



DŴR CYMRU WELSH WATER

EVENT DURATION MONITORING

October 2023

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EDM TEN Initial Investigation Report – BP0237412
Sandfields SPS (CSO 121)

Asset ID No. 51148

DOCUMENT CONTROL

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1	Initial draft	31/10/2023	A.Moule	
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Abbreviations

EDM.....	Event and Duration Monitoring
TBN.....	Trigger Breached Notification
CSO.....	Combined Sewer Overflow
SPS.....	Sewage Pumping Station
WwTW.....	Wastewater Treatment Works
DWF.....	Dry Weather Flow
PFF.....	Pass Forward Flow
STMF.....	Storm Tank Flow
STMRF.....	Storm Tank Return Flow
FFT.....	Flow to Full Treatment
SAS.....	Surplus Activated Sludge
HO.....	Hydraulic Overload

1.0 Executive Summary

Sandfields SPS CSO (also known as CSO121) is permitted to discharge storm sewage under Permit BP0237412 to estuarial waters of Swansea Bay.

The asset breached its EDM requirements on 13/08/2023 when it spilt for the sixth time during the bathing season as per the Spill Block Counting Method.

Desktop studies and operational investigations have been undertaken, however the definitive root cause for spill frequency cannot be established at this time. Significant further investigation work is required to confirm the root cause.

2.0 Site Information

2.1 Site Location

The area of Sandfields is a low-lying area adjacent to and immediately west of Swansea city centre.



Figure 1: Location of Sandfields SPS CSO, Swansea, Wales

2.2 Consent and EDM Requirements

Sandfields SPS CSO is permitted to discharge storm sewage under Permit BP0237412, which is a consolidated permit, referred to in the variation and consolidation notice for application PAN-007359 dated 18/08/2022. The notable conditions for discharge are:

- Overflow setting 1300l/s
- Screen passing solid matter no greater than 6mm in 1 dimension.
- Discharge Point NGR SS 65020 92060

The asset breached its EDM requirements on 13/08/2023 when it spilt for the sixth time during the bathing season as per the Spill Block Counting Method.

2.3 Asset and Telemetry Description

Sandfields SPS CSO receives flows from an area consisting of the Sandfields, Uplands and Mount Pleasant areas. The catchment upstream of this consists of mainly residential properties covering an area of approximately 1.00sq. km predominantly drained by combined sewers. The asset was originally constructed as part of the Sandfields Surface Water Flooding strategy in 1970's. It was subsequently converted to a foul and surface water pumping station at a later (unknown) date, before being modified into its current configuration as a pumped CSO as part of the Swansea Urban Wastewater Treatment Directive Project(s) of the late 1990's. The asset forms part of a series of assets in the wider area that may be reconfigured to divert flows via a series of flow control devices, thus it is possible for Sandfields SPS CSO to receive flows from a far wider catchment area should it be required.

Discharges are monitored by an ultrasonic level detector, used for EDM purposes. PFF is controlled by a penstock in the CSO stilling and screening chamber. Flows enter the SPS from the combined network inlet

sewer. Flow gravitates through the pumping station and into the adjacent interceptor trunk sewer passing Easterly through the asset compound.

If the flow coming into the CSO exceeds the capacity of the downstream flow control, a spill occurs due to the downstream network surcharge. Spill flows pass up, through the screen and over the weir and gravitates to the discharge point via the long sea outfall. If there is a high tide and the outfall becomes hydraulically locked, flow enters the storm pump sump, and the pumps lift flows to create sufficient hydraulic head to pass flows down the outfall.

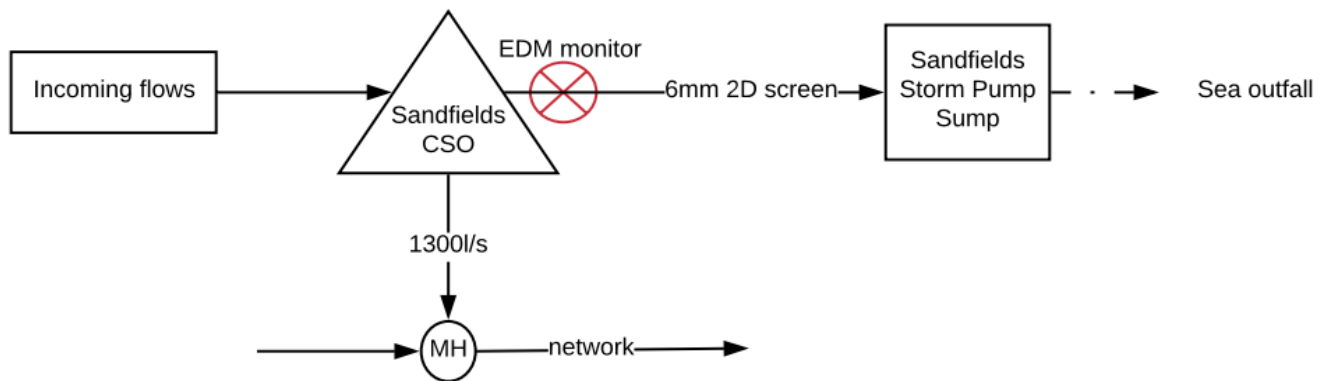


Figure 2: Sandfields SPS configuration

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 across the 2023 bathing water season. Data sets for spills are consistent with response to rainfall events in the catchment and other monitored assets in the surrounding area.

Previous investigations identified telemetry trends of the storm sump partially filling on a 12-hour cycle, suggesting there is tidal infiltration to the storm sump, and requires further investigation.

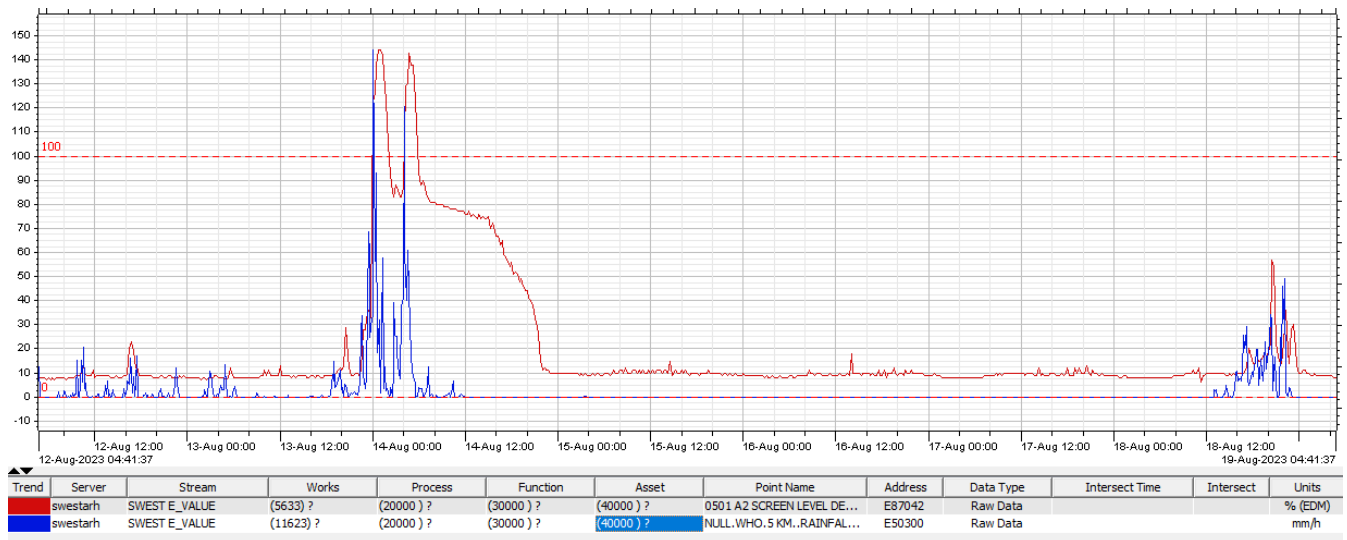


Figure 3: Red displays wet well level. Dotted red line indicates spill level. Blue displays rainfall. Data correlates to rainfall events and suggest hydraulic overload issues.

3.2 Catchment Review

According to a report commissioned by the Local Authority, titled “Flood Consequences Assessment”, in January 2017, wave overtopping of the sea walls is an issue in the area surrounding Sandfields SPS and its catchment:

“Any wave overtopping of the promenade between the Civic Centre and the location of the old Slip Bridge will initially collect within the Sandfields residential areas.”

During such event(s) there is a likelihood that flows would drain to Sandfields CSO, due to the combined nature of the sewerage network in the area.

There is currently no Sustainable Drainage Plan scheduled for the catchment.

4.0 Initial Investigation Conclusions

4.1 Root cause statement

The definitive root cause of CSO spill frequency cannot be established at this time but will likely be attributed to hydraulic overload of the sewerage system. Significant further investigation work will be required to confirm.

4.2 Root cause Investigations and work undertaken.

The investigation works that have been undertaken to date:

- CCTV surveys on the pipework between the CSO and the trunk sewer. No obstructions were identified.
- CCTV surveys of the Sandfields catchment did not identify any large volume misconnected surface water assets beyond what would be expected of a combined sewerage system, such as local highway drainage.
- A review of SPS operational control philosophy, current performance and asset condition did not identify anything to suggest the SPS to be the root cause of the spill.
- There is correlation between spills at the CSO and high flows on the adjacent trunk sewer, leading to the possibility that the trunk sewer may be backing up into the CSO. If confirmed, there are potentially three separate scenarios that could cause the asset to spill:
 1. High flows from Sandfields restricted from D/S flow control in stilling chamber (HO at the CSO)
 2. High flows in trunk sewer preventing PFF from Sandfields line (HO in trunk sewer)
 3. High flows in trunk sewer backing up to CSO (HO in trunk sewer).

4.3 Further Investigation Required

Given the large scale of the asset and associated flows, further investigation works will be escalated for DCWW Capital Alliance for Intervention, and will consist of:

- Investigate outfall infiltration and tidal flow into storm sump.
- Installation of additional level monitors in downstream assets.
- Understand the impact of trunk sewer upon this asset and investigate potential for reverse flow.
- Upstream catchment investigations and flow modelling.

4.4 Initial Investigation Recommendations

Once flow monitors are installed, a period of data collection will be required to allow for further detailed root cause analysis to be undertaken.

Welsh Water aim to complete the initial stage of installing monitors by 1st April 2024.