

# Upgrading and Expansion of San Wai Sewage Treatment Works and Expansion of Ha Tsuen Pumping Station

## Project Profile

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### 1. Basic Information

#### 1.1 *Project title*

Upgrading and Expansion of San Wai Sewage Treatment Works (STW) and Expansion of Ha Tsuen Pumping Station (PS).

#### 1.2 *Purpose and nature of the project*

To cope with the population increase in the North West New Territories (NWNT), expansion of Ha Tsuen PS and San Wai STW, two existing key sewerage infrastructures serving NWNT, are required. In addition, to mitigate the adverse impacts to the aquatic environment, upgrading the sewage treatment level of San Wai STW is proposed.

Thus, the purposes of these projects are to expand the treatment capacities and upgrade the treatment levels of San Wai STW and increase the pumping capacity of Ha Tsuen PS. The key elements of the project are:

1. Upgrading and Expansion of San Wai STW
  - (a) Expand the preliminary treatment works at San Wai STW from 164,000 m<sup>3</sup>/d to 246,000m<sup>3</sup>/d.
  - (b) Upgrade the preliminary treatment level at San Wai STW to chemically enhanced primary treatment.
  - (c) Add centralized disinfection facilities at San Wai STW for the effluent after chemically enhanced primary treatment from San Wai STW and effluent after secondary treatment from Yuen Long STW.
  - (d) Construct an emergency outfall culvert, from San Wai STW to nearby drainage channel, in order to provide an alternative discharge route for San Wai STW in an emergency event when the NWNT effluent tunnel is out of operation.
  - (e) Rearrange the existing preliminary treatment facilities of San Wai STW to conform to the upgraded treatment works layout.
2. Expansion of Ha Tsuen Pumping Station
  - (a) Expand the pumping capacity of Ha Tsuen PS from 164,000 m<sup>3</sup>/d to 246,000m<sup>3</sup>/d.

### 1.3 *Name of project proponent*

Project Management Division, Drainage Services Department

### 1.4 *Location and scale of project and history of site*

The compound of Ha Tsuen PS is located adjacent to Hung Shui Kiu drainage channel and Ping Ha Road in Yuen Long. The site for the expansion of Ha Tsuen PS is a piece of reserve land within the existing compound of Ha Tsuen PS. Ha Tsuen PS has been put into operation since early 1990s. The existing pumping capacity of Ha Tsuen PS is 164,000m<sup>3</sup>/day. After expansion, the capacity will increase to 246,000m<sup>3</sup>/day.

From aerial photos, it is noted that the site for expansion and upgrading of San Wai STW is located in a rural area currently occupied by container storage, machinery open storage and two unfilled fishponds. In addition, the proposed site for expansion and upgrading of San Wai STW falls within the proposed Hung Shui Kiu Strategic Growth Area (SGA). The total area reserved under Hung Shui Kiu SGA for expansion and upgrading and future further expansion of the San Wai STW is about 10 hectares. After expansion, the treatment capacity of San Wai STW will increase from 164,000m<sup>3</sup>/day to 246,000m<sup>3</sup>/day and the treatment level will be upgraded to chemically enhanced primary treatment with disinfection.

The project is divided into the following 2 works items and annotated accordingly on drawing DDN/223DS/1801A in Appendix 1.

<i>Works Item</i>	<i>Details</i>
<b>PS1</b>	Expansion and Upgrading of San Wai STW
<b>PS2</b>	Expansion of Ha Tsuen PS

### 1.5 *Number and type of designated project*

On the basis of the latest zoning studies under the “Planning and Development Study on North West New Territories” and the “PPFS reports” of the project, two of the works items are identified as Designated Projects within the definition of Schedule 2 of the EIA Ordinance. Item **PS1** and **PS2** are of type F.1 and F.3(b) respectively.

### 1.6 *Contact person*

## 2. **Outline of Planning and Implementation Programme**

2.1 Design and construction supervision of the project will be carried out in-house by the Sewerage Projects Division and the Electrical and Mechanical Projects Division of Drainage Services Department. Construction will be contracted out. Operation and maintenance of the completed works will be taken up respectively by the Mainland North Division, Buildings and Civil Maintenance Section of Hong Kong and Islands Division, and the Sewage Treatment 1 Division of Drainage Services Department.

- 2.2 The project will be serving existing developments, proposed developments in particular those under Hung Shui Kiu SGA, as well as a number of currently unsewered villages and non-development areas. According to the latest development programme, the first population intake of Hung Shui Kiu SGA will be in 5/2008.
- 2.3 Construction of the works will be undertaken through a number of contracts scheduled to commence in early 2004 for completion in 2/2008. Some parts of the works, particularly those under works items **PS1** has interface with a number of other projects, including the Hung Shui Kiu SGA Development and Deep Bay Link. According to the latest information, the construction of Hung Shui Kiu SGA Development package 1 works is scheduled to commence in early 2004 for completion in early 2008. For Deep Bay Link, the construction is scheduled to commence in mid-2002 for completion in early 2005. The projects may be carried out in conjunction with other interfacing projects on a different programme where appropriate.

### 3. Possible Impacts on the Environment

In the “Review of Yuen Long and Kam Tin Sewerage and Sewage Treatment Requirements” study, an Environmental Review of the proposed works has been carried out to identify possible impacts to the environment.

#### 3.1 Ha Tsuen PS

##### 3.1.1 *During construction stage*

(a) Air quality

Dust may be generated from some construction activities, mainly earthworks such as excavation. Gaseous emissions will also arise from construction plant. As tabulated in Section 4.1 below, some of the construction activities will be located close to village houses.

(b) Noise

The construction activities will generate some noise through the use of conventional construction plant and equipment, like piling equipment, air compressors and jack hammers.

(c) Water quality

Run-off from the construction sites, particularly for the works along drainage channels, may contain sediments and silts arising from earthworks, trench dewatering and stockpiled materials, as well as fuel, oil and lubricants from construction vehicles and plant.

(d) Ecology

Expansion of Ha Tsuen PS will only involve the reserved land within the Ha Tsuen PS compound, the ecological impact is considered to be minimal.

However, general construction disturbance to nearby habitats may arise from dust, noise and intrusive lighting.

(e) Visual impacts

The visual impacts from construction activities will be temporary. The presence of construction equipment and stockpiled materials in works sites may be a source of visual impacts to nearby sensitive receivers.

(f) Construction and Demolition Materials

Deep excavation will be required for the construction of dry-wet well of the pumping station. Furthermore, construction waste such as timber used in formwork and temporary works will be generated. However, it is anticipated that the surplus construction and demolition materials generated will be below 300,000 m<sup>3</sup>. The project will not involve reclamation or earth filling with imported fill.

(g) Heritage impacts

The Ha Tsuen PS is located in an area of rich heritage. It is highly likely to be of archaeological potential. In addition, some historic villages such as Kau Lee Uk Tsuen and San Uk Tsuen are located in the vicinity of the project area. The proposed project may affect the unknown archaeological site and historical buildings and structures.

(h) Cumulative effects

As the project programme will overlap with those of some other major projects as mentioned in Section 2.3, there is a potential for magnification of the environmental impacts owing to cumulative effects at the locations of project interface.

### **3.1.2 During operation stage**

(a) Air quality

Odour emission from the screening handling facilities and wet wells of the Ha Tsuen PS can be a source of air quality impact. Hydrogen sulfide is the primary source of odour nuisance. For Ha Tsuen PS, the potential for odour impacts is higher where the sewage retention time in sewerage is long, particularly in the summer months.

(b) Water quality

The long-term water quality of the project area will be greatly enhanced after the project is commissioned. Nevertheless, there are risks associated with the failure of pumping stations or the blockage or damage to rising mains or sewage tunnel, in which case bypass of sewage or treated sewage to Deep Bay may result.

(c) Noise

The sewage pumps and the ventilation fans of ventilation systems at the pumping stations are potential noise sources during operation of the project.

(d) Ecology

Potential impacts may arise in event of temporarily sewage overflow, which the avifauna feeding in the wetlands may be affected.

(e) Visual impacts

The superstructures of Ha Tsuen PS may not blend with the surrounding environment. This will create visual intrusion to the surrounding.

(f) Waste

Large-aperture screens will be installed at the Ha Tsuen PS to prevent the large solid materials in sewage from entering the pumps and causing damage.

## 3.2 San Wai STW

### 3.2.1 *During construction stage*

(a) Air quality

Dust may be generated from some construction activities, mainly earthworks such as excavation. Gaseous emissions will also arise from construction plant. As tabulated in Section 4.1 below, some of the construction activities will be located close to village houses.

(c) Noise

The construction activities will generate some noise through the use of conventional construction plant and equipment, like piling equipment, air compressors and jack hammers.

(c) Water quality

Run-off from the construction sites, particularly for the works along drainage channels, may contain sediments and silts arising from earthworks, trench dewatering and stockpiled materials, as well as fuel, oil and lubricants from construction vehicles and plant.

(d) Ecology

For the site formation of San Wai STW upgrade, filling of two fishponds will be required. In fact, other fishponds nearby had already been filled for commercial uses. The site of San Wai STW will fall within the Hung Shui Kiu SGA where a board brush approach for ecological compensation will be adopted should there be any compensation required for the whole Hung Shui

Kiu SGA development, i.e. land has already been earmarked for ecological compensation for all development areas under Hung Shui Kiu SGA development, including the San Wai STW site. There may be general construction disturbance to the nearby habitats arising from dust, noise and intrusive lighting.

(e) Visual impacts

The visual impacts from construction activities will be temporary. The presence of construction equipment and stockpiled materials in works sites may be a source of visual impacts to nearby sensitive receivers.

(f) Construction and Demolition Materials (C&DM)

Filling of two fishponds is required for the site formation works but the quantity of filling materials will be below 300,000 m<sup>3</sup>. Demolition waste such as concrete will be generated due to modification of sewage treatment facilities. Furthermore, construction waste such as timber used in formwork and temporary works will be generated. However, it is anticipated that the surplus C&DM generated will be below 300,000 m<sup>3</sup>.

(g) Heritage impacts

The San Wai STW is located in an area of rich heritage. It is highly likely to be of archaeological potential. In addition, some historic villages such as Kau Lee Uk Tsuen and San Uk Tsuen are located in the vicinity of the project area. The proposed project may affect the unknown archaeological site and historical buildings and structures.

(h) Cumulative effects

As the project programme will overlap with those of some other major projects as mentioned in Section 2.2, there is a potential for magnification of the environmental impacts owing to cumulative effects at the locations of project interface.

### **3.2.2 During operation stage**

(a) Air quality

Owing to prolonged retention time, the potential odour emission sources in San Wai STW are the rapid mixers, sludge treatment and sludge handling facilities.

(b) Water quality

The long-term water quality of the project area will be greatly enhanced after the project is commissioned. Nevertheless, there are risks associated with the failure of sewage treatment works or the blockage or damage to a rising mains or sewage tunnel in which case bypass of sewage or treated sewage to Deep Bay may result.

(c) Noise

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

(d) Ecology

Potential impacts may arise in event of temporarily sewage overflow, which the avifauna feeding in the wetlands may be affected.

(e) Visual impacts

Aesthetics is an important factor to be considered in the design of the superstructures of San Wai STW. Appropriate landscaping and architectural design are required to blend the expanded San Wai STW with the surrounding environment.

(f) Waste

At San Wai STW solid wastes are arising from grit removal at detritors, screenings at fine screens and sludge from chemically enhanced primary sedimentation.

## 4. Major Elements of the Surrounding Environment

4.1 The site for expansion and upgrading of San Wai STW is located in a rural area currently occupied for use as open storage areas. In future, Deep Bay Link will run at the Southwest boundaries of the San Wai STW. For the expansion site of Ha Tsuen PS, it is located within the reserved area inside the existing PS compound. The Ha Tsuen PS compound is surrounded by Ping Ha Road and Hung Shui Kiu drainage channel. Appendix 2 depicts the surrounding environment of the proposed sites for expansion and upgrading of San Wai Sewage Treatment Works and Ha Tsuen Pumping Station. The sensitive receivers in the vicinity of each proposed works item are tabulated below.

<i>Works item</i>	<i>Details of works</i>	<i>Sensitive receivers nearby</i>	<i>Approximate minimum distance apart (m)</i>
<b>PS1</b>	Expansion and Upgrading of San Wai STW	Village houses	180
		Deep Bay Link users	10
<b>PS2</b>	Expansion of Ha Tsuen PS	Residential development (R3) and schools at the opposite side of Hung Shui Kiu Drainage Channel <sup>Note 1</sup>	80
		PSPS residential development (R2)	60

\* Note 1: From the latest zoning studies in the "Planning and Development Study on North West New Territories" but not in the prevailing OZPs.

## **5. Environmental Protection Measures to be Incorporated in the Design and Further Environmental Implications**

### **5.1 Ha Tsuen PS**

#### **5.1.1 During construction stage**

(a) Air quality

Air quality impacts, mainly dust, generated by the construction activities will be minimized by the adoption of proper working methods such as regular water spraying, installation of wheel-washing facilities where practical, and shielding of stockpiled materials. Relevant clauses will be incorporated into the contract documents to this end.

(b) Noise

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

(c) Water quality

Close control, such as the requirement to install settlement tanks to remove sand and silt, will be exercised on the quality of effluent from the construction sites to ensure its compliance with the Water Pollution Control Ordinance.

(d) Traffic

Where works are carried out on roads, temporary traffic arrangement measures will be undertaken to maintain traffic flow and minimize traffic impacts.

(e) Ecology

Pollution control measures will be undertaken to alleviate the ecological impacts arising from dust and noise generated by the construction activities.

(f) Visual impacts

At most parts of the works site, visual impacts from construction activities will be of very short durations. Site hoarding will be erected to minimize the impact. Lastly, proper control over site cleanliness and the stockpiling of materials will be exercised to alleviate visual intrusion.

(g) Heritage impacts

Archaeological investigation will be conducted by qualified archaeologist to identify any unknown archaeological sites within the project areas. In addition, a historical building survey will also carried out to identify the historical

buildings. If necessary, condition surveys to the historical building will be carried by qualified building surveyors to protect the buildings against any damage caused by the project.

(h) Construction and Demolition Materials (C&DM)

Although it is anticipated that the surplus C&DM generated will be below 300,000 m<sup>3</sup>, in the design, consideration will be put on to minimizing the amount of excavation, thus the amount of C&DM generated. Moreover, a trip-ticket system will be implemented to control the disposal of C&DM. In addition, the C&DM will be sorted on-site to facilitate reuse, recycling and disposal as appropriate. Furthermore, the use of timber will as far as practicable be replaced by steel in formwork and temporary works so as to reduce the generation of waste.

**5.1.2 During operation stage**

(a) Air quality

Enclosure of the pollutant source with appropriate ventilation will be implemented for the proposed Ha Tsuen expansion. The ventilated flow will then be conveyed to a deodorization system to reduce odour to an acceptable level and to minimize the air quality impacts arising.

(b) Water quality

To minimize water quality impacts arising from the bypass of sewage, standby pumps will be provided to cater for periods of equipment breakdown and maintenance in Ha Tsuen PS. Dual power supply or emergency generators will be provided as far as practicable to reduce the risk of power failure. Furthermore, from operational data, emergency bypass has never occurred since the commissioning of Ha Tsuen PS in early 1990's.

(c) Noise

To minimize any noise impacts generated from pump 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.

(d) Ecology

The water quality impact mitigation measures to be implemented to reduce the need for sewage bypass will also alleviate the potential of ecological impacts.

(e) Visual impacts

Architectural features and landscaping works will be provided to the superstructures of the pumping station.

(f) Waste

Grits and screenings generated at the pumping station will be collected in plastic bags before being transported to landfills by trunks.

## 5.2 San Wai STW

### 5.2.1 During construction stage

(a) Air quality

Air quality impacts, mainly dust, generated by the construction activities will be minimized by the adoption of proper working methods such as regular water spraying, installation of wheel-washing facilities where practical, and shielding of stockpiled materials. Relevant clauses will be incorporated into the contract documents to this end.

(b) Noise

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

(c) Water quality

Close control, such as the requirement to install settlement tanks to remove sand and silt, will be exercised on the quality of effluent from the construction sites to ensure its compliance with the Water Pollution Control Ordinance.

(d) Traffic

Where works are carried out on roads, temporary traffic arrangement measures will be undertaken to maintain traffic flow and minimize traffic impacts.

(e) Ecology

Ecological impact assessment on the loss of two fishponds for site formation of San Wai STW expansion/upgrading site will be assessed in the EIA of Hung Shui Kiu SGA. According to the table 7.2 of the Inception Report/Initial Assessment Report of Hung Shui Kiu SGA EIA, compensatory land has been earmarked in the Hung Shui Kiu SGA Recommended Outline Development Plan. Furthermore, pollution control measures will be undertaken to alleviate the ecological impacts arising from dust and noise generated by the construction activities.

(f) Visual impacts

At most parts of the works site, visual impacts from construction activities will be of very short duration. Site hoarding will be erected to minimize the impact.

Lastly, Proper control over site cleanliness and the stockpiling of materials will be exercised to alleviate visual intrusion.

(g) Heritage impacts

Archaeological investigation will be conducted by qualified archaeologist to identify any unknown archaeological sites within the project areas. In addition, a historical building survey will also carried out to identify the historical buildings. Condition surveys to the historical building will be carried by qualified building surveyors if necessary to protect the buildings against any damage caused by the project.

(h) Construction and Demolition Materials (C&DM)

Although it is anticipated that the surplus (C&DM) generated will be below 300,000 m<sup>3</sup>, in the design, consideration will be put on to minimizing the generation of C&DM by maximizing the re-use of public fill. The inert C&DM such as the concrete arising from the modification of sewage treatment facilities will be sorted on-site to facilitate reuse, recycling and disposal as appropriate. Moreover, a trip-ticket system will be implemented to control the disposal of C&DM should it be needed. Furthermore, the use of timber will as far as practicable be replaced by steel in formwork and temporary works so as to reduce the generation of waste.

## 5.2.2 *During operation stage*

(a) Air quality

Odour impact assessment will be conducted to identify the sources and impact to nearby sensitive receivers. Mitigation measures such as covering up the process units with GRP covers with adequate ventilation and provision of odour removal system to reduce the odour of ventilated airflow will be considered.

(b) Water quality

To minimize water quality impacts arising from the bypass of sewage, dual power supply or emergency generators will be provided as far as practicable to reduce the risk of power failure. Due consideration will be given to the presence of sensitive receivers when determining the discharge location of the emergency outfall.

(c) 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.

(d) Ecology

The water quality impact mitigation measures to be implemented to reduce the need for sewage bypass will also alleviate the potential of ecological impacts.

(e) Visual impacts

Architectural features and landscaping works will be provided to the superstructures of the sewage treatment works.

(f) Waste

Grits and screenings generated at the sewage treatment works will be collected in plastic bags before being transported to landfills by trucks

The Environmental Review mentioned in Section 3 concluded that no insurmountable environmental impacts were identified for either construction or operation of the proposed works, but mitigation measures had to be formulated to reduce the environmental impacts to acceptable levels.

Appendix 1

**Appendix 1**



Appendix 2

Appendix 2

Appendix 2.1  
附錄 2.1

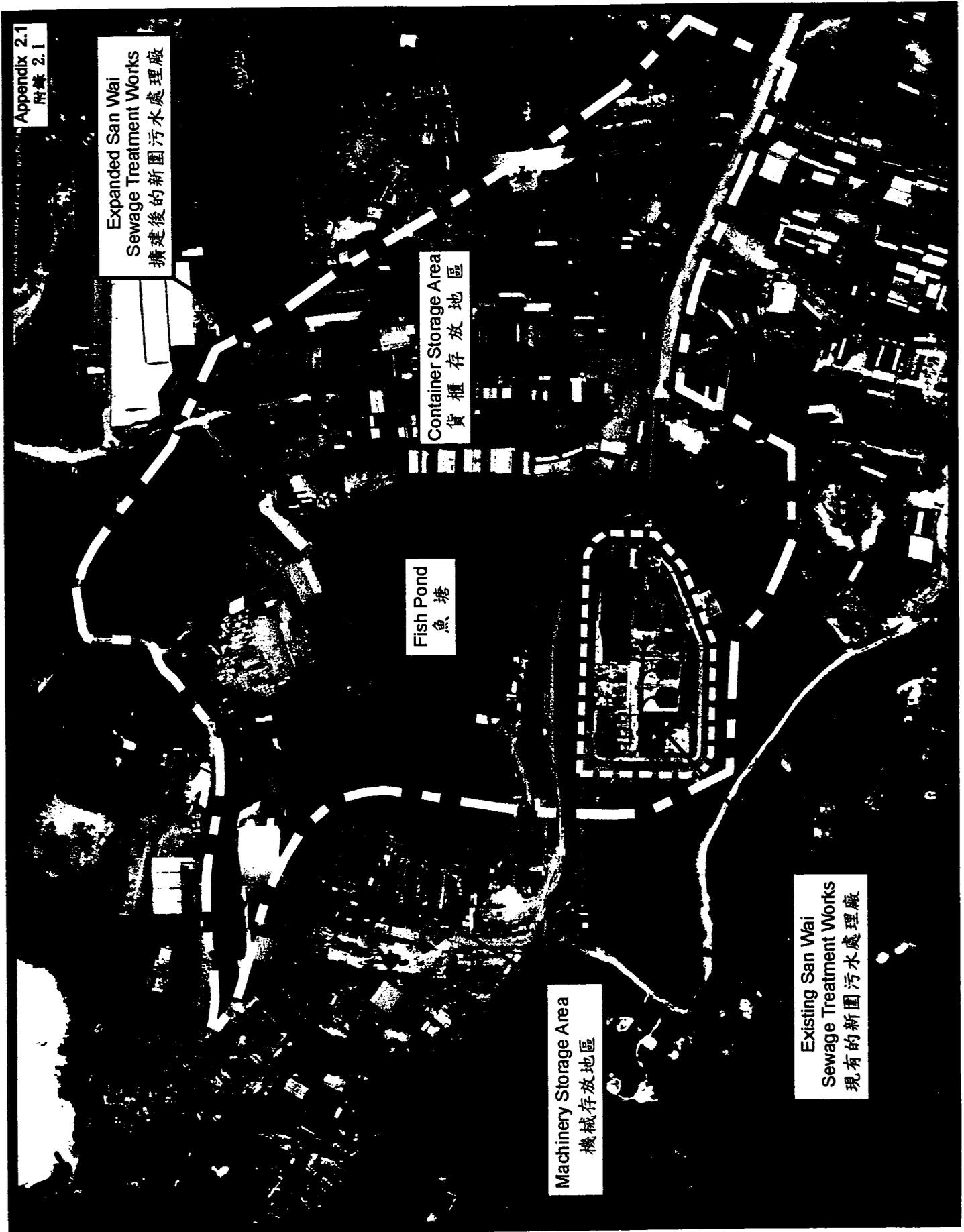
Expanded San Wai  
Sewage Treatment Works  
擴建後的新圍污水處理廠

Container Storage Area  
貨櫃存放地區

Fish Pond  
魚塘

Machinery Storage Area  
機械存放地區

Existing San Wai  
Sewage Treatment Works  
現有的新圍污水處理廠



Appendix 2.2  
附錄 2.2

Ha Tsuen  
Pumping Station  
廈村泵房

Housing Development  
R3  
房屋發展

Institute  
學校

(PS PS)  
R2  
私人參建居屋

