

10.1 INTRODUCTION

This Section examines the major processes which have been designed for the Project and provides an assessment of the potential environmental impacts associated with these processes. The nature and importance of these potential environmental impacts have been assessed in the previous sections, this section is included solely to organise the information in order to satisfy the requirements in *Clause 6.6.4* of the *Study Brief*.

10.2 MAJOR PROCESSES

The major processes proposed for the Project are mainly related to the treatment of sewage and sewage sludge. Detailed descriptions of these processes the Project have been presented in *Section 2.4* and illustrated in *Figure 2.4a*. These processes, which are highlighted below, are basically an extension of the current sewage treatment processes of the Sha Tin STW Stages I&II, with the exception of the UV disinfection facilities.

Sewage Treatment

- sewage screening at the inlet works;
- degritting at the inlet works;
- primary solids settlement in the primary sedimentation tanks;
- activated sludge treatment in the aeration tanks;
- clarification of the treated effluent in the final settling tanks;
- disinfection at the UV disinfection facilities.

Sewage Sludge Treatment:

- sludge thickening by centrifuges;
- sludge digestion in the anaerobic digestion facilities;
- sludge dewatering.

10.3 IDENTIFICATION AND EVALUATION OF POTENTIAL IMPACTS

10.3.1 *Potential Impacts*

Use and Storage of Hazardous Substances

Hazardous substances or chemicals suggested to be used for the sewage and sludge treatment processes are listed in *Table 9.6a*. This table presents the types and nature of these chemicals, the places where they would be applied, their storage location and the quantity in which they would be stored on site temporarily.

Potential Adverse Environmental Impacts Associated with the Sewage and Sludge Treatment Processes

The other potential environmental impacts associated with the sewage and sludge treatment processes listed in *Section 10.2* are presented in *Table 10.3b*.

Table 10.3b *Potential Adverse Environmental Impacts*

Treatment Processes	Potential Adverse Environmental Impacts
<i>Sewage treatment</i>	
Sewage screening	Odour, solid waste
Degriting	Odour, solid waste
Primary sedimentation	Odour, solid waste, effluent
Activated sludge aeration	Odour, effluent
Final clarification	Odour, solid waste, final effluent
UV disinfection	Final effluent
<i>Sludge treatment</i>	
Sludge thickening by centrifuge	Solid waste, odour
Anaerobic digestion	Solid waste, odour, biogas
Sludge dewatering	Solid waste, odour

10.3.2 *Evaluation of Impacts*

Use and Storage of Hazardous Substances

The potential environmental impacts associated with the use and storage of potentially hazardous chemicals which will be used for the treatment of sewage and sludge have been presented in *Section 9*. It is concluded although some of the chemicals are corrosive (e.g. soda ash, sodium bicarbonate and sodium hydroxide) and some are flammable and toxic (e.g. methanol), the quantities and types are such that they do not fall into category of a potentially hazardous installation (PHI) and thus the potential risks related to their storage will be small. It is, however, noted that some of the chemicals (such as methanol) belongs to dangerous goods and fall under the control of *Dangerous Goods (General) Regulations, CAP 295* where licences from Fire Services Department will be required.

Potential Adverse Environmental Impacts Associated with the Sewage and Sludge Treatment Processes

As shown in *Table 10.3b*, the potential adverse environmental impacts associated with the sewage and sludge treatment processes in the Stage III Extension will mainly concern odour, effluent quality and the management of sewage sludge. Evaluation on the extent of these potential impacts, has been presented in *Sections 3, 4 and 5* in this EIA Report. As concluded in the previous sections, provided the mitigation measures proposed in this report are implemented, it is considered the potential environmental impacts will be acceptable.

The primary objective of the Project, as mentioned in *Section 2*, is to provide additional sewage treatment capacity for increased population up to 2011. The need or otherwise of further expansion of the Sha Tin Sewage Treatment Works (Stage I, II and the anticipated Stage III) beyond 2011 will be subject to further review and study.

APPLICATION OF THE CORRESPONDING INTEGRATED POLLUTION CONTROL ENGINEERING

The selected processes for the treatment of sewage and sewage sludge are either replicates of the existing Stage I & II works or processes which are specially selected to reduce impacts to surrounding environment or sensitive receivers. The following provide details on the processes different from the current system which has been specially selected to minimise impact to environment.

Air Quality

According to the information provided by DSD⁽⁵⁰⁾, in the primary sedimentation process a chain-and-flight sludge removal system, instead of the current travelling bridge type system, would be employed. This system has the advantage of removing sludge to the hopper continuously, and thus can prevent sludge accumulation (which is believed to be responsible for creation of septicity in the primary sedimentation tanks), and therefore reduce odour emission.

In addition, it has been suggested in *Section 3* that by oxygen injection (or air injection or nitrate addition) at the pumping stations, a reduction in odour emission rates (including the Stage I and II works) of approximately 55% would be achieved. The improvements in the predicted cumulative off-site odour concentrations under these mitigation scenarios are shown in *Table 3.60* and *Table 3.6p*. The dosage of oxygen/air injection or nitrate addition should be determined prior to the commissioning of the Stage III Extension. According to DSD's experience, although these mitigation measures are effective in controlling odour, they may affect the biological treatment processes of the STW to a certain extent. Therefore, it would be appropriate that the exact and optimal dosage be used to achieve the 55% odour reduction and the 50U_m⁻³ criterion. Further details on the approach to achieve the optimum dosage of oxygen/air/nitrate injection are presented in *Section 3*.

Water Quality

An Ultra-violet (UV) disinfection system will be employed to treat the final effluent before it is discharged. The use of an UV system is considered to be superior to the traditional chlorine disinfection system, which has associated concerns such as toxicity to receiving waters due to residual chloride and the potential hazards related to the storage of chlorine. The use of a UV system is therefore considered to be an effective measure to reduce the levels of bacteria, especially *E. Coli*, in the final effluent.

⁽⁵⁰⁾ Drainage Services Department (1998) Letter to ERM - *Odourous Emissions*. Ref. () in SP 8/4276DS/S3/17. 23 October 1998.

Solid Waste

It is proposed that membrane filter press will be installed for sludge dewatering purposes. These filter presses will be capable of producing a sludge cake with a dry solids (ds) content of over 30%, which meets the current minimal requirement for disposal to landfill (ds content >30%). In addition, the new filter presses will be enclosed in a new sludge dewatering house which will minimise the potential odour impacts generated from sludge treatment.

In addition, the new centrifuges will be enclosed in a new sludge dewatering house which will minimise the potential odour impacts generated from sludge.

10.6 SOCIAL ACCEPTABILITY

The social acceptability of the Project to the public will be determined during the public consultation process before the commencement of the Project. As the Project is aimed at increasing the sewage treatment capacity of the existing Sha Tin STW and also to allow the facility to meet more stringent effluent discharge standards, it is considered that the Project provides overall benefits to the community and community support is expected.

10.7 CONCLUSION

The potential environmental impacts related to major processes for the proposed Stage III Extension have been reviewed. These major processes mainly relate to the treatment of sewage and sewage sludge which have the potential to create odour, water, waste and noise impacts. These various potential impacts has already been addressed in relevant Sections related to air, water, waste and other potential environmental issues in which suitable mitigation measures have been provided. It is therefore concluded that the environmental impacts related to the major processing facilities will be acceptable.