised in the following sections.

3.1 CONSTRUCTION PHASE

3.1.1 *Marine-based Impact*

The water quality impact during the reclamation of Sham Tseng Development was quantitatively assessed using the Delft3D Water Quality Model. Suspended sediment is identified as the most significant water quality parameter during the reclamation. The worst-case scenario during reclamation was assessed and it was predicted that potential water quality impact would only occur in waters at Gemini Beach, Tsing Lung Tau Beach, Golden Beach, Kadoorie Beach, New Cafeteria Beach and Dragon Beach. The water quality impact at these beaches could be effectively minimised with the implementation of the proposed mitigation measures. An environmental monitoring and audit programme is required to ensure the effectiveness of the proposed water quality mitigation measures.

The assessment of cumulative impacts was made by taking the results of previous computer modelling increases in suspended sediment concentrations at sensitive receivers for potentially concurrent projects. The results of the previous computational modelling were summed with the predicted increases in suspended solids concentrations from the STD at the sensitive receivers. It was determined that there would be an exceedance of the WQO for suspended solids at the Ma Wan Fish Culture Zone as well as beaches adjacent to the STD. Through mitigation of the STD construction the contribution of the STD construction to the total suspended solids concentration could be minimised to contribute only a small amount to the total predicted increase in concentrations. It was noted that the cumulative assessment was based on a very conservative assessment methodology, which meant that the likelihood of the predicted cumulative impacts occurring will be very small and that the duration of the contribution of the STD construction to the elevated suspended solids concentrations could be small. Despite the conservative nature of the assessment it was determined that the predicted increases in suspended solids concentrations would not result in adverse effects on the fish stocks as well as aesthetic enjoyment of the swimmers and visitors of the beaches. It was therefore concluded that the predicted exceedance of the WQO would not be considered an adverse impact.

3.1.2 *Land-based Impact*

Water quality impacts from land-based construction, including the residential development, Sham Tseng Bypass construction, construction of Sewage Treatment Facilities for Sham Tseng Reclamation (STFSTD) and sewage pumping station, are associated with the surface runoff, effluent discharge from the site, and sewage from on-site construction workers. Impacts can be controlled to comply with the Water Pollution Control Ordinance (WPCO) standards by implementing the recommended mitigation measures. No unacceptable residual impact on water quality is anticipated.

3.2 OPERATIONAL PHASE

3.2.1 Hydrodynamics

An assessment of the hydrodynamic impact due to the STD has been made using the Delft3D Upgraded model. With this quantitative modelling tool the impact has been assessed for the dry and wet seasons over a spring-neap tidal cycle. For both seasons, the baseline and operation simulations have been compared. It is concluded that:

- the influence of the proposed STD on the water level in the Study Area and in the vicinity is marginal;
- the influence on the current magnitude and direction in Ma Wan Channel mainly occurs in the immediate vicinity of the reclamation. In the dry season under spring tide conditions, the peak current speed may increase 4% during the ebb stream. The change is smaller for the neap tide and during the flood stream. In the wet season, the impact appears greater. During the ebb stream the increase in peak current magnitude can be 0.23 m s^{-1} , and about 0.07 m s^{-1} during flood stream. Nevertheless, the influence on peak currents is negligible in the centre of the Ma Wan Channel;
- the water fluxes through the Ma Wan Channel and other main channels are not notably affected by the STD;
- in the dry season the impact on the salinity is less than 0.1 ppt throughout the Study Area. In the wet season the short term impact will be about 1.0 ppt but on a long term scale the impact is less than 0.2 ppt; and
- based on the hydrodynamic modelling, the predicted cumulative water quality impact of the reclamation will be minimal.

Therefore, it is concluded that the STD will have minimal impact on the hydrodynamic regime of the Study Area and there will be no insurmountable hydrodynamic impacts.

3.2.2 Water Quality

The modelling results indicate that additional sewage discharge from the STFSTD has minimal impact upon the marine water quality. The results also indicate that the water quality at the WSD sea water intakes at the STD, Tsing Yi and Tsuen Wan will be within the WSD water quality criteria for ammoniacal nitrogen, DO and *E. coli*. Minimal impact of SS (less than 0.5% from the baseline or 0.2 mg L^{-1}) are also predicted at these intakes.

Based on the operational water quality modelling results reported, it is predicted that the suspended solids concentration at the intake point of the proposed STD salt water pumping station will exceed WSD water quality criterion (10 mgL^{-1}). It is also predicted that the SS contribution from the project to the water intake is negligible (less than 0.1 mgL^{-1}), that is, the exceedance is a regional issue that could not be mitigated in this housing project nor should it prejudice the feasibility of the proposed further reclamation.

In the eventuality of failure of the TKSTSTW facilities, sewage discharge via the Emergency Bypass would be required which will cause local substantial water quality impact upon the bathing beaches adjacent to the STD. Failure should therefore be minimised and also kept to a limited duration if they do occur. Risk of failure should be controlled by regular maintenance of treatment facilities, and provision of backup power supply and standby units of key components of the TKSTSTW and STFSTD.

4 NOISE IMPACT

4.1 CONSTRUCTION PHASE

Unmitigated construction activities of Sham Tseng Development would cause exceedances of the daytime construction noise criteria at most of the nearby noise sensitive receivers (NSRs) during the normal working hours. The most affected areas are the residential buildings at Golden Villa, the former Union Carbide site, Lido Garden, DD 387 Lot 99, the former San Miguel Brewery site, Goldenville, Dragon Garden and Villa Alfavista.

Therefore, noise mitigation measures will be necessary for the works to meet the criteria. Mitigation measures including the use of quiet plant, on-site movable noise barriers, limiting the number of plant operating concurrently and restricting the operating time usage of some of the plant will be required. It is also recommended that regular monitoring of noise at NSRs will be required during the construction phase.

4.2 OPERATIONAL PHASE

This assessment has predicted that the traffic noise levels from the proposed development at year 2019 will result in exceedances of the road traffic noise criterion at the some of the existing NSRs in Sea Crest Villa, DD387 Lot 99, Golden Villa, Goldenville, Dragon Garden, planned NSRs in residential development, Area 2, and educational uses in Area 3.

The best practicable mitigation package is recommended to comply with the road traffic noise criterion, comprising a combination of 3 to 6 m high roadside vertical, cantilever noise barriers and semi-enclosure.

A summary of the proposed noise mitigation measures is shown in *Table 4.1a* and *Figures 4.1a, 4.1b and 4.1c*.

According to the assessment result, it is estimated that approximately 575 existing NSRs dwellings would be affected by traffic noise impact and in which around 250 dwellings would be protected and benefited by the recommended noise mitigation measures. Residual impacts were predicted at about 325 dwellings due to existing road contribution.

With the implementation of the recommended mitigation measures, all the planned NSRs would be in compliance with the relevant road traffic noise criteria except for the planned NSRs in Area 3.

For the planned Area 3 NSRs for educational uses, it is predicted that approximately 13 noise sensitive rooms would require indirect technical remedies in the form of window insulation and air conditioning. Operational noise criterion for these premises is 65 dB(A).

Noise impacts from the identified fixed noise sources would not be insurmountable to the nearby NSRs provided that the sound power levels (SWLs) from the different fixed plants did not exceed the maximum permissible SWLs

Table 4.1a *Direct Mitigation Measures for Road Traffic Noise*

Item	NSR Location	Mitigation Measures	Location of Noise Barrier, approximate chainages
1	Goldenville	(1) 5 m vertical barrier along the central reserve of Sham Tseng Bypass, in absorptive material (2) 5 m vertical barrier along the southern side of eastbound Sham Tseng Bypass, in absorptive material	(1) 30 m long starting from CH: 570 to CH: 600 (2) 50 m long starting from CH: 600 to CH: 650
2	Sea Crest Villa Blocks 8, 9 & 10	(3) Semi-enclosure located along the northern side of eastbound Sham Tseng Bypass of 130 m long with cantilever 3 m from central reserve (4) Promenade extension along the western end (also serving planning purposes)	(3) 130 m long starting from CH: 600 to CH: 725 (4) 380 m long starting from CH: 725 to CH: 1100
3	DD 387 Lot 99	(5) 3.5 m vertical barrier along the southern side of the westbound Sham Tseng Bypass, in reflective material	(5) 100 m long starting from CH: 700 to CH: 800
4	Golden Villa	(6) 6 m vertical barrier along the northern side of Castle Peak Road Eastbound, in reflective material (7) 5 m vertical barrier along the central reserve of Castle Peak Road, in reflective material	(6) 170 m long, relevant to CH: 2150 to CH: 2325 (7) 100 m long starting from CH: 2150 to CH: 2255

Note: The locations and layouts of noise mitigation measures are shown on Figure 4.1a to c.

5 AIR QUALITY IMPACT

5.1 CONSTRUCTION PHASE

5.1.1 Reclamation and Construction Works

Dust will be the principal pollutant during the construction phase of Sham Tseng Development. Reclamation, wind erosion over surcharge material, vehicle movements on haul roads and infrastructure construction are expected to be the principal dust sources. Air quality impact during construction phase has been assessed and dust level at all ASRs will comply with the dust criteria with the implementation of dust suppression measures in accordance with the *Air Pollution Control (Construction Dust) Regulation*. Dust monitoring has been recommended to ensure the efficacy of the control measures and to ensure that the dust criteria will not be exceeded at any ASRs during STD construction.

5.2 OPERATIONAL PHASE

5.2.1 Traffic and Industrial Impacts

Vehicle exhaust from existing and future roads and industrial emissions are the major pollutant sources during the operation of the Sham Tseng Development. The ASRs will be affected by road traffic emissions at low level (less than 30 m above ground) and by industrial emissions at high level (greater than 30 m above ground). The predicted results show that the AQO criteria of CO, respirable suspended particulates, NO₂ and SO₂ will be satisfied at all ASRs at both low and high levels.

5.2.2 Sewage Treatment Facilities for Sham Tseng Development and Sewage Pumping Station

To minimise odour nuisance from the operation of the committed Ting Kau and Sham Tseng Sewage Treatment Works at Area 7, proposed Sewage Treatment Facilities for Sham Tseng Development at Area 6 and the sewage pumping station at Area 4, odour removal and treatment facilities will be installed and EPD's odour criterion will thus be complied with.

5.2.3 Developments above Reclamation

Odour impact from the nullahs on the reclamation is not expected as sewage discharged will be collected by the Ting Kau and Sham Tseng Sewage Master Scheme and treated at the sewage treatment works. In addition, the nullahs will be extended and decked-over through the STD. Odour nuisance from the proposed Refuse Collection Point at Area 6 will be avoided by proper waste management. Adverse odour impact on the ASRs is not anticipated.

Air quality inside the proposed Public Transport Terminus should satisfy the *Public Transport Interchange Air Quality Guidelines*. Mechanical ventilation may be required and its design and operation should meet the requirements specified in the ProPECC PN 1/98.

With regard to the odour from the Garden Bakery (location of the bakery refers to [Figure 5.1](#)), the predicted odour levels at all the planned ASRs would exceed the odour criterion of 5 units (based on an averaging time of 5 seconds) as stipulated in the TM of the EIAO. Therefore, re-planning of the development has been considered to reduce the extent of the odour impacts. However, the constraints and associated environmental problem arising from the roads in the immediate vicinity would preclude any further re-arrangement of the recommended layout to remove such exceedances. This was strengthened by the fact that the predicted odour level at P6 located at the western end of the reclamation farthest from the bakery still exceeds the criterion.

Indirect mitigation measures that could be applied are the installation of central air conditioning and deodourisation facilities for the fresh air intake at the nearby buildings. This may be applicable for some uses which rely on central air conditioning system for ventilation but cannot be applied to open areas and residential buildings which rely on openable windows for ventilation according to the Building Regulations. Therefore, indirect mitigation measures are not considered feasible.

Direct mitigation measures that could be applied to minimise the impact include reducing emissions by enclosure and installation of odour removal systems at the exhausts. Nevertheless, it should be noted that the site where Garden Bakery is presently located has been zoned to CDA for commercial/residential purposes. Thus, relocation of Garden Bakery before the first population intake in 2012 would be the long term solution to mitigate the odour problem. Whilst residual odour will occur before any relocation of the Garden Bakery, the odour impact will not cause any adverse public health effect or risk to life. The magnitude and extent of the odour impact are also considered not major and this is illustrated by a few complaints received (2 only) since 1995. Hence it is considered that the residual bakery odour is not a serious long term issue to the proposed Project.

It is concluded that residual impact will occur before any relocation of the Garden Bakery. However, the odour impact will not cause any adverse public health effect or risk to life. The magnitude and extent of the odour impact are also considered not major and this is illustrated by a few complaints received (2 only) since 1995. Hence it is considered that the residual bakery odour is not a serious long term issue to the proposed Project. Thus, it can be considered that the criteria set out in the TM Section 4.5.1d can be met.

The following quantities of waste are expected to arise during the construction of the STD: Dredged materials (approximately 354 000 m³ if dredging only limited at seawall and marine basin), excavated materials (22 500m³ inert material and 2 500m³ C&D waste); demolition material (55 00m³ inert material and 500m³ C&D waste) and construction material (27 100m³ inert material and 6 800m³ C&D waste); chemical waste (a few hundred litres per month); and general refuse (240 kg per day).

Based on the land use arrangement of the MDP, the future domestic waste generation will be about 16 tonnes per day. No estimation for commercial waste generation can be made as the number of employees is not presently available. No adverse environmental impacts associated with the transportation and disposal of domestic waste is anticipated.

Mitigation measures relating to good site practice, including minimisation of material dredged and re-use of uncontaminated inert materials for reclamation, have been recommended to ensure that adverse environmental impacts are prevented and that opportunities for waste minimisation and recycling are followed.

Provided that the recommendations put forward in this Report are conscientiously acted upon, no unacceptable environmental impacts will result from the storage, handling, collection, transport, and disposal of wastes arising from the construction and operation of the STD.

The proposed development will cause a significant change in the existing landscape character of Sham Tseng by redefining the coastal edge and extending the man-made coastal zone. It will modify the existing character, extending the urban area comprising medium and high-rise residential areas on reclamation into the bay. Although the development will extend the existing landscape character of high-rise residential development further into the bay area, it will also serve to concentrate new high-rise development in one location thereby preserving the remnant coastal character in other areas. However, the scale of the development, compared to the relatively limited high-rise developments that currently exist in the township, will alter the prevailing character of Sham Tseng by making the high-rise development character more dominant within the Study Area. Importantly, the development addresses the shortfall of open space in the Sham Tseng area and will provide greater recreation opportunities and public open space for Sham Tseng residents.

The building layout has been designed to alleviate many of the potential visual impacts by retaining the view corridors, although residents of the Lido Garden, San Miguel Brewery CDA, Sea Crest Villa Phases I and II will experience significant impacts due to their proximity to the development and the narrowing of their view corridors. Additionally, the loss of Anglers' Beach is also a significant adverse impact. However, compensation will be made by the provision of recreational facilities including a Leisure Centre with swimming pool facilities and the extension of a pedestrian footpath to a small nearby beach. This footpath will be provided as an alternative recreation provision. Other recommendations include the creation of a waterfront public open space.

The proposed mitigation measures include the implementation of compensatory tree and shrub planting (2.7ha), the design of the proposed built forms to minimise visual impacts including the retention where possible of view corridors through the development area and the provision of open space. Anglers' Beach as a recreational resource will also be reprovisioned through the provision of an indoor public swimming pool within the government Leisure Centre in Area 6. In addition to this the coastal area to the immediate west of the reclamation will be left largely intact, with landscaping works to enhance the natural waterfront environment for the area. Footpath access will also be provided between the residential developments and the coastal area.

Several key impacts have been identified, which can be summarised as follows:

Natural Coastline

Works will result in the permanent disturbance to the natural coastline at the eastern and western ends with a loss of 0.2ha. Although a natural coastline cannot be reprovisioned, it is recommended to create a naturalistic one of equivalent size using boulders below the eastern end of the bypass. However, the loss of a natural landscape resource is permanent and is thus considered to cause a significant adverse residual impact.

Loss of the Angler's Beach

The works on reclamation will require the loss of the remaining stretch of Angler's Beach as a modified coastal area and sandy beach. It is recommended to provide alternative recreation areas in the proposed Western Coastal Park together with providing a footpath to a neighbouring beach to the west. However, as this impact is permanent and the mitigation does not provide direct re-provisioning there is likely to be significant adverse residual impact.

Disturbance to the natural hillside and vegetation

The roadworks at the eastern and western ends of the project will cause significant adverse landscape impacts during construction due to disturbance to approximately 1.0ha of the existing natural hillside and vegetation. The recommended mitigation measures include for a minimum of 1.0ha of compensatory planting thus likely to reduce the long-term residual landscape impact to moderate adverse.

Permanent modification to the existing landscape character of the bay

This is likely to occur due to the extension of the manmade coastline and extension of the high-rise developments. As this is a permanent effect the residual landscape impact is likely to be significant adverse.

Visual impact to adjacent VSRs

Key visual impacts (as described in Table 7.12c of the main EIA Report) are likely to be experienced primarily by the VSRs to the north including Lido Garden, San Miguel Brewery CDA and Sea Crest Villas Phases I and II. The impacts will relate to the disturbance to and reduction of their open views to the south over the Ma Wan Channel. Mitigation has been incorporated in the building layout by the retention of some view corridors, however, as the reduction of open views is permanent the residual visual impacts are likely to be significant adverse.

Additional mitigation measures have been recommended, aimed at minimising impacts caused by the development. For example, instead of erecting vertical and cantilever noise barriers at the western elevated Sham Tseng Bypass, the elevated sections of the Bypass above the Marine Basin are proposed to be covered by the promenade (public open space which forms a deck over the Bypass). This extension will form a continuous alignment of the promenade whilst providing noise and visual mitigation.

With respect to each of the Designated Projects, the impacts can be summarised as follows:

Reclamation

The reclamation is likely to cause a number of significant adverse landscape and visual impacts, including the loss of the remainder of Angler's Beach (initial loss at western portion of the beach due to Castle Peak Road Widening Project) and modification to the character of the existing bay together with widespread construction phase visual impacts. These impacts are permanent, persisting in the long term and are thus likely to result in significant adverse residual impacts. Other impacts include loss of 0.5ha of amenity tree planting, however, this is replaceable within the future development resulting in slight adverse residual landscape impacts.

Sham Tseng Bypass & Underpass below Castle Peak Road

The slope works and vegetation losses (1.0ha in total area) at the east and west Castle Peak Road connections are considered to cause a moderate adverse residual impact, as a minimum of 1.0ha of compensatory planting can be incorporated into the project. Other mitigation includes minimisation of works, a full tree felling application in accordance with WBTC 24/94, compensatory planting at a minimum of that disturbed and consideration of all roadworks including the viaducts and noise barriers, both of which should obtain approval from ACABAS. The cover over the central section of the bypass (870m in length) alleviates, at source, the most significant visual impact that would otherwise have affected the future VSRs within the development. This, together with consideration of the design of any noise barriers/enclosures is likely to reduce the residual visual impacts to slight to moderate adverse.

Sewage Pumping Station

Recommendations of consideration of the architectural finishes of the station building, together with part of it being constructed below ground is likely to result in only slight adverse residual landscape impacts in the long term due to introduction of manmade elements within the local landscape context. Similarly the building design and opportunities for boundary screen planting are likely to result in slight adverse residual visual impacts.

A review of existing information supplemented with a summary of the results of recent intertidal surveys near Sham Tseng and Kwai Shek during 1998-99 indicate that the Study Area supports intertidal hard-bottom and soft-bottom assemblages and subtidal soft benthos. From the literature review, the Study Area, as shown on [Figure 8.1](#), was considered as important to one marine mammal, *Sousa chinensis*.

Direct impacts during the construction phase will occur through habitat loss in the area that is to be dredged or reclaimed and will affect the soft benthos as well as hard surface assemblages at Sham Tseng. The assemblages lost are of low ecological value and reclamation size is small (approximately 15.2 ha).

Indirect impacts during the construction phase such as an increase in suspended sediment concentrations and decrease in dissolved oxygen in the water column may impact filter feeders living on intertidal and subtidal habitats. However, these indirect impacts are anticipated to be localised and transient. The impacts to Chinese White Dolphin are predicted to be minimal and transient (dredging will last for approximately 18 weeks during the 50 months of reclamation works) such that they can resume normal activities after the reclamation works. Sightings of dolphins was found to be rare in and near the reclamation area (see [Figure 8.2](#)). In addition, any constraints on construction recommended to reduce impacts to water quality to acceptable levels are expected to also mitigate for effects on marine ecology. Impacts during the operational phase are predicted to be negligible and will not be a cause of concern.

The residual impact occurring as a result of construction and operation of the Sham Tseng Development is the loss of the intertidal hard bottom assemblages covering 250m of natural coastline and 250 m of gazetted beach, 900 m of artificial coastline and subtidal soft benthos covering an area of approximately 15.2 ha at the area of Sham Tseng Development.

The loss of the assemblages within the construction site can be mitigated through the subsequent recolonisation of fauna on the seawalls after construction. The monitoring and audit activities designed to detect and mitigate any unacceptable impacts to water quality will also serve to protect against unacceptable indirect impacts to ecologically valuable marine species and habitats. As no unacceptable impacts to marine ecology are expected to occur, the development and implementation of a monitoring and audit programme specifically designed to assess the effects associated with the Sham Tseng Development on marine ecology is not necessary.

A review of existing information on commercial fisheries resources located within and around the Sham Tseng Development area has identified the area as supporting low abundances of fisheries resources and few vessels depend on the area for their catches.

Potential impacts to fisheries resources and operations may arise from disturbances to benthic habitats, changes in water quality and contaminant release. Detailed discussion of the potential water quality impacts is provided in *Section 3*. Disturbances to benthic habitats are predicted to be largely confined within the reclamation area and shall be in compliance with the relevant Water Quality Objectives. Sediment deposition outside of the reclamation area is minimal and not anticipated to impact fisheries resources. As changes in water quality will be minimal and transient, adverse impacts to fisheries resources are not predicted to arise. Assessment of contaminant release has indicated minimal concentrations will be released and are not predicted to impact fisheries resources.

As impacts arising from the proposed reclamation works are thus predicted to be largely confined to the reclamation area, they are not expected to cause adverse impacts to any fishery grounds including the nearest Fish Culture Zone, Ma Wan, or species of importance to the fishery. While no special mitigation measures are required for fisheries resources, constraints on dredging operations recommended to control impacts to water quality to within acceptable levels are also expected to mitigate impacts to fisheries resources. Cumulative impacts predicted to arise from the proposed reclamation operations in conjunction with concurrent projects are not expected to result in greater adverse impacts to fisheries resources than impacts arising from the concurrent projects independently.

The Marine Archaeological Investigation indicates that no archaeological material is likely to be buried within the Study Area. Therefore, no impact to any archaeological deposit is expected and neither further archaeological investigation nor any mitigation measures are required.

The potential land use impact during the reclamation, construction and operational phases of the Sham Tseng Development has been assessed. In spite of potential unmitigated noise and air pollution caused by the construction works and the traffic, no insurmountable land use impact is identified and appropriate mitigation measures will be undertaken to cater for the various phases of the Project.

Given that, at this stage, it is not possible to measure the rates of gas emission from the organic sediment within the area of the proposed STD, an estimate of the future rate of gas generation has been made from the results of analysis of the sediment for total organic carbon and sediment oxygen demand.

Several assumptions and estimations have been made when making theoretical predictions about possible future rates of methane generation. The estimated average rate of methane gas generation is well within the suggested

maximum rate of methane emission per unit area of $10 \text{ L m}^2 \text{ day}^{-1}$ and the limit of $84.7 \text{ L m}^2 \text{ day}^{-1}$ recommended by the London Scientific Services. The former criterion provides a reasonable general guide for determining whether the rates of methane emission pose an unacceptable risk to unrestricted development on a potentially gassing site. The latter criterion represents the absolute "cut-off" level of methane flux which developments should be allowed to build on the potentially gassing site. It is therefore considered that the predicted rate of gas generation will not pose unacceptable risk and constraints to future developments on the reclamation.

Given the inherent uncertainties involved in estimating future rates of gas emissions from theoretical calculations of rates of gas generation and given that mitigation measures for avoiding the potential risks may be very expensive, it is recommended that monitoring of gas emission rates from the undredged area be undertaken by qualified specialists following the reclamation works to confirm the findings of this assessment.

As detailed in the Project EM&A Manual, the EIA Study has recommended a comprehensive EM&A programme comprising monitoring and audit during both construction and operation for: air quality (baseline, construction and operation), noise (baseline, construction and operation), water quality (baseline and construction), waste management (construction) and biogas (construction).

ENVIRONMENTAL BENEFITS, DESIGNS AND KEY PROTECTION MEASURES

The key benefits associated with the Project are expected to be primarily of an socio-economic nature. Additional environmental benefits, designs, and key protection measures arising from the Project include:

- Buffer distances between the planned sensitive receivers and the air pollution / noise sources have been reserved in the MDP to minimise the air quality / noise impact upon the sensitive receivers;
- A comprehensive and well integrated landscape and open space framework will be provided by the reclamation. This will enhance the image of Sham Tseng as a prestigious and vibrant residential area and improve the overall environment and quality of life of the township;
- The semi-enclosed promenade above the proposed Sham Tseng Bypass will not only protect the residential towers (which are behind the promenade) from the road traffic noise along the Bypass, but also provide a waterfront public open space for leisure and better landscaping;
- The proposed Sham Tseng Bypass will remove through traffic from Castle Peak Road in the vicinity of Sham Tseng township and will offer a more pleasant environment to the local resident particularly on noise and air quality;
- Traffic noise impact may affect approximately 575 residential dwellings. However, around 250 dwellings would be protected and also around 250 dwellings would be benefited by the recommended noise mitigation measures;
- Noise generated by the fixed plant during their operation is restricted to comply with the EIAO-TM criteria at the relevant NSRs;
- Water quality mitigation measures for the construction of the reclamation were specified in terms of operational constraints (for example, limiting the rate of dredging and filling, defining the construction sequence for the reclamation and filling behind the seawall) to ensure no adverse impact;
- The Projects' reclamation will require a large amount of fill material and therefore offer a very good opportunity to utilise the public fill generated in the SAR. The use of public fill will not only alleviate the demand for virgin fill material but also reduce the pressure of disposing inert Construction and Demolition Material at the strategic landfills;

- Sewerage Impact Assessment carried out indicates that the committed Ting Kau and Sham Tseng Sewage Treatment Works (TKSTSTW) will have limited spare capacity to cater for future development on the proposed reclamation. In the circumstances, a 1 ha. site has been reserved for extension of the planned sewage treatment works, which is essential for providing additional treatment capacity to cater for the need of the future development of Sham Tseng and its adjacent area; and
- Currently, there is no salt water supply for the Sham Tseng area and fresh water is being used for flushing. This is considered to be a waste of our precious water resources. The reclamation will create land for provision of a salt water pumping station for supplying salt water to the Sham Tseng area.

Table 14.1a also summarises the potential impact and recommended environmental measures of various pollution activities during the construction and operation of the STD.

Table 14.1a Summary of the Potential Impact and Recommended Environmental Measures of Various Pollution Activities

Pollution Activity	Key Potential Impact	Mitigation Measure	EIA Reference
Dredging and Reclamation	Adverse water quality impact upon the adjacent beaches	<ul style="list-style-type: none"> control the dredging and filling rates; sandfilling behind the constructed seawall; sandfilling within the 'cell' of embayed water body formed by the permanent and temporary seawall; revise the reclamation programme to incorporate the proposed water quality mitigation measures. 	<p>Section 3.7.1</p> <p>Section 3.7.1</p> <p>Section 3.7.1</p> <p>Section 3.7.1</p>
Sham Tseng Bypass including connections to the Castle Peak Road and the Castle Peak Road Underpass	Adverse road traffic noise impact upon the existing and planned noise sensitive receivers	<ul style="list-style-type: none"> waterfront promenade above the Bypass to prevent noise impact upon the housing sites at Areas 2, 4 and 5; Vertical and cantilever barriers and semi-enclosure at the Bypass and Castle Peak Road to minimise noise impact upon the existing sensitive receivers 	<p>-</p> <p>Section 4.7.2</p>
Sewage Treatment Facilities for Sham Tseng Development (STFSTD)	Odour and noise impact upon the adjacent planned sensitive receivers	<ul style="list-style-type: none"> a 30 m buffer distance between the STFSTD and the CDA site at Area 5 has been reserved; installation of deodorisation units at the STFSTD; installation of deodorisation units at the air vents of the central air-conditioning facilities of the government complex at Area 6; control of maximum permissible sound power level to 85 dB(A) and 75 dB(A) for daytime and night time respectively at the STFSTD. 	<p>-</p> <p>Section 5.7.2</p> <p>Section 5.7.2</p> <p>Section 4.6.3</p>
Underground Sewage Pumping Station	Odour and noise impact upon the adjacent planned sensitive receivers	<ul style="list-style-type: none"> installation of the odour removal facilities at the air vent of the sewage pumping station; Control of maximum permissible sound power level at the underground sewage pumping station. 	<p>Section 5.7.2</p> <p>Section 4.6.3</p>
Dredging of marine basin, pier structures and berthing facilities	Adverse water quality impact upon the adjacent beaches	<ul style="list-style-type: none"> control the dredging rate. 	Section 3.7.1
Operation of the Combined Outfall	Adverse water quality impact during emergency discharge	<ul style="list-style-type: none"> regular maintenance of sewage treatment facilities; provision of standby equipment and key components of the STFSTD; provision of dual power supply 	<p>Section 3.7.2</p> <p>Section 3.7.2</p> <p>Section 3.7.2</p>

Pollution Activity	Key Potential Impact	Mitigation Measure	EIA Reference
Main Development Area	Impacts on landscape resources	<ul style="list-style-type: none"> • Minimisation of slope works and reprofiling to tie in with existing gradient. • Tree survey and felling application in accordance with WBTC No. 24/94, Tree Preservation. • Compensatory tree planting to restore vegetation cover and screen (minimum 0.05ha) 	Section 7.16
	Impacts on landscape character	<ul style="list-style-type: none"> • Tree survey and felling application in accordance with WBTC No. 24/94, Tree Preservation.. • Compensatory tree planting to restore vegetation cover and screen noise barrier (approximately 0.5ha). • Minimisation of slope cutting. • Re provision of publicly accessible waterfront including open space and planting on elevated promenade and on edge of marine basin in Western Coastal Park • Retention and protection of Gemini Beach headland during works 	Section 7.16
	Visual Impact of the proposed development site	<ul style="list-style-type: none"> • Careful positioning of public open space and low rise buildings (schools) for retention of some view corridors between sites 2 and 4 and between sites 4 and 5 such that as many sea views as possible are retained • The design of noise attenuation structures to minimise visual impact and integrate as far as possible into the future landscape context. • Minimisation of height of Leisure Centre to retain views of water (NB Leisure Centre screens views of STW extension) • Tree planting to screen low level views and integrate proposals into overall landscape framework for more elevated views. 	Section 7.16
DP 1 Reclamation area	Change to character setting due to extension of manmade waterfront	<ul style="list-style-type: none"> • Retention of marine basin on the village side of the bypass to retain coastal landscape character as far as possible. 	Section 7.16 and Table 7.18a
	Visual intrusion of construction stage reclamation	<ul style="list-style-type: none"> • No mitigation possible as many of the VSRs are medium-high rise buildings. Temporary hoarding should be used to screen low-level views. • Apply hydroseeding to areas within site, which will be left vacant for more than one year. • The top dressing of 'selected fill' should be applied at the earliest opportunity to minimise the duration of visual impact cause by exposed public fill material 	Section 7.16 and Table 7.18a

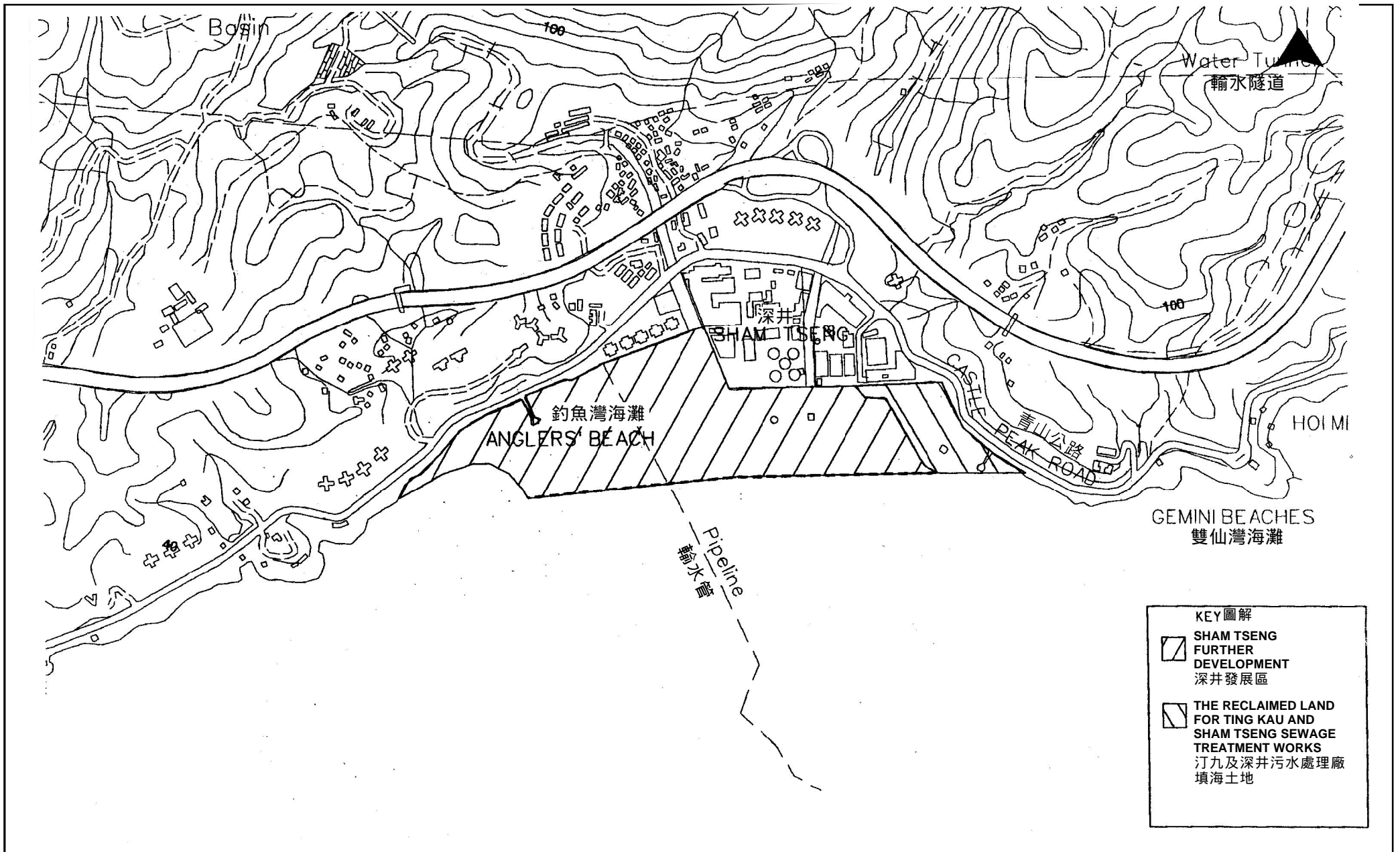
Pollution Activity	Key Potential Impact	Mitigation Measure	EIA Reference
DP 2 Sham Tseng Bypass	Loss of vegetation and slope re-profiling (0.3ha)	<ul style="list-style-type: none"> • Minimisation of slope works and reprofiling to tie in with existing gradient. • Tree survey and felling application in accordance with WBTC No. 24/94, Tree Preservation. • Replacement tree and shrub planting to restore vegetation cover (Minimum of 0.3ha) 	Section 7.16 and Table 7.18b
	Visual impact caused by noise mitigation measures at connection with Castle Peak Road: full / semi-enclosure and barriers	<ul style="list-style-type: none"> • Road enclosure/barrier designed to be visually recessive (transparent panels etc). Soften appearance using tree planting alongside structure. 	Section 7.16 and Table 7.18b
	Visual impact caused by construction stage works and operational road	<ul style="list-style-type: none"> • Construction stage: No mitigation possible as many of the VSRs are medium-high rise buildings. Temporary hoardings may be used to screen low-level views. • Central section of bypass will be covered with a deck designed as a waterfront promenade accessible to the public, effectively screening the road. • Western end, the bypass will be on a bridge across the marine basin 	Section 7.16 and Table 7.18b
DP3 Sewage Pumping Station	Extension of built form adjacent to high-rise areas	<ul style="list-style-type: none"> • Architectural finishes and design/position integrated with adjacent buildings to reduce visual clutter. 	Section 7.16 and Table 7.18c
	Introduction of SPS in front of VSRs	<ul style="list-style-type: none"> • Screen planting at the boundary of plant 	Section 7.16 and Table 7.18c
DP 4 Underpass below Castle Peak Road	Loss of vegetation and slope re-profiling (.0.1ha) (note – most disturbance is caused by the Bypass)	<ul style="list-style-type: none"> • Minimisation of slope works and reprofiling to tie in with existing gradient. • Tree survey and felling application in accordance with WBTC No. 24/94, Tree Preservation. • Replacement tree and shrub planting to restore vegetation cover (Minimum of 0.1ha) 	Section 7.16 and Table 7.18d
	Visual impact caused by construction stage works and operational road	<ul style="list-style-type: none"> • Construction stage: No mitigation possible as the VSRs are medium or high rise buildings. Temporary hoardings may be used to screen low-level views. • On completion underpass will primarily be a depressed and covered road so impacts reducing impacts in long term, although consideration should be given to underpass portal 	Section 7.16 and Table 7.18d

OVERALL CONCLUSIONS

The findings of this EIA have provided information on the nature and extent of environmental, including cumulative, impacts arising from the construction and operation of the Sham Tseng Development. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards.

Overall, the EIA Final Report for the development of Sham Tseng Development has predicted that the Project will generally comply with all environmental standards and legislation after the proposed construction and operational stage mitigation measures are implemented. The reclamation will improve the environmental quality as illustrated in Section 2.2.2 and the EIA has also demonstrated the bakery odour can be mitigated and will not cause any long term serious environmental implication. Thus the EIA has demonstrated the acceptability of any residual impacts from the Project and the protection of the population and environmentally sensitive resources. Environmental monitoring and audit mechanisms have been recommended before and during construction and operation, where necessary, to verify the accuracy of the EIA predictions and the effectiveness of recommended mitigation measures.

Figures



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PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
 SHAM TSENG DEVELOPMENT

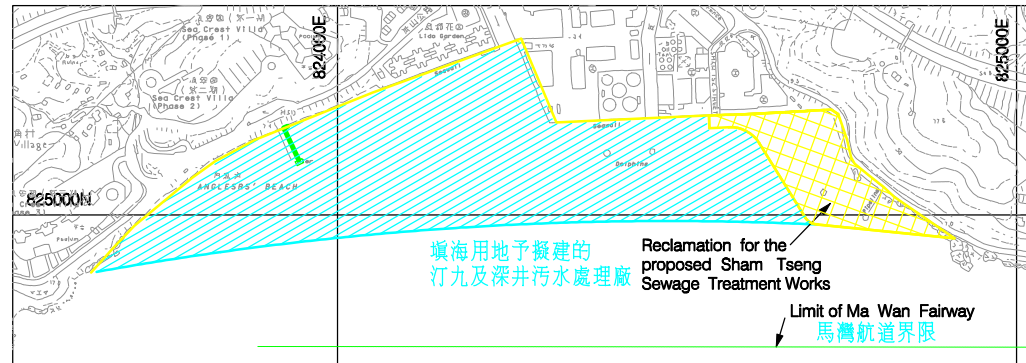
The Proposed 15.2 ha Sham Tseng Development 建議的15.2公頃深井發展區		2.1a	
Drawing No. 圖號	MY	Checked 校核	Scale 比例 1:10000
Approved 批准	Date 日期 05/00	Status 現況	


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Civil Engineering Department

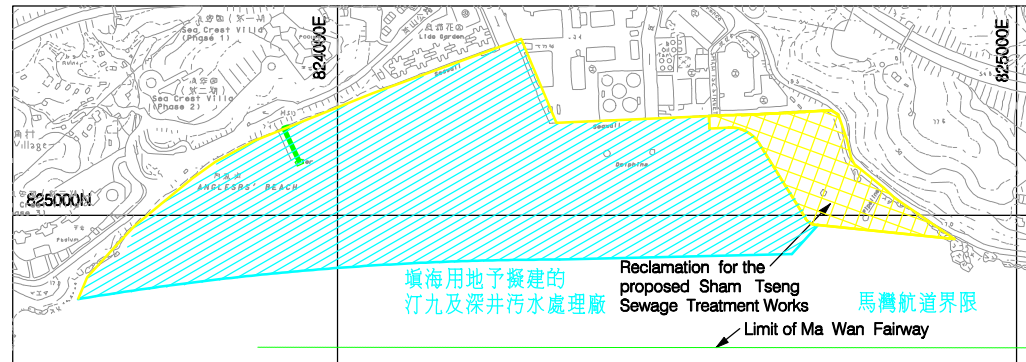
Note 註 :

1. Limit of Ma Wan Fairway is in accordance to Admiralty Chart No.3280.

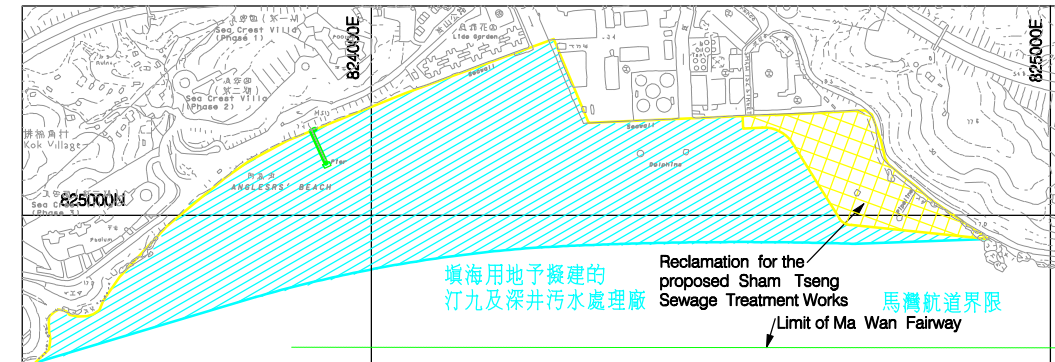
馬灣航道界限是以航海用圖3280號作根據



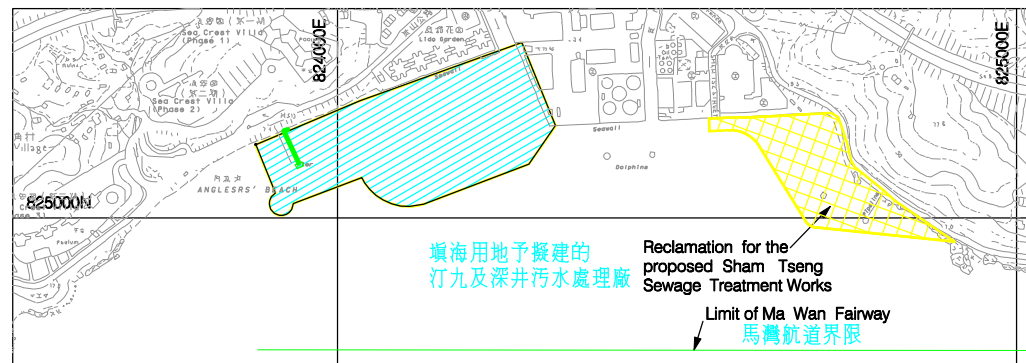
方案1 填海面積約16.3公頃
OPTION 1
Area of Reclamation = 16.3 ha (Approx.)



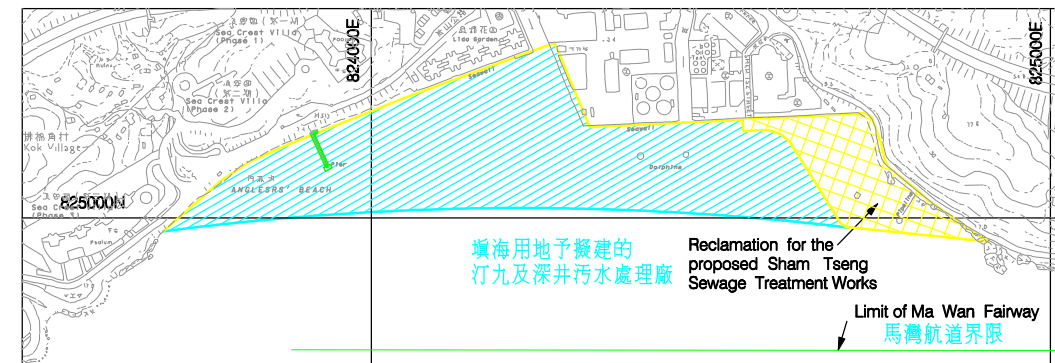
方案2 填海面積約21.3公頃
OPTION 2
Area of Reclamation = 21.3 ha (Approx.)



方案4 填海面積約25公頃
OPTION 4
Area of Reclamation = 25.0 ha (Approx.)



方案3 填海面積約6公頃
OPTION 3
Area of Reclamation = 6.0 ha (Approx.)



方案5 填海面積約11.3公頃
OPTION 5
Area of Reclamation = 11.3 ha (Approx.)

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PLANNING AND ENGINEERING FEASIBILITY STUDY
FOR SHAM TSENG DEVELOPMENT

CONCEPTUAL RECLAMATION
LAYOUT OPTIONS 1 TO 5

DRAWING NO.
圖則編號

FIGURE 2.2a

DESIGNED
設計

DRAWN
繪圖

CHECKED
複核

SCALE
比例

1 : 10000

APPROVED
批准

DATE
日期

STATUS
現況

PRELIMINARY



CIVIL ENGINEERING

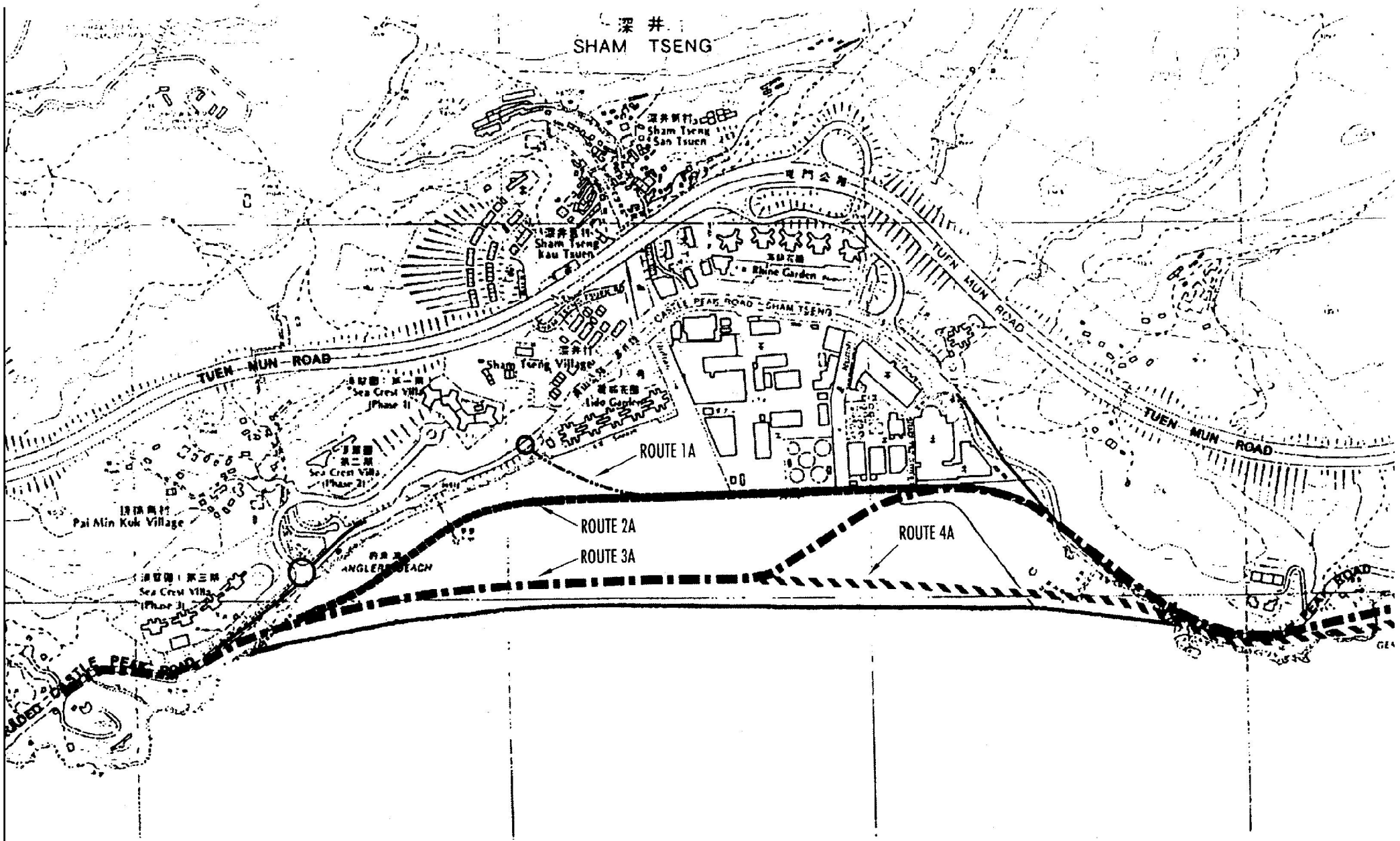
DEPARTMENT

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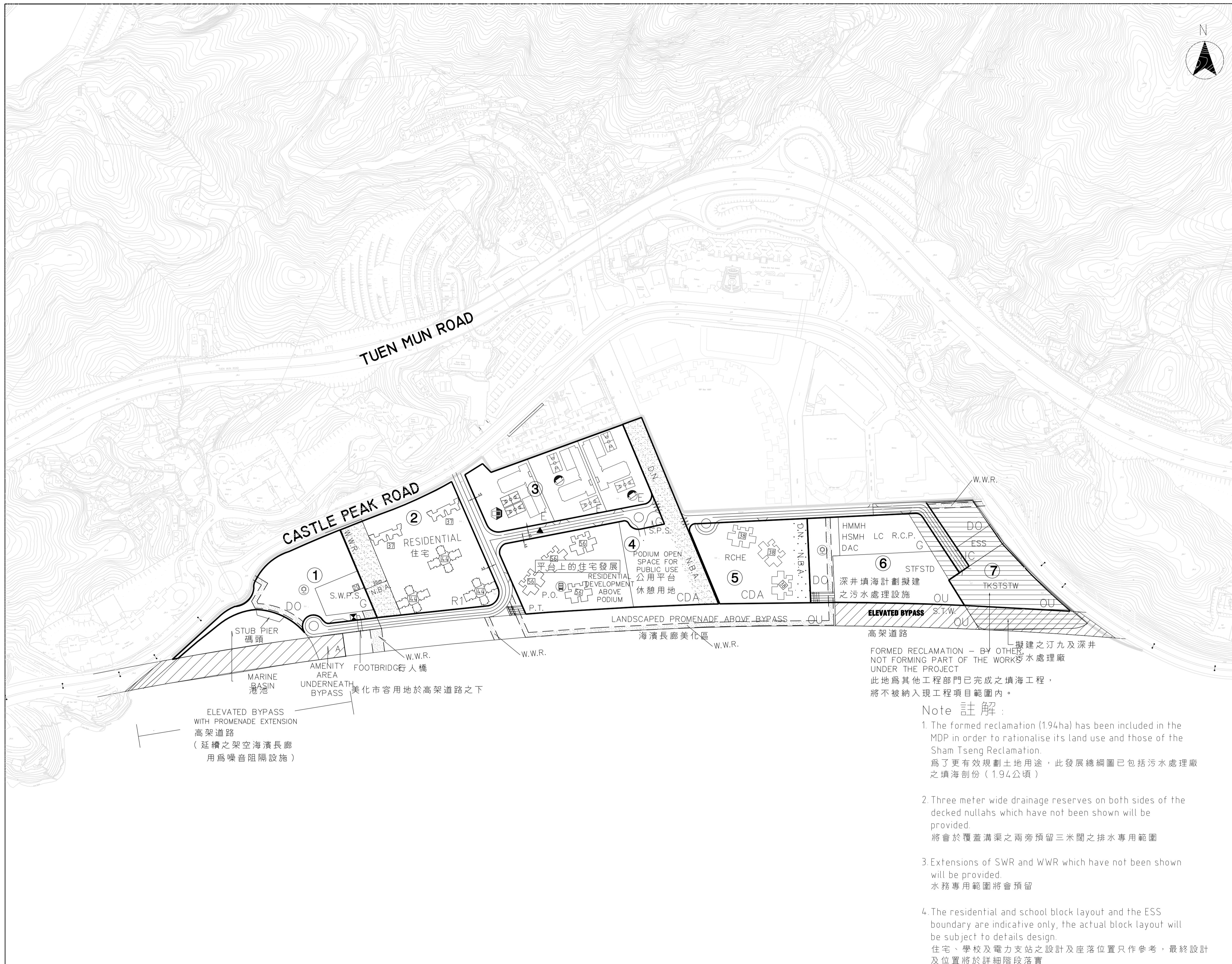
By-pass Alignments
 繞道路線

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
 SHAM TSENG DEVELOPMENT

		2.2b	
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
	MY		1:100
Approved 批准		Date 日期	Status 現況
		05/00	



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Notation 圖例:

	Secondary School 中學
	Primary School 小學
	Commercial Node 商業樞紐
	District Park / Neighbourhood Park 地區公園 / 鄰舍公園
	Public Bus Terminus 公共車輛總站
	Elevated Road 高架道路
	Proposed Level (in metres above P. D.) 擬議水平 (以主水平基準以米計算)
	MDP Boundary 總綱發展藍圖界線
	Planning Area Boundary 規劃地區界線
	Development Area Boundary 發展地區界線
	Planning Area No. 規劃地區號碼
	All footpaths to be 3.5m wide 除說明外, 所有行人徑為3.5米闊
	Utility / Services Installation 公用設施 / 服務 / 維修專用範圍
	Emergency Vehicular Access 緊急車輛通道
	Zebra Crossing (indicative) 斑馬線
	Terraced Staircase (indicative) 台階
	Escalator 扶手電梯
	No. of Domestic Levels 住宅層數
	DAC Day Activity Centre 日間活動中心
	HMMH Hostel for Moderately Mentally Handicapped 中度弱智宿舍
	HSMH Hostel for Severely Mentally Handicapped 嚴重弱智宿舍
	RCHE Residential Care Home for the Elderly 長者護理中心
	LC Leisure Centre 康樂中心
	Lift and Staircase (indicative) 升降機及樓梯
	S.W.P.S. Salt Water Pumping Station 海水抽水站
	ESS Electricity Sub-station 電力支站
	W.W.R. Water Works Reserve 水務專用範圍
	S.W.R. Saltwater Works Reserve 鹹水水務專用範圍
	N.B.A. Non-Building Area 非建築用地
	A Amenity Area underneath Elevated Bypass 高架橋道下之美化市容用地
	D.N. Decked Nullah 覆蓋溝渠
	P.O. Post Office 郵政局
	P.T. Public Toilet 公廁
	S.P.S. Sewage Pumping Station 污水抽水站 beneath cul-de sac (10x20m)
	R.C.P. Refuse Collection Point 廢物收集站
	Formed Reclamation 已完成之填海區
	TKSTSTW Ting Kau & Sham Tseng Sewage Treatment Works 擬建之汀九及深井污水處理廠
	STFSTFD Sewage Treatment Facilities for Sham Tseng Development 深井發展污水處理設施

SCHEDULE OF USES AND AREAS
土地用途及面積一覽表

ZONES 地帶	NET SITE AREA & % 淨面積及百分率	
	HECTARES 公頃	% 百分率
R1 Residential - Zone 1 住宅用地第一類	2.28	13.30%
CDA Comprehensive Development Area 綜合發展區	4.41	25.73%
E Education 教育用地	1.97	11.49%
G Government 政府用地	0.90	5.25%
IC Institution or Community 團體或社區用地	0.16	0.93%
DO District Open Space 地區休憩用地	1.76	10.27%
OU Other Specified Uses 其他指定用途	4.30	25.09%
Road Reserve and Amenity Areas 道路預留用地及美化市容地帶	1.36	7.93%
	17.14	100.00%

FORMED RECLAMATION - BY OTHERS
NOT FORMING PART OF THE WORKS
UNDER THE PROJECT
此地為其他工程部門已完成之填海工程，
將不被納入現工程項目範圍內。

Note 註解:

- The formed reclamation (1.94ha) has been included in the MDP in order to rationalise its land use and those of the Sham Tseng Reclamation. 為了更有效規劃土地用途，此發展總綱圖已包括污水處理廠之填海部份 (1.94公頃)
- Three meter wide drainage reserves on both sides of the decked nullahs which have not been shown will be provided. 將會於覆蓋溝渠之兩旁預留三米闊之排水專用範圍
- Extensions of SWR and WWR which have not been shown will be provided. 水務專用範圍將會預留
- The residential and school block layout and the ESS boundary are indicative only, the actual block layout will be subject to details design. 住宅、學校及電力支站之設計及座落位置只作參考，最終設計及位置將於詳細階段落實

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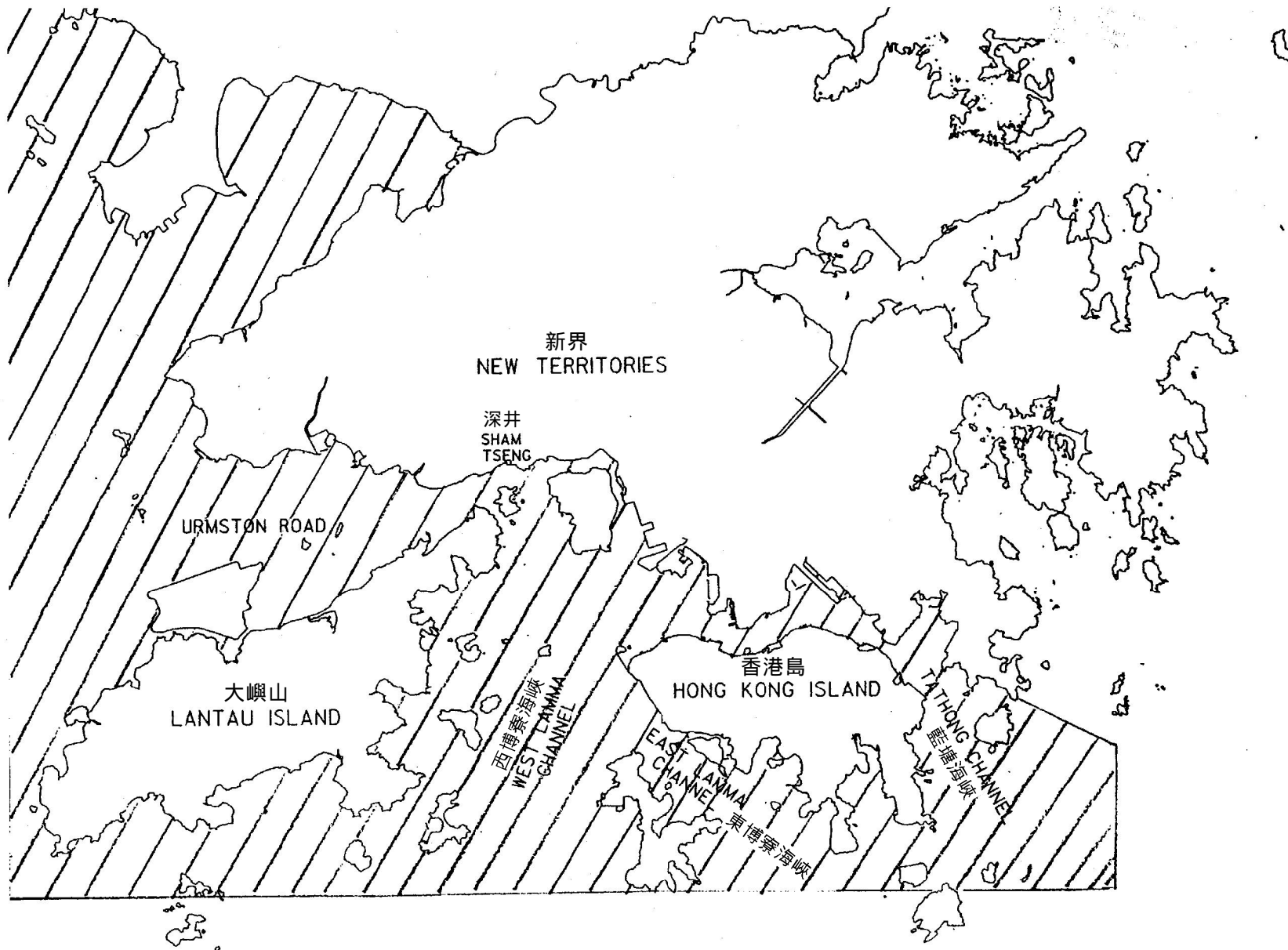
PLANNING AND ENGINEERING FEASIBILITY STUDY
FOR SHAM TSENG DEVELOPMENT

MASTER DEVELOPMENT PLAN
深井發展總綱圖

Figure No. 圖則編號	2.2c	
Drawn 繪圖	Checked 覆核	Approved 批准
GL	AW	MS
Scale 此例	Date 日期	Date 日期
1 : 5000	05/00	05/00
Status 現況	Preliminary	

CIVIL ENGINEERING
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土木工程署



圖解
KEY
 WATER QUALITY IMPACT AREA
 水質影響區域

不按比例
NOT TO SCALE

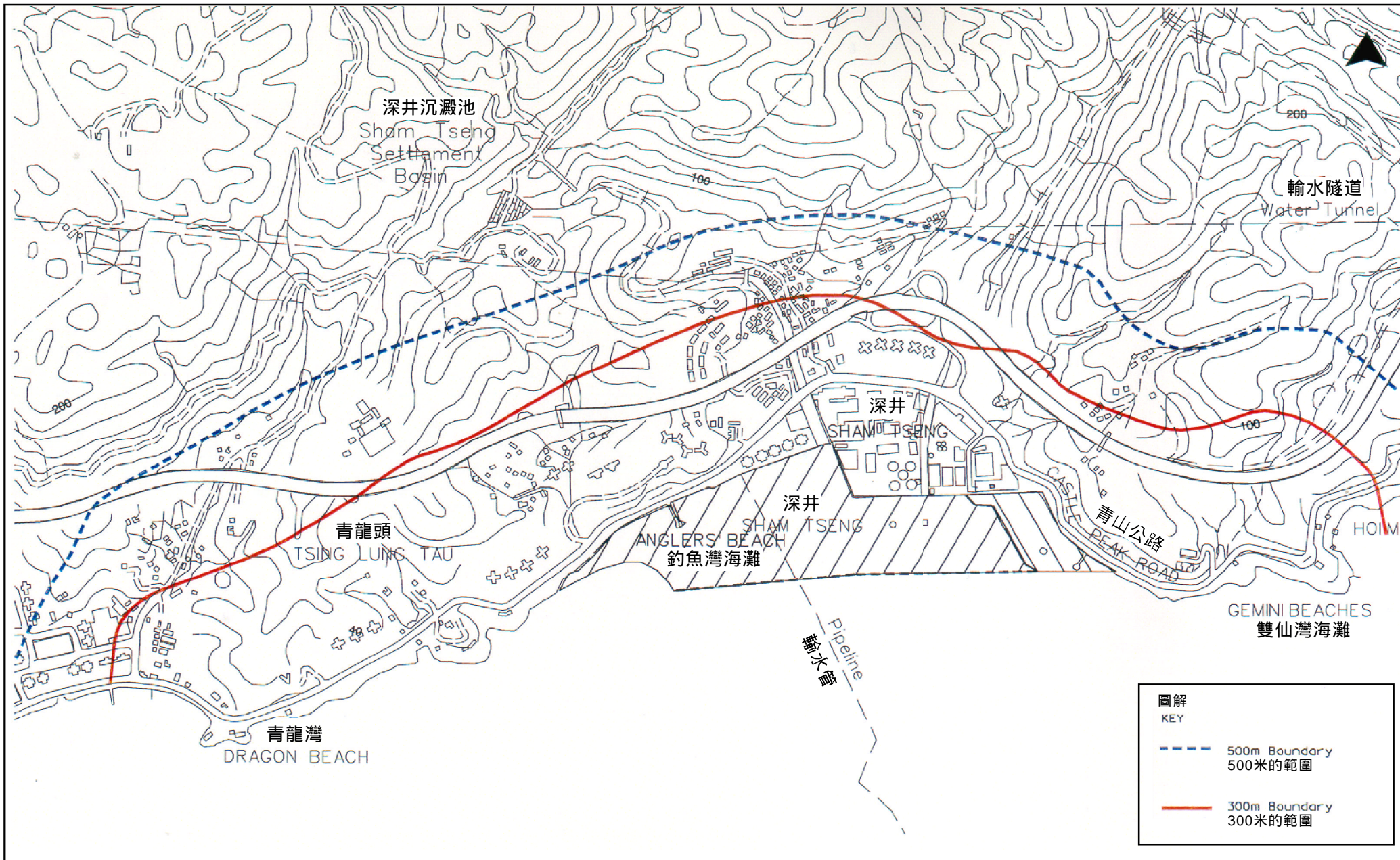
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 PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
 SHAM TSENG DEVELOPMENT

**Study Area of Water Quality
 Impact Assessment**
 水質影響評估研究區域

Drawing No. 圖號	2.3a		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批核		Date 日期	Status 現況

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**Civil Engineering
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圖解
KEY

- - - 500m Boundary
500米的範圍
- 300m Boundary
300米的範圍

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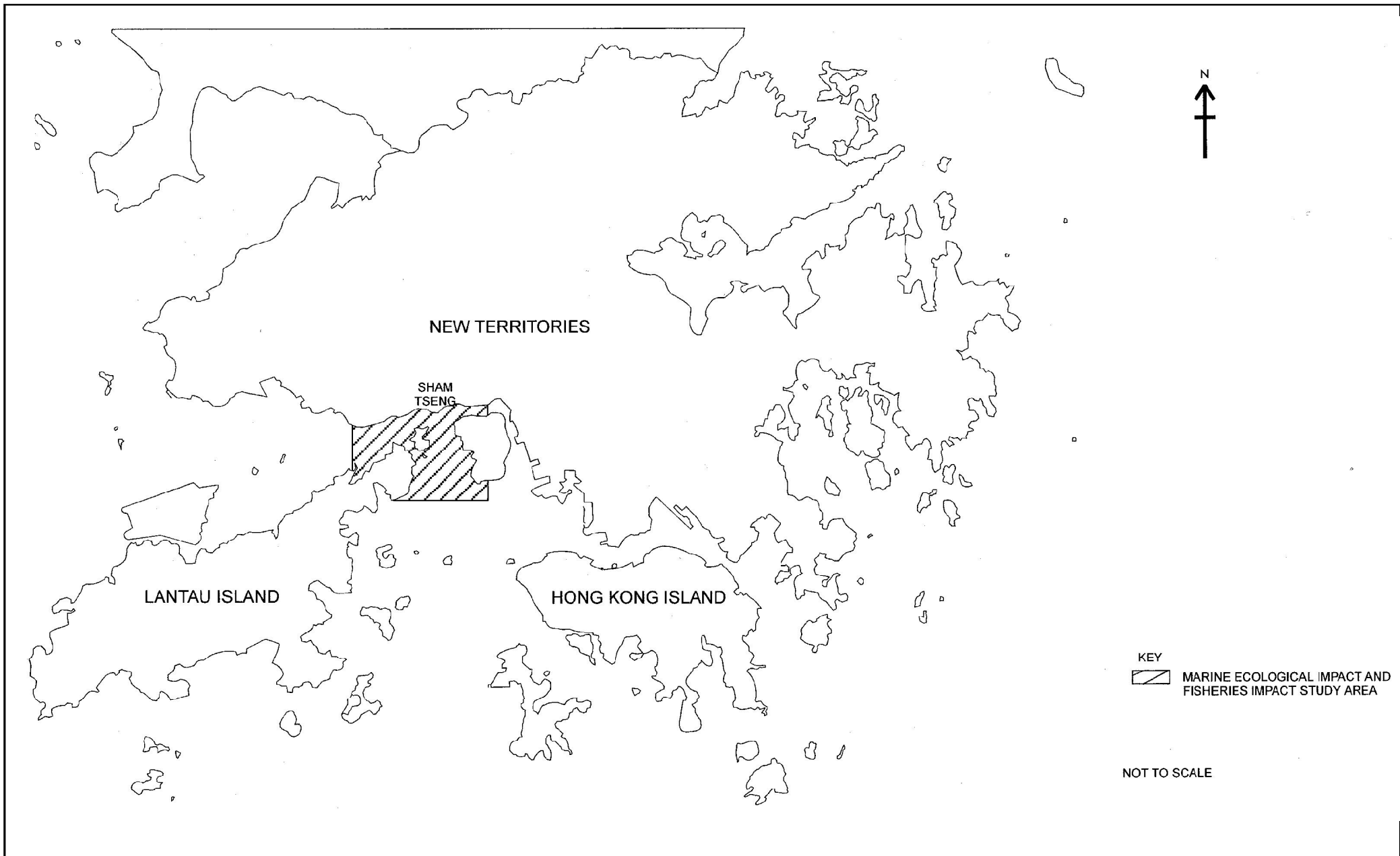
PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
SHAM TSENG DEVELOPMENT

**The 300m and 500m Boundaries of
The Study Area**
研究區域的300米及500米範圍

Drawing No. 圖號	2.3b		
Designed 設計	Drawn 繪圖 MY	Checked 校核	Scale 比例 Not to Scale
Approved 批准	Date 日期 05/00	Status 現況 Preliminary	



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Civil Engineering
Department



KEY
 MARINE ECOLOGICAL IMPACT AND FISHERIES IMPACT STUDY AREA

NOT TO SCALE

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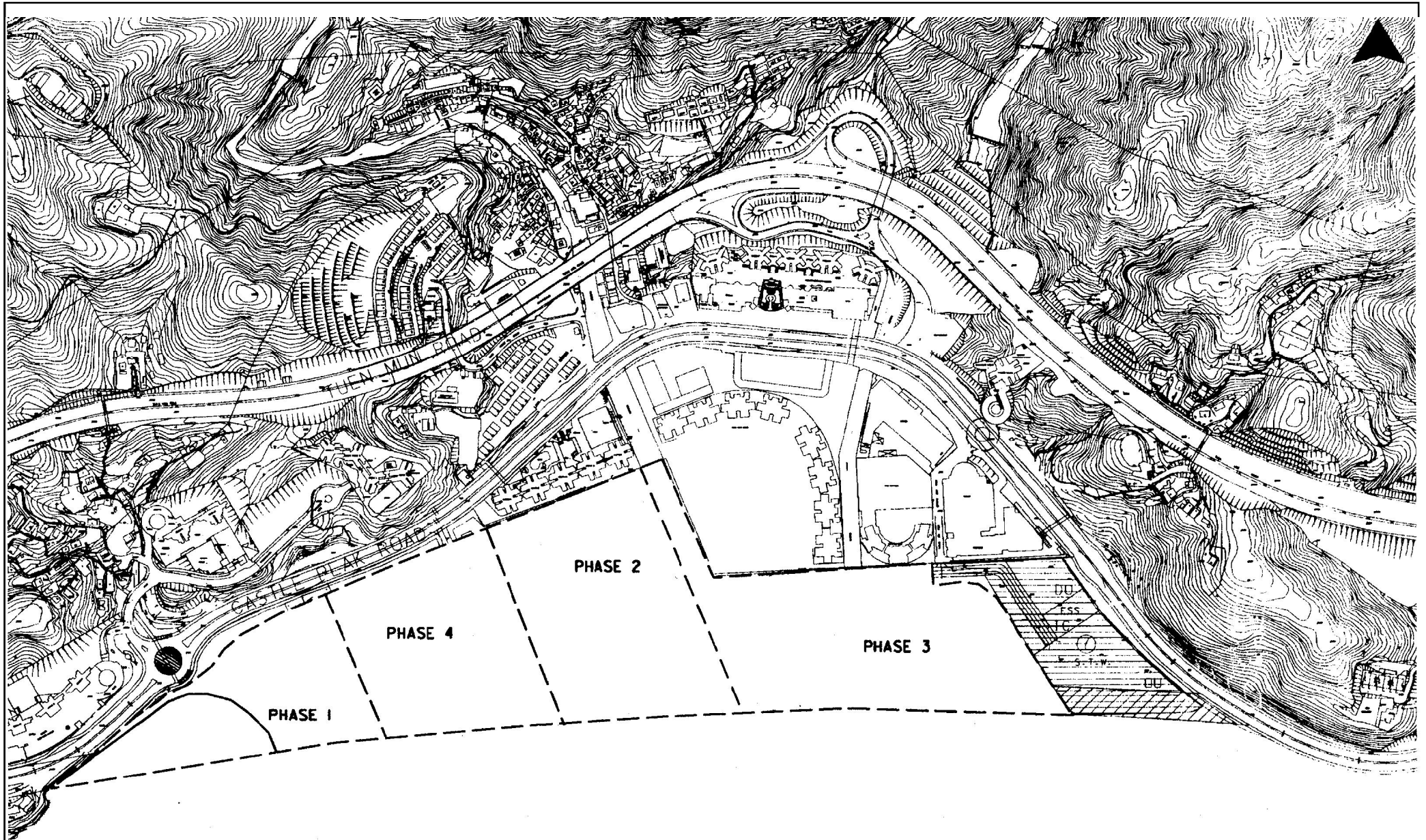
PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
 SHAM TSENG DEVELOPMENT

Drawing No. 圖號		2.3c	
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 現況

**Study Area of Marine Ecological
 Impact and Fisheries Impact**
 海洋生態影響及漁業影響研究區域



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 Civil Engineering
 Department**



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Proposed Reclamation Phasing
 建議的填海階段

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
 SHAM TSENG DEVELOPMENT

Drawing No.
 圖號

2.7a

Designed
 設計

Drawn
 繪圖

Checked
 校核

Scale
 比例

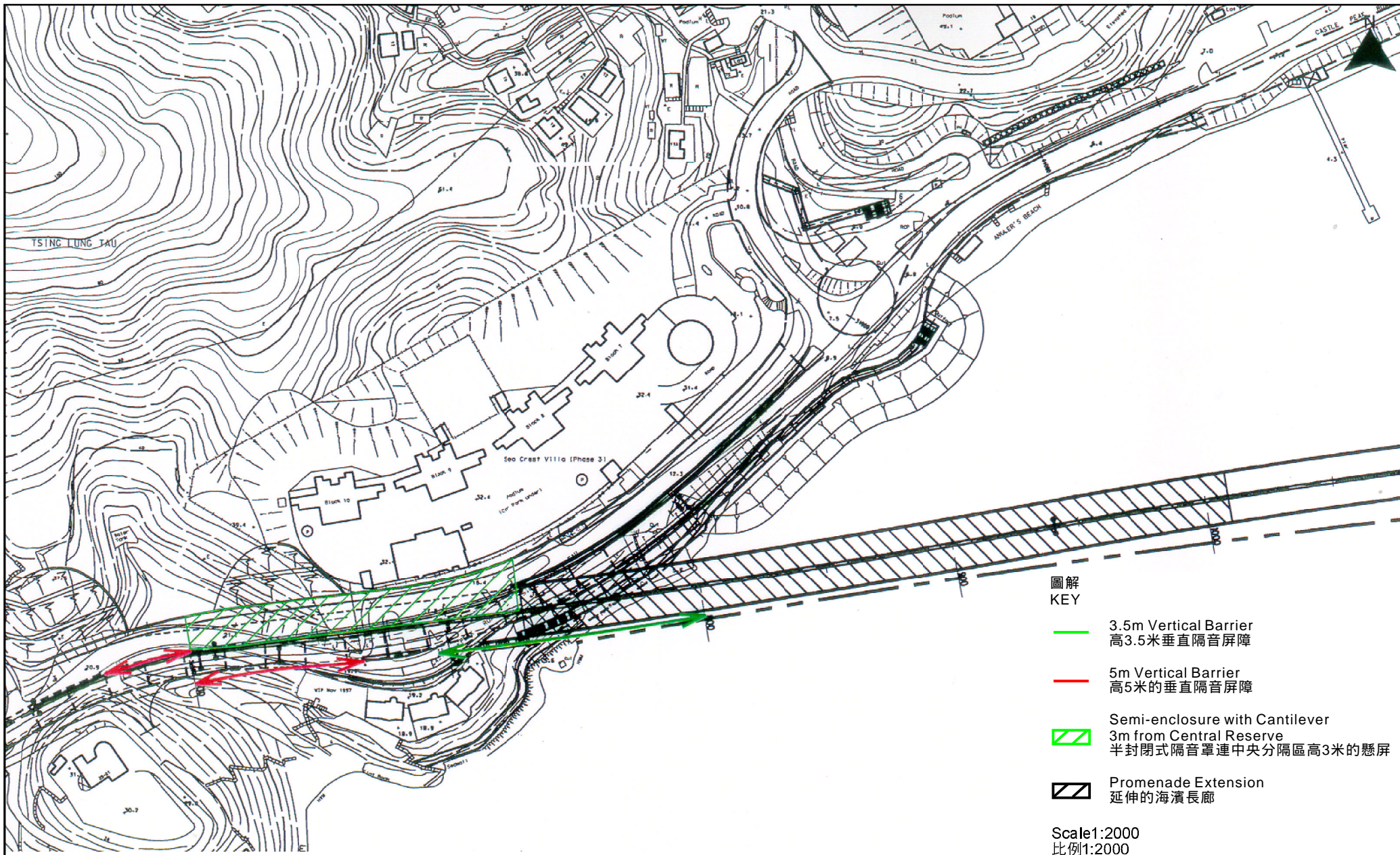
Approved
 批准

Date
 日期

Status
 現況



土木工程署
Civil Engineering
Department



圖解
KEY

-  3.5m Vertical Barrier
高3.5米垂直隔音屏障
-  5m Vertical Barrier
高5米的垂直隔音屏障
-  Semi-enclosure with Cantilever
3m from Central Reserve
半封閉式隔音罩連中央分隔區高3米的懸屏
-  Promenade Extension
延伸的海濱長廊

Scale 1:2000
比例 1:2000

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**Proposed Noise Mitigation Measures
at the Western Connection**
西面接駁點建議噪音緩解措施

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
SHAM TSENG DEVELOPMENT

Drawing No.
圖號

4.1a

Designed
設計

Drawn
繪圖

Checked
校核

Scale
比例

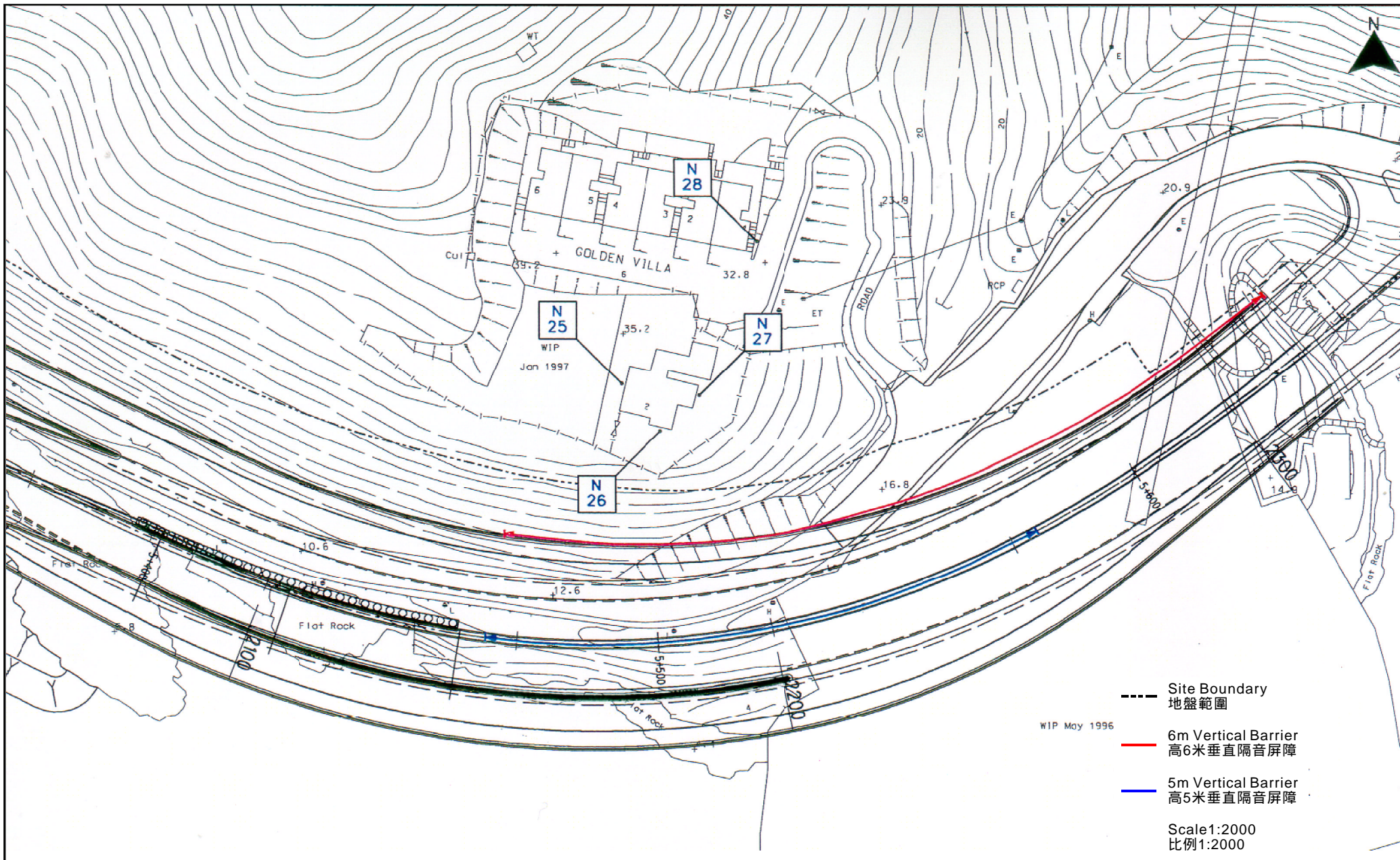
Approved
批准

Date
日期

Status
現況



土木工程署
Civil Engineering
Department



- Site Boundary
地盤範圍
- WIP May 1996
- 6m Vertical Barrier
高6米垂直隔音屏障
- 5m Vertical Barrier
高5米垂直隔音屏障
- Scale 1:2000
比例 1:2000

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**Proposed Noise Mitigation Measures
at the Eastern Connection**
東面接駁點擬議的噪音緩解措施

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
SHAM TSENG DEVELOPMENT

Drawing No.
圖號

4.1b

Designed
設計

Drawn
繪圖

Checked
校核

Scale
比例

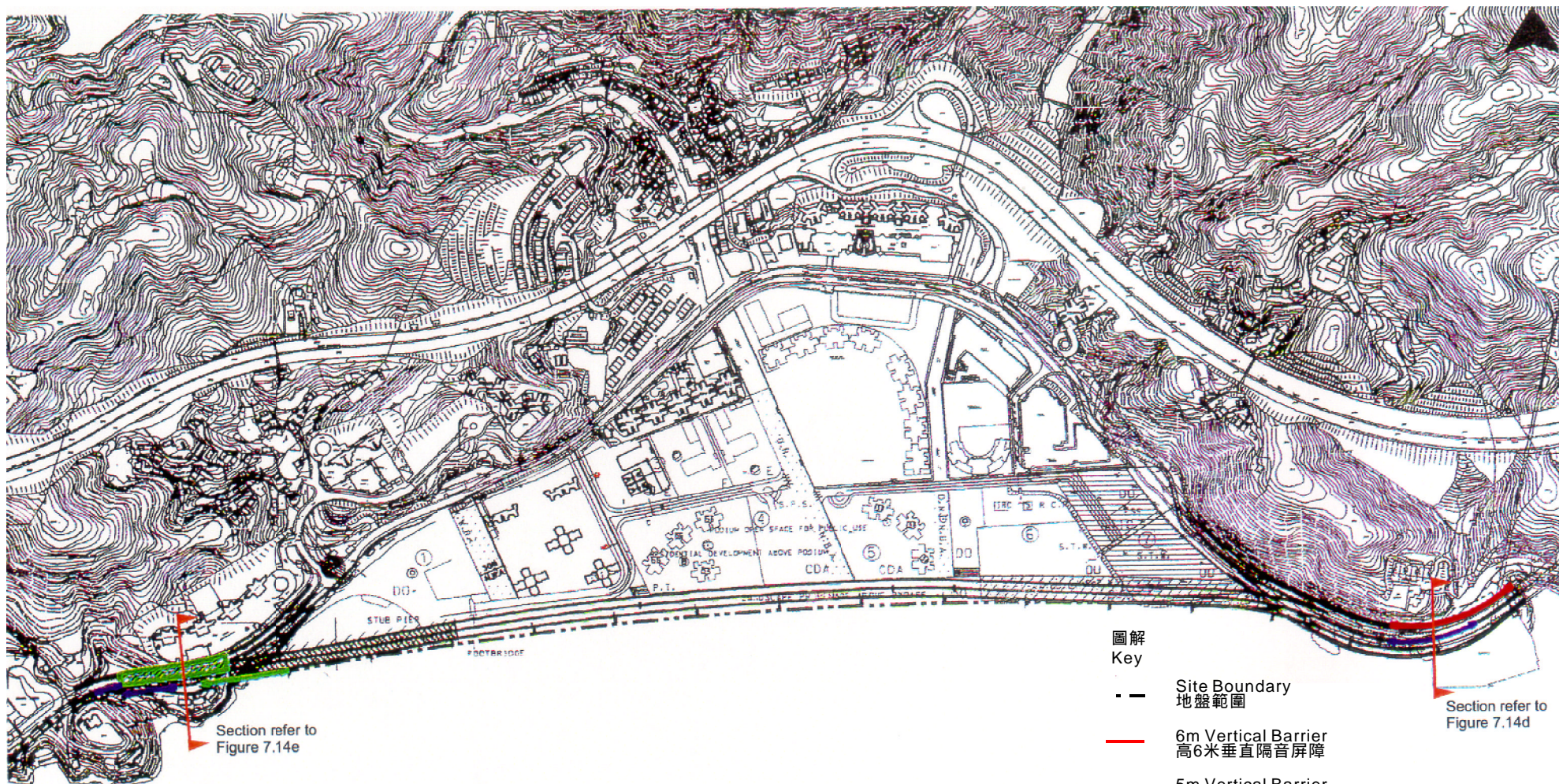
Approved
批准

Date
日期

Status
現況



**土木工程署
Civil Engineering
Department**



- 圖解
Key
- Site Boundary
地盤範圍
 - 6m Vertical Barrier
高6米垂直隔音屏障
 - 5m Vertical Barrier
高5米垂直隔音屏障
 - 3.5m Vertical Barrier
高3.5米垂直隔音屏障
 - Semi-enclosure with Cantilever
3m from Central Reserve
半封闭式隔音罩，連中央分隔區高3米的懸屏
 - Promenade Extension
延伸的海濱長廊
- Scale 1:7000
比例 1:7000

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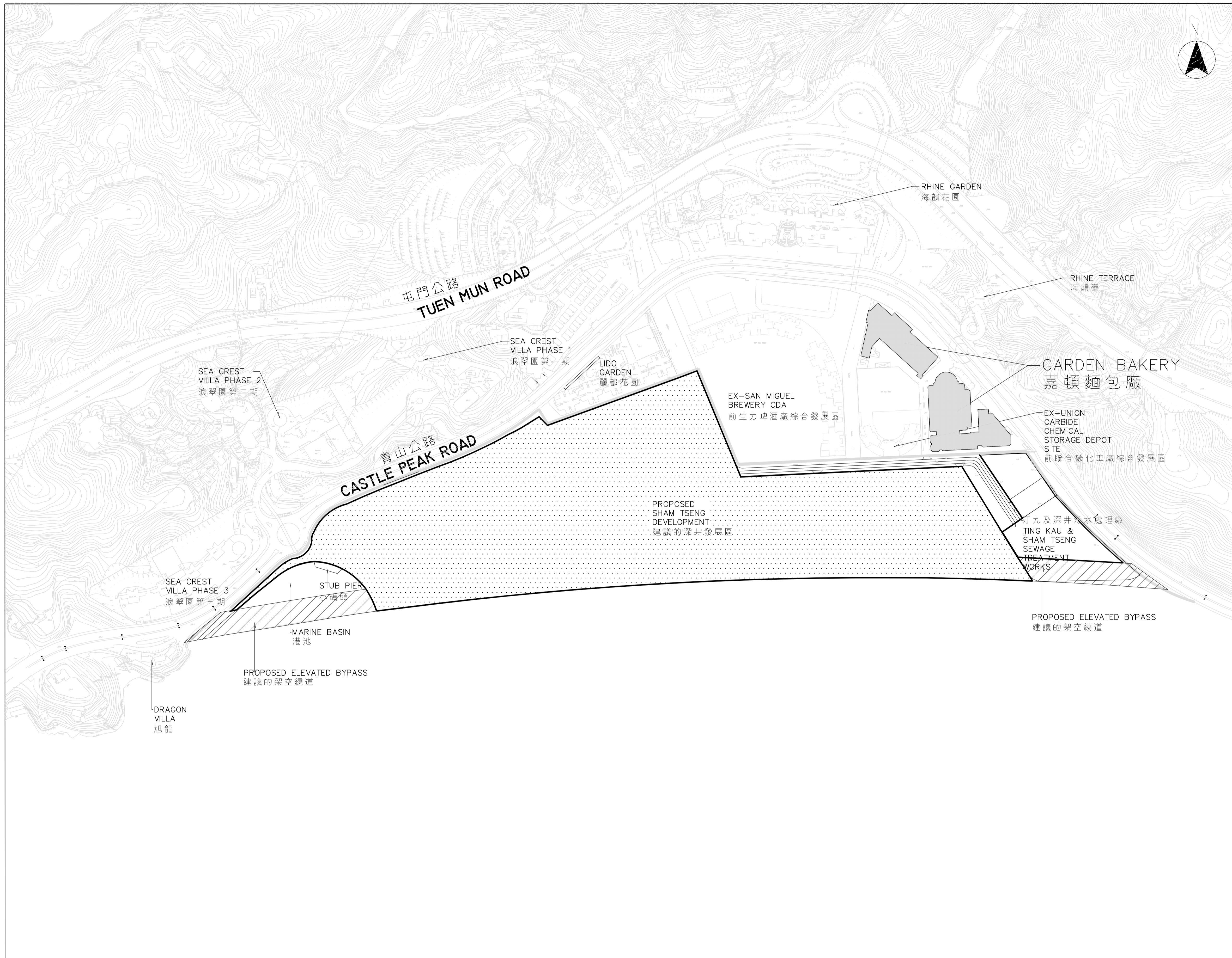


Proposed Noise Mitigation Measures
建議的噪音緩措施

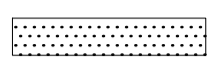
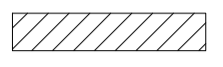
PLANNING AND ENGINEERING FEASIBILITY STUDY FOR SHAM TSENG DEVELOPMENT

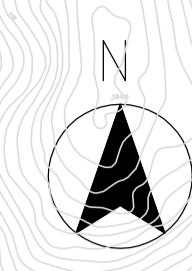
Drawing No. 圖號		4.1c	
Designed 繪圖	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准		Date 日期	Status 狀況





Legend 圖例 :

-  Proposed Sham Tseng Development
建議的深井發展區
-  Proposed Elevated Bypass
建議的架空繞道



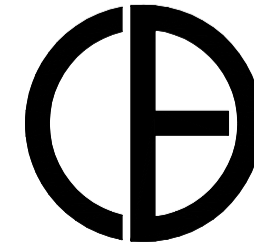
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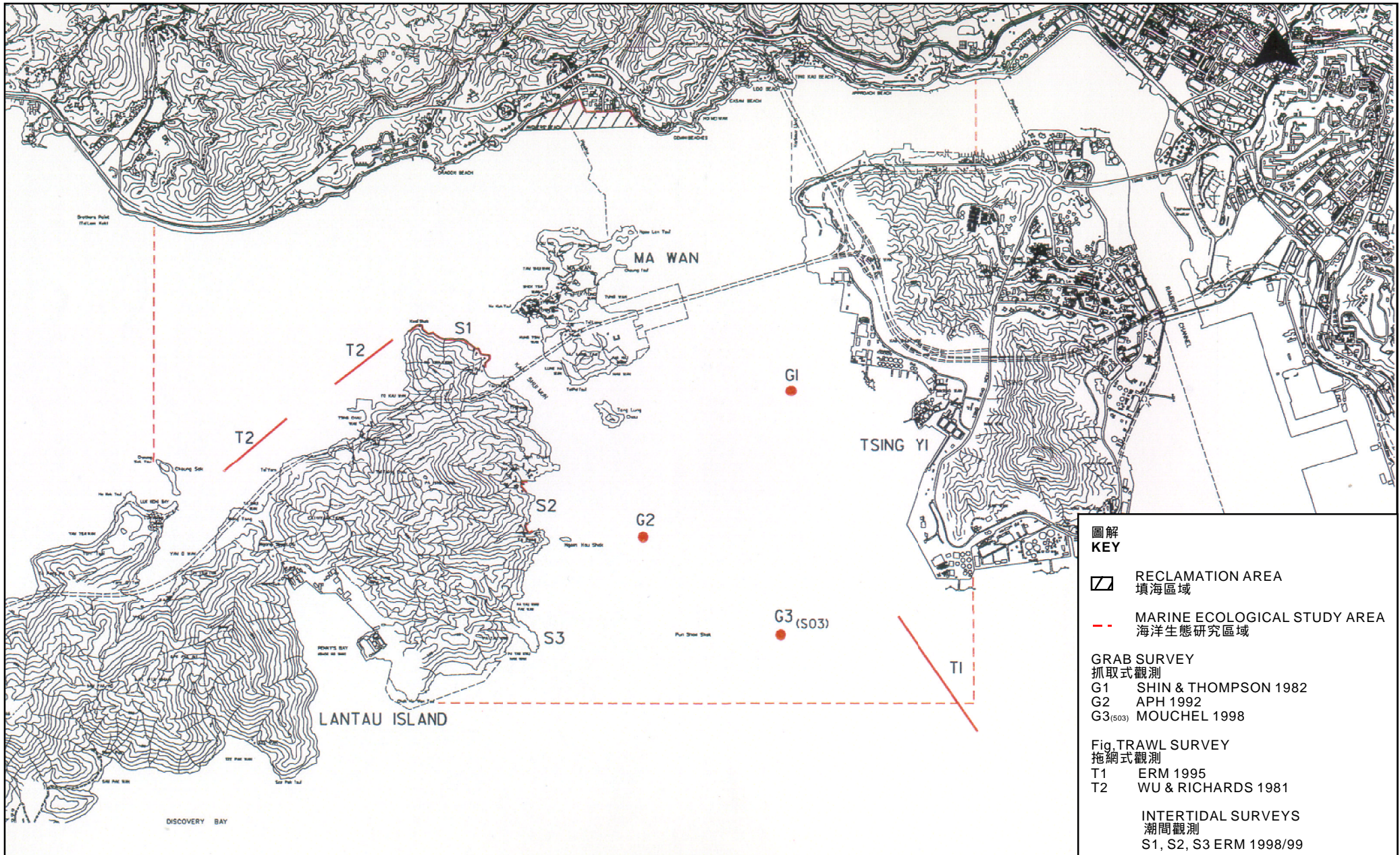
Scott Wilson

AGREEMENT NO. CE 93/97
PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
DEVELOPMENT ON SHAM TSENG FURTHER RECLAMATION

LOCATION OF GARDEN BAKERY
嘉頓麵包廠的位置

Figure No. 圖則編號	5.1	
Drawn 繪圖 GL	Checked 複核 AW	Approved 批准 MS
Scale 比例	Date 日期 05/00	Date 日期 05/00
1 : 5000	Status 現況 Preliminary	

 CIVIL ENGINEERING
DEPARTMENT **香港**
HONG KONG **土木工程署**



**圖解
KEY**

-  RECLAMATION AREA
填海區域
-  MARINE ECOLOGICAL STUDY AREA
海洋生態研究區域

- GRAB SURVEY
抓取式觀測**
- G1 SHIN & THOMPSON 1982
 - G2 APH 1992
 - G3^(S03) MOUCHEL 1998

- Fig. TRAWL SURVEY
拖網式觀測**
- T1 ERM 1995
 - T2 WU & RICHARDS 1981

**INTERTIDAL SURVEYS
潮間觀測**
S1, S2, S3 ERM 1998/99

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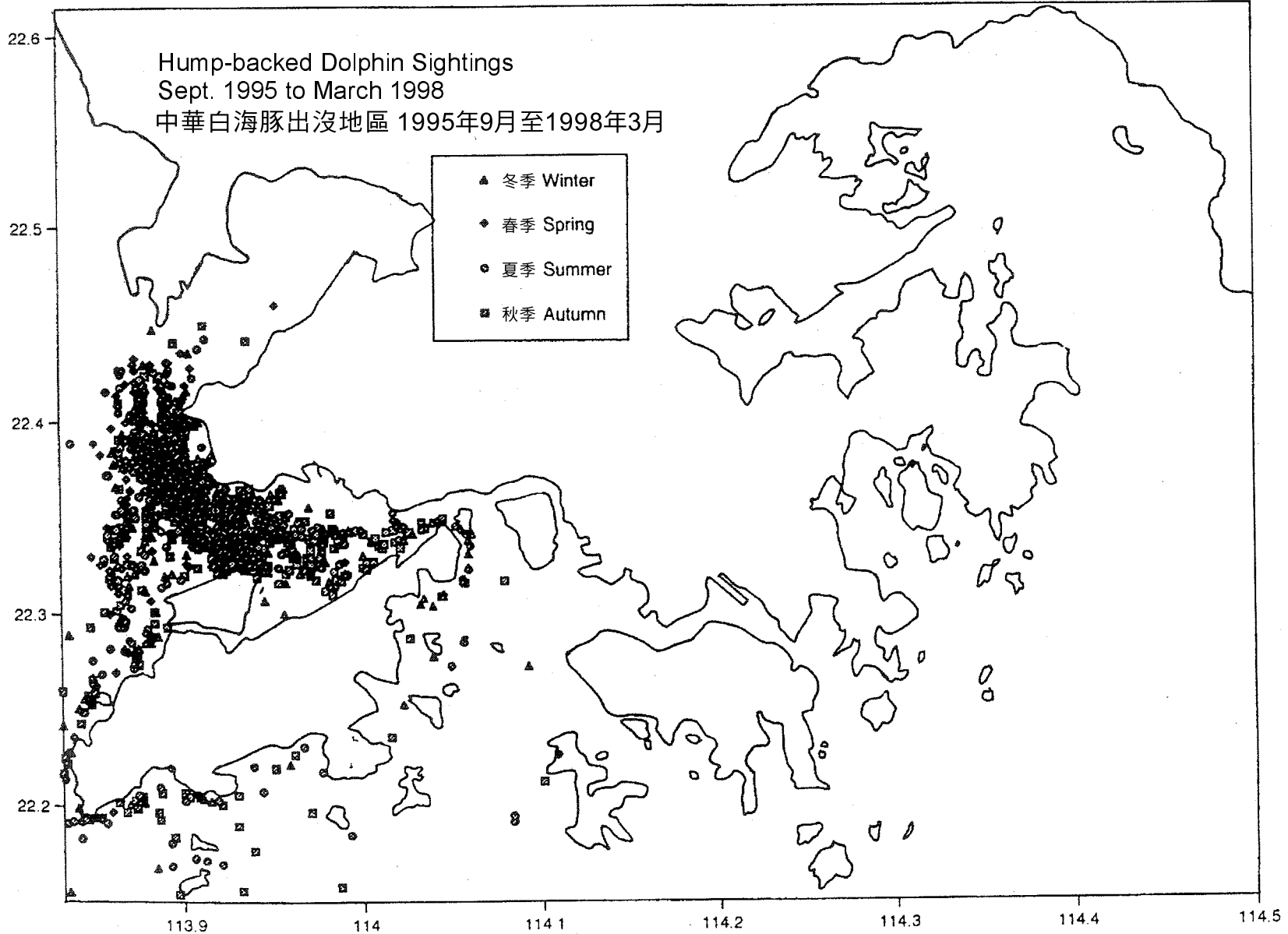
PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
SHAM TSENG DEVELOPMENT

**Marine Ecological Information
in the Study Area**
研究區域海洋生態資料

Drawing No. 圖號	8.1		
Designed 設計	ERM	Drawn 繪圖	MY
Checked 校核		Date 日期	5/00
Approved 批准		Status 狀況	C178028SC01TDGN



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Locations of Sightings of
Hump-Backed Dolphins in
Hong Kong (Jefferson 1998)
香港境內中華白海豚出沒地點

PLANNING AND ENGINEERING FEASIBILITY STUDY FOR
SHAM TSENG DEVELOPMENT

Drawing No. 圖則編號	8.2		
Designed 設計	Drawn 繪圖	Checked 校核	Scale 比例
Approved 批准	Date 日期		Status 現況



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