

CASE STUDIES



Municipal Wastewater

Wastewater Treatment – **Swansea Wastewater Treatment Works, Swansea, United Kingdom**

UV Treatment Upgrades in Wales

PROJECT BACKGROUND

Swansea Bay is located on the Bristol Channel on the southern coast of Wales and is home to the Swansea Wastewater Treatment Works (WwTW). Swansea WwTW is operated by Dŵr Cymru Welsh Water and is a key treatment plant because Swansea Bay is designated as bathing water. In the late 20th century Swansea Bay was prone to pollution problems, primarily because of a poorly sited main sewer at Mumbles Head, which screened and stored sewage in four underground tanks before releasing it back down the outfall on the ebb tide. Swansea Bay is home to one of the highest tidal ranges in the world and at low tide the sea retreats so far from the high tide marks that it exposes remnants of a prehistoric forest. As a result, the natural current in Swansea Bay often didn't transport the polluted water far enough out to sea, and recirculated it instead around the Bay and then down the Bristol Channel.

In the late 1990s, construction was completed on a wastewater treatment plant near Port Tennant, and was considered at that time to be one of the most technologically advanced wastewater treatment plants in the world. The Swansea WwTW is buried underground with extensive landscaping making it practically undetectable from inland. It was originally designed to treat wastewater for a population equivalent (PE) of 165,000, but currently treats wastewater for a PE of approximately 185,000. The Swansea WwTW treats water from the Swansea Valley and eastern and central areas of the city.



THE TROJANUV SOLUTION

In order to improve the treatment performance (because of the continued cost to maintain compliance), and ensure that it would eventually have the treatment capacity to meet future population growth equivalent of up to 225,000, Swansea WwTW was in need of an equipment upgrade. This would replace the previously installed TrojanUV4000®, which was configured as Duty/Assist. That system contained two banks, each with five UV modules with 16 lamps per (eight lamps deep and two lamps wide).

Dŵr Cymru Welsh Water chose to upgrade to the TrojanUV Signa®. Imtech Water, Waste and Energy (who also provided Dŵr Cymru Welsh Water's process solution for Swansea Bay) played a critical role, alongside Trojan Technologies, in the upgrade project.

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The TrojanUVSigna was selected because it was the most energy-efficient UV system on the market, and because it provided the best whole life cost solution.

Other key factors in the selection process included:

- Simplified installation into existing channel, with only minor modifications to the existing channel
- TrojanUV Solo Lamp Technology[®], which demonstrated exceptional power savings and increased lamp life compared to the previously installed UV system
- Significant reduction in maintenance costs
- The ability to maintain the existing TrojanUV4000 system, while installing the new system
- Innovative approach to remove the previous medium-pressure UV system and replace with the low-pressure TrojanUVSigna

The TrojanUVSigna installation at Swansea WwTW was the first of its kind in the UK and Europe. It has a maximum flow rate of 1,301 l/s (30 MGD) and average flow rate of 650 l/s (15 MGD). There are three UV banks with a total of 126 lamps, for a maximum duty power of 87 kW.

The system was commissioned in January 2014. Since then it has been effectively treating to regulatory standards.

The TrojanUVSigna is specifically designed for large-scale wastewater treatment applications, makes conversion to UV treatment easier, and simplifies operator maintenance.

TrojanUV Solo Lamp Technology combines the best features of both medium-and low-pressure lamp technology.

“Global water and sewerage companies who select the TrojanUVSigna are choosing the most innovative and cost-effective UV treatment technology,” says Wayne Lem, municipal market manager for Trojan Technologies. “We’re proud to be working with Swansea WwTW on this installation, as they share our commitment to public health and ensuring greater water confidence.”

SYSTEM DESIGN PARAMETERS

- **PEAK DESIGN FLOW:**
1301 litres/second (30 MGD)
- **UV TRANSMITTANCE:** 45%
- **TREATMENT LIMIT:**
22 mJ/cm²
- **NUMBER OF UV UNITS:**
1 channel with 3 banks for a total of 126 lamps
- **AVERAGE SOLIDS CONCENTRATION:** 30 mg/L
- **UPSTREAM TREATMENT:**
Lamella primary settlement with MBBR secondary treatment and DAF final treatment before UV treatment at discharge point

BENEFITS OF MP LAMPS

- Low lamp count and small footprint
- Dimmable from 100 to 30% power

BENEFITS OF LPHO LAMPS

- Low power consumption (1/3 the energy usage of MP lamps)
- Long lamp life (15,000 hours)
- Low carbon footprint



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