

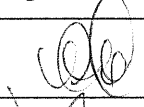



Agreement No. CE 51/2002 (DS)

**Upgrading of Pillar Point Sewage Treatment Works
- Investigation, Design and Construction**

Executive Summary For EIA Study

[January 2008]

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Version: Final

Date: 30th January 2008

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1. INTRODUCTION

1.1 Project Background

1.1.1.1 The existing Pillar Point Sewage Treatment Works (PPSTW) is a preliminary treatment works of 5.79 m³/s capacity. The operation of the existing PPSTW is to remove screenings followed by grit removal prior to discharging its effluent into the sea via twin submarine outfalls. Under the Review of the Tuen Mun and Tsing Yi Sewerage Master Plan (RTMTYSMP) commissioned in February 1999, the existing Pillar Point STW was recommended be upgraded from preliminary treatment to chemical treatment with disinfection. The aim of the recommended upgrading works is to improve the effluent quality, and to meet the demand of future population and pollutant loads at ultimate development scenario.

1.1.1.2 The RTMTYSMP recommended the viability of the upgrading works to the PPSTW, comprised the following:

- expanding the treatment capacity of the existing STW to cope with the increased peak wet weather sewage flow under the ultimate development scenario to cater for the increase in population arising from the planned development in Tuen Mun area;
- upgrading the sewage treatment level of the existing STW to incorporate chemical treatment with disinfection at minimum removal rates of 70%, 55% and 99.9% for suspended solids (SS), biochemical oxygen demand (BOD) and *E. coli* respectively;
- upgrading existing septic waste reception facilities at PPSTW; and
- providing and upgrading ancillary facilities covering the administration building, workshop, laboratory, odour control facilities, sludge handling and dewatering facilities, access roads and minor landscaping works within the STW for the operation and maintenance of the upgraded STW.

1.1.1.3 The construction of the upgrading works and the operation and maintenance of the upgraded PPSTW will be implemented under a design-build-operate (DBO) contract arrangement (hereinafter referred to as “the Project”). .

1.2 The Assignment

- 1.2.1.1 On 6 July 2005, Metcalf and Eddy Ltd. was commissioned by the Drainage Services Department of the Hong Kong SAR Government to undertake the Investigation, Design and Construction of the Project (hereinafter referred to as “the Assignment”).
- 1.2.1.2 A preliminary design taking into account all the Project requirements is carried out. In the preparation of the preliminary design, the sewage flows and loads are to be estimated in order to determine the treatment capacity and effluent standards of the upgraded PPSTW. Moreover, an appropriate treatment process is to be selected for the upgraded PPSTW. The Environmental Impact Assessment (EIA) Study is conducted based on the preliminary design in order to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and related activities that take place concurrently.
- 1.2.1.3 The Project 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) and requires an environmental permit under the EIAO for the implementation of the Project. The EIA Study Brief (No. ESB-122/2004) for an EIA study for the Project under section 5(1) of the EIAO was issued by the Environmental Protection Department (EPD) on 23 December 2004.

2. PROJECT DESCRIPTION

2.1 Project Location

2.1.1.1 The Pillar Point Sewage Treatment Works (PPSTW) is located at north of the Tuen Mun River Trade Terminal and bounded by Lung Mun Road to the north (**Figure 2.1** refers). **Figure 2.2** shows the layout of the existing PPSTW. The open area adjacent to the existing PPSTW has been designated for the future upgrading of the treatment works.

2.2 Project Scope

2.2.1.1 The technical review and evaluation of different treatment processes conducted for the Project recommended the following processes and these recommendations were adopted for development of the preliminary design:

- Chemically enhanced primary treatment (CEPT) process
- Disinfection by UV irradiation
- Compact septic waste reception station and discharging septic waste into sludge holding/thickening tanks
- Sludge dewatering by using centrifuges

2.2.1.2 The preliminary layout plan for the upgraded PPSTW with the recommended treatment processes is shown in **Figure 2.3**.

2.2.1.3 The recommended effluent standards for the upgraded PPSTW are summarized in **Table 2.1** below.

Table 2.1 Recommended Effluent Standards for Upgraded PPSTW

Parameters	Concentrations	Remarks	Concentrations	Remarks
TSS	80 mg/L	average	120 mg/L	95%ile
BOD ₅	120 mg/L	average	180 mg/L	95%ile
<i>E.coli</i>	20,000 counts/100ml	geometric mean	300,000 counts/100ml	95%ile

2.3 Project Programme

2.3.1.1 It is intended to implement the upgrading works of the PPSTW and to thereafter operate and maintain the whole of the STW under DBO contract arrangement. The DBO contract is currently scheduled to commence in mid 2009 for completion of the construction in 2012.

3. KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Air Quality Impact

Construction Phase

- 3.1.1.1 In view of the small scale of construction works which would be limited to within the boundary of PPSTW, no adverse construction dust impact would be expected at the nearest representative air sensitive receivers (ASRs) with the implementation of the dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices. No odour emission was identified during the construction phase as no temporary sewage treatment process/facilities would be provided. Dust monitoring and audit are recommended for the construction phase to ensure the efficacy of the control measures.

Operation Phase

- 3.1.1.2 Odour emission from the Upgraded PPSTW would be the main concern during the operation phase. Air dispersion modelling was conducted to simulate the potential odour impacts of the proposed preliminary layout of the Upgraded PPSTW on the ASRs. With reference to the modelling results, it is noted that only providing deodourizing units for the treatment of vented air from the covered sewage/sludge treatment facilities of the upgraded PPSTW except the quiescent zone of sedimentation tanks is not sufficient to make all the ASRs below the odour criterion of 5 odour units. Highest odour concentration of 8.5 odour units is predicted at River Trade Terminal Office under the worst-case scenario. With the implementing the recommended mitigation measure, covering the quiescent zone of sedimentation tanks and providing an additional deodourizing unit for the treatment of vented air, the predicted odour level at representative ASRs would comply with the EPD criterion of 5 odour units.
- 3.1.1.3 Based on the preliminary design with implementing the mitigation measure, all the exposed areas with sewage or sludge of the upgraded PPSTW would be covered. The vented air from the inlet pumping station, coarse screens, aerated grit channels, fine screens, common flow channels, outfall pumping station, flash mixing tanks, flocculation tanks, low lift and returns pumping station, weir area and effluent channel of the sedimentation tanks, quiescent zone of the sedimentation tanks and the solids handling building (SHB) would be treated at the three deodourizing units (OD1, OD2 & OD5) next to low lift and returns pumping station before discharging into the atmosphere. While the vented air from the sludge pumping station, raw sludge holding tanks, sludge dewatering building, return liquor pumping station septic waste reception area, exposed area of UV contact tanks and fine screens (including all influent & effluent channels) of UV disinfection facilities would be treated in the two deodourizing units (OD3 & OD4). All the deodourizing units are with 90% odour removal efficiency, which is considered common and practically achievable. Operational odour monitoring is proposed to monitor the effectiveness of recommended mitigation measures.

3.2 Water Quality Impact

Construction Phase

- 3.2.1.1 Minor water quality impact would be associated with land-based construction. Impacts may result from site runoff and sewage from the construction workforce. Impacts could be controlled to comply with the WPCO standards by implementing the recommended mitigation measures. Unacceptable residual impacts on water quality would not be expected.

Operation Phase

- 3.2.1.2 An assessment of water quality impact due to the operation of the Project was made using the Delft3D model. The water quality modelling results showed that the discharge of effluent from the upgraded PPSTW after CEPT and UV disinfection would not cause adverse water quality impacts. As a result of the upgrading of the PPSTW, the overall loading of BOD₅, TSS and *E.coli* in the effluent would be reduced due to the CEPT and disinfection as compared to the current preliminary treatment process. The modelling results showed that there would be water quality improvement for BOD₅, TSS and *E.coli* due to the upgrading works.
- 3.2.1.3 A sensitivity test was carried out to investigate the water quality effect due to the change from CEPT with disinfection to a higher treatment level (i.e. secondary treatment with nitrogen removal and disinfection). The sensitivity test indicated that there would be no substantial differences in the water quality impacts due to this change. The modelling results showed negligible reduction in *E.coli* levels at the bathing beaches due to the higher treatment level. The reduction of BOD₅ and nutrient levels in the receiving water was also insignificant. Based on the impact assessment results, the selection of CEPT with disinfection is considered the most effective option for PPSTW in minimizing the water quality impacts.
- 3.2.1.4 The model predicted that the bacteria levels in the Tuen Mun and Tsuen Wan coastal waters would be elevated due to the emergency release of untreated effluent at the PPSTW. Mitigation measures, including dual power supply, standby pumps, back-up treatment units and equipment, would be provided to avoid the occurrence of any emergency discharge. A framework of the emergency response procedures has been formulated to minimise the impact due to any temporary discharge of untreated effluent from the PPSTW. A detailed EM&A programme is also recommended to collect water quality information and to mitigate the potential impact. The monitoring results shall be employed to identify areas for any further necessary mitigation measures to avoid, rectify and eliminate environmental damage associated with the emergency release of untreated effluent from the PPSTW. No insurmountable water quality impact would be expected from these temporary discharges under emergency situation provided all the recommended mitigation measures are properly implemented.

3.3 Ecological Impact

- 3.3.1.1 A literature review has been conducted to establish the ecological baseline condition of the Assessment Area and assessment of potential impacts conducted in accordance with the EIAO TM requirements.
- 3.3.1.2 The water quality impact modeling results indicated that the potential impact zone would be restricted to the Northwestern and Western Buffer WCZs. No impact on ecological resources outside of these zones is expected.
- 3.3.1.3 No adverse ecological impact is anticipated from the Project because there would be improvement in water quality with reduction in *E. coli* levels and increase in DO levels in the receiving waters after the Project commissioned. No mitigation measures would be required. Environmental monitoring and auditing requirements in relation to ecological resources protection are covered in the water quality assessment.

3.4 Waste Management Implications

- 3.4.1.1 Waste types generated by the construction activities are likely to include C&D material from excavation works, general refuse from the work force, and chemical waste from the maintenance of construction plant and equipment. Wastes generated by the operational activities would include sludge and spent UV lamps. Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts are not anticipated during the construction and operation phases.

3.5 Landscape and Visual Impact

Construction Phase

- 3.5.1.1 There are a total of approximately 343 trees within the existing PPSTW. Of these, 253 trees are proposed to be retained, 90 trees will be affected and are proposed to be transplanted/felled. None of the affected trees are classified as Old and Valuable (OVT) trees. Apart from the 18 numbers of "*Leucaena leucocephala*", all the affected trees are proposed to be transplanted. The 18 numbers of "*Leucaena leucocephala*" are proposed to be felled in accordance with ETWB TCW No. 3/2006. There will be mitigation through the transplanting of some existing trees and the planting of new stock. Moreover, 81 numbers of "*Cassia surattensis*" will be provided as the additional compensatory planting for loss of greenery in the area due to removal of the affected trees.
- 3.5.1.2 There is expected to be moderate impacts on the existing institutional areas during construction to the landscape character of the Government utilities area. Workers on River Trade Terminal & Cargo Handling Area (OU1) would have moderate adverse visual impact during construction phase. Impact would be lessen as slight in operational stage when landscape and visual mitigation measures are fully implemented. The visual impact would be insubstantial significance as most of the tree planting would provide proper screening effect in maturity of 10 years.

Operation Phase

- 3.5.1.3 Day 1 after the implementation of mitigation measures during operation there would still be some slight negative visual impact on the VSRs close to the Project on River Trade Terminal & Cargo Handling Area. 10 years after the implementation of mitigation measures during operation, the residual impacts on all VSRs are insubstantial.
- 3.5.1.4 After the proposed mitigation measures have been implemented and the proposed tree planting has matured over 10 years, it is anticipated that all residual adverse landscape and visual impacts in the operational phase will be of insubstantial significance.

3.6 Environmental Monitoring and Audit

- 3.6.1.1 Environmental monitoring and audit (EM&A) requirements have been specified in an EM&A Manual. The EM&A Manual contains full details of proposed baseline and compliance monitoring programmes, as well as performance specifications, audit requirements and monitoring procedures.

4. OVERALL CONCLUSION

- 4.1.1.1 The findings of this EIA Study have determined the likely nature and extent of environmental impacts predicted to arise from the construction and operation phases of the Project. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards.
- 4.1.1.2 Overall, the EIA Study for the proposed upgrading works for PPSTW has predicted that the Project, with the implementation of the proposed mitigation measures for construction and operation phases, would comply with all applicable environmental standards and legislation. This EIA has also demonstrated the acceptability of the residual impacts from the Project and the protection of the population and environmentally sensitive resources. EM&A mechanisms have been recommended, where necessary, to verify the accuracy of the EIA predictions and the effectiveness of recommended mitigation measures.