PWP Item 4226DS
SAI KUNG SEWAGE TREATMENT WORKS
PHASE II UPGRADING

PROJECT PROFILE

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

February 2001

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(Cont'd)

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Appendix

1. BASIC INFORMATION

1.1 Project Title

The title of this Project is:

"Sai Kung Sewage Treatment Works - Phase II Upgrading" hereinafter referred to as the "Project"

1.2 Purpose and Nature of the Project

This Project is to upgrade the existing Sai Kung Sewage Treatment Works (STW) to provide additional treatment capacity to cope with the population increase within the STW catchment area, and to satisfy the new treated effluent discharge requirements. Upon completion of the Project, the STW can cater for an Average Dry Weather Flow (ADWF) of 20,000 m^3/d. The key elements of the Project are:

a) Modify and expand the existing preliminary treatment units, including the inlet screens, inlet pumps and detritors;

b) Modify and expand the existing primary treatment units, if necessary;

c) Modify and expand the existing secondary treatment units, including the bioreactors and final clarifiers;

d) Modify and expand the existing effluent disinfection system;

e) Construct a new outfall;

f) Modify and expand the existing solid stream treatment units, including sludge digesters and sludge dewatering facilities;

g) Construct new sludge thickening facilities; and

h) Demolition of the existing treatment units, including the reinforced concrete structures and electrical and mechanical equipment.

1.3 Name of the Project Proponent

Project Management Division, Drainage Services Department

1.4 Location of the Project

The existing Sai Kung STW is located to the north-west of Sharp Island across the Inner Port Shelter (Sai Kung Hoi). The location and extent of the STW are indicated on Drawing No. DDN/226DS/0802A.

1.5 Types of Designated Project Involved

The Project constitute a single Designated Project under Schedule 2, Part 1, C.12 and F.1 of the Environmental Impact Assessment Ordinance (EIAO).

1.6 Name and Telephone Number of Contact Persons

2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Implementation

The Project will be implemented in-house by DSD. The tentative programme for implementation is shown in Appendix I.

2.2 Interactions with Other Projects

The design of the Project will be affected by the future population and development in the STW catchment which are being reviewed under the South East New Territories (SENT) Development Strategy Review Study managed by the Planning Department. Dependent on the outcome of the SENT Development Strategy Review Study, the treatment capacity of the STW may need to be further increased from 20,000m^3/d to 22,000 m^3/d to meet the demand.

3. POSSIBLE IMPACT ON THE ENVIRONMENT

3.1 Outline Process Involved

3.1.1 Overview of the Project

The Project will provide an increase in treatment capacity from 8,000 m^3/d (ADWF) to 20,000 m^3/d or 22,000 m^3/d depending on the result of further review to be carried out to check the feasibility of upgrading the STW to 22,000 m^3/d. The peaking factor for the design flow is 3.3. In addition, the treatment process will be designed to meet the proposed effluent quality requirements which now include an ammonia-nitrogen limit and a stricter total nitrogen limit.

3.1.2 Site Plan and Existing Process

The layout plan of the existing Sai Kung STW is shown on Drawing No. DDN/226DS/0802A.

The existing liquid stream treatment process consists of two (2) inlet screens, four (4) inlet pumps, two (2) detritors, two (2) primary sedimentation tanks, two(2) 4-stage Bardenpho configured bioreactors, two (2) final clarifiers; UV disinfection facilities and a 500m long outfall of 750mm diameter.

The solid stream process consists of septic waste receiving facilities, aerobic sludge digesters and sludge dewatering facilities. Septic waste is discharged from trucks to the septic waste receiving facilities, which consist of a basket screen, macerator pumps and a discharge screen, before being treated in the aerobic digesters. Sludge from primary and secondary treatments is pumped to the aerobic digesters without thickening. The digested sludge is then decanted and pumped to the membrane plate filter press for dewatering, and chemical addition is required to attain a sludge cake of 30% solids content. Together with the screenings and grit from preliminary treatment, the dewatered sludge is finally trucked to the SENT landfill for disposal.

3.1.3 Previous Upgrading Works

The original design capacity of Sai Kung STW was 15,200 m^3 /d (ADWF). As a result of the Phase I upgrading in 1996 to include nitrogen removal in the bioreactors, the design capacity of the secondary treatment processes have been de-rated to 8,000 m^3/d (ADWF) and 24,000 m^3/d (PWWF). The capacity of the other unit processes on site remains unchanged.

3.2 Possible Environmental Impacts During Construction of the Project

The objective of this section is to highlight the likely environmental impacts and issues that may arise during the construction of the Project.

3.2.1 Dust

Dust may be generated from some construction activities, mainly earthworks and demolition works.

3.2.2 Odour

During construction, primary and secondary sludge may be trucked off-site to facilitate modification and demolition of the existing treatment units. Sludge may be pumped out to temporary sludge storage tanks and sludge tankers regularly for disposal during construction. Odour may be generated from the temporary sludge storage tanks and during trucking of undigested sludge.

3.2.3 Noise

The construction activities may generate some noise through the use of conventional construction plants and equipment, like piling equipment, air compressors and excavators.

3.2.4 Liquid Effluents, Discharges or Contaminated Runoff

Contaminated site surface runoff may be generated as a result of the construction activities, for example due to erosion of excavations, oils or chemicals used, etc.
Dredging works for laying of the new outfall may have some impacts on the marine environment. Dredging of seabed may release sediments, hence increasing suspended solids concentrations. Contaminants originally trapped in the sediments, if any, may also be released into the water column during the dredging process.

3.2.5 Generation of Waste

Construction activities will generate various types of waste, including wood, timber and bamboo from formwork and falsework, and waste concrete from on-site concreting and demolition of the existing structures. The workforce on site will also generate general refuses comprising food scraps, paper and empty containers, etc.

3.2.6 Unsightly Visual Appearance

Visual impacts resulted from the construction activities will be temporary. The presence of construction equipment and stockpiled materials on works site may be a source of visual impacts to nearby sensitive receivers.

3.2.7 Ecological Impacts

All upgrading works will be undertaken within the existing STW site except the new outfall. Water quality affected by the dredging activities may have impacts to marine organisms.

3.3 Possible Environmental Impacts During Operation of the Project

The objective of this section is to highlight the likely environmental impacts and issues that may arise during the operation of the Project.

3.3.1 Odour

The potential odour sources in the STW are the sludge treatment units and the sludge and screenings handling facilities. Moreover, prolonged storage of the screenings and grit in the storage skips of the screening compactors and degritting facilities may also create odour problem.

3.3.2 Noise

The sewage/sludge pumps and the ventilation fans of ventilation systems are potential noise sources during operation of the STW.

3.3.3 Liquid Effluent Discharges

Additional treated effluent will be discharged into the Port Shelter. Nevertheless, the long-term water quality of the Project area will be improved after the Project is commissioned.

3.3.4 Generation of Waste

Additional screenings, grit and sludge will be generated due to the increase in sewage flow to be handled by the STW.

3.3.5 Storage, Use, Handling, Transport or Disposal of Hazardous Materials

At Sai Kung STW, hazardous materials currently in use include lubricant oil and chemicals, and they are stored in a dangerous goods house. Additional quantity will be handled by the STW due to the increase in sewage flow.

3.3.6 Risk of Accidents Resulting in Pollution

The risks of accidents that may result in discharge of untreated or partially treated sewage include:-

a) Total failure of power supply;
b) Equipment breakdown; and
c) Reception of toxic chemicals.

3.3.7 Unsightly Visual Appearance

Additional treatment units and structures will be constructed within the STW, which may have minor visual impacts to the surroundings.

4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

The purpose of this section is to outline those existing and planned sensitive receivers and sensitive parts of the natural environment which might be affected by the Project. The location of the existing and planned sensitive receivers are shown on Drawing Nos. DDN/226DS/0803A and DDN/226DS/0804A.

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

4.1.1 Residential Developments

The nearest residential area is the Tai Woo Place which is approximately 80 m north of the STW. Further north, about 260 m from the STW, is the Tui Min Hoi Harbour Villa. A series of suburban residential units are located in Tui Min Hoi, within 300 m due north-west of the STW. Fisherman Housing Estate and Sai Kung Tui Min Hoi Chuen are situated approximately 450m due west of the STW, to the south side of Hong Kin Road. Lakeside Garden is located approximately 700m north-west of the STW, around Fui Yiu Lane and Chui Tong Road area. To the further north-east of Lakeside Garden, there exists a residential and commercial combined area in the Sai Kung town which includes a series of seafood restaurants, at the south-east of Po Tung Road, approximately 800 m north of the STW. In addition, Sha Kok Mei Temporary Housing Area is situated due north of the combined area, approximately 1.25 km north of the STW.

4.1.2 Planned Development

The major planned developments in the vicinity of the site include:

a) An “R3” development to the north of Tai Woo Court; and

b) 12 approved Small Houses to the west of Tai Woo Court

4.1.3 Educational Institutions

A primary school is located approximately 160 m north-west of the STW. The next nearest school is also a primary school, located along Po Tung Road, approximately 750 m north-west from the STW. Other educational institutions are located over 1 km from the STW, which include the Lions Nature Education Centre along the Hiram's Highway, and the Sai Kung Sung Tsun Secondary School and three primary schools which are within the above-mentioned residential and commercial combined area in the Sai Kung town. None of them has a direct line-of-sight to the STW.

4.1.4 Health Care Facilities

There are two clinics at each side of Po Tung Road. One is situated at the north side of Yau Ma Po while the other is located within the above-mentioned residential and commercial area in the Sai Kung town. Both are approximately 900 m to the north-west of the STW. None of them has a direct line-of-sight to the STW.

4.1.5 Recreational Facilities

To the south-west of the STW is the Ma On Shan Country Park. Sai Kung Outdoor Recreation Centre is located on the north side of Hong Kin Road approximately 700 m to the west of the STW, and its line-of-sight is blocked by the Fisherman Housing Estate. In addition, Sai Kung West Country Park and Sai Kung East Country Park are located approximately 900 m and 1.8 km respectively on the north-east of the STW.

4.1.6 Places of Worship

There are several places of worship. The nearest church is located approximately 250 m north-west of the STW. Other places of worship include:

a) The Sai Kung Baptist Church, which is located on Hiram's Highway approximately 850 m to the north-west of the STW;

b) The Tin Hau/Emperor Kwan Temple, which is located on Hiram's Highway approximately 700 m to the north-west of the STW;

c) The Tin Hau Temple, which is located on Pak Kong Road approximately 1.5 km to the north-west of the STW;

d) The Tin Hau Temple, which is also located on north-east of Nam Wai approximately 2.5 km to the south west of the STW; and

e) The Che Gong Temple, which is located on the east of Ho Chung approximately 3.2 km to the south west of the STW;

4.1.7 Agricultural Areas

The nearest agricultural areas are situated in Tsiu Hang and adjacent to the Lions Nature Education Centre. They are approximately 600 m south-west and 900 m west of the STW respectively. Other agricultural areas are located over 1 km from the STW, which include those located north of the Sai Kung Tang Shiu-Kin Sports Ground, south of Pak Kong and north of Tai Chung Hau.

4.1.8 Water Courses, Nullahs and Confined Water Bodies

The largest water body in the area is the Inner Port Shelter (Sai Kung Hoi), and Hang Cho Shui, which is a river located approximately 750 m north of the STW. The river starts from Wong Chuk Yeung and passes through the Sai Kung town and ultimately discharges into the Inner Port Shelter. Another river is situated approximately 1.6 km to the south-west of the STW, starting from Uk Cheung and discharging into the Hebe Haven (Pak Sha Wan).

The nearest service reservoir is located approximately 250 m west of the STW. Another service reservoir and a water treatment works are situated approximately 1 km north-west of the STW.

4.1.9 Fresh/Sea Water Pumping Station

There are no exiting pumping stations for fresh/sea water intakes within the vicinity of the STW. However, a salt water pumping station has been proposed in Tui Min Hoi, to the northwest of Tai Woo Court.

4.1.10 Beaches

The nearest gazetted beach should be Kiu Tsui Wan, approximately 1.6 km to the south-east of the STW. Other gazetted beaches in the area include: Hap Mun Wan, approximately 2.8 km to the south-east of the STW and Trio Beach which is located east of the southern Sai Kung Peninsula, approximately 2.3 km to the south of the STW.

4.1.11 Marine Water Resources

The existing STW site is situated along the coastline of the Inner Port Shelter which possesses a relatively large body of water and may be considered sensitive to any potential environmental impact. In addition, to the immediate north is the mooring area for local vessels, which is vulnerable to water pollution. With respect to the general Sai Kung area, the Inner Port Shelter supports a number of beneficial uses. The key uses are secondary contact recreation (e.g. rowing, windsurfing), navigation and aesthetic enjoyment. In particular, any water pollution caused by uncontrolled sewage discharge will affect tourism which is a major economic activity in Sai Kung.

In recognition of this sensitivity, direct or indirect discharges to the Inner Port Shelter are strictly controlled under the Water Pollution Control Ordinance through Table 7 of the *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*.

The nearest mariculture fish rafts are located over 2 km south of the STW, in the southern part of Hebe Haven, west of Tai Ngam Hau. Pak Sha Wan Scout Sea Activities Centre is located in Hebe Haven, approximately 1.5 km to the south-west of the STW.

4.1.12. Pollution Sensitive Industries

With the exception of the Lions Nature Education Centre and the recreational facilities mentioned above, it is understood that there are no industries in the vicinity of the existing STW that will be sensitive to pollution potentially caused by the STW.

4.1.13 Areas of Conservation Value

Several areas of conservation value surround the general Sai Kung environs. Immediately adjacent to the STW are the Tsui Hang Special Area and Ma On Shan Country Park. The Ma On Shan Country Park consists of a Site of Special Scientific Interest (SSSI) which is the Pak Sha Wan Peninsula. Other areas of conservation value include the MacLehose Trail, Wilson Trail, Nature Trail, Tree Walk as well as Family Walk are within Ma On Shan Country Park, Sai Kung East Country Park and Sai Kung West Country Park areas. However, these conservation areas are significantly distant from the STW site.

4.1.14 Places of High Visual Value

The existing STW site lies on a considerable area of relatively undeveloped countryside of high visual value.

4.1.15 Sites of Cultural Heritage

There are two Tin Hau Temples in Sai Kung. One of them is approximately 700 m north of the STW. The other one is located over 1.5km north-west of the STW. As they are significantly distant from the STW, they are unlikely to be affected by the Project.

4.2 Major Elements of the Surrounding Environment Affecting the Project

The Project will be located within the existing STW site and no major elements of the surrounding environment is likely to affect the proposed works.

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

This section describes those measures likely to be incorporated in the design to minimise environmental impacts arising from both the construction and the operation phases of the Project.

5.1 Construction Stage

5.1.1 Dust

The contractor will be required to follow the good construction practices for dust minimisation to reduce dust nuisance to a minimum. A number of practical measures include regular water spraying, provision of vehicle wheel-washing and body washing facilities and shielding of stockpiled materials. Relevant clauses will be incorporated into the contract documents.

5.1.2 Odour

To minimize odour problem, the temporary sludge storage tanks will be covered and the sludge tankers for disposal should be fully enclosed.

5.1.3 Noise

The contractor for the works will have to comply with the provisions of the Noise Control Ordinance.

5.1.4 Liquid Effluents, Discharges or Contaminated Runoff

With regard to site surface runoff, good practices as given in the ProPECC PN 1/94 Construction Site Drainage should be followed as far as practicable in order to minimise the chance of erosion, and to retain and reduce suspended solids in the run-off before discharge.

The requirement of installation of silt curtains, the use of properly maintained closed mechanical grabs and the proper controlling of loading of barges and hoppers will be included in the contract documents.

5.1.5 Generation of Waste

The contractor will be required to follow the good site practices for the construction waste arising including provision of sufficient waste disposal points and regular collection for disposal and separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Facility.

In addition, construction and demolition (C&D) material will be generated from demolition of the site buildings and facilities. The C&D material should be separated on-site into three categories: (i) public fill, the inert portion of the C&D material (e.g. concrete and rubble), which should be re-used on-site or disposed of at public filling areas; (ii) C&D waste for re-use and/or recycling, the non-inert portion of the C&D material, (e.g. steel and other metals); (iii) C&D waste which cannot be re-used and/or recycled (e.g. wood, glass and plastic).

5.1.6 Unsightly Visual Appearance

Hoarding will be erected at the site boundary as far as practicable to minimize the visual impact due to construction activities.

5.2 Operation Stage

5.2.1 Odour

Odour impact assessment will be conducted to identify the sources and impact to nearby sensitive receivers. Mitigation measures, such as covering up the major odour sources, providing adequate ventilation and odour removal system, may be implemented to reduce the odour impact.

5.2.2 Noise

To minimize any noise impacts generated from pumps operation, all pumps will be enclosed in structures, located underground in the dry/wet well. Extraction fans will be located away from the sensitive receivers as far as practicable.

5.2.3 Liquid Effluent Discharges

Water quality assessment will be conducted to analyze the impacts to the nearby sensitive receivers due to the additional discharge from STW into the Port Shelter. Nevertheless, the Project will result in a higher standard of treated effluent with lower ammonia-nitrogen and lower bacteria levels. Therefore, the long-term water quality of the Port Shelter will be improved after the Project is commissioned.

5.2.4 Generation of Waste

Wastes generated during normal operation of the STW will include inlet screenings, grit from detritors and dewatered sludge. It is considered that the existing government procedures and practices controlling the disposal of these wastes to landfill could easily be modified to account for any increase in waste generation.

5.2.5 Storage, Use, Handling, Transport or Disposal of Hazardous Materials

At Sai Kung STW, hazardous materials currently in use include lubricant oil and chemicals, and they are stored in a dangerous goods house. It is considered that the existing government procedures and practices controlling the storage and handling of these materials could easily be modified to account for any increase in hazardous materials.

5.2.6 Risk of Accidents Resulting in Pollution

Standby treatment units and dual power supply will be provided in the Project to minimize the risks of accidents such as total failure of power supply and equipment breakdown of the STW.

5.2.7 Unsightly Visual Appearance

Architectural features will be provided to the superstructures of the STW.

The Environmental Review carried out in the "Review of Sai Kung Sewage Treatment Works Phase II Upgrading" concluded that based on the largely qualitative assessment, no insurmountable environmental impacts were identified for construction and operation of the Project, but mitigation measures had to be formulated to reduce the environmental impacts to acceptable levels.

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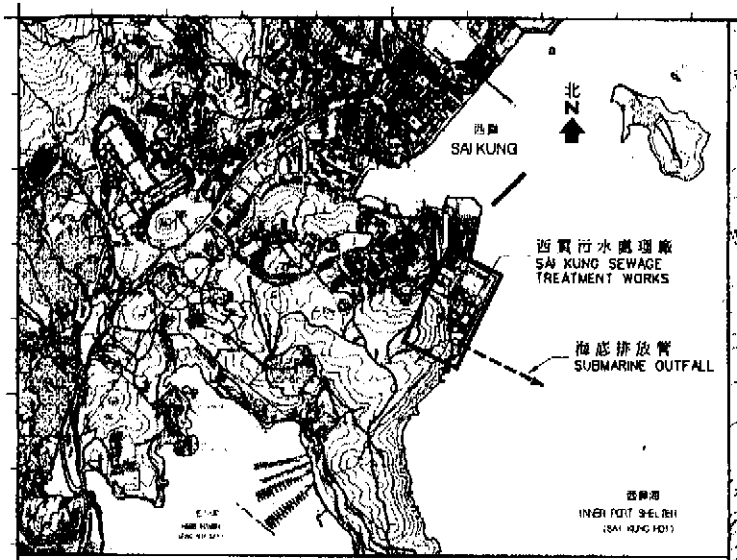
圖則
Drawings



索引圖 KEY PLAN 比例 SCALE : N T S

圖例 LEGEND :

- (A) 入水泵房 INLET PUMPING STATION
- (B) 濃泥脫水及行政大樓 SLUDGE DEWATERING AND ADMINISTRATION BUILDING
- (C) 化糞池廢物收集處 SEPTIC RECEPTION UNIT
- (D) 除砂池 GRITTOR
- (E) 初級沉澱池 PRIMARY SEDIMENTATION TANK
- (F) 好氧消化池 AEROBIC SLUDGE DIGESTER
- (G) 生物反應池 BIOREACTORS
- (H) 最終沉澱池 FINAL SEDIMENTATION TANK
- (I) 回流及剩餘活性污泥泵房 RAS & SAS PUMPING STATION
- (J) 紫外光消毒槽 UV DISINFECTION CHANNEL
- (K) 壓縮室 COMPRESSOR HOUSE

PROVISIONAL
SUBJECT TO AMENDMENT

版 No.	日期 date	修改項目 description	簡寫 Initial
A	1.2.01	一. 圖框修改 1. BORDER REVISED 二. 附加中文註釋 2. CHINESE TRANSLATION ADDED.	LA

修訂 REVISION

圖則名稱 drawing title

現時西貢污水處理廠的規劃圖

LAYOUT PLAN OF THE EXISTING SAI KUNG SEWAGE TREATMENT WORKS

繪圖 drawn	SIGNED	M. F. YEUNG	日期 date 29.12.00.	圖則編號 drawing no. DDN/226DS/0802A
核對 checked	SIGNED	P. W. CHAN	日期 date 29.12.00.	比例 scale N T S
批准 approved			日期 date	

部門 office 污水工程部
SEWERAGE PROJECTS DIVISION

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
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版 No.	日期 date	修改項目 description	簡簽 initial
A	1.2.4	附加中文註釋 CHINESE TRANSLATION ADDED.	ZI

修訂 REVISION

圖則名稱 drawing title

西貢污水處理廠第二期改善工程
敏感受體的位置圖
(全二張其一)

SAI KUNG SEWAGE TREATMENT WORKS
PHASE II UPGRADING
- LOCATION PLAN OF SENSITIVE RECEIVERS
(SHEET 1 OF 2)

繪圖 drawn	SIGNED W. H. TSUI	日期 date 12.01.01
核對 checked	SIGNED P. W. CHAN	日期 date 12.01.01
批核 approved		日期 date
部門 office	污水工程部 SEWERAGE PROJECTS DIVISION	

圖則編號 drawing no. DDN/226DS/0803A

比例 scale 1 : 20 000

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
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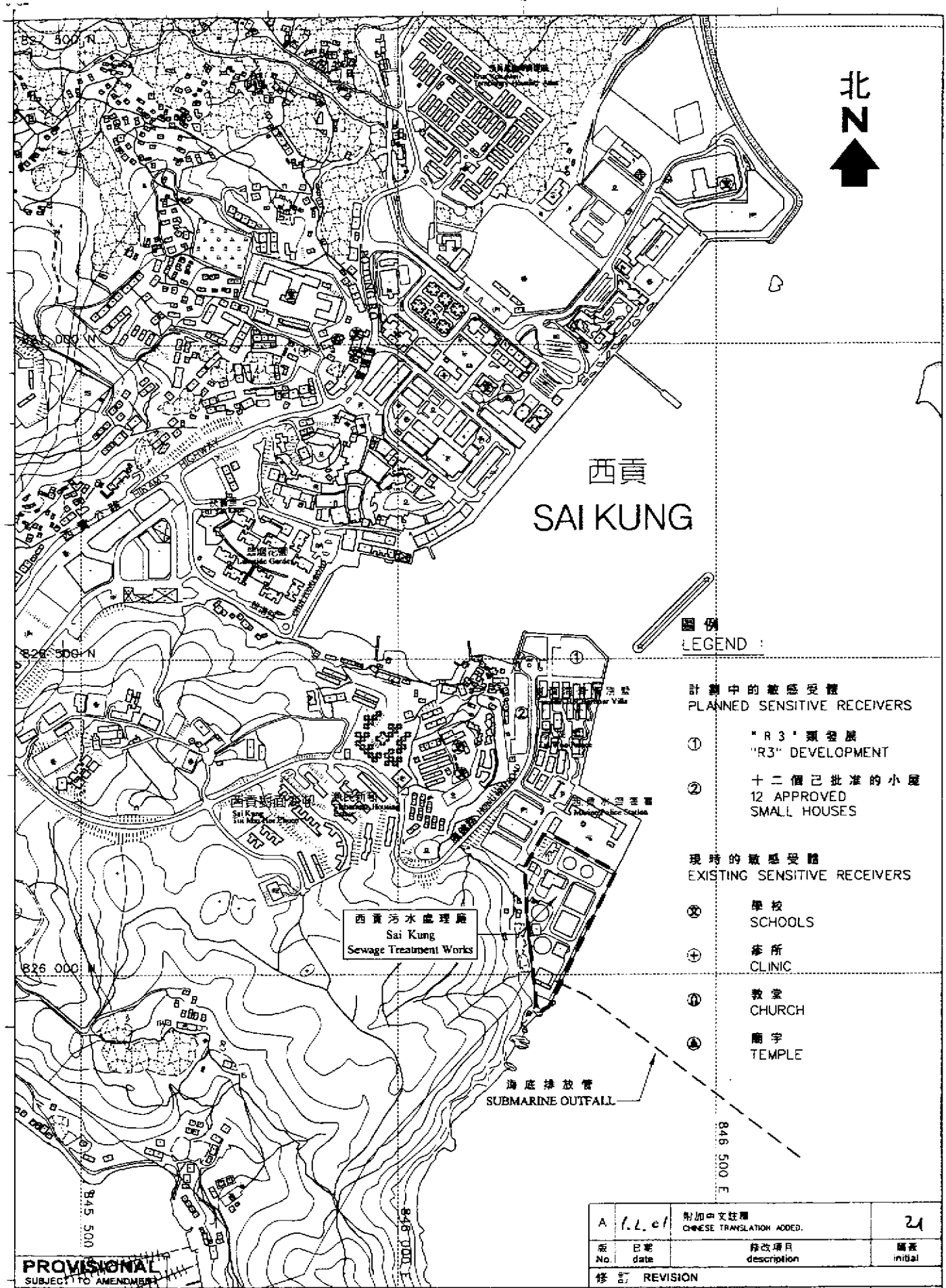

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版 No.	日期 date	修改項目 description	簽署 initial
A	1.2.01	附加中文註釋 CHINESE TRANSLATION ADDED.	21

修訂 REVISION

圖則名稱 drawing title
西貢污水處理廠第二期改善工程
敏感受體的位置圖
(全二張其二)
SAI KUNG SEWAGE TREATMENT WORKS
PHASE II UPGRADING
- LOCATION PLAN OF SENSITIVE RECEIVERS
(SHEET 2 OF 2)

繪畫 drawn SIGNED K. W. FONG 日期 date 12.01.01
核對 checked SIGNED P. W. CHAN 日期 date 12.01.01
批核 approved 日期 date

部門 office 污水工程部
SEWERAGE PROJECTS DIVISION

圖則編號 drawing no. DDN/226DS/0804A
比例 scale N.T.S.

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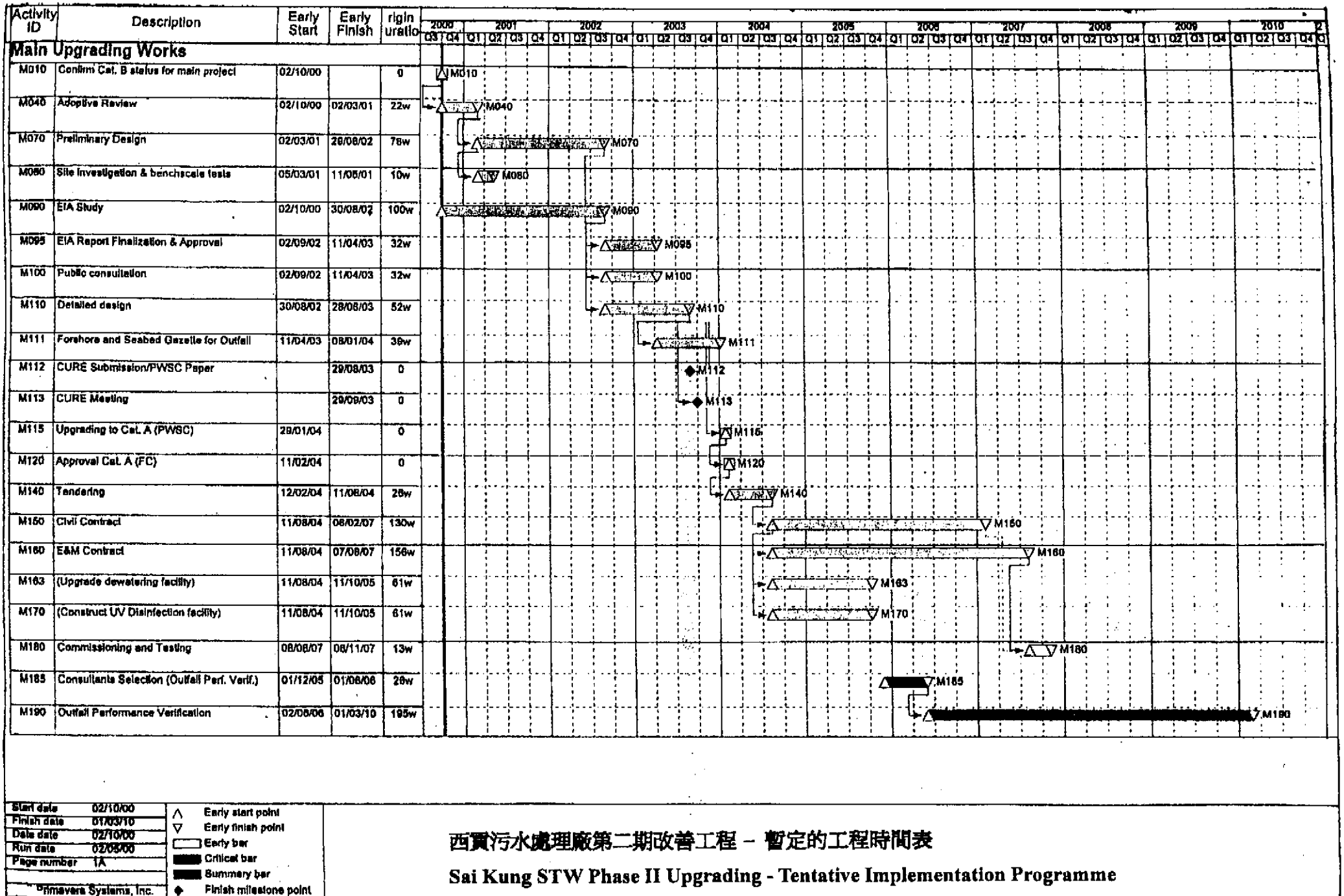
附錄
Appendix



西貢污水處理廠第二期改善工程 – 暫定的工程時間表

Sai Kung STW Phase II Upgrading - Tentative Implementation Programme

附錄 Appendix I