

*Chapter 7: Upgrading and operation of Pillar Point Sewage Treatment Works*

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The Audit Commission ("Audit") conducted a review of the upgrading and operation of the Pillar Point Sewage Treatment Works ("PPSTW").<sup>1</sup>

2. The upgrading and operation of PPSTW was the first sewage treatment works project of the Drainage Services Department ("DSD") adopting the design-build-operate ("DBO")<sup>2</sup> arrangement. A DBO contract ("Contract A") at a contract sum of \$2,673.7 million was awarded to a contractor ("Contractor A") in July 2010 for the design and construction of the upgrading works as well as the operation and maintenance of the upgraded PPSTW. The upgraded PPSTW commenced operation in May 2014. The total project expenditure for the upgrading works as of October 2020 was \$1,858.9 million and the total payment to Contractor A for the operation of the upgraded PPSTW up to 31 March 2020 was about \$412 million.

3. The Committee noted the following findings from the Director of Audit's Report No. 76 ("the Audit Report"):

Upgrading works of the Pillar Point Sewage Treatment Works

- early deterioration of concrete protective coating at PPSTW had been found since December 2013, and various actions had been taken to address the problem.<sup>3</sup> As of January 2021, the investigation to identify the root cause of the matter was still in progress;
- Contract A specified the requirements for the material used in fine screens. In November 2014, it was found that the materials of chain in the fine screens at the upgraded PPSTW included one grade of stainless steel which was at variance with the grade specified under the contract requirements, and there was a durability issue as the main

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<sup>1</sup> PPSTW in Tuen Mun was built in 1982. In 2001, to cater for the increase in population and planned new developments in Tuen Mun district and to improve the quality of the effluent discharged from PPSTW, the Environmental Protection Department considered that there was a need to upgrade the capacity and treatment level of PPSTW.

<sup>2</sup> DBO is a form of contract procurement whereby the contractor is required to design and construct a proposed facility in accordance with all requirements set forth in the contract by the Government. Upon completion, the contractor will be required under the contract to operate and maintain the completed facility for a specified period of time. The ownership of the facility will remain with the Government throughout the contract duration. Upon expiry of the operation phase specified in the contract, the facility will be handed back to the Government free of any charges in a specified condition.

<sup>3</sup> Please refer to paragraphs 2.7 to 2.10 of the Audit Report for details.

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difference between the two grades was corrosion resistance. In the event, all the chains were replaced by Contractor A at its sole cost in August 2015;

- as of mid-September 2015 (i.e. four months after the expiry of the defects correction period in May 2015),<sup>4</sup> there were 944 items of defect works not yet completed/rectified by Contractor A. All defects correction works were subsequently completed in November 2015;
- the account of Contract A in respect of the design and build portions was finalized 3.5 years after the substantial completion of the upgrading works of PPSTW in May 2014, exceeding the three-year time limit specified in the Financial Circular No. 7/2017;

Monitoring of operation of upgraded Pillar Point Sewage Treatment Works

- since commissioning of the upgraded PPSTW in May 2014 and up to October 2020, DSD had deducted a total of \$565,920 from the payment to Contractor A on eight occasions involving non-compliances with 5 of the 13 Key Performance Indicators.<sup>5</sup> The non-compliance involving the highest amount (\$460,980) of payment deduction (accounting for 81% of the total of \$565,920) was related to an unauthorized emergency bypass incident in August 2014. The incident lasted for about 11 hours with about 95 000 cubic metres of untreated sewage discharged and, as a result, 14 beaches were closed for about two days;
- DSD conducted surprise checks for *Escherichia coli* concentration in effluent of PPSTW on 161 days from April 2019 to October 2020. For the 23 days with high *Escherichia coli* concentration in effluent found by the surprise checks, Contractor A had taken nine days to about 20 months to complete the relevant investigations;
- the Labour Department prosecuted Contractor A for violation of the Occupational Safety and Health Ordinance (Cap. 509) in a fatal accident<sup>6</sup> occurred in October 2014, and Contractor A was convicted and fined a total of \$145,000 in September 2015. DSD had not taken

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<sup>4</sup> According to Contract A, Contractor A should carry out the defect works in the construction works at its own cost within the one-year defects correction period which commenced after the substantial completion of construction works in May 2014.

<sup>5</sup> Please refer to Table 4 in paragraph 3.8 of the Audit Report for details.

<sup>6</sup> Please refer to paragraph 3.22 of the Audit Report for details of the fatal accident.

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adequate and timely follow-up actions on Contractor A with regard to the fatal accident. It was only in March 2021 that DSD sent a written request to the Labour Department asking for information on the cause of the accident and issued an under-performance notice to Contractor A for poor provision of safety measures during work;

- in September 2020, DSD issued a warning letter to Contractor A stating that it had already issued at least six letters about data inconsistencies and data loss in the Supervisory Control and Data Acquisition System ("SCADA System")<sup>7</sup> since October 2018 but there was still no significant improvement, and inaccurate data in SCADA System would directly tamper DSD's monitoring of site operation. Contractor A subsequently took about 1.5 years to resolve the problem of data inconsistencies, but the data loss problem was not yet fully resolved as of February 2021;
- according to the records of the Computerised Maintenance Management System,<sup>8</sup> there were 7 572 maintenance tasks (7 313 for preventive maintenance and 259 for corrective maintenance) completed between January 2019 and October 2020. Audit noted that there was delay in completion for 2 108 (29%) of the 7 313 preventive maintenance tasks, ranging from one day to one year (averaging 12 days) after target completion dates. For the 259 corrective maintenance tasks, there was delay in completion for one task for about five months. Moreover, DSD had not regularly compiled management information on maintenance carried out at PPSTW;
- according to the structural condition survey,<sup>9</sup> while there were no serious defects or signs of structural distress or instability, 1 290 defects were observed along both internal and external structural elements of the buildings and structures. Contractor A completed the rectification works for all these defects about eight months after issue of the report in May 2020, exceeding the 60-day time limit specified in Contract A;

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<sup>7</sup> SCADA System is a real-time system used for remote control and monitoring of the operation of PPSTW by Contractor A, which is linked to the field equipment.

<sup>8</sup> The Computerised Maintenance Management System is to facilitate management of systems and equipment, daily operation work, corrective and preventive maintenance of PPSTW. All maintenance and asset related information is recorded, analysed and stored in the System.

<sup>9</sup> According to Contract A, Contractor A is required to appoint an independent structural engineer to carry out a structural condition survey of the buildings and structures, including assessment on the physical condition of the key structural components at the plant.

Administration of design-build-operate contract arrangement

- the design and construction portions of Contract A were substantially completed in May 2014 and the total contract expenditure (\$1,774.7 million) was much higher than \$500 million. However, as of January 2021, DSD had not conducted a post-completion review for the design and construction portions of Contract A;<sup>10</sup> and
- as of January 2021, the results in the review report of Contract A and DSD's experience gained in monitoring the operation of the upgraded PPSTW were not posted onto the Knowledge Management Portal.<sup>11</sup>

4. The Committee did not hold any public hearing on this subject. Instead, it asked for written responses regarding DSD's work in managing the upgrading works of PPSTW and monitoring the operation of upgraded PPSTW. The replies from the **Director of Drainage Services** are in *Appendices 18 to 20*.

5. The Committee wishes to be kept informed of the progress made in implementing the various recommendations made by Audit.

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<sup>10</sup> According to the Project Administration Handbook for Civil Engineering Works issued by the Civil Engineering and Development Department, a post-completion review is a useful project management tool and shall be conducted within a reasonable period, say six months, upon the substantial completion of a major consultancy agreement or a major works contract on projects under the Public Works Programme. As a broad guideline, post-completion reviews are generally not warranted for consultancy agreements and works contracts of a project which has a total cost less than \$500 million or of a project which does not involve complicated technical and management issues.

<sup>11</sup> According to DSD Technical Circular No. 1/2005, Knowledge Management Portal is a departmental centralized knowledge database to capture valuable experience and enhance effective sharing of information. It is a platform to facilitate storage, retrieval and sharing of useful knowledge and information within DSD.