

Project Profile

for

Harbour Area Treatment Scheme (HATS) - Provision of Disinfection Facilities at Stonecutters Island Sewage Treatment Works



Drainage Services Department
The Government of the Hong Kong Special Administrative Region

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1. BASIC INFORMATION

1.1 Project Title

The title of this Project is:

“Harbour Area Treatment Scheme (HATS) – Provision of Disinfection Facilities at Stonecutters Island Sewage Treatment Works”.

1.2 Purpose and Nature of the Project

The HATS Stage I system, since its full commissioning in December 2001, has been preventing 600 tonnes of sludge from entering the Harbour each day and has brought about substantial and widespread improvements in the general water quality of the Harbour. These improvements have provided a better environment for marine life throughout the whole harbour area. However, whilst the overall bacteria (*E.coli*) levels in the harbour have been reduced by some 50%, the levels in the western harbour and the beaches along the Tsuen Wan coast have increased due to the impacts of the discharge of large volume of treated but un-disinfected effluent off Stonecutters Island, resulting in closure of four gazetted beaches along the Tsuen Wan coast in 2003. The Public Account Committee (PAC) of the Legislative Council, at its public hearing held on 6 May 2004, expressed concerns about the increase in bacteria level (*E. coli*) in the western harbour area and the closure of some Tsuen Wan beaches as a result, and urged the Administration to advance the provision of part of the permanent disinfection facilities under HATS Stage 2A to improve the water quality in the western harbour area such that the gazetted beaches can be re-opened for public use.

In response to PAC’s request, it is Government’s plan to expedite part of the permanent disinfection facilities proposed under Stage 2A at the existing Stonecutters Island Sewage Treatment Works (SCISTW) for early completion in 2008/09 to disinfect the treated effluent at SCISTW before discharge so that the closed Tsuen Wan beaches can be re-opened at the earliest possible time. The purpose of the Project is to implement the Government’s plan. The key elements of the Project include:

- Provision of a seawater pumping station and its intake culvert;
- Provision of an electro-chlorination plant and associated storage and dosing system; and
- Provision of a dechlorination plant and associated storage and dosing system.

1.3 Name of the Project Proponent

Chief Engineer, Harbour Area Treatment Scheme Division, Drainage Services Department

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

The Project will be constructed within the existing sewage treatment works on

Stonecutters Island (a location plan is attached at **Annex A**), which is currently providing chemically enhanced primary treatment (CEPT) for 1.4 million cubic metres of sewage collected each day through deep tunnels from the HATS Stage 1 catchments (i.e. the whole of Kowloon peninsula, Tseung Kwan O, Kwai Chung, Tsing Yi, Chai Wan and Shau Kei Wan). The design treatment capacity of the SCISTW is 1.7 million cubic metres per day. At present, the plant has no disinfection facility and the CEPT treated effluent is now discharged to the waters southwest of Stonecutters Island through a 1.7 km long outfall.

Disinfection will be achieved using chlorination process. An electrochlorination plant and associated facilities for on-site generation of hypochlorite will be built to treat the Stage 1 flows. A preliminary layout plan showing the proposed disinfection facility is attached at **Annex B**.

Alternative disinfection technology using Ultra Violet (UV) Irradiation to disinfect the CEPT sewage at SCISTW has also been considered. The efficiency and effectiveness of the UV option are however dependent very much on the influent characteristics. For a ferric chloride assisted CEPT influent, as in the case of SCISTW, the trial results show that the effective transmittance of the UV light is very low, resulting in a large number of UV lamps needed to disinfect the huge volume of CEPT flow at SCISTW. It is thus not efficient or cost-effective to use the UV method in the SCISTW case. More detailed evaluation of this alternative option will be provided in the assessment to be followed.

The Project site at Stonecutters Island was formed by reclamation and has been used as a sewage treatment works since its commissioning in mid 1997.

1.5 Types of Designated Project Involved

This is a Designated Project under Item F.1 Part I Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO), i.e. “sewage treatment works with an installed capacity of more than 15,000 m³ per day”.

1.6 Name and Telephone Number of Contact Persons

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2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Implementation

Detailed design and construction supervision of the Project will be

undertaken by Drainage Services Department using in-house resources, whereas the environmental impact assessment, if needed, will be carried out by consultants under the management of Drainage Services Department.

The construction works for the disinfection facilities will be packaged under one single contract and is tentatively scheduled to commence in late 2006 for completion in 2008/09.

2.2 Interactions with Other Projects

As all the construction works will be carried out within the existing SCISTW compound and no temporary works areas outside the existing STW site are required, no interactions with other projects are expected.

3. POSSIBLE IMPACTS ON THE ENVIRONMENT

3.1 Process Outline

The proposed disinfection facilities are designed to reduce the E. coli level in the CEPT effluent from the SCISTW. The preliminary design incorporates the following components:

- a seawater pumping station and its intake culvert;
- an electrochlorination plant;
- a hypochlorite storage and dosing system;
- a sodium bisulphite storage and dosing system; and
- an electric substation.

The hypochlorite solution produced from the electrochlorination plant will be dosed at the effluent channels of the sedimentation tanks. Disinfection will then take place in an existing culvert connecting the sedimentation tanks and the outfall system and sodium bisulphite will be dosed at the downstream end of the culvert for dechlorination before the effluent is discharged into the outfall system.

3.2 Possible Environmental Impacts during Construction of the Project

3.2.1 Noise

Construction noises may arise from excavation, non-percussive piling, and general construction activities.

3.2.2 Air Quality Impacts

No gaseous or odorous emissions will arise from the construction of the Project. However, dust may be generated from some construction activities such as excavation and demolition works.

3.2.3 Water Quality Impacts

There may be some water quality impacts during the construction of the seawater intake structure. Besides, runoff from the site during construction may contain sediments and silts arising from earthworks, and oil and lubricants from construction vehicles and plant.

3.2.4 Waste Impacts

Wastes generated during the construction phase may include

- Spoil from excavation and demolition works (about 1,200m³);
- Construction wastes such as wood, metal scraps, concrete, etc.;
- General waste from site personnel; and
- Chemical wastes from maintenance of construction plant and equipment.

3.2.5 Visual Impacts

The proposed disinfection facilities will be constructed within the existing STW compound. Visual impact during construction is minimum.

3.2.6 Ecological Impacts

There will be no loss of habitats, though there may be some minor impacts on the marine ecology during the construction of the seawater intake structure.

3.2.7 Traffic Impacts

Delivery of construction materials to and disposal of spoil and waste materials from the site are needed during construction.

3.2.8 Hazard

No hazard is identified during the construction stage.

3.3 Possible Environmental Impacts during Operation of the Project

3.3.1 Noise

Pumps/motors, ventilation equipment and other machinery are potential noise sources during the operation of the disinfection facilities, but most of such equipment will be located inside designated buildings.

3.3.2 Air Quality Impacts

No odour will be generated from the disinfection facilities.

3.3.3 Water quality Impacts

The proposed chlorination process is an effective way to reduce the pathogen level in treated sewage, thus minimizing the health risks to humans and

marine mammals from sewage-borne infection. However, the discharge of chlorinated effluent would give rise to some water quality concerns related to the total residual chlorine (TRC) and chlorination by-products (CBPs) formed by reactions between chlorine and other substances in the effluent. TRC includes free residual chlorine of un-dissociated and dissociated hypochlorite when chlorine is dissolved in water, plus combined residual chlorine of chloramines formed by reacting with ammonia. “CBPs” refer to chlorinated organic compounds (or total organic halogen) formed by the action of chlorine on the total organic carbon fraction of CEPT effluent. The two largest identified fractions of CBPs are trihalomethanes (THM) and haloacetic acids (HAA). TRC is recognized as being highly toxic to aquatic life. CBPs, on the other hand, are generally considered of concern to human health.

To minimize the toxic effects of TRC, dechlorination will be applied after chlorine disinfection. A literature review conducted in 2000 concluded that most dechlorination agents would not induce toxicity in the effluent. Another study (Chemwatch, 2004) also suggested that the risk of bioaccumulation of dechlorination agents in aquatic species would be low. There is however a concern about the overdosing of sulphite from the dechlorination process because excess sulphite can react with dissolved oxygen in the wastewater to produce sulphates, which may lead to reduced DO and low pH levels in the effluent.

3.3.4 Waste Impacts

Small amounts of wastewater and solid waste will be generated from the maintenance of the electrochlorination plant and its equipment during operation.

3.3.5 Visual Impacts

The proposed buildings for the disinfection facilities would be low-rise structures. Given the industrialized setting of SCISTW and the surrounding areas, the visual impacts during operation will be negligible.

3.3.6 Ecological Impacts

No terrestrial ecological impacts are envisaged. However, the discharge of chlorinated effluent with residual chlorine and CBPs may affect the marine ecology in the vicinity of the outfall location.

3.3.7 Traffic Impacts

Increase in traffic due to delivery of chemicals to site for the dechlorination process is very small.

3.3.8 Hazards

Hydrogen gas will be generated during the electrochlorination process and released to the atmosphere.

The hypochlorite solution generated from the electro-chlorination plant, at 0.2% concentration, will be stored in two on-site storage tanks of a total capacity of 1,000 tonnes for a short period of time before being dosed in the CEPT effluent. Any leakage may pose potential threat to site personnel and environment. Also the delivery and storage of sodium bisulphite, which is classified as dangerous goods, may have some hazard concern.

4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

4.1 Existing and Planned Sensitive Receivers and Sensitive Parts of the Natural Environment

The existing and planned sensitive receivers who may be affected by the Project include:

- (a) Personnel at the Government Dockyard adjacent to SCISTW;
- (b) Personnel at the existing shipyards and the KMB bus depot at some 300 m northeast of SCISTW;
- (c) Personnel and residents at PLA's barracks at some 600 m southwest of SCISTW;
- (d) Residents of a new housing development (under construction) at more than 700 m northeast of SCISTW;
- (e) Visitors to the Lai Chi Kok Park at some 900 m north of SCISTW;
- (f) Residents of the Mei Foo Sun Chuen at some 1,000 m north of SCISTW; and
- (g) Swimmers at the Tsuen Wan beaches which may be affected by the SCISTW outfall discharge.

4.2 Major Elements of the Surrounding Environment which might affect the Area in which the Project is Located

Major elements around the Project site include:

- (a) the SCISTW itself;
- (b) the West Kowloon Refuse Transfer Station;
- (c) the Route 3 viaduct;
- (d) the Route 9 (to be renamed as Route 8 later) viaduct, which is under construction; and
- (e) container terminals and storage yards.

A plan showing the locations of the existing and planned sensitive receivers, and the major elements is attached at **Annex C**.

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

5.1 Construction Stage

5.1.1 Noise Impacts

The contractor will have to comply with the provisions of the Noise Control Ordinance. Mitigation measures such as use of noise barriers, silence equipment, etc. will be used to contain the construction noise within the statutory requirements.

5.1.2 Air Quality Impacts

Dust generated by the construction activities will be minimized by employing appropriate mitigation measures, such as regular water spraying, provision of wheel washing facilities, and covering of stockpiled materials. The contractor will be required to abide by the relevant provisions of the Air Pollution Control Ordinance and its subsidiary legislation, including the Construction Dust Regulations.

5.1.3 Water Quality Impacts

The scale of the seawater intake construction at the seawall will be very small. An assessment will be made and necessary mitigation measures and monitoring programme will be devised to ensure that any impacts will be contained within the acceptable limits.

5.1.4 Waste Impacts

Wastes generated in the construction stage will be properly disposed of in accordance with the Waste Disposal Ordinance. Chemical wastes will be disposed of at a licensed chemical treatment and disposal facility in accordance with the Waste Disposal (Chemical Waste) (General) Regulations. Wastes that can be reused will be segregated for recycling as far as practicable.

5.1.5 Visual Impacts

The proposed disinfection facilities will be constructed within the existing STW compound. Visual impact during construction is minimum.

5.1.6 Ecological Impacts

No terrestrial ecological impacts are envisaged. Regarding the marine ecological impacts, as noted in 5.1.3, an assessment will be made and necessary mitigation measures and monitoring programme will be devised to contain any impacts arising from the construction of the seawater intake structure within the acceptable limits.

5.1.7 Traffic Impacts

It has been assessed that the existing road network around the Project site can accommodate the slight additional traffic arising from the construction

activities. The traffic impact will be minimal.

5.1.8 Hazards

No hazard is expected during the construction stage.

5.2 Operation Stage

5.2.1 Noise Impacts

The potential noise impacts during operation will be insignificant as all equipment will be located inside buildings at SCISTW.

5.2.2 Air Quality Impacts

No odourous gas will be generated from the disinfection facilities.

5.2.3 Water Quality Impacts

As noted in 3.3.3, TRC and CBPs are the two major water quality concerns in using the chlorination disinfection process. To reduce the effluent TRC level, dechlorination will be applied to keep it at not more than 0.2 mg/L for 95% of the time, and not more than 0.4 mg/L for all the times. At such a TRC level, a preliminary analysis has indicated that the effluent so discharged through the existing outfall at SCISTW would have very low risk to aquatic life and human being and the influence would be confined to waters within the Zone of Initial Dilution (ZID). As for CBPs, the chlorine dosage will be carefully designed and controlled to minimize the formation of CBPs. Based on a maximum chlorine dosage of 20 mg/L, it is assessed that the risk of CBPs to most aquatic life is not expected to be of concern as the level of CBPs will be sufficiently diluted to insignificant levels at the edge of ZID. For sodium bisulphite, the risk to aquatic life would be confined to waters within the ZID. The risk to human beings is expected to be minimal, even for undiluted chlorinated effluent.

A more detailed evaluation will be undertaken to assess the impacts of TRC and CBPs arising from the proposed disinfection facilities on water quality at the discharge location and sensitive receivers such as bathing beaches, secondary contact recreation areas, seawater abstraction sites and mariculture zones. Bench scale tests will be conducted to obtain more information on the level of CBPs in chlorinated CEPT effluent. An operational plan will also be formulated to control the dosage of hypochlorite and sodium bisulphite to ensure that the chlorination disinfection process will not pose any material threat to the aquatic life and human being during operation.

5.2.4 Waste Impacts

The small amounts of wastewater and solid waste generated from the maintenance of the electrochlorination plant and its equipment will be handled and disposed of in accordance with the established practice.

5.2.5 Visual Impacts

The proposed disinfection facilities will be low-rise structures built within an existing STW compound which in turn is located in an industrialized area. No visual impacts are envisaged.

5.2.6 Ecological Impacts

There are no terrestrial ecological impacts. Regarding the potential impacts on marine ecology, please see 5.2.3 above.

5.2.7 Traffic Impacts

The additional traffic due to chemical delivery is very small and no traffic impact is envisaged.

5.2.8 Hazards

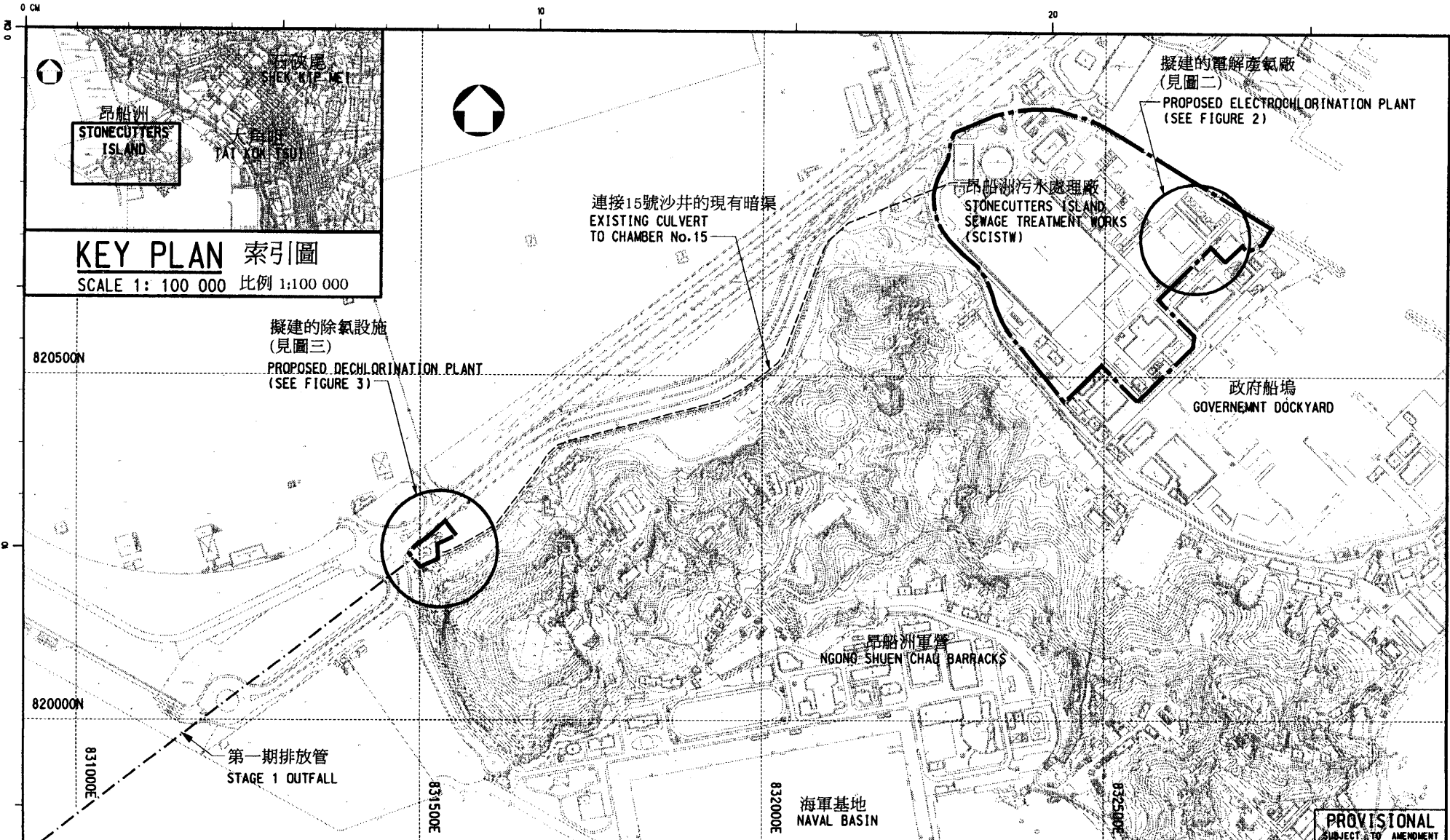
The hydrogen gas generated during the electrochlorination process will be collected and diluted in a de-gas system and vented into the atmosphere through properly designed vent ducts placed at appropriate height and location for safe and effective dispersion.

The electrochlorination plant area will be classified as a hazardous area. A hot work permit system will be implemented so as to ensure that hot work will be carried out in a safe manner.

The hypochlorite and sodium bisulphite storage tanks will be properly designed to minimize any risks of leakage. Bund walls will be built around the storage tanks to contain any leakage in case of damage. Sodium bisulphite will be delivered to site using licensed D.G. vehicles. Regular inspection and preventive maintenance of the storage tanks will also be carried out to ensure proper functioning of these tanks. Moreover, precautionary measures will be implemented to prevent accidental contact of the chemicals with acids, which would otherwise generate toxic gases.

In addition, contingency plans will be developed to deal with these hazards in the event that they did occur.

- End -



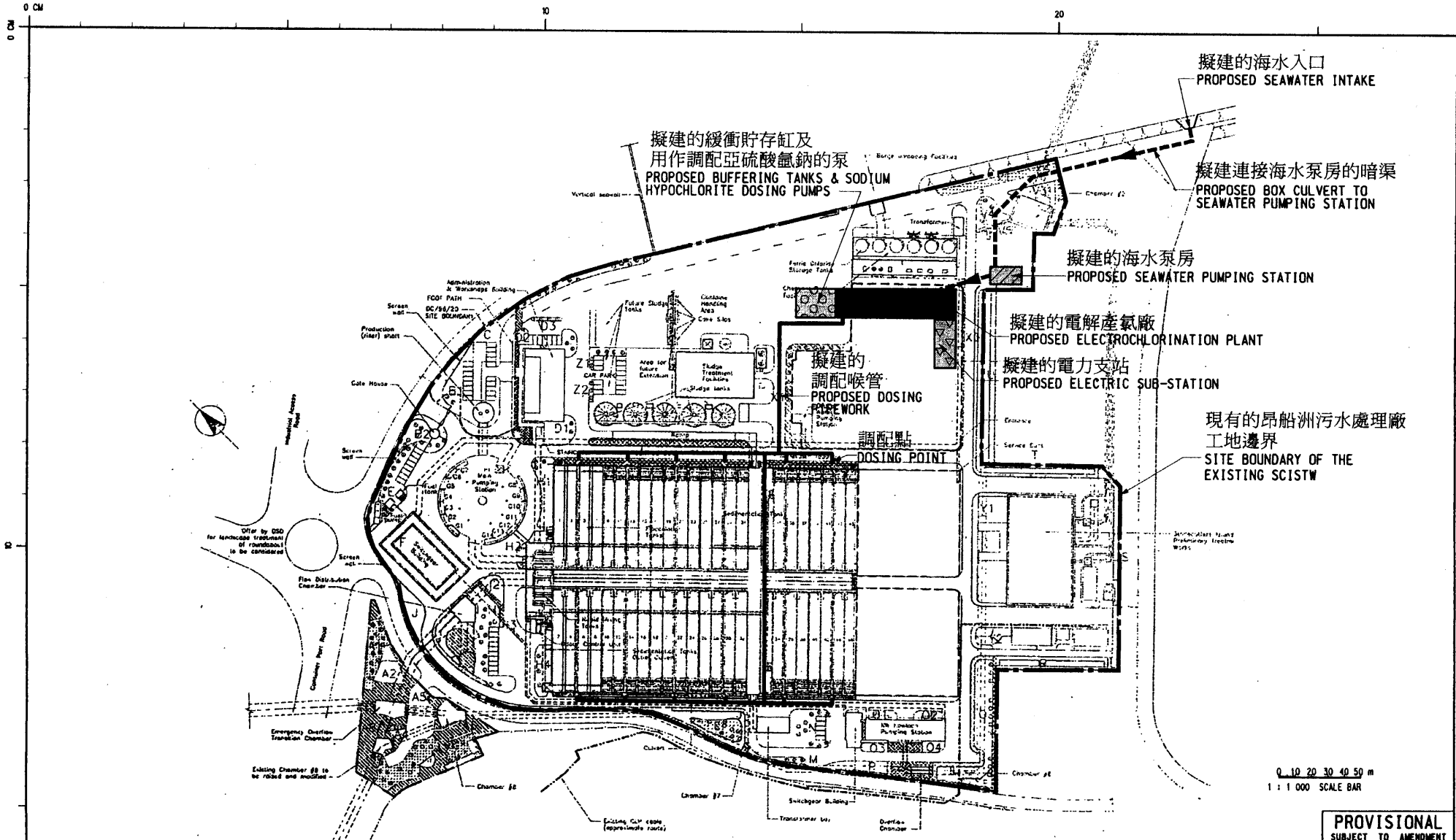
KEY PLAN 索引圖
SCALE 1: 100 000 比例 1:100 000

圖則名稱 drawing title
 淨化海港計劃 - 擬在昂船洲污水處理廠加建的消毒設施-位置圖
 HARBOUR AREA TREATMENT SCHEME (HATS) -
 PROVISION OF DISINFECTION FACILITIES AT
 STONECUTTERS ISLAND SEWAGE TREATMENT WORKS
 - LOCATION PLAN

繪畫 drawn	So	M. L. SO	日期 date	JUNE.04
核對 checked	Lower	S. C. CHIU	日期 date	AUG.04
批核 approved	[Signature]	M. H. LEUNG	日期 date	SEPT.04
部門 office	污水工程部 SEWERAGE PROJECTS DIVISION			

圖則編號 drawing no.	比例 scale
FIGURE 1	1:7500 OR AS SHOWN
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Annex A (附件A)

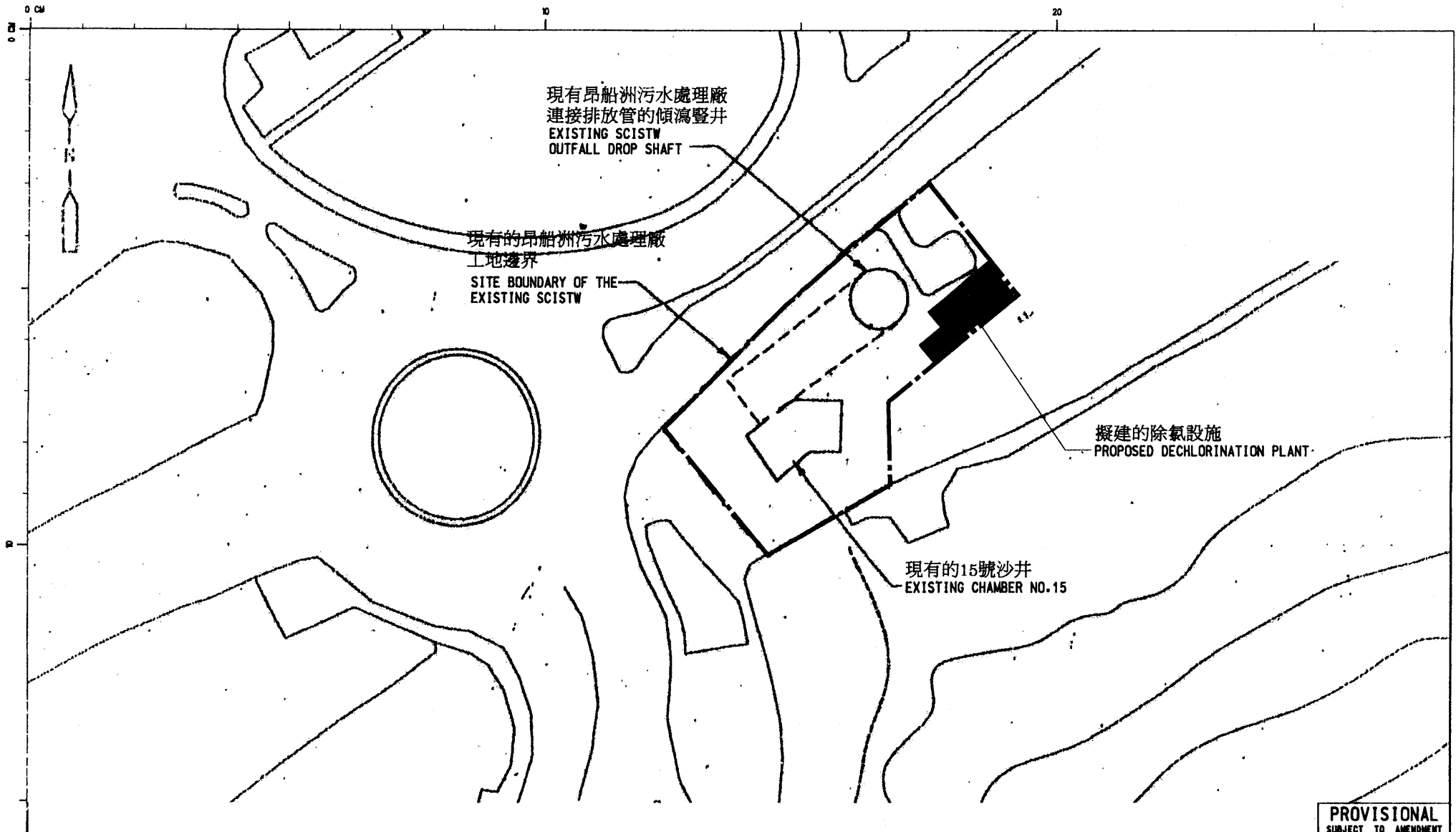


Annex B (附件 B)

圖則名稱 drawing title
 淨化海港計劃 - 擬在昂船洲污水處理廠加建的消毒設施
 - 規劃圖(全二張其一)
 HARBOUR AREA TREATMENT SCHEME (HATS) -
 PROVISION OF DISINFECTION FACILITIES AT STONECUTTERS ISLAND SEWAGE TREATMENT
 WORKS - LAYOUT PLAN (Sheet 1 of 2)

繪畫 drawn	So	M. L. SO	日期 date	JUNE.04
核對 checked	<i>Lowri</i>	S. C. CHIU	日期 date	AUG.04
批核 approved	<i>LF</i>	M. H. LEUNG	日期 date	SEPT.04
部門 office	污水工程 SEWERAGE PROJECTS DIVISION			

圖則編號 drawing no.	比例 scale
FIGURE 2	N.T.S.
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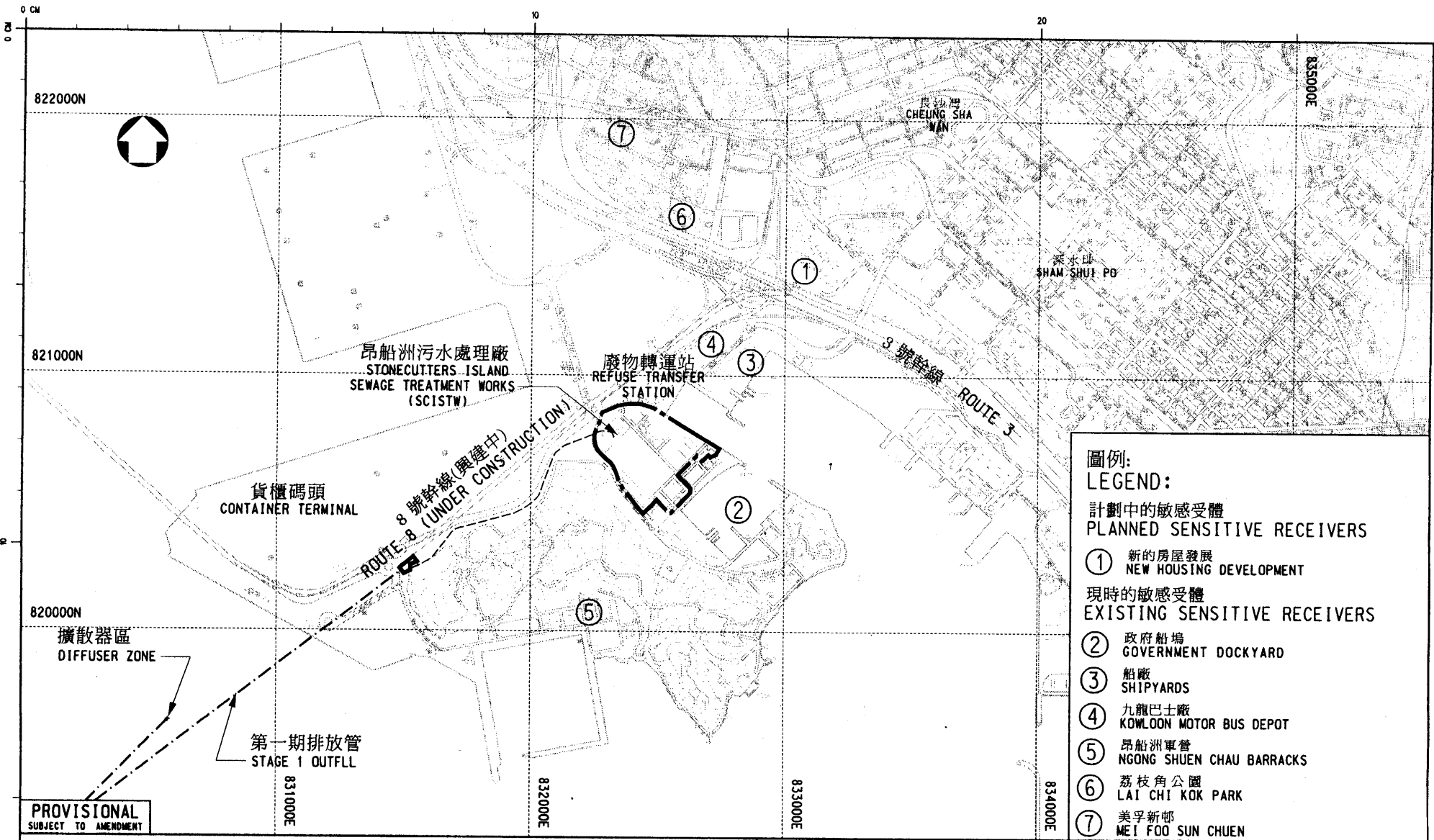
PROVISIONAL
SUBJECT TO AMENDMENT

圖則名稱 drawing title
淨化海港計劃 - 擬在昂船洲污水處理廠加建的消毒設施
- 規劃圖(全二張其二)
HARBOUR AREA TREATMENT SCHEME (HATS) -
PROVISION OF DISINFECTION FACILITIES AT STONECUTTERS ISLAND SEWAGE TREATMENT
WORKS - LAYOUT PLAN (Sheet 2 of 2)

繪畫 drawn	S.O. K. F. NG	日期 date	JUNE.04
核對 checked	Law S. C. CHIU	日期 date	AUG.04
批核 approved	M. H. LEUNG	日期 date	SEPT.04
部門 office	污水工程處 SEWERAGE PROJECTS DIVISION		

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FIGURE 3	N.T.S.
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Annex B (附件 B)



圖例:
LEGEND:

計劃中的敏感受體
PLANNED SENSITIVE RECEIVERS

① 新的房屋發展
 NEW HOUSING DEVELOPMENT

現時的敏感受體
EXISTING SENSITIVE RECEIVERS

② 政府船塢
 GOVERNMENT DOCKYARD

③ 船廠
 SHIPYARDS

④ 九龍巴士廠
 KOWLOON MOTOR BUS DEPOT

⑤ 昂船洲軍營
 NGONG SHUEN CHAU BARRACKS


⑥ 荔枝角公園
 LAI CHI KOK PARK

⑦ 美孚新邨
 MEI FOO SUN CHUEN

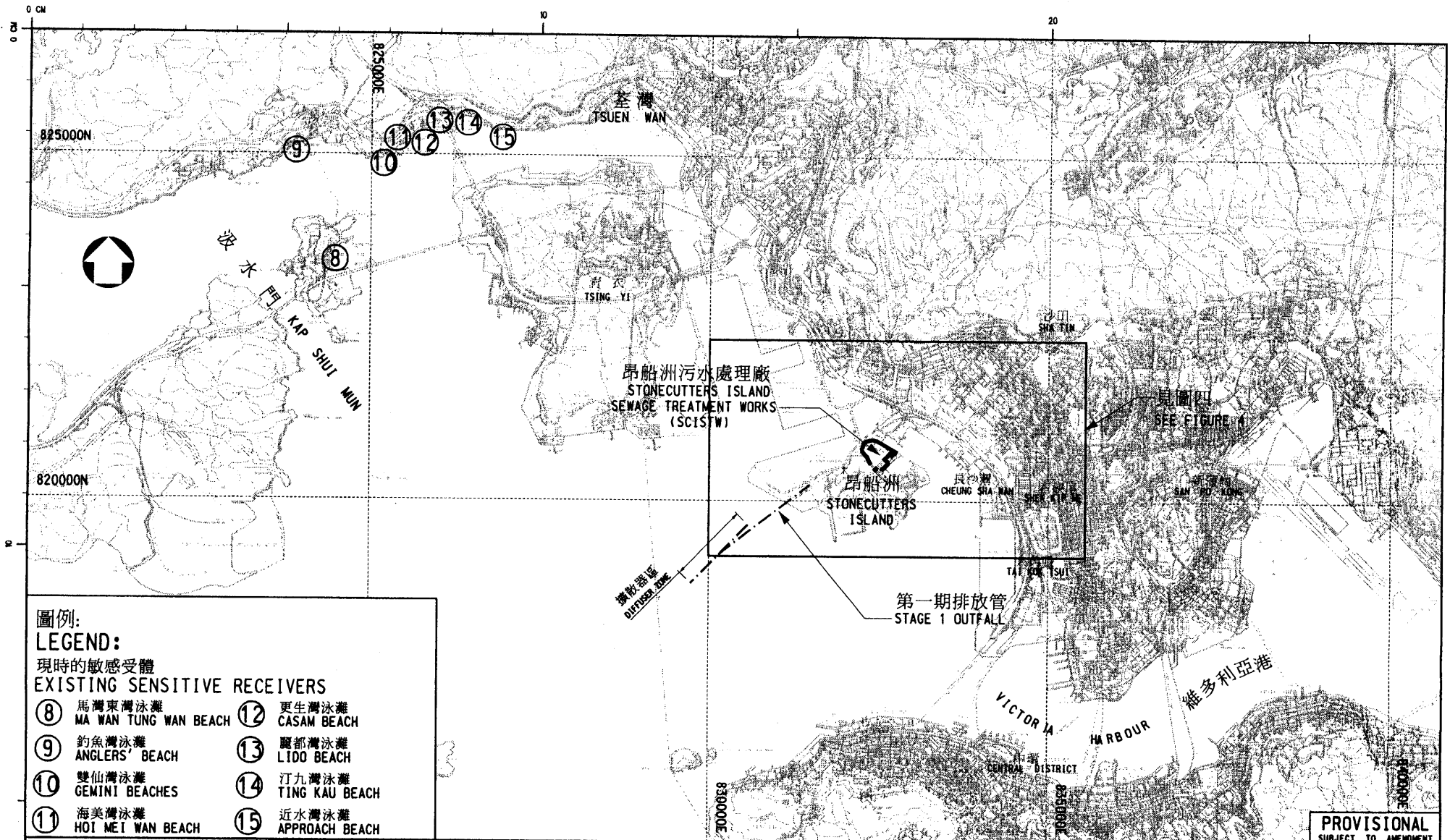
PROVISIONAL
 SUBJECT TO AMENDMENT

圖則名稱 drawing title
 淨化海港計劃 - 擬在昂船洲污水處理廠加建的消毒設施
 - 敏感受體及周圍主要環境元素-位置圖(全二張其一)
 HARBOUR AREA TREATMENT SCHEME (HATS) - PROVISION OF DISINFECTION FACILITIES AT
 STONECUTTERS ISLAND SEWAGE TREATMENT WORKS -
 LOCATION PLAN OF SENSITIVE RECEIVERS AND
 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT (SHEET 1 OF 2)

繪畫 drawn	So	M. L. SO	日期 date	JUL.04
核對 checked	<i>Lawin</i>	S. C. CHIU	日期 date	AUG.04
批核 approved	<i>LF</i>	M. H. LEUNG	日期 date	SEPT.04
部門 office	污水工程部 SEWERAGE PROJECTS DIVISION			

圖則編號 drawing no.	比例 scale
FIGURE 4	1:20000
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Annex C (附件C)



圖例:

LEGEND:

現時的敏感受體

EXISTING SENSITIVE RECEIVERS

- | | |
|-----------------------------------|---------------------------|
| ⑧ 馬灣東灣泳灘
MA WAN TUNG WAN BEACH | ⑫ 更生灣泳灘
CASAM BEACH |
| ⑨ 釣魚灣泳灘
ANGLERS' BEACH | ⑬ 麗都灣泳灘
LIDO BEACH |
| ⑩ 雙仙灣泳灘
GEMINI BEACHES | ⑭ 汀九灣泳灘
TING KAU BEACH |
| ⑪ 海美灣泳灘
HOI MEI WAN BEACH | ⑮ 近水灣泳灘
APPROACH BEACH |

圖則名稱 drawing title

淨化海港計劃 - 擬在昂船洲污水處理廠加建的消毒設施
- 敏感受體及周圍主要環境元素的位置圖(全二張其二)

HARBOUR AREA TREATMENT SCHEME (HATS) - PROVISION OF DISINFECTION FACILITIES AT
STONECUTTERS ISLAND SEWAGE TREATMENT WORKS -
LOCATION PLAN OF SENSITIVE RECEIVERS AND
MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT (2 OF 2)

繪畫 drawn	So	M. L. SO	日期 date	JUL.04
核對 checked	<i>[Signature]</i>	S. C. CHIU	日期 date	AUG.04
批核 approved	<i>[Signature]</i>	M. H. LEUNG	日期 date	SEPT.04
部門 office	污水工程部 SEWERAGE PROJECTS DIVISION			

圖則編號 drawing no.	比例 scale
FIGURE 5	1:75000

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