Event Duration Monitoring

Trigger Exceedance Notification

Document ID

Report type: Stage 2: Full Investigation Proposal

Permit Number: BC0003001

Receiving / Impacted waters: (SFW26)

Location: Gowerton WwTW

DCWW Asset ID: 50628

CAR References:

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Document Control

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1	Stage 2: Asset Manager Review	19/02/2026	Paul Buttle	Draft Review
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1. Executive Summery

This report investigates the performance of Gowerton WwTW and its combined sewer overflow as per its permit BC0003001, under schedule 3 – A2.

The asset reached the trigger level and breached on 10/11/2025, as a result of discharging for the 27th time, using the agreed spill block counting method against a numerical SFW26 as held in the above-mentioned permit.

The investigation, as outlined in Stage 2, will be focused on building on Stage 1 understanding of the site and its catchment dynamics, sewer network configuration and potential causes for recent exceedances in shellfish water quality standards.

Summary of Root Cause

PFET is operating outside of its solids handling, especially on first flush from periods of dry weather. This overloads the process and puts PFET into significant backwash cycling which prevents full flow throughput. This in turn forces more flows to be sent to the storm storage tanks and causing higher spill rate than was initially modelled in AMP6 for this asset.

There are maintenance issues with internally leaking lanes in each of the PFET cells particularly when FE is applied for back washing. This results in poor media washing, which has resulted in a maintenance scheme which is in progress with the Capital Team. This full delivery of this scheme has been delayed due the original manufacturer no longer supporting the process or specific equipment.

Next Steps

The next steps will involve a full Stage 2 investigation under the maintenance work, to identify why the FE losses are so high preventing correct and affective media backwashing as detailed in the Full Investigation Plan (FIP), Table 1 and Solids removal project optimisation work as outlined in the Spill Reduction Plan (SRP), Table 2.

2. Stage 2: Initial Investigation

2.1. Site Location

Gowerton WwTW (Asset ID: 50628) Victoria Road, Gowerton, Swansea, Wales, SA4 3AB.

Figure 1: Location of Gowerton WwTW, Swansea SA4 3AB.

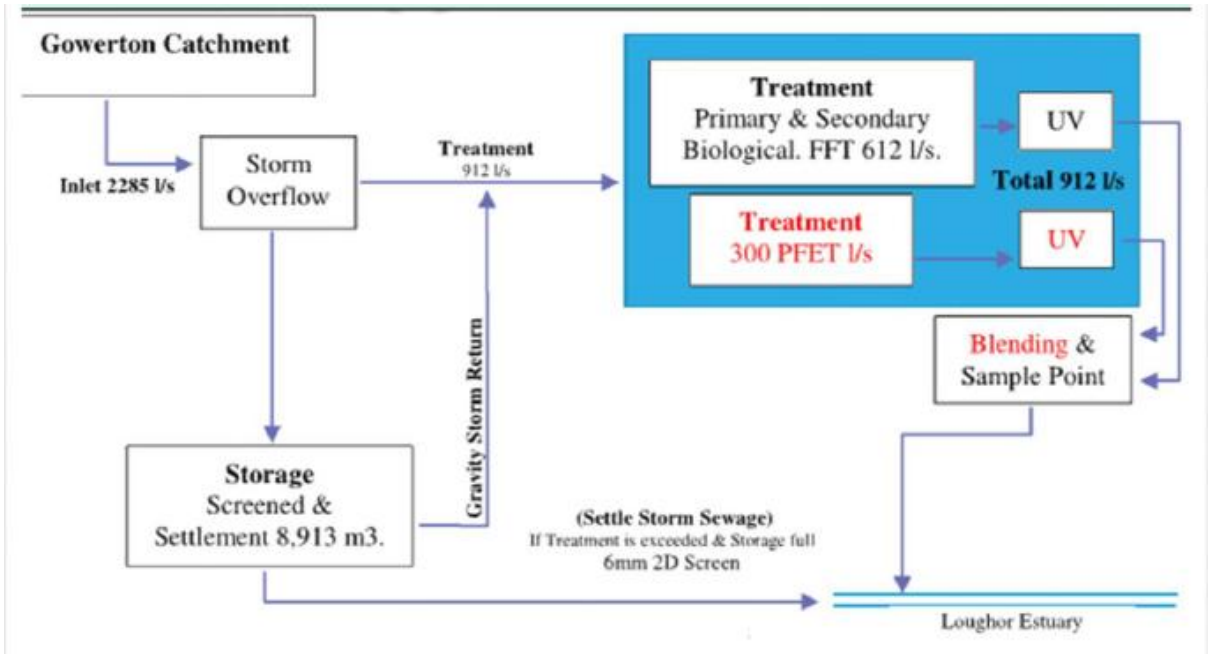

Figure 2: Basic schematic Gowerton WwTW flow split.

2.2. Permit & EDM Requirements

Permit:

The asset is permitted by NRW under consent number BC0003001, with a later variation number PAN-020312 and being issued 20th Jan. 2025.

Population Equivalent (PE): from DCWW WwTW Mapping info. >58,676PE.

The key conditions of this permit under section 3 – A2 site numerical details around storm discharge are outlined below:

- All storm sewage flows shall have passed through screen, having apertures no greater than 6mm in more than one dimension.
- Discharge is only permitted when the flow rate before the weir is greater than 912l/s, to its sanitary limits and the online storm storage capacity is fully utilised as per the terms and conditions of the discharge permit.
- Minimum storage capacity of 8,913m3.
- A1 (Treated FE) & A2 (Storm) permit discharge to the Loughor Estuary @ SS56087 97883.
- Discharge waters for this site and its permit, is classified as Shellfish Waters (SFW). The treatment works has a 26-spill allowance in the Permit during the calendar year starting from January the 1st and finishing 31st December.
- For 2025 the site breached this limit with its 27th spill on the 10/11/2025 against the agreed spill block counting method.
- Storm storage tank modulated gravity and final pumped return is set up to automatically return storage volume as soon as any headroom is available in the treatment process.

A2 Settled storm sewage via Settled Storm Discharge Point	Discharge start and end times	N/A	N/A	Condition 3.3.3 does not apply	Whenever a discharge occurs	N/A
	Block-counted significant spills	26 spills	1st January to 31st December inclusive	Condition 3.3.3 does not apply	15 minutes	(Condition 3.1.6 applies - the spills threshold is a trigger for investigation only and not a statistic for use in compliance of asset)
	Block-counted spills	N/A	1st January to 31st December inclusive	Condition 3.3.3 does not apply	15 minutes	N/A

Permit number:
BC0003001

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Table S3.1 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements

Effluents and discharge points	Parameter	Limit (including unit)	Reference Period	Limit of effective range	Monitoring frequency	Compliance Statistic
	Event duration monitoring status (operational / not operational)	N/A	N/A	Condition 3.3.3 does not apply	15 minutes	N/A
	Flow passed forward	912 l/s	15-minute except where 2-minute required by condition 2.4.1	N/A	Continuous 15-minute instantaneous or averaged flow except where 2-minute required by 2.4.1	Minimum Condition 3.1.7 applies
	Overflow operation (into storm storage) monitoring yes/no or start and end times	N/A	N/A	N/A	2-minute where yes/no or whenever overflow operates where start and end times	N/A
	Overflow operation (into storm storage) monitoring status (operational / not operational)	N/A	N/A	N/A	2-minute or whenever operational status changes	N/A

Table S3.2 Discharge points

Effluent Name	Discharge Point	Discharge point NGR	Receiving water/Environment
A1 Secondary treated sewage effluent with nutrient removal and PFET sewage effluent subject to disinfection by ultraviolet irradiation	Final Effluent Discharge Point	SS 56087 97883	Loughor Estuary
A2 Settled storm sewage	Settled Storm Discharge Point	SS 56087 97883	

Table S3.3a Storm sewage discharge settings

Effluents and discharge points	Description of discharge	Overflow setting l/s	Maximum size of solid matter	Screen aperture size	Minimum screen capacity flow l/s	Minimum storage capacity m^3
A2 Settled storm sewage via Settled Storm Discharge Point	Settled storm sewage	912	No greater than 6 mm in more than 1 dimension	6 mm x 6 mm	All flows shall be screened	8913

Figure 3: Image of Permit Information out of Permit BC0003001.

EDM Discharge:

Description of how EDM discharge occurs: This section covers both EDMS and EDME flow path to its discharge into the Loughor Estuary.

Inflows are all pumped to an elevated Inlet area via the onsite terminal pumping station. All these flows arrive at the same discharge chamber system at the head of the works on site at Gowerton WwTW.

Figure 4: Gowerton Headworks Splitter chamber.

Flows in excess of the 912l/s flow to treatment figure, and up to >2,285l/s, arriving through the inlet by gravity is further split where the excess storm flow volume passes over a secondary weir which is where EDMS is monitored by an ultrasonic instrument and a secondary probe instrument.

Storm flow to the storm storage tanks is triggered at this point through telemetry and via the sites outstation (Telemetry ID. 2E123785, Spill to Storm Tanks (EDMS) @ 100%).

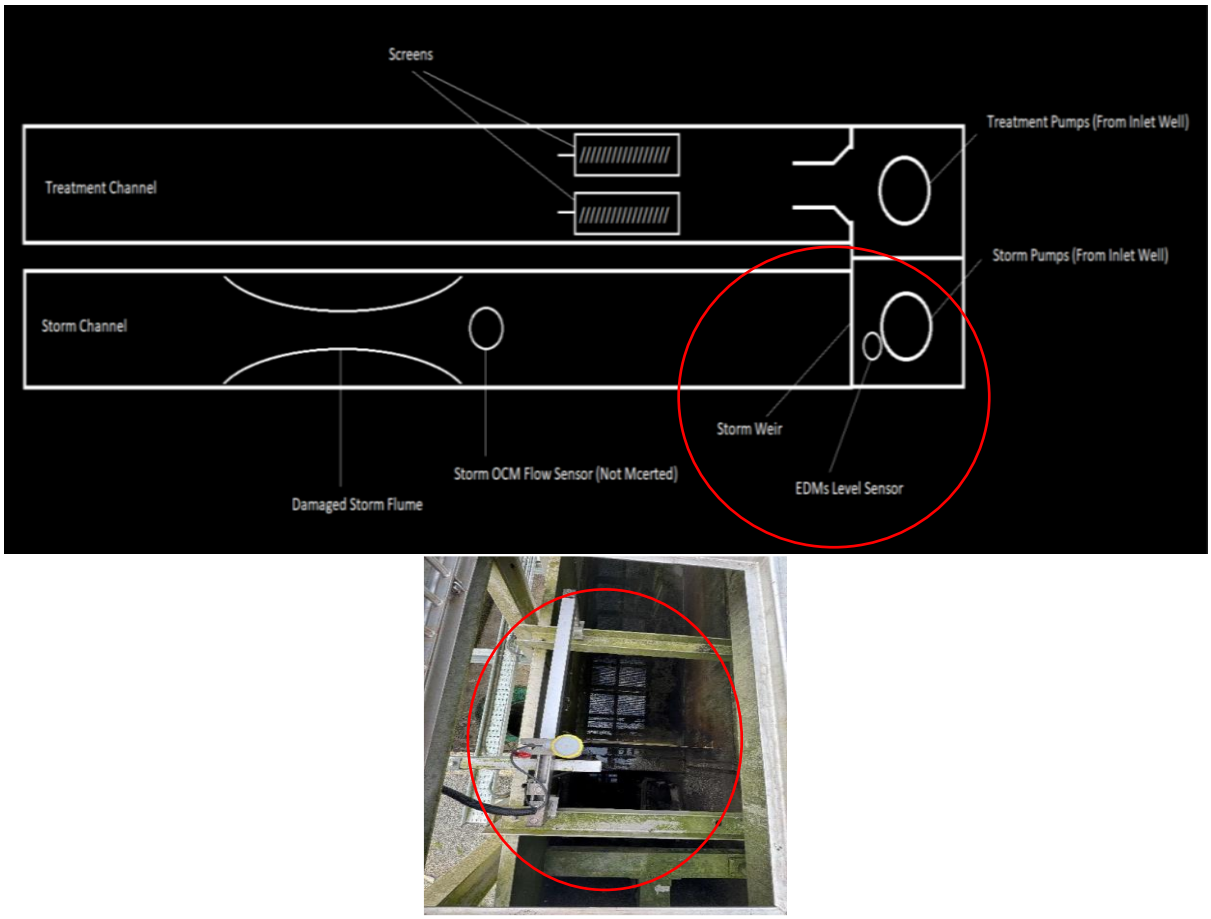


Figure 5: EDMS Monitoring to Storm Storage Tank Split.

EDME discharges are monitored using a level control instrument in the storm outlet single pipe discharge chamber, storm flow triggered through telemetry and via the sites outstation (Telemetry ID. 2E23779, 0703 Multi Scenario Derived Spill @ 100%).

Figure 6: EDME Monitoring Chamber for Settled and Screened Discharge.

2.3. Asset and Telemetry Description

Asset:

Gowerton WwTW (DCWW Asset ID: 50628), serves a catchment subdivided into 5 main sub-catchments which are: Crofty/Penclawdd, Killay/Waunarlwydd, Blean Y Maes, Rhosog/Cefn Stylle and Gorseinon. All sub-catchments made up of both gravity and pumped networks, and where three arrive at terminal pumping stations (TSPS) for their sub-catchment. These being Penclawdd TSPS (DCWW Asset ID: 72084, (FPF flow of 82l/s)) located in the West of the treatment works, Killay TSPS (DCWW Asset ID: 52636, (FPF flow of 240l/s)) located to the East of the treatment works and Rhosog TSPS (DCWW Asset ID: 51141, (FPF flow of 185l/s)) located to the North of the treatment works.

All these flows arrive by gravity apart from Penclawdd TSPS and Rhosog TSPS, with these last two stations pumping directly into the last section of trunk sewer prior to the Inlet works screen area.

Maximum inflows modelled for the treatment works at the inlet is likely >2,285l/s (Noted in 2012 ARUP's peak flow paper).

Inflow is split between main treatment works @612l/s and PFET treatment @300l/s, and up to a peak hydraulic gravity flow arriving through the inlet of >2,285l/s. Excess flows above 912l/s are sent to the storm storage tanks and storm discharge route as explained in more detail below.

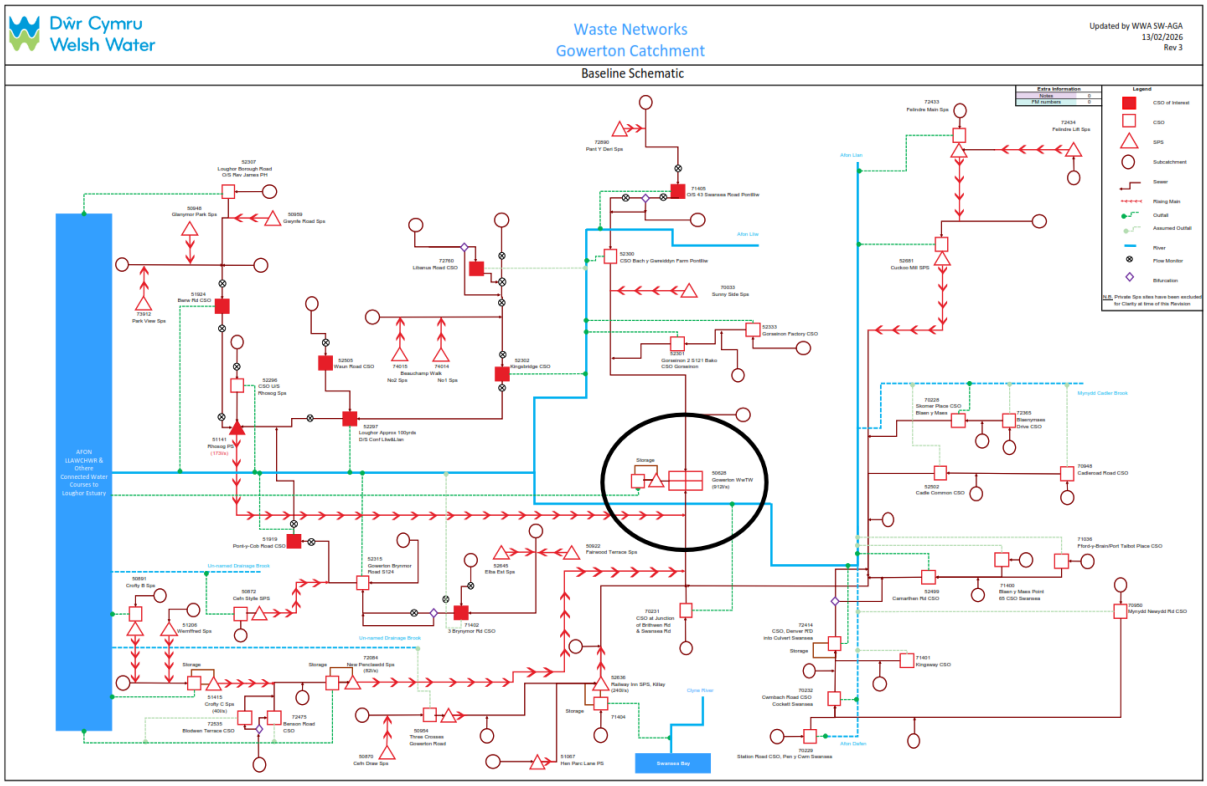


Figure 7: The High-level Catchment schematic.
For Larger Catchment overview document (See Appendix B).

Flows initially arrive through the screen plant and grit drop out area, before proceeding into the site main terminal foul/storm pumping station, this lifts all flows to the head of the works. The first 612l/s is split by using the control of the foul duty/standby pumps within the onsite terminal pumping station and sent directly to the head of the works where this gravitates through the main biological treatment process. This foul flow is controlled by the duty foul pump via the wet well level controlling the speed of the pump VSD and capped by the drive by signals received from the Mcert flow meter, to make sure this 612l/s flow is met at all times.

If the inflow arriving from the network rises above this 612l/s, the inflow will cause the TSPS wet well to rise until this causes the duty Storm pump to start. The storm pump(s) are set up in a Duty/Assist 1/Assist 2 set up. They are all on VSD's and start/stop individually on level as well as ramp up and down according to the wet well level.

The storm pump initially starts and will feed PFET its first 300l/s flow to make up the 912l/s totalised treatment flow. If the PFET is in back wash there is an additional compensation flow while the back wash water is sent from the PFET process to the main treatment flows for the solids to be co-settled as per the operating technique that sits alongside the permit.

Flows from both treatment processes are recombined in the blending chamber at the bottom of the works before these combined flows are discharged through the common gravity dual FE lines to the Loughor Estuary.

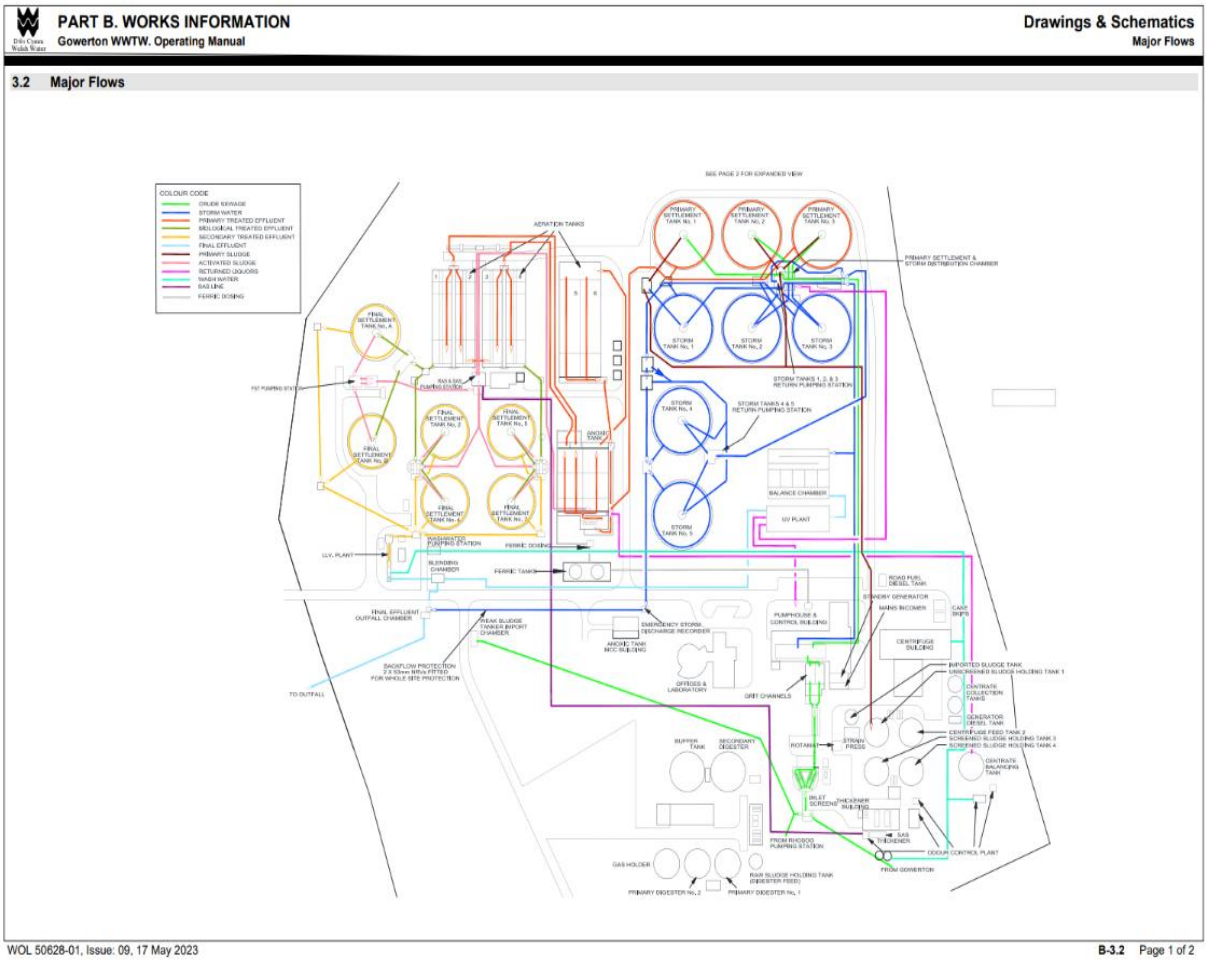


Figure 8: Site layout and key areas.
Site Layout in larger scale from Site WOM (See Appendix C).

Storm Discharge Though A2:

Once flows are in excess of 912l/s combined treatment and the onsite TSPS wet well levels are still rising, the duty storm pump will speed up and pass all additional flows to the 3 x first in line radial storm storage tanks automatically via the storm EDMS weir. The number of storm pumps and their discharge speed increase according to the well level in the onsite TSPS and automated control logic, keeping up with the inflow even if this is greater than the described peak inflow of approx. >2,285l/s allowed through the inlet area. EDMS monitoring is as indicated in the above EDMS section of this report.

This storm flow then fills these 3 x radial storm storage tanks until these tanks overflow and leave as screened and settled storm water. This flow is then initially diverted to 2 x additional radial storm storage tanks for secondary offline settlement and spill/volume reduction. Once these 2 x additional radial storm storage tanks are full, a bypass penstock opens between the two sets of storm storage tanks and allow flows to discharge directly from the 3 x first in line storm storage tanks via the EDME monitoring chamber, as indicated in the above EDME section of this report.

Once all storm storage tanks are fully utilised to meet the storage requirements of the permit, the flows discharge down a single storm line until this reaches the site FE discharge area. Flows are then combined at this point with the two treatment FE lines leaving the blending chamber and both FE and storm discharge then flow down a tandem mixed flow gravity discharge pipe system until this is discharged just downstream of the Bynea Road and Rail Bridges into the Loughor Estuary @ SS56087 97883.

Telemetry Description:

The site is a large wastewater treatment works and largely manned and operated by on site staff through Monday to Friday with other operational staff visits throughout the weekend. Site is also reviewed 24/7 by a DCWW corporate telemetry alarm system run remotely via DCWW telemetry management team.

Operational information with regards to status of equipment, site flow process and accompanying levels etc. are all relayed from the site through the site Scada control connected directly into sites telemetry outstation.

These alarms and trend data are managed 24/7 and passed onto operational front-line and call out staff through a priorities filtering structure, both in and outside of operational staffed hours.

The data is also stored/archived in accordance with DCWW data management protocols and procedures.

2.4. Telemetry Data Analysis

A review of the telemetry data has been carried out under Stage 1 of this ongoing TEN process and has been verified to produce the spill count and date of breaching the SFW limit, as shown below in Fig 9 and as mentioned in the above report.

Spill block data

Spill Numb	SpillBlockStart	SpillBlockEnd	ReadingsOverLi	MaxReadin	SuspectRead	SpillRangeType
1	05/01/2025 03:30:00	05/01/2025 15:30:00	34	100	0	Initial 12 Hour Block
2	05/01/2025 15:30:00	06/01/2025 15:30:00	72	100	0	Subsequent 24 Hour Block
3	06/01/2025 15:30:00	07/01/2025 15:30:00	2	100	0	Subsequent 24 Hour Block
4	27/01/2025 00:45:00	27/01/2025 12:45:00	3	100	0	Initial 12 Hour Block
5	23/02/2025 18:00:00	24/02/2025 06:00:00	35	100	0	Initial 12 Hour Block
6	18/04/2025 18:00:00	19/04/2025 06:00:00	23	100	0	Initial 12 Hour Block
7	22/04/2025 23:30:00	23/04/2025 11:30:00	18	100	0	Initial 12 Hour Block
8	12/06/2025 12:45:00	13/06/2025 00:45:00	32	100	0	Initial 12 Hour Block
9	14/06/2025 01:00:00	14/06/2025 13:00:00	3	100	0	Initial 12 Hour Block
10	30/08/2025 17:15:00	31/08/2025 05:15:00	2	100	0	Initial 12 Hour Block
11	09/09/2025 19:45:00	10/09/2025 07:45:00	16	100	0	Initial 12 Hour Block
12	10/09/2025 07:45:00	11/09/2025 07:45:00	30	100	0	Subsequent 24 Hour Block
13	11/09/2025 07:45:00	12/09/2025 07:45:00	9	100	0	Subsequent 24 Hour Block
14	12/09/2025 07:45:00	13/09/2025 07:45:00	5	100	0	Subsequent 24 Hour Block
15	14/09/2025 14:30:00	15/09/2025 02:30:00	48	100	0	Initial 12 Hour Block
16	15/09/2025 02:30:00	16/09/2025 02:30:00	22	100	0	Subsequent 24 Hour Block
17	17/09/2025 14:45:00	18/09/2025 02:45:00	45	100	0	Initial 12 Hour Block
18	18/09/2025 02:45:00	19/09/2025 02:45:00	25	100	0	Subsequent 24 Hour Block
19	20/09/2025 13:15:00	21/09/2025 01:15:00	25	100	0	Initial 12 Hour Block
20	03/10/2025 12:00:00	04/10/2025 00:00:00	34	100	0	Initial 12 Hour Block
21	19/10/2025 11:30:00	19/10/2025 23:30:00	22	100	0	Initial 12 Hour Block
22	19/10/2025 23:30:00	20/10/2025 23:30:00	25	100	0	Subsequent 24 Hour Block
23	04/11/2025 04:15:00	04/11/2025 16:15:00	44	100	0	Initial 12 Hour Block
24	04/11/2025 16:15:00	05/11/2025 16:15:00	96	100	0	Subsequent 24 Hour Block
25	05/11/2025 16:15:00	06/11/2025 16:15:00	14	100	0	Subsequent 24 Hour Block
26	06/11/2025 16:15:00	07/11/2025 16:15:00	1	100	0	Subsequent 24 Hour Block
27	10/11/2025 22:30:00	11/11/2025 10:30:00	1	100	0	Initial 12 Hour Block
28	11/11/2025 10:30:00	12/11/2025 10:30:00	19	100	0	Subsequent 24 Hour Block
29	12/11/2025 10:30:00	13/11/2025 10:30:00	64	100	0	Subsequent 24 Hour Block
30	14/11/2025 13:00:00	15/11/2025 01:00:00	44	100	0	Initial 12 Hour Block

27th Trigger Breach Date: 10/11/2025	
Total Spills No	30
Significant Spills No	30
Single Spill Events No	2
Total Spill Duration (hours)	203.25
Significant Spill Duration (hours)	203.25

Figure 9: EDM Telemetry verified Data in Block count, as issued in Stage 1.

Early indications from the Stage 1 telemetry review have picked up on observed PFET flow restrictions due to cell availability and being in high level condition relatively early in the storm process. This is worse when there has been a spell of relatively dry weather and where first flush solids and tanker imports solids inundate PFET and restrict its ability to process true storm flows until such time has elapsed that PFET starts to recover, this longer term recovery is not working due largely to the ineffective washing as a direct result of the lost FE flow and volume allowed to circumnavigate alternative pathways within the PFET cells.

There are several occasions in the above table, where the spills under EDME were of a short single figure duration. If PFET were healthier in these time frames, the spills could well have been preventable and where other spill durations could well be reduced on their duration and impact.

Telemetry data sets for the asset was collected using multiple trend data idents, so much so the below (Fig: 10) small-scale snapshot is not easily read until this is blown up into a larger scale (This is equally true for then larger scale uploaded into Appendix D, E and F).

Without understanding the PFET operation it is difficult to translate the data trend lines. We have tried to break this down into the highlighted areas and provided comments to simplify understanding of these significant areas impacting on PFET's flow/treatment consistency and capacity.

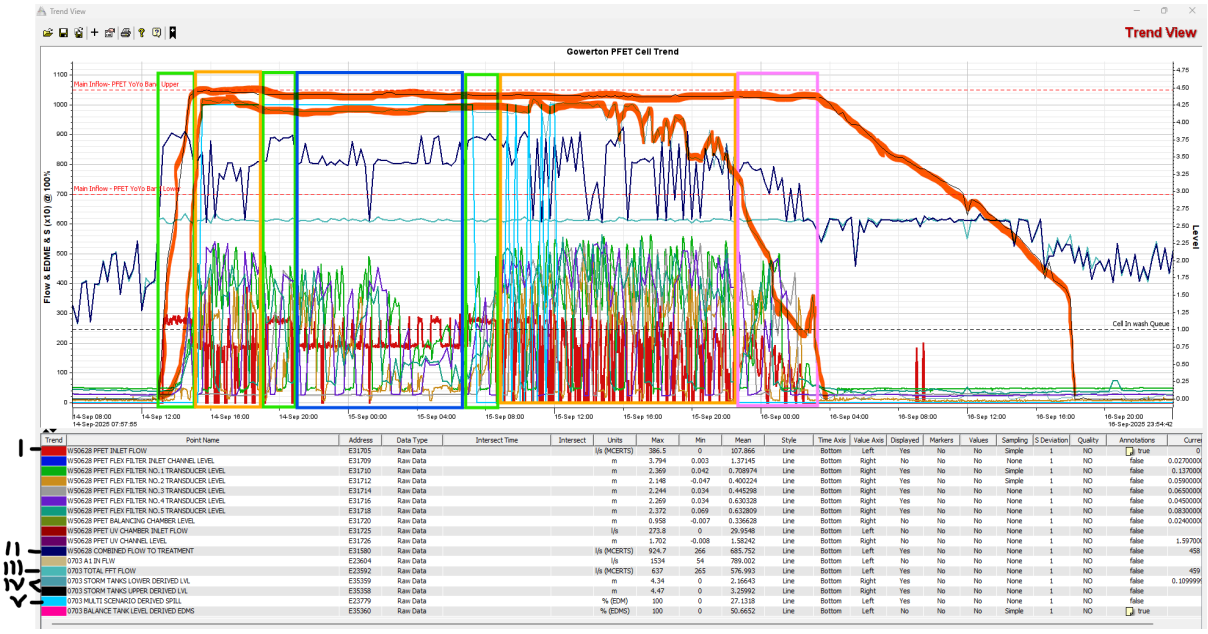


Figure 10: Extract of Telemetry Data analysed for 14th Sept. 2025.
(Larger Copy and further explanation in key held in Appendix D, E & F), Above Extract copied from DCWW Telemetry Prisum Trend data and annotated to identify example data issues.

Trend Line Key:

1, Red Line: PFET in flow.
2, Purple Line: Combined FPF to treatment by both main treatment works flow and PFET treatment flows.
3, Aqua Line: FPF to main treatment works.
4, Orange (Highlighted) Line: Storm tanks rising.
5, Blue Line: Indicates 100% EDME spill to the environment.

Box Key:

First Green Box: Indicates PFET starts up and is able to meet FPF for short duration of this period.
First Orange Box: Indicates the period where the cells are failing due to high solids loading preventing cells from draining correctly and all stacking up waiting for a back wash while sequentially filling to the Hi-Hi status in low flow mode, and where it will no longer take flows taking the cell offline, reducing the PFET's ability to maintain inflow and why the PFET's Red inflow line drops out to safeguard PFET from flooding. (A zoomed in section in Appendix E with box colour key added).
Navy Box: Show's PFET trying to recover, Red inflow line is indicating a reduced flow while cell availability is trying to sort itself out in low flow mode and showing prolonged flow rate is achievable in this condition as initial solid loading passes and cells try and clean themselves to stabilise flow intake. (A zoomed in section in Appendix F with box colour key added).
Second Green Boxes and Pink Box: These indicate where PFET has tried to recover sufficiently to deal with the storm flow, where Navy Box transitions to Second Green boxes area can see this recovery happening as the Red Inflow line increases for longer periods, and the cells are more able to take the changes in solids loading without failing.
Second Orange Box: Unfortunately, higher solids return through this period and PFET fully fails until the storm subsides and the Pink Box area just shows PFET tailing off as recovery begins again.

Note:

1, Clearer detail is in the Appendix D view. Same key detail applies.
2, This snapshot is a representative generic insight to the trends for Gowerton PFET spill data.
3, Some details have been omitted to provide clarity on what is trying to be presented in this report.

2.5. Catchment Review

In AMP5 the Loughor was under the spotlight from a shellfish farming impact perspective and the European court investigations. DCWW invested heavily in understanding its assets and catchment combined flows and I&I, with a view of reducing spills throughout its gravity and automated spilling assets which were being seen at the time as contributing to the biological impacts seen on the shellfish farming industry.

Gowerton WwTW was a primary spiller with its network inflow significantly laden with surface water runoff, allowed into the system over decades of growth, alongside several significant I&I locations draining down the catchment post storm weather passing.

Although the asset is failing and has repeatedly failed its SFW, PFET has been unable to meet its design treatment capacity or flow rate. This has been acknowledged and there is work being undertaken to try and resolve the underlying issues. Work is currently being implemented at Gowerton with any lesson learnt from that PFET plant potentially replicated at Llanelli WwTW PFET plant.

Looking into the Stage 1 reports and minor spill triggered areas, its believed the site could become compliant with improvements and optimisation of the PFET process in trying to get the process up to the designed flows modelled back in AMP6. It's felt that solids inrush management, replacement media, as well as the optimised backwashing may result in more consistent flows through PFET and reduce the flow periods where the lower flow capacity for PFET is forcing more flows to the storm storage system and resulting spills.

With bringing PFET back online as functionally designed, complete with reduced solids loading and optimised backwash functional controls implemented, this should naturally lower these short duration storm spill triggers by allowing more flow through PFET more consistently.

At this point, it's believed the treatment works and PFET process needs to be corrected before revisiting the catchment for flow or growth creep that may be increasing I&I flows.

This report has not ruled out the catchment creep but has identified a deeper dive into optimising the asset may well be sufficient once the Stage 2 investigation has been completed and any notable action carried out as per FIP Table 1 below.

In AMP8, a PFET assessment report has been compiled by ARUP on the Loughor Estuary SFW under an NRW "CAR_NRW0043836" request for Gowerton. This is due to be finalised, signed off and issued to the relevant offices in NRW shortly.

2.6. Root Cause Statement

Preliminary findings suggest the spill exceedance may be attributed to a combination of hard factors, such as civil, hydraulic and solids loading limitations within the PFET process, linked to first flush and higher unforeseen solids loadings than the design allowed for. The hydraulic performance of the PFET asset against permit numeric detail, directly results in the site running outside of design horizon, with lower PFET treatment flows resulting in higher storm flow to the storm storage tanks and higher numbers of resulting storm spills observed in Fig 9.

Despite initial desktop studies, the root cause remains speculative.

Additional capital works is underway to remove the high level of first flush solids and the import domestic solids loading, removing this from the RCA, also puts Gowerton PFET outside of its original design threshold.

An area that has already been identified through careful monitoring of both PFET plants and their cell performance has been for an opportunity to optimise areas of the control logic to reduce embedded functional delays observed in the process sequence control. This will allow for improved back washing efficiency which in turn should provide better cell availability and decrease frequency of reduced flow function which is leading to increased spills as PFET protects itself hydraulically.

PFET cell leakage through closure plates and bladders are reducing effectiveness of the PFET cell back washing phase across all 5 cells. This may be a significant root cause into the cell hydraulics and causing cells to come back online without being fully cleaned, further aggravating the above-mentioned flow processing ability and causing the cells to quickly need another clean earlier than anticipated, shortening the already reduced flow capacity. Maintenance funding is already planned for this but due to the supplier no longer supporting the PFET product, sourcing spares like media and bladders will be an issue for this phase.

2.7. Stage 2: Next Steps

Two Part Outcome.

Part 1: Full Investigation Proposal:

Table 1 FIP: Outlines a summary of key FIP actions needed to be completed to develop a robust and long-term spill reduction investigation and optioneering/maintenance for this site. From these outcomes there will be rectification works to the issues found to close out and reduce future risk of SFW spill failures for this asset.

Part 2: Provide Optimization of Current PFET control logic.

Table 2 SRP: Outlines a summary of key SRP actions needed to provide solids removal and optimise original control logic in reducing backwash delay times and cell change overs and to maximise continuous flow through PFET and minimise early inhibits from being reached within the PFET process, which reduces overall FPF and increases risk of early/prolonged spill counts, especially around the low spill duration/event triggers.

2.8. Stage 2 Full Investigation Plan

Table 1: Full Investigation Plan

Action Ref.	Action Required	Action Due Date	Comments	Complete (Y/N)	Completion Date
1	PFET cell major maintenance programme.	Spring/Summer 2026	Planned capital intervention: Develop plan off the back of the supply chain and maintenance project. Delayed due to lack of manufacturer support.	N	
2	Capital delivery.	TBC	AMP8 deliverable commitment programme to be developed.	N	
3	Fully commission optimisation modifications.	TBC – dependent upon Action 1	DCWW: Post projects, optimisation commissioning of the software already installed settings for cell process controls (In wet weather).	N	
4	Monitor performance in 2026/27/28.	TBC - dependent upon Action 1	Awaiting solids removal and maintenance/repair works to be completed. Assess for further options for any new capital scheme requirements post-delivery of these two key phases and optimisation of control.	N	

3. Stage 3: Trigger Exceedance Reason Report (TERR)

Carry out the work described in the above FIP and below SRP sections, outcomes of which will produce information to be used in any future TERR and NRW interface around timeline conformation and additional next steps as part of this ongoing TEN process. Supporting evidence and information will also be supplied as part of this ongoing process.

The Gowerton PFET solids removal scheme is well underway and due to be online for commissioning in March 2026; Unfortunately, the project been delayed several times due to supply chain and installation snags preventing programme milestones being achieved and resulting programme creep.

The Maintenance project programme cannot be currently identified to give a detailed timelines due to no longer having the manufacturer's support for the replacement media. This is delaying the project until an alternative supplier can be found and then understanding manufacturing delays and costs associated with an alternative media product/supplier. Cell bladders are currently still available but on a long lead time and involve a dependence on the media issue being resolved. Programme and dates to be confirmed.

4. Stage 4: Spill Reduction Plan

4.1. Spill Reduction Proposal

Optimisation of the backwash control sequence and low flow operation modifications including look up table for cell availability of the PFET control when at high cell levels, to maintain flow as long as possible rather than shut down all flows. Reducing out of service hydraulic delays and increase flow throughput of the PFET process.

Secondary issues identified while implementing and testing new control software for optimisation. FE wash water losses are high from each cell and in urgent need of re-sealing, overhaul and repairing on each PFET cell, prevented software going live. Work on these areas under maintenance need to be completed before any benefits from this optimisation program can be realised.

Table 2: Spill Reduction Plan

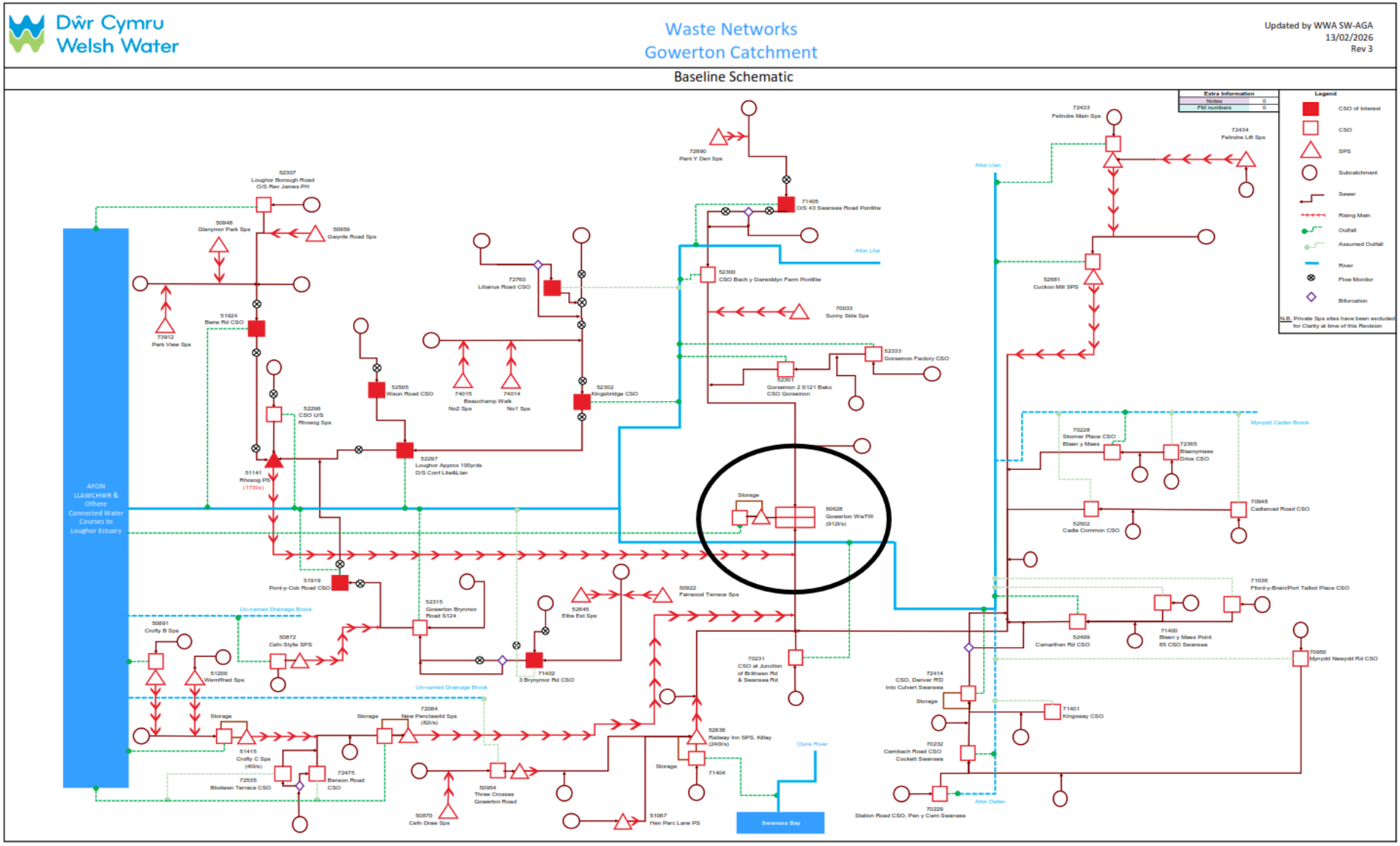
Action Ref.	Action Required	Action Due Date	Comments	Complete (Y/N)	Completion Date
1	Solids removal project.	March 2026	Planned capital intervention: Progression with recommended solid removal option(s) due to be commissioned March 2026.	N	Delayed due to supply chain issues.
2	Modification of the backwash and blower control sequence. Aimed to reduce cell offline delays.	Action due after completion of Action 1	Installation completed and partially tested. Awaiting PFET maintenance and repair work to finalise testing.	N	
3	Improved backwash water using FE directly from blending chamber. Aimed for consistent backwash water for cell cleaning.	Action due after completion of Action 1	Installation completed and partially tested. Awaiting PFET maintenance and repair work to finalise testing.	N	
4	Modification to low flow control function and implement proportional flow control off cell availability table. Aimed to improve flow path for longer periods before high level hydraulically shuts down cells.	October 2025	Control modification complete, function tested and in operation.	Y	October 2025

5. Appendices

5.1. Appendix A: Acronyms/Abbreviations

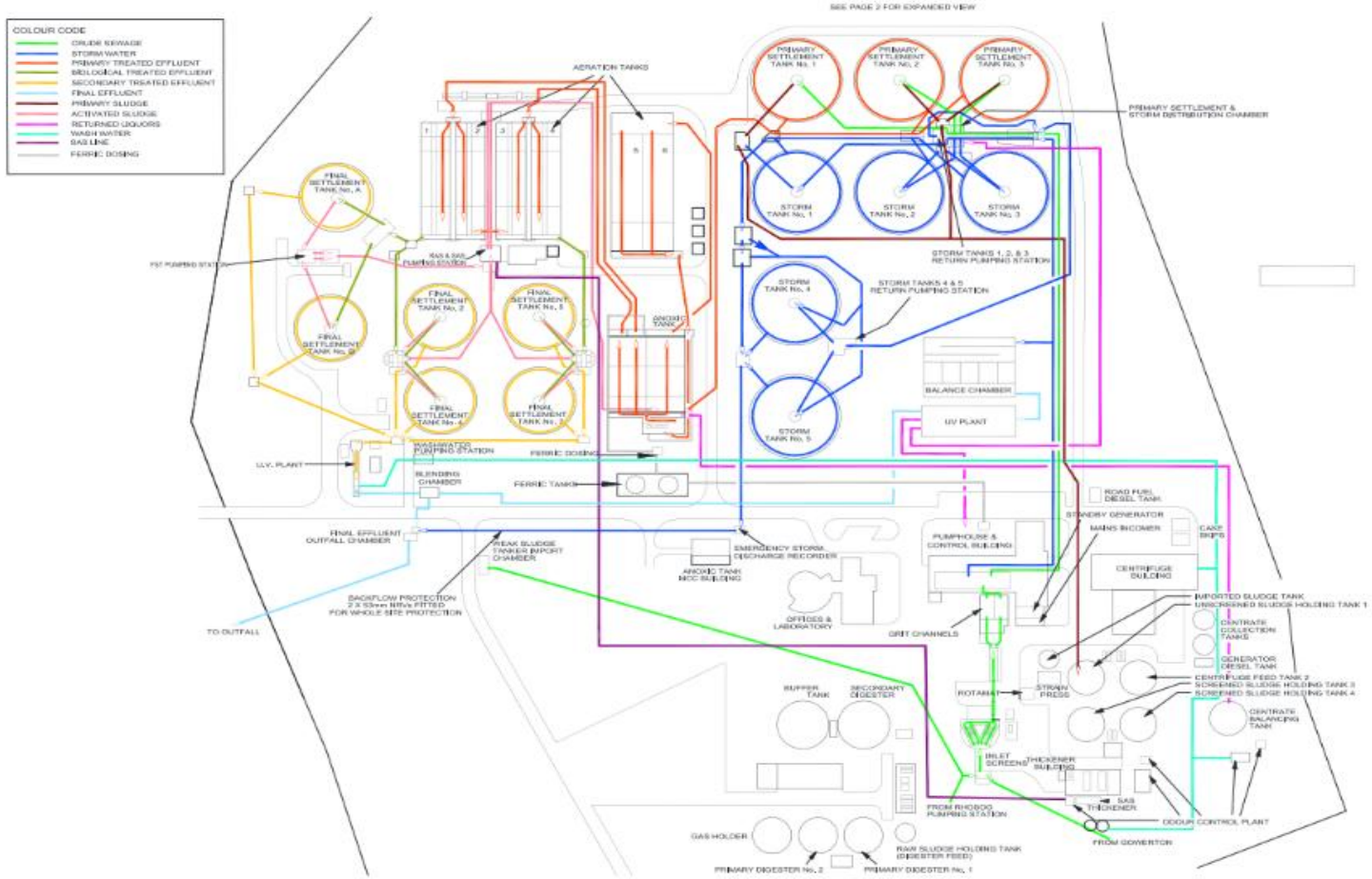
Acronym/Abbreviation	Meaning
AMP	Asset Management Plan
AGA	Above Ground Assets Operational Team
BGA	Below Ground Assets Operational Team (“The Networks Team”)
CSO	Combined Sewer Overflow
DMS	Discharge Mechanism Summary
DWF	Dry Weather Flow
DCWW	Dwr Cymru Welsh Water
EDM(S/E)	Event and Duration Monitoring (S = Storm Tanks, E = Environment)
FFT	Flow to Full Treatment
FIP	Full Investigation Plan
FPF	Flow Pass Forward
HO	Hydraulic Overload
I&I	Infiltration and Inflow
MVS	Minimum Viable Solution
NGR	National Grid Reference
OVA	Option Value Analysis
PFET	Peak Flow Equivalent Treatment
PFF	Pass Forward Flow
SAS	Surplus Activated Sludge
SO	Sewer Overflow
SOAF	Sewer Overflow Assessment Framework
SPS	Sewage Pumping Station
SRP	Spill Reduction Plan
STMF	Storm Tank Flow
STMRF	Storm Tank Return Flow
TEN	Trigger Event Notification
TERR	Trigger Exceedance Reason Report
TSPS	Terminal Sewage Pumping Station
WWA	Wastewater Assets Team
WWTW	Wastewater Treatment Works

5.2. Appendix B: Gowerton WwTW - Catchment Schematic View.

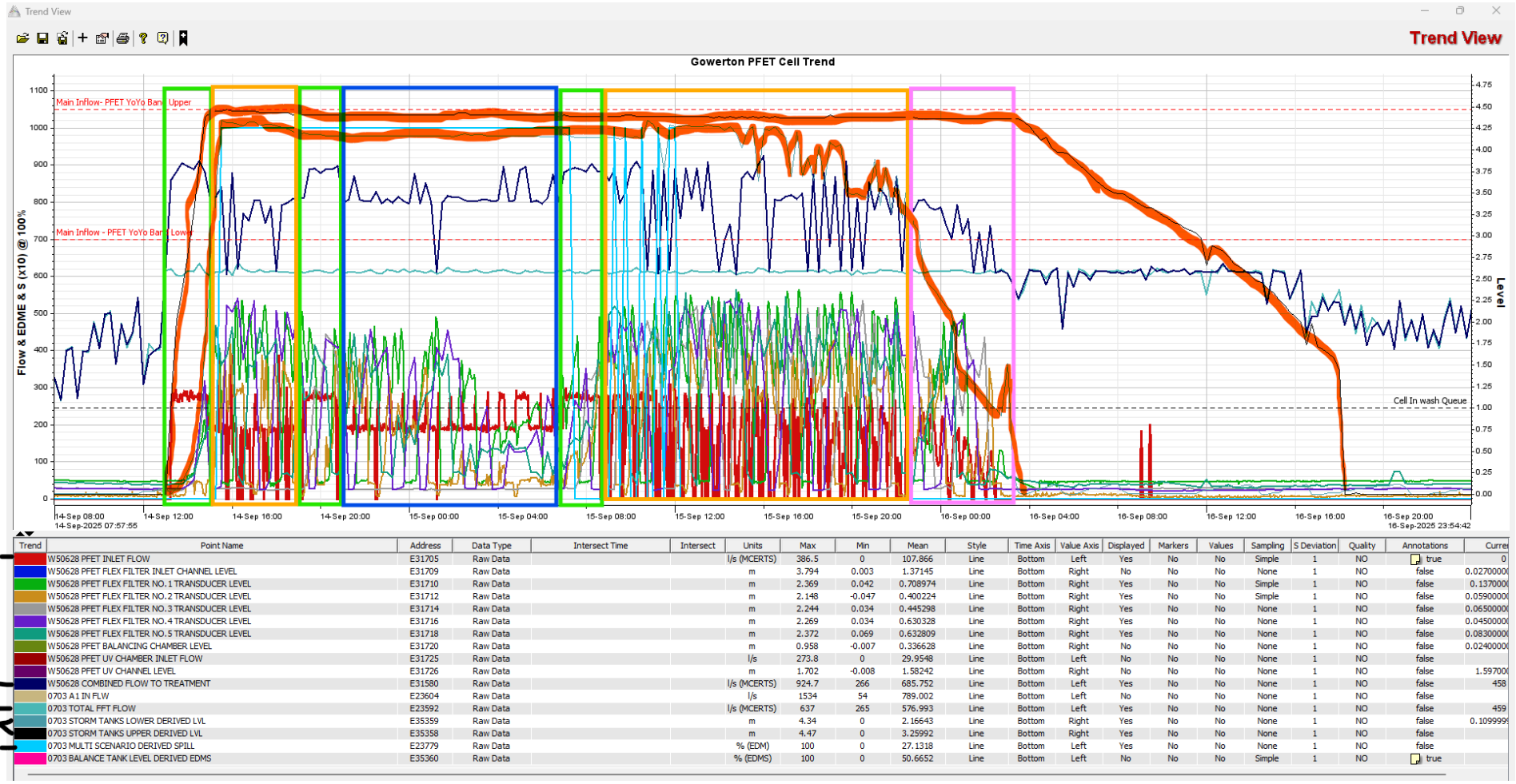


5.3. Appendix C: Gowerton WwTW - Site Layout from WOM Document.

3.2 Major Flows



5.4. Appendix D: Gowerton WwTW - Telemetry Data Trend Capture and Key Info.



Trend	Point Name	Address	Data Type	Intersect Time	Intersect	Units	Max	Min	Mean	Style	Time Axis	Value Axis	Displayed	Markers	Values	Sampling	S Deviation	Quality	Annotations	Curre
	W50628 PFET INLET FLOW	E31705	Raw Data			l/s (MCERTS)	386.5	0	107.866	Line	Bottom	Left	Yes	No	No	Simple	1	NO	true	0
	W50628 PFET FLEX FILTER INLET CHANNEL LEVEL	E31709	Raw Data			m	3.794	0.003	1.37145	Line	Bottom	Right	No	No	No	None	1	NO	false	0.0270000
	W50628 PFET FLEX FILTER NO. 1 TRANSDUCER LEVEL	E31710	Raw Data			m	2.369	0.042	0.708974	Line	Bottom	Right	Yes	No	No	Simple	1	NO	false	0.1370000
	W50628 PFET FLEX FILTER NO. 2 TRANSDUCER LEVEL	E31712	Raw Data			m	2.148	-0.047	0.400224	Line	Bottom	Right	Yes	No	No	Simple	1	NO	false	0.0590000
	W50628 PFET FLEX FILTER NO. 3 TRANSDUCER LEVEL	E31714	Raw Data			m	2.244	0.034	0.445298	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0650000
	W50628 PFET FLEX FILTER NO. 4 TRANSDUCER LEVEL	E31716	Raw Data			m	2.269	0.034	0.630328	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0450000
	W50628 PFET FLEX FILTER NO. 5 TRANSDUCER LEVEL	E31718	Raw Data			m	2.372	0.069	0.632809	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0830000
	W50628 PFET BALANCING CHAMBER LEVEL	E31720	Raw Data			m	0.958	-0.007	0.336628	Line	Bottom	Right	No	No	No	None	1	NO	false	0.0240000
	W50628 PFET UV CHAMBER INLET FLOW	E31725	Raw Data			l/s	273.8	0	29.9548	Line	Bottom	Left	No	No	No	None	1	NO	false	
	W50628 PFET UV CHANNEL LEVEL	E31726	Raw Data			m	1.702	-0.008	1.58242	Line	Bottom	Right	No	No	No	None	1	NO	false	1.597000
	W50628 COMBINED FLOW TO TREATMENT	E31580	Raw Data			l/s (MCERTS)	924.7	266	685.752	Line	Bottom	Left	Yes	No	No	None	1	NO	false	458
	0703 A1 IN FLW	E23604	Raw Data			l/s	1534	54	789.002	Line	Bottom	Left	No	No	No	None	1	NO	false	
	0703 TOTAL FFT FLOW	E23592	Raw Data			l/s (MCERTS)	637	265	576.993	Line	Bottom	Left	Yes	No	No	None	1	NO	false	459
	0703 STORM TANKS LOWER DERIVED LVL	E35359	Raw Data			m	4.34	0	2.16643	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.1099995
	0703 STORM TANKS UPPER DERIVED LVL	E35358	Raw Data			m	4.47	0	3.25992	Line	Bottom	Right	Yes	No	No	None	1	NO	false	
	0703 MULTI SCENARIO DERIVED SPILL	E23779	Raw Data			% (EDM)	100	0	27.1318	Line	Bottom	Left	Yes	No	No	None	1	NO	false	
	0703 BALANCE TANK LEVEL DERIVED EDMS	E35360	Raw Data			% (EDMS)	100	0	50.6652	Line	Bottom	Left	No	No	No	Simple	1	NO	true	

Trend Line Key:

1, Red Line: PFET in flow.

2, Purple Line: Combined FPF to treatment by both main treatment works flow and PFET treatment flows.

3, Aqua Line: FPF to main treatment works.

4, Orange (Highlighted) Line: Storm tanks rising.

5, Blue Line: Indicates 100% EDME spill to the environment.

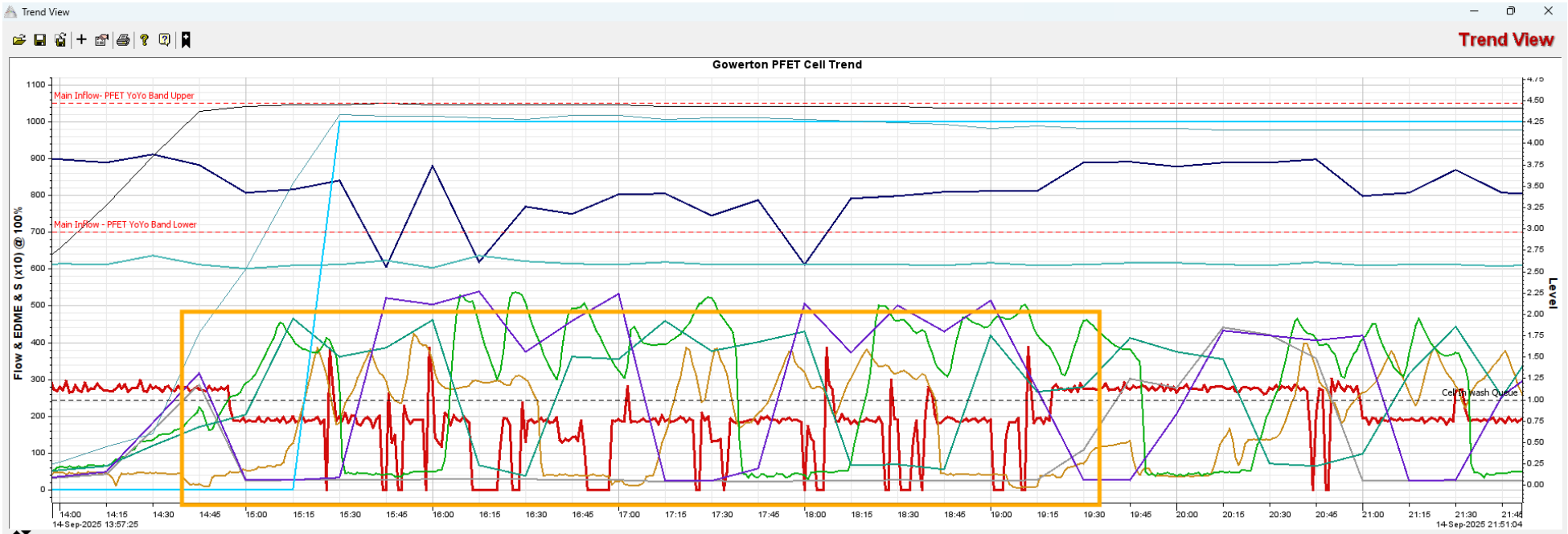
Box Key:

First Green Box: Indicates PFET starts up and is able to meet FPF for short duration of this period.
First Orange Box: Indicates the period where the cells are failing due to high solids loading preventing cells from draining correctly and all stacking up waiting for a back wash while sequentially filling to the Hi-Hi status in low flow mode, and where it will no longer take flows taking the cell offline, reducing the PFET ability to maintain inflow and why the PFET's Red inflow line drops out to safeguard PFET from flooding. (A zoomed in section in Appendix "E" with box colour key added).
Navy Box: Show PFET trying to recover, Red inflow line is indicating a reduced flow while cell availability is trying to sort itself out in low flow mode and showing prolonged flow rate is achievable in this condition as initial solid loading passes and cells try and clean themselves to stabilise flow intake. (A zoomed in section in Appendix "F" with box colour key added).
Second Green Boxes and Pink Box: These indicate where PFET has tried to recover sufficiently to deal with the Storm flow, where Navy Box transitions to Second Green boxes area can see this recovery happening as the Red Inflow line increases for longer periods, and the cells are more able to take the changes in solids loading without failing.
Second Orange Box: Unfortunately, higher solids return through this period and PFET fully fails until the storm subsides and the Pink Box area just shows PFET tailing off as recovery begins again.

Note:

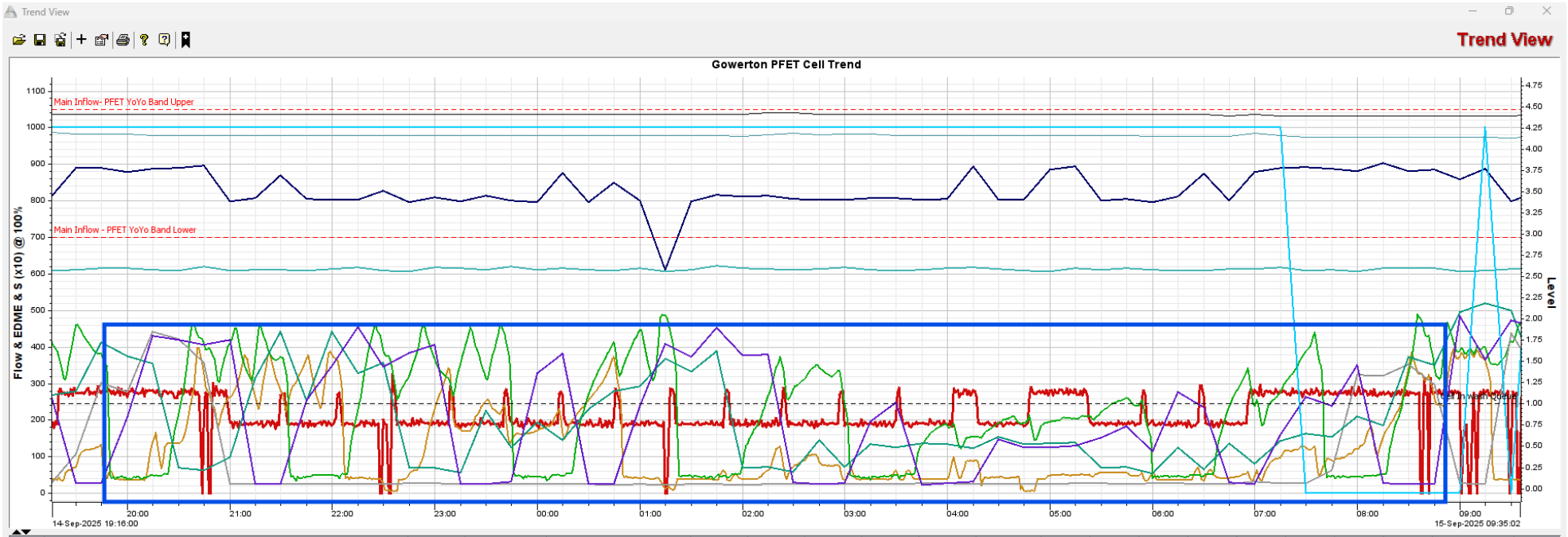
1, This snapshot is a representative generic insight to the trends for Gowerton PFET spill data.
2, Some details have been omitted to provide clarity on what is trying to be presented in this report.

5.5. Appendix E: Telemetry Data Trend, Event in more detail 1.



Trend	Point Name	Address	Data Type	Intersect Time	Intersect	Units	Max	Min	Mean	Style	Time Axis	Value Axis	Displayed	Markers	Values	Sampling	S Deviation	Quality	Annotations	Curre
	W50628 PFET INLET FLOW	E31705	Raw Data			l/s (MCERTS)	387.3	0	198.671	Line	Bottom	Left	Yes	No	No	None	1	NO	true	0
	W50628 PFET FLEX FILTER INLET CHANNEL LEVEL	E31709	Raw Data			m	3.953	-0.008	2.26097	Line	Bottom	Right	No	No	No	None	1	YES	false	0.0270000
	W50628 PFET FLEX FILTER NO.1 TRANSDUCER LEVEL	E31710	Raw Data			m	2.258	0.07	1.11574	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.149000
	W50628 PFET FLEX FILTER NO.2 TRANSDUCER LEVEL	E31712	Raw Data			m	1.774	-0.031	0.712158	Line	Bottom	Right	Yes	No	No	None	1	NO	false	-0.0140000
	W50628 PFET FLEX FILTER NO.3 TRANSDUCER LEVEL	E31714	Raw Data			m	1.85	0.042	0.332846	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0770000
	W50628 PFET FLEX FILTER NO.4 TRANSDUCER LEVEL	E31716	Raw Data			m	2.269	0.049	1.07005	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0480000
	W50628 PFET FLEX FILTER NO.5 TRANSDUCER LEVEL	E31718	Raw Data			m	1.949	0.111	1.04775	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0830000
	W50628 PFET BALANCING CHAMBER LEVEL	E31720	Raw Data			m	1.019	0.016	0.624592	Line	Bottom	Right	No	No	No	None	1	YES	false	0.0350000
	W50628 PFET UV CHAMBER INLET FLOW	E31725	Raw Data			l/s	308.5	0	76.0752	Line	Bottom	Left	No	No	No	None	1	YES	false	
	W50628 PFET UV CHANNEL LEVEL	E31726	Raw Data			m	1.716	0.008	1.60349	Line	Bottom	Right	No	No	No	None	1	YES	false	1.597000
	W50628 COMBINED FLOW TO TREATMENT	E31580	Raw Data			l/s (MCERTS)	910.7	605	815.888	Line	Bottom	Left	Yes	No	No	None	1	NO	false	345
	0703 A1 IN FLW	E23604	Raw Data			l/s	1534	54	678.327	Line	Bottom	Left	No	No	No	None	1	NO	false	
	0703 TOTAL PFT FLOW	E23592	Raw Data			l/s (MCERTS)	637	601	613.3	Line	Bottom	Left	Yes	No	No	None	1	NO	true	408
	0703 STORM TANKS LOWER DERIVED LVL	E35359	Raw Data			m	4.34	0.249333	3.63939	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0399999
	0703 STORM TANKS UPPER DERIVED LVL	E35358	Raw Data			m	4.47	2.70111	4.27503	Line	Bottom	Right	Yes	No	No	None	1	NO	false	
	0703 MULTI SCENARIO DERIVED SPILL	E23779	Raw Data			% (EDM)	100	0	79.4118	Line	Bottom	Left	Yes	No	No	None	1	NO	false	
	0703 BALANCE TANK LEVEL DERIVED EDMS	E35360	Raw Data			% (EDMS)	100	0	31.3747	Line	Bottom	Left	No	No	No	Simple	1	n/a	true	

5.6. Appendix F: Telemetry Data Trend, Event in more detail 2.



Trend	Point Name	Address	Data Type	Intersect Time	Intersect	Units	Max	Min	Mean	Style	Time Axis	Value Axis	Displayed	Markers	Values	Sampling	S Deviation	Quality	Annotations	Curre
	W50628 PFET INLET FLOW	E31705	Raw Data			l/s (MCERTS)	326	0	218.012	Line	Bottom	Left	Yes	No	No	None	1	NO	true	0
	W50628 PFET FLEX FILTER INLET CHANNEL LEVEL	E31709	Raw Data			m	3.953	-0.008	2.26097	Line	Bottom	Right	No	No	No	None	1	YES	false	0.0230000
	W50628 PFET FLEX FILTER NO.1 TRANSDUCER LEVEL	E31710	Raw Data			m	2.053	0.093	0.933372	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.1480000
	W50628 PFET FLEX FILTER NO.2 TRANSDUCER LEVEL	E31712	Raw Data			m	1.655	-0.031	0.485634	Line	Bottom	Right	Yes	No	No	None	1	NO	false	-0.0290000
	W50628 PFET FLEX FILTER NO.3 TRANSDUCER LEVEL	E31714	Raw Data			m	1.85	0.046	0.331725	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0750000
	W50628 PFET FLEX FILTER NO.4 TRANSDUCER LEVEL	E31716	Raw Data			m	2.034	0.048	0.860825	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0470000
	W50628 PFET FLEX FILTER NO.5 TRANSDUCER LEVEL	E31718	Raw Data			m	2.184	0.178	0.866482	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0880000
	W50628 PFET BALANCING CHAMBER LEVEL	E31720	Raw Data			m	1.019	0.016	0.624592	Line	Bottom	Right	No	No	No	None	1	YES	false	0.0340000
	W50628 PFET UV CHAMBER INLET FLOW	E31725	Raw Data			l/s	308.5	0	76.0752	Line	Bottom	Left	No	No	No	None	1	YES	false	
	W50628 PFET UV CHANNEL LEVEL	E31726	Raw Data			m	1.716	0.008	1.60349	Line	Bottom	Right	No	No	No	None	1	YES	false	1.597000
	W50628 COMBINED FLOW TO TREATMENT	E31580	Raw Data			l/s (MCERTS)	903.9	610	831.992	Line	Bottom	Left	Yes	No	No	None	1	NO	false	392
	0703 A1 IN FLW	E23604	Raw Data			l/s	1534	54	678.327	Line	Bottom	Left	No	No	No	None	1	NO	false	
	0703 TOTAL FFT FLOW	E23592	Raw Data			l/s (MCERTS)	623	607	612.399	Line	Bottom	Left	Yes	No	No	None	1	NO	true	408
	0703 STORM TANKS LOWER DERIVED LVL	E35359	Raw Data			m	4.19867	4.13	4.15924	Line	Bottom	Right	Yes	No	No	None	1	NO	false	0.0399999
	0703 STORM TANKS UPPER DERIVED LVL	E35358	Raw Data			m	4.43	4.39	4.40672	Line	Bottom	Right	Yes	No	No	None	1	NO	false	
	0703 MULTI SCENARIO DERIVED SPILL	E23779	Raw Data			% (EDM)	100	0	85.3145	Line	Bottom	Left	Yes	No	No	None	1	NO	false	
	0703 BALANCE TANK LEVEL DERIVED EDMS	E35360	Raw Data			% (EDMS)	100	0	31.3747	Line	Bottom	Left	No	No	No	Simple	1	n/a	true	