

Flood Gate Control Philosophy Updated March 2025

An automatically controlled flood gate shall be installed within the confines of the treatment facility at Afan WwTW to provide sludge containment in the event of a catastrophic failure of the digesters or associated equipment.

During normal operation the flood gate will remain closed and only open if it receives a signal from the weighbridge informing it to open to allow access for a lorry to deliver sludge to the AAD facility. Once the lorry has delivered the load of sludge it will then have to TARE off again on the weighbridge, which will then send a signal to the flood gate to close. Operations staff will have the ability to override any of this control philosophy in the event of an emergency, which they will be alerted too by the SCADA system in the control room.

When in the open position, the floodgate shall be automatically controlled in line with the following procedure:

The two existing digester tanks both have duty and standby pressure transducers as level monitoring devices, these levels will be used to detect a rapid change in digester level. Additionally, DCWW will install a laser level device within the containment area to monitor levels outside the digester. These additional sensors will provide a triple validation of any digester failure, but also detect any other sludge asset failures.

This will be achieved by modifying the existing control software to monitor each digester level and the external containment area level, using Welsh Water standard program block (Rate of Change) which will detect a fast rate of change within each digester or a rise in the external containment area. Once this condition has been detected the system will immediately send a signal to automatically close the floodgate and provide a visual warning the gate is closing.

It will take approximately 45 seconds for the gate to go from the fully open position to the fully closed position and then a further 15 seconds to create the water-tight seal (based on water). As the floodgates close the sites automatic gates will be inhibited to prevent further vehicle access/egress to site.

At the same time as the signal to activate the closure of the gate a level 6 alarm, which is the highest level for waste water operations, will be sent via the site Scada System and through our Prism SmartHub remote monitoring system/team. This will raise the alarm and inform operations personnel both on site and remotely the alarm has been activated.

At this point operations will investigate the cause of the alarm. If a failure has occurred, the operations team will initiate the appropriate emergency response in line with our emergency response manual.

If a false alarm or a minor leakage occurs, operations will carry out the appropriate actions to rectify the situation. Permission will then be obtained from site supervisor or above to reset the system and put the flood gates back into the appropriate position and record this in the site WOF008 log books.

If a more serious failure has occurred operational staff will follow DCWW emergency response plan, as outlined in the permit application, including escalation to bronze, silver or gold management as applicable.

Once appropriate actions/measures have been completed on site (which will vary dependant on volume/impact of spill) to ensure the risk is removed and no harm to the environment can occur the Bronze/silver/gold manager can authorise opening of the gates and the system can be reset.

Each incident will be recorded in site log books WOF007 and where appropriate a SECTION 5 NOTICE ISSUED TO THE NRW, additionally an incident review will be carried out.

As Level 6 alarms these would fall under DCWW Wastewater Unannounced Telemetry Alarm Dynamic Testing PM (3) 15w level 3 procedure. This would mean if the Level 6 alarm has not been activated within a set period it will be reported on and must then be dynamically tested end to end to ensure operation.

The following table provides the potential rate of loss of volumes lost per minute:

Number of minutes since failure	Volume Lost (m3)	Volume lost (%)	Flow rate (m3/s)
1 min	33.6	1%	0.56
2 min	67.3	2%	0.56
3 min	100.7	2%	0.56
4 min	134.1	3%	0.56
5 min	167.2	4%	0.55

Based on the calculation, no sludge would make it to the floodgate thus in the event of failure with the floodgates changing from an open position whilst receiving a sludge delivery, to closed position as per the proposed philosophy would achieve full containment and prevent any loss from the works. As an additional control measure, some ground area, outside the flood gate will be elevated (such as construction of humps) to create a low level containment area, this will act to retain any potential leakage via the gate in a non-permeable area on site.

The site is fed by a ring main power supply that is able to be fed from either side of the ring main. This would also provide assurance that the alarms and gates would operate as designed in the event of a power failure or outage.