Afon Cynffig / Kenfig River Pollution Incident Independent monitoring findings 26 and 27 May 2026

Prepared by A Peace for Nature

Purpose of this report

This briefing summarises further independent environmental monitoring and site observations undertaken by A Peace for Nature on 26 and 27 May 2026 on the Afon Cynffig / Kenfig River downstream of the Marlas STW SPS outfall, North Cornelly.

The monitoring was undertaken in response to the ongoing pollution incident affecting the river and followed earlier APFN monitoring published on 24 May 2026. That earlier monitoring identified severe deterioration in water quality downstream of the outfall, including exceptionally elevated ammonia and phosphate, severe dissolved oxygen depletion and evidence of wastewater related impact several kilometres downstream.

The visits on 26 and 27 May 2026 were also used to show elected representatives and local stakeholders the affected river reach, explain APFN's independent monitoring approach and observe the current mitigation measures deployed in the river.

Samples were also taken during the day by APFN and an external consultant for laboratory analysis. Those laboratory results were not available at the time this report was prepared (expected ~8 days).

Background

Dŵr Cymru Welsh Water has confirmed that temporary treatment works and aeration equipment have been deployed at Marlas Pumping Station as part of mitigation work associated with issues on its wastewater network in the area.

A Peace for Nature remains extremely concerned that the current mitigation appears to be focused heavily on emergency in river aeration after polluted water has already entered the river.

The field evidence gathered by APFN indicates that the affected reach remains under severe wastewater related stress and that critically low dissolved oxygen conditions continue downstream despite the visible presence of aeration equipment.

On 26 May 2026, APFN toured the established sampling locations with Huw Irranca-Davies MS to provide an understanding of the situation. Huw Irranca-Davies MS advised that he would write to Dŵr Cymru Welsh Water and Natural Resources Wales.

On 27 May 2026, APFN met elected representatives, local authority leadership, Kenfig Angling Association members and local residents at the river.

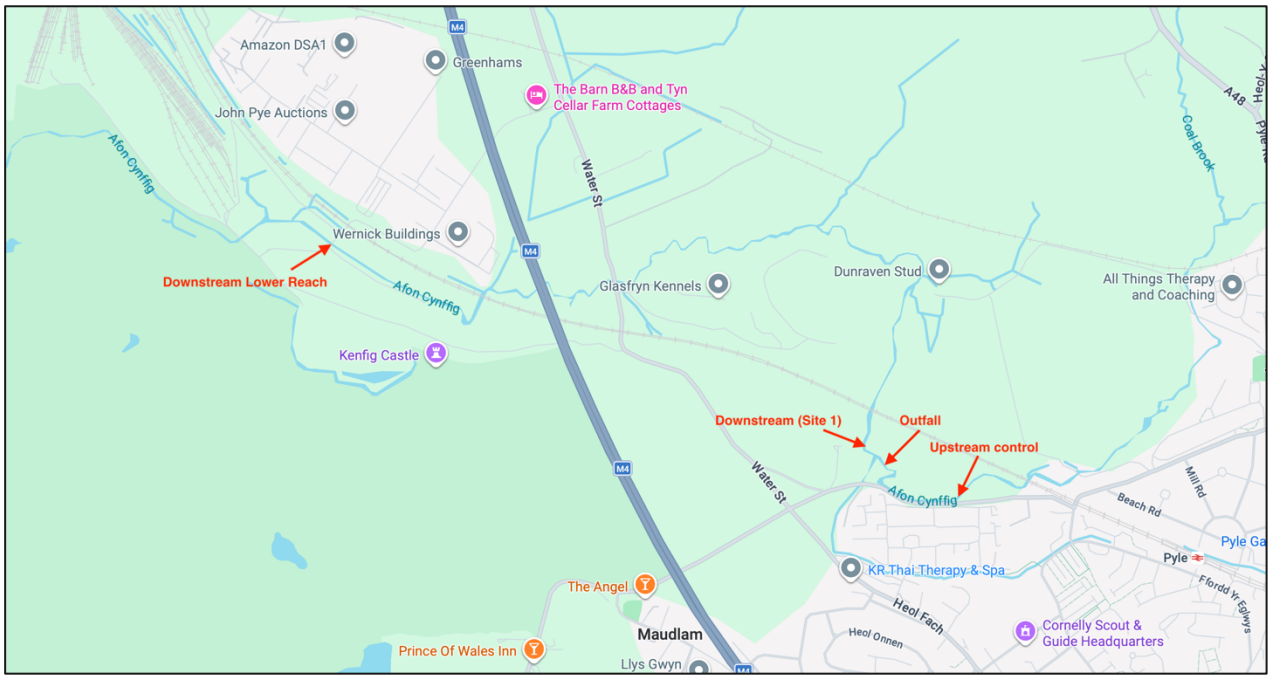
Those attending included:

Stephen Kinnock MP
Alun Cox MS
Sera Evans MS
Elyn Stephens MS
Benjamin Hodge McKenna MS
Cllr John Spanswick
Cllr Gary Haines

During the visits, Huw Irranca-Davies MS described the river as “dead”. Stephen Kinnock MP described the situation as “an environmental disaster”.

Sampling locations

The same monitoring locations identified and used during previous site visits were used.



For this visit, the principal monitored locations were:

Upstream control	Upstream of the affected discharge reach ~300-400m
Outfall	Marlas STW SPS outfall discharge
Downstream (Site 1)	~100 m downstream from the outfall
Downstream lower reach	Lower affected reach ~3.2km downstream of the discharge

APFN also undertook additional dissolved oxygen monitoring during the site visit to understand the effect of the ongoing pollution and the apparent performance of current aeration mitigation.

Methodology

Surface water samples were collected from the relevant monitoring locations using clean sampling containers. Testing was undertaken on site.

The monitoring was undertaken as independent field screening by APFN. The results should be treated as indicative field evidence of water quality conditions at the time and location of sampling. They are not a substitute for statutory regulatory monitoring or laboratory analysis.

Conductivity readings were recorded using automatic temperature compensation to a reference temperature of 25.0°C. Photometer reagent tests were undertaken using the relevant reagent method and reaction timing requirements. Results were recorded contemporaneously and supported by photographs of instrument readings where available.

Measurements were taken using portable field-testing equipment on site. Photographic and video evidence was also obtained during the visit.

Field Testing Equipment Used

- Hanna Instruments HI83399 Multiparameter Photometer with COD capability
- Hanna Instruments HI98193 Dissolved Oxygen Meter
- Hanna Instruments HI98192 EC/TDS/NaCl/Resistivity Meter
- Hanna Instruments HI98713 ISO Turbidimeter
- Hanna Instruments pHep+ Portable pH Meter
- Sterile and clean sample collection containers
- Hanna Instruments consumable reagents for all tests undertaken
- GPS-enabled mobile device for recording sampling coordinates and photographic evidence

Site Conditions/Observations

The river was in gentle flow during the inspection and water depth at the assessed locations was generally shallow. There were no obvious visual signs of recent heavy rainfall at the site.

The upstream control point appeared relatively clear, with visibly lower turbidity and no obvious signs of gross pollution or plume contamination. In contrast, a visible, grey-coloured plume was observed entering the watercourse from the discharge structure associated with the permitted point of discharge. The affected area downstream was visibly discoloured when compared with upstream conditions.

The discharge appeared active during the inspection.

Grey pollution deposits were visible on the riverbed, together with sewage sludge and sewage-related algae. A strong sewage odour was present at the outfall area.

At the lower sampling site, approximately 100 metres downstream from the outfall, sewage fungus appeared to be re-establishing on the riverbed. Grey and black deposits were visible at that location.

The sewage odour was worse than on any previous APFN visit to this area. An independent consultant with extensive industry experience attended the site and stated: “The smell was terrible before reaching the site. It’s the worst I’ve seen.”

Water quality throughout the downstream stretch was visibly poor and smelled of sewage. No visible aquatic life was observed in the river from the discharge point downstream.

Birds were observed bathing in and around the upstream control area.

Field results

Parameter	Upstream control (19:05 hrs)	Outfall (18:18 hrs)	Site 1 (17:44 hrs)	Downstream lower reach (10:37 hrs)
Temperature	19.4°C	19.9°C	18.8°C	
Conductivity	476.1 µS/cm	801.8 µS/cm	519.1 µS/cm	
Reference Temperature (Tref)	25.0°C	25.0°C	25.0°C	
Dissolved Oxygen	81.4% saturation	13.6% saturation	70.6% saturation	3.9% saturation
Ammonia Nitrogen (NH_3-N) (HR)	0.27 mg/L	58.7 mg/L	7.6 mg/L	
Phosphate (PO_4^{3-}) (HR)	0.4 mg/L	20.5 mg/L	3.1 mg/L	
Nitrate (NO_3^--N)	0.7 mg/L	12.8 mg/L	2.2 mg/L	
Turbidity	4.87 FNU	217 FNU	27.8 FNU	
pH	9.84	9.20	9.33	

Table 1: Results from field-based surface water tests taken on 27 May 2026 on the Afon Cynffig / River Kenfig by APFN

Key findings

The monitoring data shows a continuing and severe deterioration in water quality at and downstream of the Marlas STW SPS outfall.

The most serious findings were:

1. Ammonia reached 58.7 mg/L at the outfall. This is higher than the 50.6 mg/L recorded by APFN at the outfall on 22 May 2026.
2. Phosphate reached 20.5 mg/L at the outfall. This is higher than the 18.5 mg/L recorded by APFN at the outfall on 22 May 2026.
3. Turbidity reached 217 FNU at the outfall. This represents a very substantial increase compared with the upstream control reading of 4.87 FNU.
4. Dissolved oxygen at the outfall was recorded at 13.6%.
5. Dissolved oxygen at the downstream lower reach was recorded at 3.9% saturation. This is the lowest dissolved oxygen reading recorded by APFN on the river to date.
6. The upstream control remained substantially different from the outfall, with ammonia of 0.27 mg/L, phosphate of 0.4 mg/L and turbidity of 4.87 FNU.
7. The data indicates that the pollution impact was not confined to the immediate outfall area and that severe oxygen depletion persisted downstream despite the deployment of aeration equipment.

Dissolved oxygen and aeration concern

Five visible aeration devices were observed operating within the affected reach during the monitoring visit.

Additional dissolved oxygen readings recorded during the visit included:

Location	Dissolved Oxygen Saturation
Upper control	83%
Outfall	13.8%
~100 m downstream from the outfall	22.9%
Downstream lower reach	3.9%

Table 2: Results from field-based dissolved oxygen saturation tests taken on 27 May 2026 on the Afon Cynffig / River Kenfig by APFN

These readings indicate that the current aeration deployment is not maintaining ecologically protective dissolved oxygen conditions across the wider affected reach.

The downstream lower reach reading of 3.9% saturation is extremely concerning. APFN considers this to represent a critical oxygen depletion condition. Such a reading indicates that the water column was, at that location and time, almost devoid of oxygen available to support aquatic life.
Our earlier published briefing raised concern that aeration may produce localised oxygenation around active devices while severe oxygen depletion persists downstream. The results from 27 May 2026 reinforce that concern.

On the evidence available to APFN, the current aeration deployment should not be presented as proof that river health is improving. It should be treated as emergency mitigation only. The critical question remains whether the mitigation is maintaining protective dissolved oxygen levels throughout the affected reach. The APFN monitoring data indicates that it is not currently doing so.

Pump and hose arrangement observed at sampling location

APFN observed a pump and hose arrangement operating on the opposite bank near APFN's original sampling location. The pump was connected to an approximately 2-inch hose and was discharging water across and into the river directly adjacent to the outfall.

The visible equipment label appeared to identify the pump as a GIP unit, Type B2204, 1.1 kW, 230 V, 2800 rpm, 50 Hz, with a stated maximum flow of 360 l/min and maximum head of 16 m.

The purpose and operational basis for this pump arrangement were not confirmed to APFN. Its immediate effect was to disturb the water column, create turbulence and make it difficult to obtain a true representative sample of the outfall discharge at APFN's established sampling point.

APFN is concerned that the positioning and operation of this equipment may have been to materially interfere with independent sampling. APFN considers that Dŵr Cymru Welsh Water and Natural Resources Wales should explain why this pump was deployed at that location, what it was intended to achieve and whether any assessment was undertaken of its effect on independent monitoring.

Concern regarding public reassurance

APFN remains concerned that public statements about aeration equipment risk giving the impression that the river is being restored or that ecological conditions are improving across the affected reach.

The independent monitoring data does not support that conclusion.

The evidence indicates that severe oxygen depletion continued downstream, including a dissolved oxygen reading of 3.9% saturation at the downstream lower reach. The water was visibly polluted, the smell of sewage was severe, and no visible aquatic life was observed downstream from the discharge point.

The effect of the aeration and hose operations was also to produce visible turbulence, spray and a fine mist of polluted water. Due to the conditions present, a face mask respirator was worn during sample collection.
Public reassurance should therefore be based on transparent monitoring data, not the mere presence of aeration equipment.

APFN therefore considers that the current aeration deployment is not addressing the cause of the pollution and is not maintaining protective conditions across the affected reach. On the evidence available, the devices appear to be providing, at best, very localised disturbance or oxygenation, while the river remains severely chemically polluted and critically oxygen depleted downstream.

APFN is concerned that the visible presence of aeration equipment risks giving the impression that meaningful action is being taken, when the monitoring data shows that the river remains in severe distress. The equipment may provide a public-facing sign of activity, but it does not appear to be delivering the required environmental outcome. If the pollutant load continues to enter the river, the aeration devices cannot reasonably be presented as an effective solution.

APFN calls on Dŵr Cymru Welsh Water to urgently review whether the current aeration deployment is necessary, proportionate or effective. On the evidence currently available, it appears to be delivering little to no desired effect across the affected reach and may represent a waste of time, fuel and operational resource when the priority should be to stop or treat the discharge before it reaches the river.

Scale of discharge and public health context

APFN understands, using Dŵr Cymru Welsh Water's current estimated flow rate, that approximately 56,000 tonnes of wastewater may have discharged to the river over a 15-day period. This is approximately 56,000,000 litres.

At an estimated rate of approximately 150 tonnes per hour, the scale of the continuing discharge is significant. If the discharge continues for a further two weeks while Dŵr Cymru Welsh Water completes repairs to the main sewer pipe, a further estimated 50,000 to 52,000 tonnes of wastewater could still enter the Afon Cynffig / Kenfig River before the issue is resolved.

APFN considers this deeply concerning. The field monitoring shows that the discharge is associated with extremely elevated ammonia, phosphate, nitrate and turbidity at the outfall, together with severe dissolved oxygen depletion downstream. Aeration devices placed in the river do not remove this chemical or microbiological load. If the pollutant load continues to enter the river, the river remains exposed to continuing harm regardless of the visible presence of aeration equipment.

The microbiological results received by APFN also indicate extremely elevated bacterial contamination. While those results should be treated with caution because of the delay between sampling and analysis, they remain consistent with the wider evidence of sewage impact.

For context, bathing water classifications use E. coli and intestinal enterococci as key microbiological indicators. Inland bathing waters rated "sufficient" are based on thresholds of ≤900 cfu/100 ml for E. coli and ≤330 cfu/100 ml for intestinal enterococci, assessed using percentile-based regulatory methods. Values worse than the "sufficient" threshold fall into the "poor" category.

The APFN microbiological samples recorded the following results:

Sample location	Enterococci	Coliforms	E. coli
Outfall	6,000 cfu/100 ml	>10,000 cfu/100 ml	>10,000 cfu/100 ml
~100 m downstream from outfall	>10,000 cfu/100 ml	>10,000 cfu/100 ml	>10,000 cfu/100 ml

Table 3: Results from UKAS Pathology Management Services surface water samples taken on 18 May 2026 on the Afon Cynffig / River Kenfig by APFN

These values are not presented as a formal bathing water classification, because the river is not being assessed through the statutory bathing water regime and the test limitations are acknowledged. However, they provide a stark public health comparator and reinforce APFN's concern that the affected reach is not simply chemically polluted, but also subject to significant faecal contamination.

The laboratory report notes that the validity of the results is compromised due to the time elapsed between sampling (18 May 2026) and testing (21 May 2026). The results should therefore be treated with appropriate caution and should not be presented as formal regulatory evidence.

However, even with those limitations, the results are highly concerning. They are consistent with APFN's wider field observations of sewage odour, visible wastewater impact, grey and black riverbed deposits, elevated ammonia, elevated phosphate, high turbidity and severe dissolved oxygen depletion. APFN considers that these findings reinforce the urgent need for formal microbiological monitoring by Dŵr Cymru Welsh Water and Natural Resources Wales, using appropriate chain of custody and accredited laboratory methods.

Environmental significance

The combined pattern of results is highly concerning.

The upstream control point showed substantially better water quality than the outfall and downstream impact locations. At the outfall, ammonia, phosphate, nitrate, turbidity and conductivity all increased sharply. Dissolved oxygen was severely depleted at the outfall and critically depleted at the downstream lower reach. This pattern is consistent with a river under severe wastewater related stress.

The most significant environmental concerns are:

1. Extremely elevated ammonia concentrations at the outfall. Very high phosphate concentrations at the outfall.
2. Critically low dissolved oxygen downstream, including a reading of 3.9% saturation.
3. Elevated pH conditions that may increase ammonia toxicity risk.
4. High nutrient enrichment capable of contributing to sewage fungus, algal growth and ecological imbalance.
5. Visible grey and black sewage deposits affecting the riverbed downstream.
6. Severe sewage odour and visible pollution throughout the downstream affected reach.
7. No visible aquatic life observed downstream from the discharge point during the visit.

Natural Resources Wales (NRW) - executive engagement concern

APFN has engaged directly with the key parties involved in this incident, including Welsh Government, locally elected representatives and the Chief Executive and Chief Operating Officer of Dŵr Cymru Welsh Water.

APFN has asked NRW for a meeting at Chief Executive level, but that request has been refused.

NRW is the only principal body that continues to refuse executive level engagement with APFN on this matter. This is not acceptable given the severity of the incident, the ongoing pollution of the Afon Cynffig / Kenfig River and the evidence now gathered through independent monitoring.

APFN therefore asks NRW to reconsider its position and arrange an urgent meeting with its Chief Executive to discuss the incident, the regulatory response, the permit position, the monitoring data and the action being taken to protect the river and public.

Comparison with historic NRW data

This section compares historic river data taken from published records held by NRW with recent environmental testing carried out by APFN during the ongoing DCWW pollution incident affecting the Afon Cynffig / Kenfig River.

NRW sample location: R KENFIG, BSC WEIR & FISH PASS
Grid ref: SS7949983077
Easting/northing: 279499, 183077
Lat/long: 51.533699, -3.738691

This places the NRW monitoring point slightly downstream of our lower reach pollution monitoring point. It is also where contractors acting on behalf of DCWW are actively aerating the river. It is a good comparator for what the river looked like historically just below our affected reach monitoring point.

Using the NRW historic data (21.01.2020 – 05.02.2026) against our lower reach results from 22 May 2026 and the DO result from 27 May 2026, the pattern is stark.

Parameter	NRW historic range at fish pass	APFN lower reach	What it shows
Dissolved oxygen	68.2% to 97.9%, average 83.9%	20.8% on 22 May 2026, then 3.9% on 27 May 2026	Major collapse in oxygen. The 27 May reading is more than 94% below NRW's lowest historic reading.
Ammoniacal nitrogen as N	0.0147 to 0.0879 mg/L, average 0.0273 mg/L	4.1 mg/L	Around 47 times higher than the highest NRW historic reading, around 150 times higher than the NRW average.
Orthophosphate	0.0116 to 0.0512 mg/L as P	1.1 mg/L as PO_4^{3-}, approximately 0.36 mg/L as P	Around 7 times higher than the highest NRW historic orthophosphate reading, around 16 times higher than the NRW average.

Total oxidised nitrogen as N	1.12 to 2.12 mg/L, average 1.66 mg/L	2.7 mg/L	Elevated above the NRW historic range, but not as extreme as ammonia, phosphate or DO.
Conductivity	257.2 to 658 µS/cm, average 482.4 µS/cm	479.4 to 482.4 µS/cm	Not the standout issue at the lower reach. It sits close to the NRW average.
pH	7.21 to 7.66	8.18 on 22 May 2026	Higher than the historic NRW range. This matters because higher pH can increase ammonia toxicity.
Temperature	6.9°C to 17.5°C	15.4°C to 15.9°C	Within historic range, so temperature alone does not explain the deterioration.

Table 4: Comparison of NRW historic and APFN current data

The strongest finding is that the NRW historic data shows the river at the fish pass normally had oxygenated water, low ammonia and low orthophosphate. Our results show the opposite during this pollution incident, very low oxygen, very high ammonia and materially elevated phosphate.

The dissolved oxygen comparison is especially powerful. NRW's lowest historic reading at this point was 68.2% saturation. APFN recorded 20.8% at the lower reach on 22 May 2026 and then 3.9% on 27 May 2026. This report records that 3.9% was the lowest DO reading APFN has seen on the river to date. It is described as a critical oxygen depletion condition.

The ammonia comparison is also very strong. NRW's highest historic ammoniacal nitrogen reading at the fish pass was 0.0879 mg/L. APFN recorded 4.1 mg/L at the downstream lower reach on 22 May 2026. That is not a small deterioration, it is a step change in river chemistry. Our 24 May 2026 APFN briefing recorded that ammonia remained elevated downstream, including 4.1 mg/L at the downstream lower reach.

NRW's historic data reports orthophosphate as phosphorus (P), whereas APFN's field kit reports phosphate as PO_4^{3-}. These are related but reported on different chemical bases, so the APFN result has been converted onto a phosphorus basis for comparison.

APFN recorded 1.1 mg/L phosphate as PO_4^{3-} at the downstream lower reach on 22 May 2026. This is equivalent to approximately 0.36 mg/L as P. NRW's historic orthophosphate results at the fish pass ranged from approximately 0.0116 to 0.0512 mg/L as P. On that basis, APFN's converted result remains around 7 times higher than NRW's highest historic value at that location.

Potential immediate treatment solution

During the site visit, Wayne Preece, CEO of Hydro Industries confirmed that Hydro Industries is willing and able to assist with the incident. He advised that Hydro Industries could mobilise its plant immediately and bring the pollution issue under control by treating the discharge before it reaches the river.

APFN understands that this would seek to stop the pollution at source, rather than relying only on mitigation after polluted wastewater has entered the river.

APFN understands that this offer has now been escalated to senior level within Dŵr Cymru Welsh Water for a decision on whether the company wishes to proceed.

APFN further understands from Dŵr Cymru Welsh Water communications that a high-level meeting is due to take place on 28 May 2026 to discuss this option.

APFN is grateful to Hydro Industries for making itself available to assist the local community and environment with mobile treatment equipment. This is Welsh technology being offered to help protect a Welsh river during an active pollution incident.

This option has the full support of the elected officials who were on site and who spoke with Wayne Preece by telephone during their visit.

APFN is due to meet with DCWW executive team, elected representatives and Hydro Industries on 29 May 2026. Updates will follow.

APFN position

APFN recognises that aeration may be a legitimate emergency mitigation measure during a pollution incident. However, it must not be treated as evidence that the river is recovering unless that is supported by robust monitoring data across the affected reach.

The APFN results indicate that the Afon Cynffig / Kenfig River remains under severe environmental pressure. The most serious concern is that critically low dissolved oxygen conditions persisted downstream despite active aeration deployment.

The 3.9% dissolved oxygen reading at the downstream lower reach represents a serious escalation in concern. APFN considers that the current mitigation strategy is not sufficient if oxygen levels of this kind are being recorded downstream.

APFN considers that the focus must now shift urgently from in-river emergency mitigation to stopping or treating the pollutant load before it enters the river.

Recommendations

1. DCWW should urgently confirm whether it will accept the Hydro Industries offer of immediate mobile treatment support.
2. DCWW should urgently publish all environmental monitoring data associated with the incident, including dissolved oxygen, ammonia, phosphate, nitrate, turbidity, pH, temperature, conductivity and microbiological data.
3. Continuous dissolved oxygen monitoring should be maintained upstream, at the outfall, within the aeration zone and downstream through the affected reach.
4. Overnight dissolved oxygen data should be made available, given the risk of oxygen depletion outside daytime monitoring periods.
5. DCWW should provide the technical basis for any public statement that aeration is helping to improve river health.
6. The current aeration strategy should be urgently reviewed to determine whether it is sufficient to maintain protective dissolved oxygen conditions downstream.
7. Operational measures to stop or treat the pollutant load before it reaches the river should be urgently prioritised.
8. DCWW and NRW should review whether current aeration and hose operations are creating any public health or occupational exposure risk through aerosolisation of polluted water.
9. Independent monitoring by APFN should be supported and reasonable access is facilitated where landowner consent exists.

Conclusion

The independent monitoring and site observations undertaken by A Peace for Nature on 26 and 27 May 2026 show that the Afon Cynffig / Kenfig River remains under severe wastewater-related stress downstream of the Marlas STW SPS outfall.

The evidence does not support any reassurance that in-river aeration alone is restoring river health across the affected reach. APFN recorded critically low dissolved oxygen downstream, including 3.9% saturation at the lower reach, alongside extremely elevated ammonia, phosphate, nitrate and turbidity at the outfall. This indicates that the pollutant load remains severe and that the current mitigation is not maintaining protective conditions throughout the river.

The comparison with NRW's historic monitoring data at the nearby BSC Weir and Fish Pass strengthens this concern. Before this incident, NRW data showed the river at that location was generally well oxygenated, with low ammonia and low orthophosphate. APFN's recent monitoring shows a marked departure from that baseline, including dissolved oxygen falling to 20.8% on 22 May 2026 and then 3.9% on 27 May 2026, ammonia at the lower reach rising to around 47 times NRW's historic maximum and phosphate, once converted onto the same phosphorus basis, rising to around 7 times NRW's historic maximum.

APFN considers this to be an ongoing significant environmental pollution incident requiring urgent operational intervention, transparent publication of monitoring data and immediate regulatory scrutiny.

The priority must now be to stop or treat the pollutant load before it enters the river. Dŵr Cymru Welsh Water should urgently and transparently confirm whether it will proceed with the immediate mobile treatment support offered by Hydro Industries.

Interpretation of Monitoring Parameters

The monitoring parameters selected during this investigation were chosen to assess both general river health and the potential influence of sewage-related pollution within the affected river system.

Dissolved Oxygen (DO)

Dissolved oxygen measures the amount of oxygen available within the water column for aquatic life. Healthy rivers typically maintain sufficiently high dissolved oxygen concentrations to support fish, invertebrates and aerobic microbial communities.

Reduced dissolved oxygen concentrations can indicate elevated organic pollution loading, excessive microbial decomposition activity or sewage contamination. Very low dissolved oxygen conditions can place severe stress on aquatic ecosystems and may contribute to fish kills and ecological degradation (Welsh Government, 2009). The significantly reduced dissolved oxygen saturation values recorded within parts of the affected reach are consistent with elevated biological oxygen demand associated with organic pollution.

Ammonia Nitrogen (NH_3-N)

Ammonia is one of the most important indicators of sewage contamination and organic waste pollution within freshwater systems. Elevated ammonia concentrations are commonly associated with untreated or partially treated sewage discharges, agricultural waste or decomposing organic matter. Ammonia can become highly toxic to fish and aquatic organisms, particularly at elevated pH and temperature conditions (UKTAG, 2007). The elevated ammonia concentrations recorded within the outfall reach and downstream monitoring locations strongly indicate substantial organic and wastewater-related contamination within the affected section of river.

Phosphate (PO_4^{3-}) (HR)

Phosphate is a nutrient commonly associated with sewage effluent, detergents, agricultural runoff and organic pollution. Excessive phosphate concentrations can contribute to eutrophication, excessive algal growth and ecological imbalance within river systems. Elevated phosphate concentrations may also promote the development of sewage fungus and other pollution-tolerant microbial communities (UKTAG, 2013; Exton et al., 2024). The substantially elevated phosphate concentrations identified during monitoring are significantly above expected background concentrations for a healthy river system (Environment Agency, 2019).

Nitrate (NO_3^--N)

Nitrate is another nutrient parameter commonly used to assess water quality and nutrient enrichment. While nitrate can occur naturally at low concentrations, elevated levels are frequently associated with wastewater discharges, agricultural runoff and

nutrient pollution. Excessive nitrate loading may contribute to ecological imbalance and excessive biological productivity within freshwater systems (Environment Agency, 2019).

Conductivity

Conductivity measures the ability of water to conduct electrical current and is influenced by the concentration of dissolved ions and salts present within the water. Elevated conductivity readings can indicate increased dissolved pollutant loading, including wastewater contamination, sewage effluent or other anthropogenic inputs. The marked increase in conductivity recorded adjacent to the outfall compared with the upstream control location indicates a significant increase in dissolved ionic loading within the affected reach.

Turbidity

Turbidity measures the cloudiness or clarity of water and reflects the concentration of suspended particles present within the river. Elevated turbidity may result from suspended sediments, organic matter, sewage solids, microbial growth or disturbed riverbed deposits. High turbidity can reduce light penetration, affect aquatic habitats and indicate deteriorating water quality conditions.

pH

pH measures the acidity or alkalinity of water. Healthy freshwater systems generally remain within a relatively stable pH range. Elevated or unstable pH conditions can influence chemical toxicity, aquatic ecosystem health and ammonia toxicity. The elevated pH values recorded during monitoring may increase the toxicity potential of ammonia present within the affected reach (UKTAG, 2007).

Temperature

Water temperature directly influences dissolved oxygen availability, biological activity and chemical processes within freshwater ecosystems. Higher temperatures generally reduce the ability of water to retain dissolved oxygen while simultaneously increasing biological oxygen demand and microbial activity (Welsh Government, 2009).

Reference Temperature (Tref)

The conductivity monitoring equipment used during this investigation applies automatic temperature compensation to a standardised reference temperature of 25.0°C (Tref).
This process allows conductivity readings collected under varying environmental temperatures to be directly compared using a consistent calibration reference standard.