DŴR CYMRU WELSH WATER

EVENT DURATION MONITORING

November 2023

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EDM TEN Initial Investigation Report – BC0003001 Gowerton WwTW

Asset ID No. 50628

DOCUMENT CONTROL

Version	Status	Date	Author(s)	Description of Change
1	Initial draft	28/11/2023	A. Moule	
2	Amended draft	29/1/2024	D. Davies	Inclusion of AGA PFET improvements
3	Draft Checked and Approved	11/06/2024	H. Hopkins	Delegate Client Manager approval
4	Updated draft	10/07/2024	A. Moule	Amendments made following initial NRW review comments dated 18/06/2024

Abbreviations

AGA……	**Above Ground Assets**
AMP……	**Asset Management Plan**
BGA……	**Below Ground Assets**
CAR……	**Corrective Action Response**
CSO……	**Combined Sewer Overflow**
DCWW……..	**Dwr Cymru Welsh Water**
DMS……..	**Discharge Mechanism Summary**
DWF……	**Dry Weather Flow**
EDM……	**Event and Duration Monitoring**
EP……	**Emergency Penstock**
FFT……	**Flow to Full Treatment**
FIP.....	**Full Investigation Plan**
GIS……..	**Geographic Information System**
LSO……..	**Long Sea Outfall**
MCC……	**Motor Control Centre**
NGR……	**National Grid Reference**
NRV……	**Non-Return Valve**
NRW……..	**National Resources Wales**
PFF……..	**Pass Forward Flow**
PLC……	**Programmable Logic Controller**
PS……..……	**Pumping Station**
SDP……	**Sustainable Drainage Plan**
SPS……..	**Sewage Pumping Station**
SSO……..	**Short Sea Outfall**
TEN……..	**Trigger Event Notification**
UV……	**Ultraviolet**
VSD……..	**Variable Speed Drive**
WwTW……	**Wastewater Treatment Works**

1.0 Executive Summary

Gowerton WwTW is permitted to discharge storm sewage under Permit BC0003001 to Loughor Estuary.

The asset breached its EDM requirements on 24/09/2023 when it spilt for the 27th time to shellfish waters during the calendar year as per the Spill Block Counting Method. A CAR (CAR_NRW0042664) record was received by DCWW on 20/10/2023.

Desktop studies and operational investigations have been undertaken, however the definitive root cause for the spill frequency cannot be fully established at this time, but initial indications suggest there may be issues with the newly commissioned Peak Flow Equivalent Treatment (PFET) process at the asset, in addition to high volumes of network flows being received that are exceeding the assets' operational capacity.

Investigations remain ongoing and several improvement actions have been identified that are aligned to Compliance Assessment Reports.

Prior to TEN, DCWW and NRW were already engaged in ongoing dialogue regarding the matter.

2.0 Site Information

2.1 Site Location

Gowerton WwTW is located 4 miles northwest of Swansea and serves the town of Gowerton and the surrounding areas. The population served by the WwTW is approximately 64000.

The storm overflow is situated at the entrance to WwTW which discharges into the final effluent twin 1300mm outfall pipes that travel West for approx. 3.5km prior to discharge in Loughor Estuary.

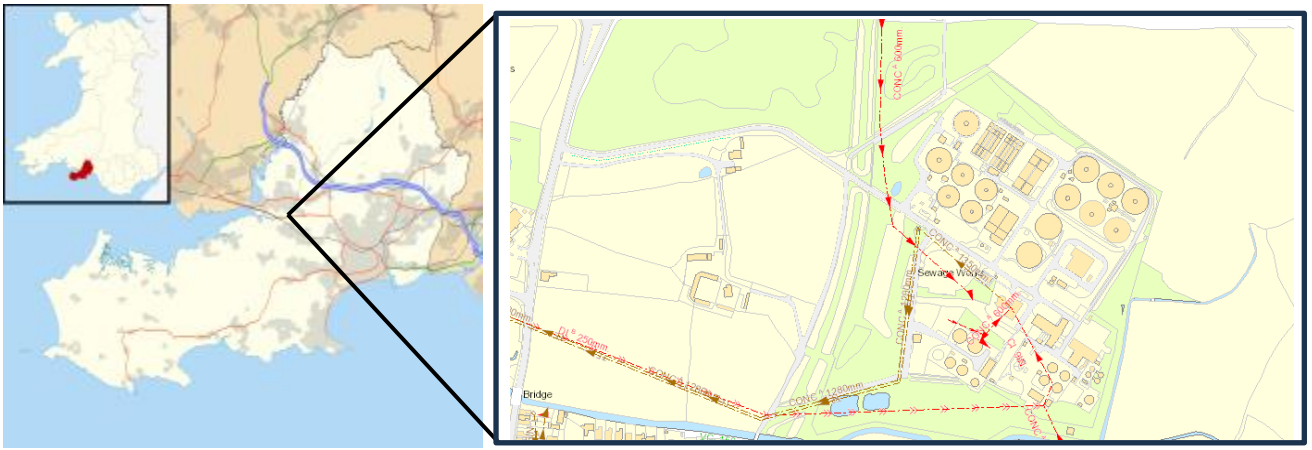


Figure 1: Location of Gowerton WwTW, Gowerton, Swansea, Wales

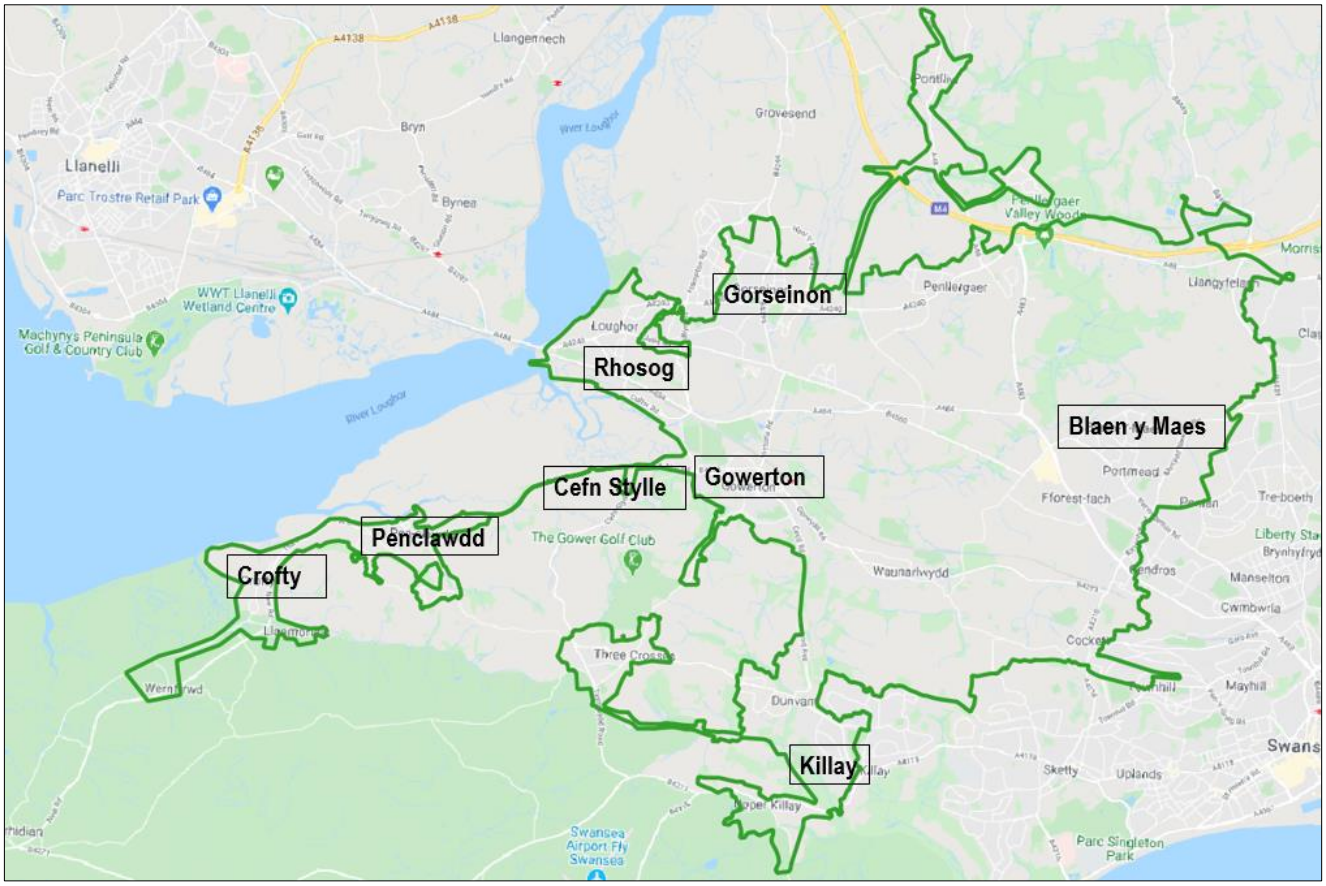


Figure 2: Gowerton WwTW Catchment

2.2 Permit and EDM Requirements

This asset is permitted to discharge storm sewage under BC0003001, which is a consolidated permit referred to in the variation and consolidation notice for application PAN-014896 dated 16/12/2021. The notable conditions for discharge are:

- Overflow setting 912l/s. (612l/s FFT & 300l/s PFET)
- Minimum storage capacity of 8913m^3 fully utilised.
- Screen passing solid matter no greater than 6mm in 1 dimension.
- Discharge Point NGR SS 56087 97833.

The asset breached its EDM requirements on 24/09/2023 when it spilt for the 27th time to shellfish waters during the calendar year as per the Spill Block Counting Method.

2.3 Asset and Telemetry Description

Gowerton WwTW works provides treatment by means of screening, grit removal, primary settlement, aeration, final clarification, and UV disinfection. There are five process areas: preliminary, primary, secondary, sludge treatment and storm.

Flows arrive at the WwTW through two gravity sewers serving Gowerton, Gorseinon, Penllergaer, Killay, Waunarlwydd, Fforestfach, Cockett and Blaenymaes. There are two pumped mains that connect just before entering the WwTW: Rhosog SPS, serving Loughor and Penclawdd SPS serving North Gower. Flows arrive at the inlet pumping station, where they are pumped for primary treatment.

The Permitted PFF of 912l/s is controlled by the capacity and control of the FFT pumps. Flows more than 612 l/s are fed into the PFET plant (maximum flow of 300l/s) via the storm line. The plant contains screenings handling, ferric sulphate dosing, solids removal and UV disinfection to produce an effluent quality that when blended with the main works flow meets discharge consents requirements.

Flows up to 612l/s are subject to biological treatment and disinfection by UV irradiation. Flows more than 612l/s (up to 912l/s) are subject to PFET and disinfection by UV irradiation.

When flows exceed 912l/s, the level in the inlet pump sump rises and the storm pumps operate, pumping flow into the storm storage tanks. Once the tanks are full, excess flow spills over the weirs, through the storm monitoring chamber and to the outfall pipes. After storm cessation, the storm tanks empty, and their contents returned to full treatment.

Monitoring of the spills from the storm tanks is undertaken using an ultrasonic level in the storm monitoring chamber.

Figure 3: Image of the Storm Overflow Chamber

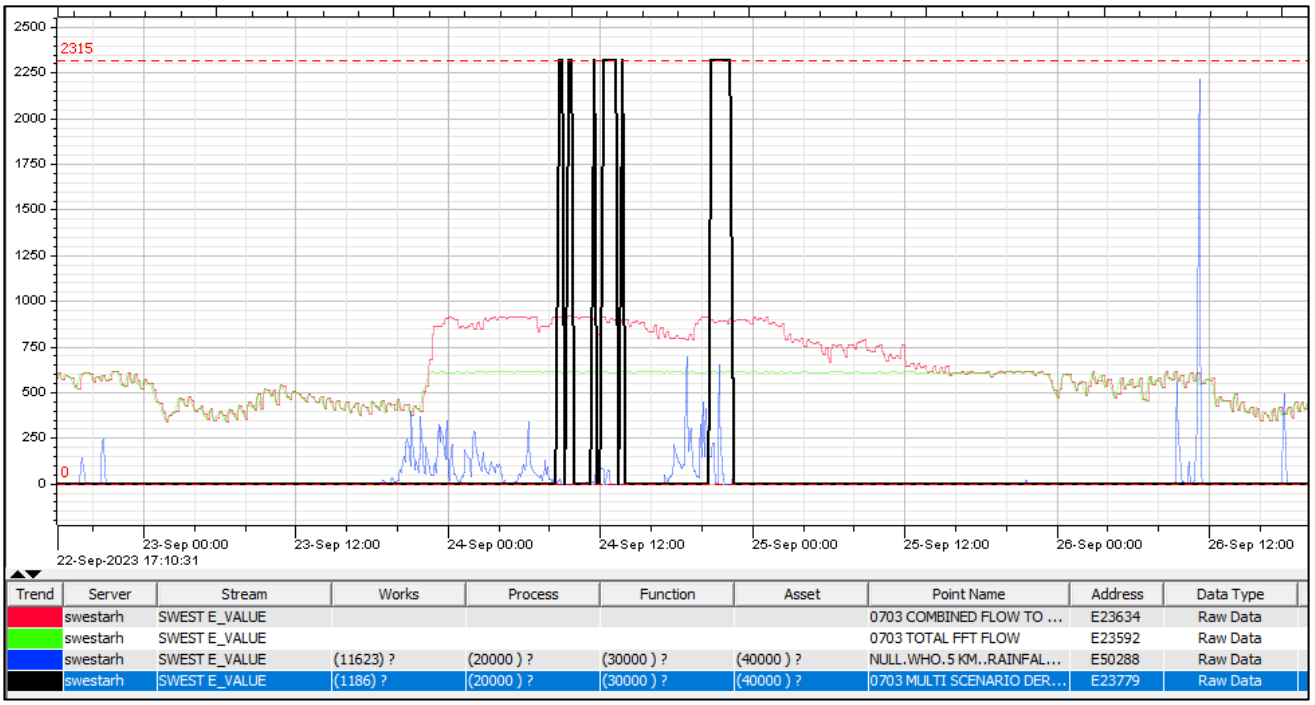
Figure 4: Image of the Level monitor in the Storm Overflow Chamber

3.0 Desktop Study

3.1 Telemetry Data Analysis

A review of the telemetry data has been carried out for the period of recorded spills in 2023.

Data sets for spills are consistent with response to rainfall events in the catchment and other monitored assets in the surrounding area. All discharges occurred when FFT flows exceeded 612l/s, and storm tanks were utilised to full capacity (8913m^3) prior to any spills taking place. However, there were occasions when PFET did not achieve 300l/s prior to excess flows being diverted to storm storage, thus the permitted volumes of 912l/s were not being achieved prior to spills to storm.



Trend	Server	Stream	Works	Process	Function	Asset	Point Name	Address	Data Type
	swestarh	SWEST E_VALUE					0703 COMBINED FLOW TO ...	E23634	Raw Data
	swestarh	SWEST E_VALUE					0703 TOTAL FFT FLOW	E23592	Raw Data
	swestarh	SWEST E_VALUE	(11623) ?	(20000) ?	(30000) ?	(40000) ?	NULL.WHO.5 KM..RAINFAL...	E50288	Raw Data
	swestarh	SWEST E_VALUE	(1186) ?	(20000) ?	(30000) ?	(40000) ?	0703 MULTI SCENARIO DER...	E23779	Raw Data

*Figure 5: Telemetry data extract - **Blue** displays rainfall, **Green** - FFT, **Red** - combined flow to treatment inc. PFET, **Black** – spill events*

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3.2 Catchment Review

A Sustainable Drainage Plan (SDP) was undertaken for the catchment during AMP6 (2015-2020). The asset was identified as having issues achieving PFF during DWF conditions as well as flooding issues. Significant investment was undertaken because of the SDP; however, a large amount of catchment growth was noted as being planned across the catchment, which will have future impacts on WwTW performance.

4.0 Initial Investigation Conclusions

4.1 Root cause statement

The root cause for the WwTW spill frequency cannot be established at this time, but the initial data review suggests there is a link to rainfall events, and these may have occurred without PFET reaching 300l/s.

From initial investigations, it suggests that the PFET cannot consistently treat the maximum 300l/s, especially at the start of a rainfall event when suspended solids are a higher concentration. This is indicative at the start of a storm event, during storm pump duty rotation and when import tankers discharge into the works inlet.

Investigations remain ongoing and several improvement actions have been identified that are aligned to Compliance Assessment Reports.

Outside of the TEN process, DCWW and NRW are already engaged in ongoing dialogue regarding the issue.

4.2 Root cause Investigations and work undertaken.

A series of operational issues have been previously brought to the attention of NRW by DCWW, that were either responsible, or contributed to many of the spills identified as part of this breach:

- 08/11/2022 – DCWW advised NRW of a leak caused by a faulty valve on one of the storm tanks. This required dropping the levels in 2 of the 5 tanks to prevent the leak. This resulted in the storm tanks operating at a reduced capacity, resulting in premature discharges to the environment. The fault was repaired on the 27/01/2023.

- 23/12/2022 – An unplanned event was notified to NRW via OPNOT. A mechanical issue was identified with a PFET cell wash valve. A Cell was taken out of service and PFET flows were reduced whilst awaiting repair. High rainfall and flows for the ensuing period meant that the WwTW could not recover and return to normal operating mode as expected, thus necessitating a further OPNOT.

- 10/01/2023 - An unplanned event was notified to NRW via OPNOT. The PFET cells were going into high level causing plant failure. PFET remained online, but flows were reduced to keep PFET operational (240l/s). A subsequent CAR (CAR_NRW0041540) was received on 14/03/2023.

- 09/03/2023 – A planned event was notified to NRW via OPNOT. Advised that PFET was running at a reduced flow of 240l/s to allow it to continue operating. Regular adjustments were made to gradually increase flow.

- 10/03/2023 – An update was provided to advise that PFET had run the previous night at 260l/s and the next ‘run’ was planned for 275l/s.

- 24/04/2023 – An update was provided to advise that PFET plant started running and operating at the full 300l/s, however plant subsequently encountered performance issues due to solids loading, resulting in intermittently reduced flows.

During each event, post repair on 27/01/2023, storm storage was fully utilised prior to any spills to the environment. Although as noted in section 3.1, full permitted FPF of 912l/s wasn’t always achieved prior to spilling to storm tanks.

4.3 Further Work Required

Significant Capital investment and intervention will be required to achieve PFF. The below initial investigations are ongoing.

- Wet well penstock replacement: To enable regular cleaning of the wet well. This will reduce the volume of solids passed to PFET when the storm pump starts. AGA maintenance is ongoing with an estimated completion date of 30 June 2024. – now completed
- Diversion of tanker inlet imports to other WwTW sites during storm conditions: To reduce solids being pumped to PFET. This has been in place for approximately 1 year and shall continue.
- Repair PFET Cell Leaks causing FPF restriction: This is in planning with DCWW Capital Alliance. Programme dates to be communicated once confirmed. Initial cell inspection was undertaken 12th March 2024. DCWW aim to have more information and potential solutions options by August 2024. The mitigation date will depend on the solution chosen for delivery.
- PFET Media Investigations: Ongoing for the accelerated deterioration of filter media. Filter media has already been replaced once, and deterioration has accelerated due to increased washing required when the process is overloaded with solids. This will be undertaken in negotiation with NRW following completion of investigation works, however a further mitigation project will be required.

The above measures are not exhaustive and are only part of DCWW initial investigations. Further improvements will be identified as the investigation progresses. These will be communicated with further updates once known and form part of the Full Investigation Plan.

4.4 Initial Investigation Recommendations

DCWW will complete the actions and improvements identified in Compliance Assessment reports. DCWW will continue with initial investigations into PFET operation and performance and provide a progress update by 27th September 2024.