

EXECUTIVE SUMMARY

行政摘要

Drainage Services Department
渠務處

Sha Tin Sewage Treatment Works,
Stage III Extension Environmental
Impact Assessment Study

沙田污水處理廠
第三期擴建工程
環境評估研究

Agreement No. CE 90/97

協議編號 CE 90/97

Job No. : C1795

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The Sha Tin Sewage Treatment Works Stage III Extension (the Project) is planned to come into operation in 2003 and will provide additional sewage treatment facilities to cope with the anticipated increases in sewage flows and loads in the Sha Tin catchment area. In addition to the provision of additional treatment capacity to meet the demands created by population growth, the Project will also enhance the standards of sewage and sludge treatment. Based on the initial design of the Project, it is estimated that the Sha Tin Sewage Treatment Works (Sha Tin STW) will be able to service the flow produced from a total permanent residential population of 720,000 and from the commercial, institutional and industrial developments in the catchment. In addition, an alternative design will also be assessed for a total permanent population of 830,000.

The purpose of this Environmental Impact Assessment (EIA) Study is to assess the environmental acceptability of the Project and to propose practical mitigation measures for implementation during the construction and operation phases, should they be required.

PROJECT DESCRIPTION

At present, the treated effluent from both the Sha Tin STW and the Tai Po STW is conveyed, via pumps and a sewer tunnel to the Kai Tak Nullah for disposal into the Victoria Harbour (the Tolo Harbour Effluent Export Scheme (THEES)). This disposal arrangement will remain in place upon completion of the Project and its performance is subject to an independent monitoring and verification programme being managed by the EPD under Agreement No. CE 1/98.

The Project will comprise of the development of the following process elements:

- primary sedimentation tanks;
- activated sludge aeration tanks;
- final sedimentation tanks;
- sludge thickening facilities;
- sludge dewatering facilities;
- anaerobic sludge digestion tanks;
- flow control facilities;
- measurement channels;
- ultra-violet disinfection facilities.

The Project will also involve the installation of electrical and mechanical (E&M) equipment for the new facilities and the replacement of some E&M equipment in the existing Stage I/II facilities. *Figure 2a* shows the location of the Project Area and the surrounding environment of the Sha Tin STW. *Figure 2b* shows the general layout of the Project.

The construction works for the Stage III Extension are scheduled to commence in September 2000 and to be completed in December 2003. The actual sequence of work and construction programme will be prepared by the Contractor; however,

the major work items likely to be undertaken for this Project are presented below:

- site preparation;
- piling;
- excavation and backfilling;
- reinforced concrete construction;
- pipe laying;
- E&M equipment installation;
- testing and commissioning.

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POTENTIAL ENVIRONMENTAL IMPACTS, KEY FINDINGS AND RECOMMENDATIONS

The following key environmental impacts have the potential to be generated during the construction and operation of the Project:

- water quality impacts due to the discharge of treated sewage effluent;
- odour nuisance;
- solid waste management issues related to the excavation of potentially contaminated material and the generation of additional sludge arisings;
- visual and landscape impacts due to the development of new structures;
- landuse impacts related to off-site nuisance.

The assessment approach, key findings and recommendations of the Study are summarised in the following sections.

3.1

AIR QUALITY

The potential for the Project to create a nuisance due to odour emissions was identified as a key issue. A comprehensive assessment was undertaken to evaluate both the impact from the Project and the cumulative impact from the existing Stages I and II and the proposed Stage III Extension. Odour emission rates at the STW were estimated and the dispersion of odours was simulated using the Industrial Source Complex Version 3 (ISC3) model, to predict the worst case impacts at sensitive receivers in the Study Area.

3.1.1

Construction Phase

A qualitative assessment was carried out to address the potential for dust nuisance during the construction phase. The conclusion was that provided the mitigation measures proposed in this Study and as specified in the *Air Pollution Control (Construction Dust) Regulation* are followed, dust related impacts at sensitive receivers will not be significant. An environmental audit programme is however needed to ensure the appropriate dust control measures are implemented effectively during the construction phase.

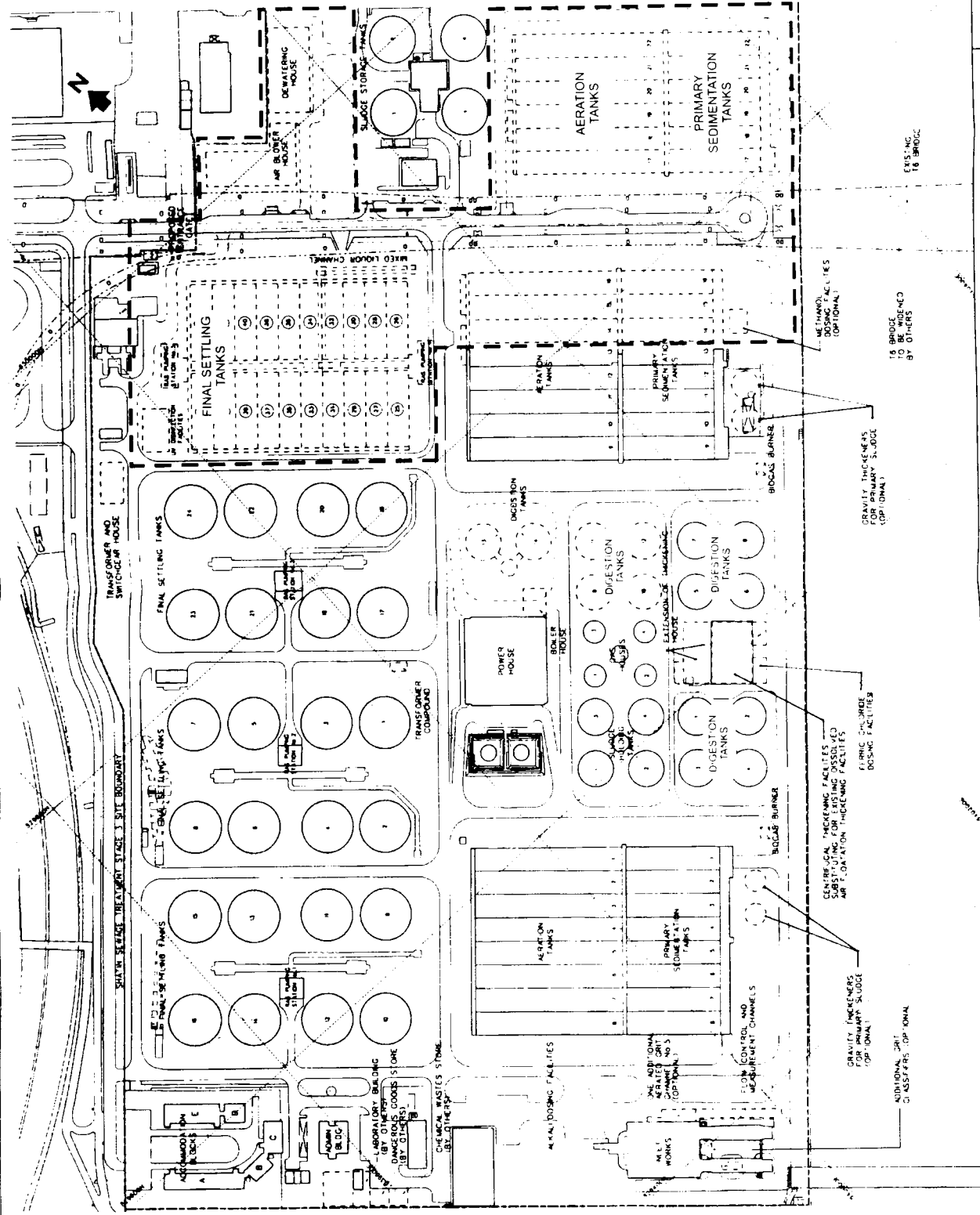


LOCATION OF THE PROJECT AND EIA STUDY AREA

- 1 VEHICLE WEIGHING STATION
- 2 MARINE POLICE NORTH DIVISION BASE/CURRENTLY OPERATING UNDER A SHORT TERM TENANCY AGREEMENT. IN 1996 (AND AGAIN RECENTLY) POLICE DEPARTMENT APPLIED TO LANDS GOVERNMENT FOR A PERMANENT GOVERNMENT LANDS ALLOCATION. THIS HAS NOT BEEN GRANTED TO DATE).
- 3 CURRENTLY VACANT LAND, GRANTED TO CHINESE UNIVERSITY OF HONG KONG IN 1997 FOR EXTENSION OF FACILITIES. PLANS HAVE BEEN SUBMITTED TO LANDS DEPARTMENT FOR APPROVAL.
- 4 EXISTING BUS DEPOT.
- 5 GREEN BELT AREA. NO APPLICATIONS FOR RE-ZONING HAVE BEEN ENTERTAINED.
- 6 FULLY DEVELOPED, LOW-DENSITY, PRIVATE RESIDENTIAL AREA. NO FURTHER DEVELOPMENT INDICATED IN THE SHA TIN DEVELOPMENT PROGRAMME (1997) TO 2004
- 7 SHA TIN RACECOURSE
- 8 CAR PARK CURRENTLY OPERATING UNDER A SHORT TERM TENANCY AGREEMENT. NO COMMITTED PERMANENT USE
- 9 SHA TIN NEW FISHERMANS VILLAGE
- 10 GREEN BELT WITH NO APPLICATION FOR RE-ZONING
- 11 COMMITTED HOME OWNERSHIP SCHEME
- 12 COMMITTED PRIMARY SCHOOL
- 13 COMMITTED PRIVATE RESIDENTIAL DEVELOPMENT
- 14 COMMITTED SECONDARY SCHOOL
- 15 OPEN SPACE STRIP
- 16 GIC SITE CONTAINING AN EXISTING PRIMARY SCHOOL AND A SECONDARY SCHOOL
- 17 OPEN SPACE

FIGURE 2a

MAJOR WORKS IN STAGE 3



GENERAL LAYOUT OF THE SHA TIN SEWAGE TREATMENT WORKS AND STAGE III EXTENSION

FIGURE 2b

3.1.2 *Operation Phase*

Based on the odour modelling results, mitigation measures are recommended for the Project. These include the use of oxygen/air injection or nitrate addition at the sewage pumping stations for the Sha Tin STW. These measures will achieve a significant reduction in the predicted odour concentrations at the existing and committed future sensitive receivers in the Study Area and are expected to lead to compliance with the criterion stipulated in the *Technical Memorandum for Environmental Impact Assessment Process*. In order to confirm there is no residual impact and that the mitigation measures are effective, an odour complaint registration procedure and monitoring programme is recommended. The detailed odour monitoring programme is presented in a standalone *Environmental Monitoring and Audit (EM&A) Manual*.

3.2 *WATER QUALITY*

Since April 1995 treated effluent from the Sha Tin STW has been discharged through the THEES into the Kai Tak Nullah which drains via the Approach Channel and the Kwun Tong Typhoon Shelter into the Victoria Harbour. Changes to the quantity and quality of effluent associated with the Project have the potential to impact the quality of the receiving waters. In addition, more stringent effluent quality standards, including requirements for ammoniacal nitrogen ($\text{NH}_3\text{-N}$) and *E. coli*, will be introduced upon the operation of the Sha Tin STW Stage III Extension.

3.2.1 *Construction Phase*

An evaluation of potential construction phase impacts indicates that the Project will not cause major impacts to the neighbouring Shing Mun River and Tolo Harbour, provided that the good site management practices as recommended in this EIA Study are followed. It is recommended that a comprehensive environmental audit program should be carried out during the construction of the Project to ensure that the proposed site management practices are enforced.

3.2.2 *Operation Phase*

Mathematical water quality modelling was conducted to simulate the effects of the combined flows from the existing Stages I and II of the Sha Tin STW and the proposed Stage III Extension. The assessment of water quality impacts due to the discharge of treated sewage effluent showed that the increased flows from Sha Tin STW following the completion of the Stage III Extension would not cause unacceptable impacts in the Victoria Harbour, even at the highest pollutant concentrations evaluated in this EIA Study. The only breaches of the WQOs were predicted for total inorganic nitrogen and ammoniacal nitrogen in a mixing zone along the face of the South East Kowloon Reclamation when the SSDS Stage I Interim Outfall was assumed to still be in operation. The area of exceedence was predicted to be in the immediate vicinity of the Kai Tak Nullah discharge point and did not impact on any sensitive receivers. This situation would not persist once the SSDS Stage II outfall in the East Lamma Channel was commissioned.

A comprehensive effluent quality monitoring programme at the Sha Tin STW is recommended in order to ensure the operation of the Stage III Extension will be in full compliance with the effluent discharge standards to be proposed by the Environmental Protection Department (EPD).

3.3 *SOLID WASTE*

In order to manage the various waste streams from the construction and the operation of the Project, potential sources of waste were identified and their associated impacts were assessed.

3.3.1 *Construction Phase*

The results of the detailed land contamination study indicated that an area within the disused sludge lagoons is contaminated by chromium, copper, lead and zinc and that basic remedial measures are needed. It is recommended that approximately 1,400 m³ of contaminated soil will have to be excavated for disposal at an approved landfill during the construction phase of the Project. Further tests have been carried out and confirmed that the contaminated materials meet the landfill acceptance criteria.

3.3.2 *Operation Phase*

The operation of the Stage III Extension will generate 60% more sludge than the existing Stage I and II facilities. Off-site disposal will only require a minimal number of additional vehicle movements. As part of the Project, the capacity of the existing anaerobic digestion facilities will be expanded. This will provide the opportunity for enhanced treatment of sludges, which will further reduce their volume and odour potential. Therefore, provided that the mitigation measures proposed for sludge management in this Study are adopted, the impacts associated with waste management during the operation of the Project should be minimal and will not pose a nuisance.

3.4 *VISUAL AND LANDSCAPE IMPACT*

The Sha Tin STW site lies in a prominent waterfront location at the main visual gateway between Tai Po to the north and Sha Tin and Ma On Shan new towns to the south and east. It is a prime location at the interface between the new towns of Sha Tin and Ma On Shan. In designing the extension to the existing STW, the objective was to avoid any additional impact on the value of the surrounding properties and the visual quality of the residents in the existing and future communities.

According to the results of the visual and landscape impact assessment, the proposed Stage III Extension will result in insignificant adverse impacts to the sensitive receivers in the area. Nevertheless, proposals for site-wide improvement measures, including tree planting, have been made in order to enhance the visual and landscape quality of the facilities and the Shing Mun River waterfront.

3.5 *LAND USE IMPACT*

Potential nuisance created during the operation of the Project may affect existing and planned residential and other sensitive developments in the Study Area. As highlighted in *Section 3.1*, odour is a particular concern in this regard.

A detailed planning review has been undertaken and a land use and development inventory prepared. The review was based on the most recent Outline Zoning Plans, Outline Development Plans, Layout Plans and other relevant planning studies in the Study Area. The assessment shows that the landuse impact of the STW Stage III Extension will not be adverse, as the existing works have been in place for more than 17 years and the Project Area was originally reserved for the expansion of the STW. In addition, provided the proposed mitigation measures are implemented and perform in accordance with expectations, impacts to existing and committed landuses in the Study Area will not be significant.

It should also be noted that one of the prime functions of the Project is to cater for the significant growth of the population in the catchment area. The provision of a high standard of sewage treatment and the necessary capacity are considered essential if the population growth potential is to be realised and adverse water quality impacts avoided.

3.6 *OTHER POTENTIAL ENVIRONMENTAL ISSUES*

There are a number of other potential environmental impacts which are not explicitly referenced by the EIA Study Brief but are referenced in the *Environmental Impact Assessment Ordinance*. These issues includes hazard assessment, noise impact assessment, ecological and fisheries impact assessment and cultural heritage impact assessment. An evaluation of these potential impacts has concluded that they are not considered to be of concern in relation to the Project.

3.7 *ENVIRONMENTAL MONITORING AND AUDIT*

In order to ensure that the proposed mitigation measures for the control of noise, dust, water quality and waste pollution during the construction phase are effective, a detailed schedule for the implementation of mitigation measures has been developed and an environmental audit programme has been proposed. The EM&A programme of this Project will also address operational issues and monitoring of odour at both the Sha Tin STW and representative sensitive receivers is recommended.

4 *OVERALL CONCLUSION*

This EIA Study has assessed the potential environmental impacts during the construction and operation of the Sha Tin Stage III Extension. Key issues including odour, water quality, solid waste management, visual and landuse impacts have been addressed in detail. It is determined that provided the mitigation measures recommended in this Study are implemented, no residual impacts are envisaged. An environmental monitoring and audit programme has been devised in order to ensure the proposed mitigation measures are enforced and perform according to expectations. The Project will also provide environmental benefits through the provision of enhanced sewage treatment capacity and standards for the Sha Tin catchment area with an ultimate population up to 830,000.