PR24

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A3-16 WINEP MONITORING

NES30

WATER AND WASTEWATER

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1. INTRODUCTION TO MONITORING

The Environment Agency (EA) has introduced statutory monitoring as part of the Water Industry National Environment Programme (WINEP) statutory planning framework in 2025-30 to gain a better understanding of the impact of our water and wastewater assets on the environment. This business case covers the investigations and installation of the following types of monitoring:

- compliance monitoring of overflows at Sewage Treatment Works (STW) or last in line sewage pumping stations (SPS);
- compliance monitoring of emergency overflow operation on network SPS;
- compliance monitoring of trade effluent discharges from Water Treatment Works (WTW); and
- continuous river water quality monitoring.

Table 1 sets out the WINEP requirements, the relevant legislation and our proposed level of investment for 2025-30 relating to the Water and Wastewater Network Plus Price Controls.

TABLE 1: REQUIREMENTS FOR MONITORING DURING AMP8

Requirement	Legislation	AMP8 Investment
The statutory requirements for storm overflow discharges from STW to have Monitoring Certification Scheme (MCERTS) certified overflow operation and flow passed forward (FPF) for full treatment monitoring that allows performance with their permit conditions to be better regulated (U_MON3 and 4).	• Water Framework Directive – Good Ecological Status in receiving water bodies. • Urban Wastewater Treatment Regulations (1994) – duties to provide and maintain wastewater collecting systems and operate treatment plants.	Capex = £6.908m Opex = £0.435m Wastewater network +
The statutory requirement for WTW trade effluent discharges to have MCERTS flow monitoring to allow their performance against permit conditions to be better regulated (EPR_MON1).	• Water Framework Directive – Good Ecological Status in receiving water bodies.	Capex = £1.424m Opex = £0.040m Water network +
The statutory requirements to monitor the duration and frequency of emergency overflow operation to MCERTS standards (U_MON 6).	• Environment Act 2021 requirements to monitor and report on the operation of storm overflows.	Capex = £113.503m Opex = £11.800m For AMP8 and AMP9 combined Wastewater network +
The statutory requirement for continuous water quality monitoring upstream and downstream (and extra locations if required) of all storm overflows and STW to inland watercourses and estuaries (EnvAct_INV1, EnvAct_MON1, EnvAct_MON4).	• Environment Act 2021 requirements to monitor and report on the operation of storm overflows. • Urban Wastewater Treatment Regulations (1994) – duties to provide and maintain a wastewater collecting system and operate treatment plants.	Capex = £125.790m Opex = £2.463m Wastewater network +
The non-statutory requirement for continuous monitoring of coastal and inland complex environments such as lakes, canals and groundwater to better understand any water quality impacts from storm overflows (EnvAct_INV2, EnvAct_MON2, EnvAct_INV3 EnvAct_MON3).	Not applicable	
Making continuous water quality monitoring accessible in near real time (EnvAct_MON5).	Not part of the Environment Act 2021 but likely to be required in implementing legislation.	

The impact of installing extra monitors coupled with a change in the way the EA regulates pollutions will result in an increase in the number of reported pollution incidents. The impact of this is excluded from this business case and included within our enhancement case **A3-23 Pollution Incidents** (NES37).

1.1. SUMMARY OF COSTS

We will deliver our monitoring programme through enhancement investment. We summarise the costs in Table 2 below.

TABLE 2: COSTS BY ENHANCEMENT LINE (TOTEX)

Enhancement lines	Capex (£M)	Opex (£M)	Total (£M)
Flow monitoring at STWs (UMON 3&4), CWW3.4 to CWW3.6	6.909	0.437	7.346
Trade effluent discharge flow monitoring CW3.22 to CW3.24	1.424	0.040	1.463
MCERTS monitoring at emergency SPS overflows (UMON6) CWW3.10 to CWW3.12	113.505	11.800	125.305
Continuous river water quality monitoring CWW3.7 to CWW3.9	122.328	2.462	124.790
TOTAL	244.166	14.739	258.904

Note that trade effluent discharge flow monitoring is allocated to the water network plus control and is included in Table CW3.

We responded to a request from the EA in July 2023 suggesting changes to our environmental programme, including the delay of some monitoring investments and other elements. The EA has responded to some of our suggestions, but there is no agreed revised programme yet.

In August 2023, the EA issued further guidance on river water quality monitoring, but this was too late to change our business plan. However, we expect that the updated guidance will mean changes to the phasing of monitoring. We have provided some duplicate tables alongside our business plan to reflect the updated guidance (NES_BPT04) but these changes are not yet reflected in our business plan.

We expect the revised guidance to mean a reduction from **£124.790m** to **£35.076m** in our 2025-30 business plan, with the remainder of the investment being delivered in 2030-35 instead. We estimate that this would mean a **£3.30** per year reduction in wastewater bills in 2029/30 compared to our business plan.

This investment case, and our business plan, reflects **the full £124.790m** in 2025-30.

Table 3 sets out the approach we followed within this business case to consider these updates.

TABLE 3: OUR APPROACH TO RECENT GUIDANCE CHANGES

Drivers	Date of latest revised guidance	Our approach
River water quality monitoring (EnvAct_INV1, EnvAct_MON1, EnvAct_MON4)	The key changes include: • an update to the clustering range, which has been increased; • an update to the exemptions, with several criteria added; • removal of EnvAct_MON1 driver, as installation of monitors at estuarine sites is no longer a statutory obligation under PR24; • the phasing / timeline of rolling out monitoring under EnvAct_MON4; and • further detail around siting of monitors. Informed by EA/19/2023 (18 August 2023)	Our business case is based on pre-August 2023 guidance. We will provide data tables on original guidance and shadow tables based on the likely impact of August 2023 guidance. We will provide an updated business case and data tables reflecting August 2023 guidance after the October submission. We **wrote to Ofwat** on the 19th of September 2023 outlining this approach (NES66).
Emergency overflow operation (UMON6)	Changes to phasing and prioritisation of sites Informed by EA/19/2023 (18 August 2023) Final list of sites to be agreed with the EA by 15 December 2023.	Our business case is based on a total of all 594 requirements with 25% of the total investment in AMP8 and 75% in AMP9. We are currently working through which sites will be in AMP8 and will submit this to the EA by 27 October 2023. Once a finalised set of sites has been agreed with the EA, we will update the business case and resubmit tables. We expect this to be in early 2024. We **wrote to Ofwat** on the 19th of September 2023 outlining this approach (NES66).

2. NEED FOR ENHANCEMENT INVESTMENT

2.1. ALIGNMENT WITH STATUTORY PLANNING FRAMEWORKS

All elements of this business case have been developed in accordance with the WINEP Framework. There is separate guidance for:

- monitoring of flow compliance (UMON3 and 4)[1];
- monitoring of emergency overflow operation on network SPS (UMON6)[2]; and
- Environment Act continuous water quality monitoring (EnvAct_INV1, EnvAct_MON1, EnvAct_MON4)[3].

2.2. NEED FOR INVESTMENT IN AMP8

2.2.1 Compliance monitoring for overflow operation at STW or last in line SPS

Table 4 shows that monitoring for overflow operation is a statutory requirement, the timing of which is dictated by the guidance.

TABLE 4: PR24 WINEP DRIVER GUIDANCE FOR MONITORING OF FLOW COMPLIANCE

Driver code	Description	Legal obligation	Tier 1 outcome	PR24 data tables enhanced category
U_MON3	MCERTS certified FPF overflow operation monitoring at STW or last in line SPS overflows. By 31 December 2026 Where preferable by end of December 2025.	Statutory	Water company actions to protect the environment from the effects of urban wastewater collection and discharges.	Wastewater network+ price control - Flow monitoring at STWs
U_MON4	MCERTS certified FPF flow monitoring at STW or last in line SPS overflows. By 31 December 2026 Where preferable by end of December 2025.	Statutory		

Our list of needs for monitoring compliance was agreed with the EA using the PR19 project brief sign off[4]. We were provided with a WINEP sheet that was pre-populated for PR24 AMP8 delivery. A full list of sites which we have agreed with the EA is included in Appendix A.

Figure 1 shows the process we used to identify the MCERTS certified FPF operation. This is a new statutory requirement to provide MCERTS accreditation to FPF monitors which were installed in AMP7 and have received a certificate of conformity. There are 149 monitors on 143 wastewater sites, which require MCERTS certification as early as possible in PR24, which we have interpreted to be by 31 December 2026 and if possible, by December 2025.

[1] PR24 WINEP driver guidance – Monitoring for flow compliance – Version 0.3, Environment Agency
[2] PR24 WINEP driver guidance – Monitoring of emergency overflow operation on network sewage pumping stations – Version 0.3, Environment Agency
[3] PR24 WINEP driver guidance - Environment Act Continuous Water Quality Monitoring, version 0.3, Environment Agency
[4] PDF Project Brief and Sign Off ST021_0201 WINEP U_INV2 Investigations, or Excel Regulatory Outputs Sign off Tracker for U_INV2 (LIVE), Northumbrian Water

FIGURE 1: SITE ALLOCATION TO U_MON3 DRIVER SUB-COMPONENTS

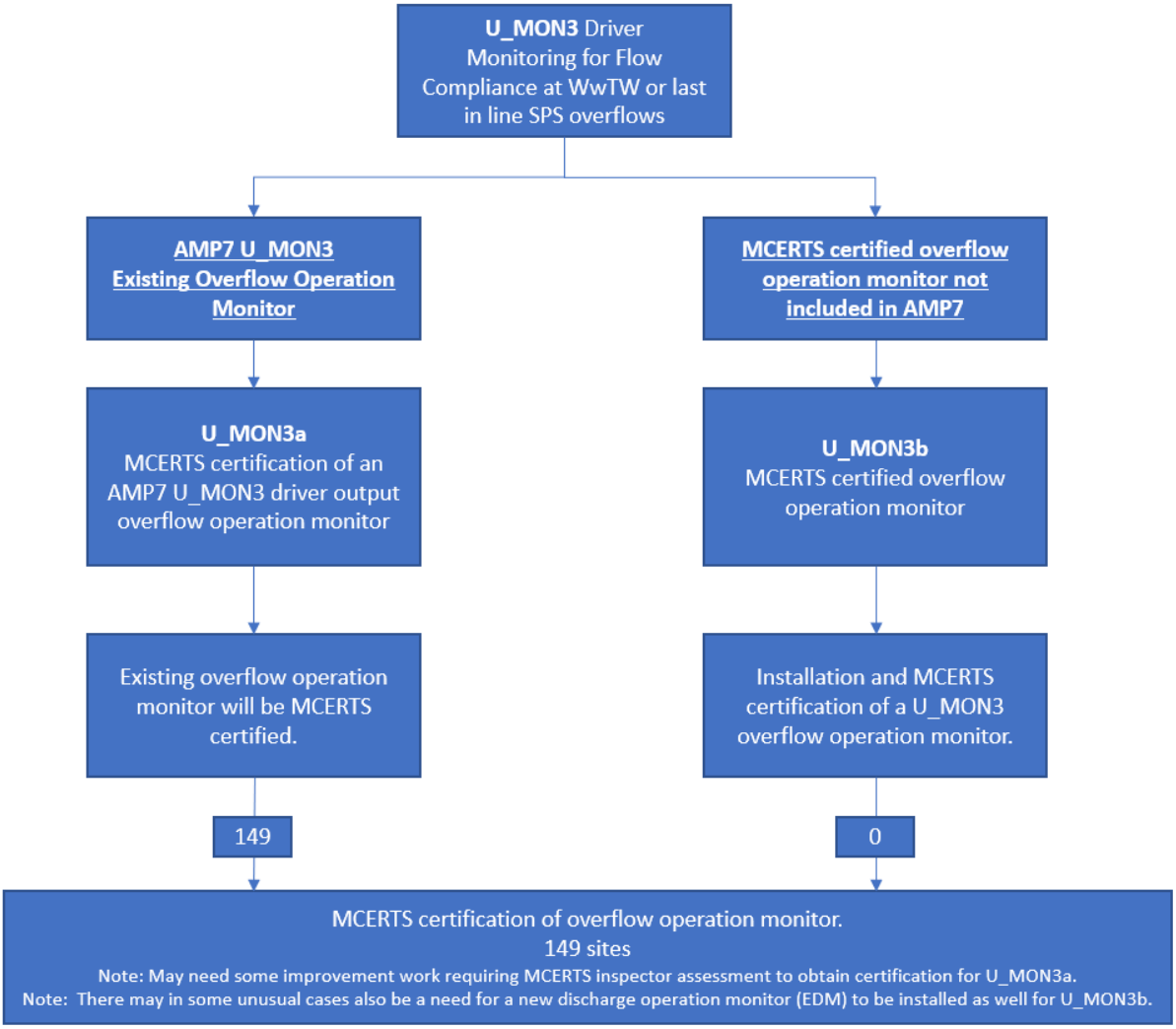
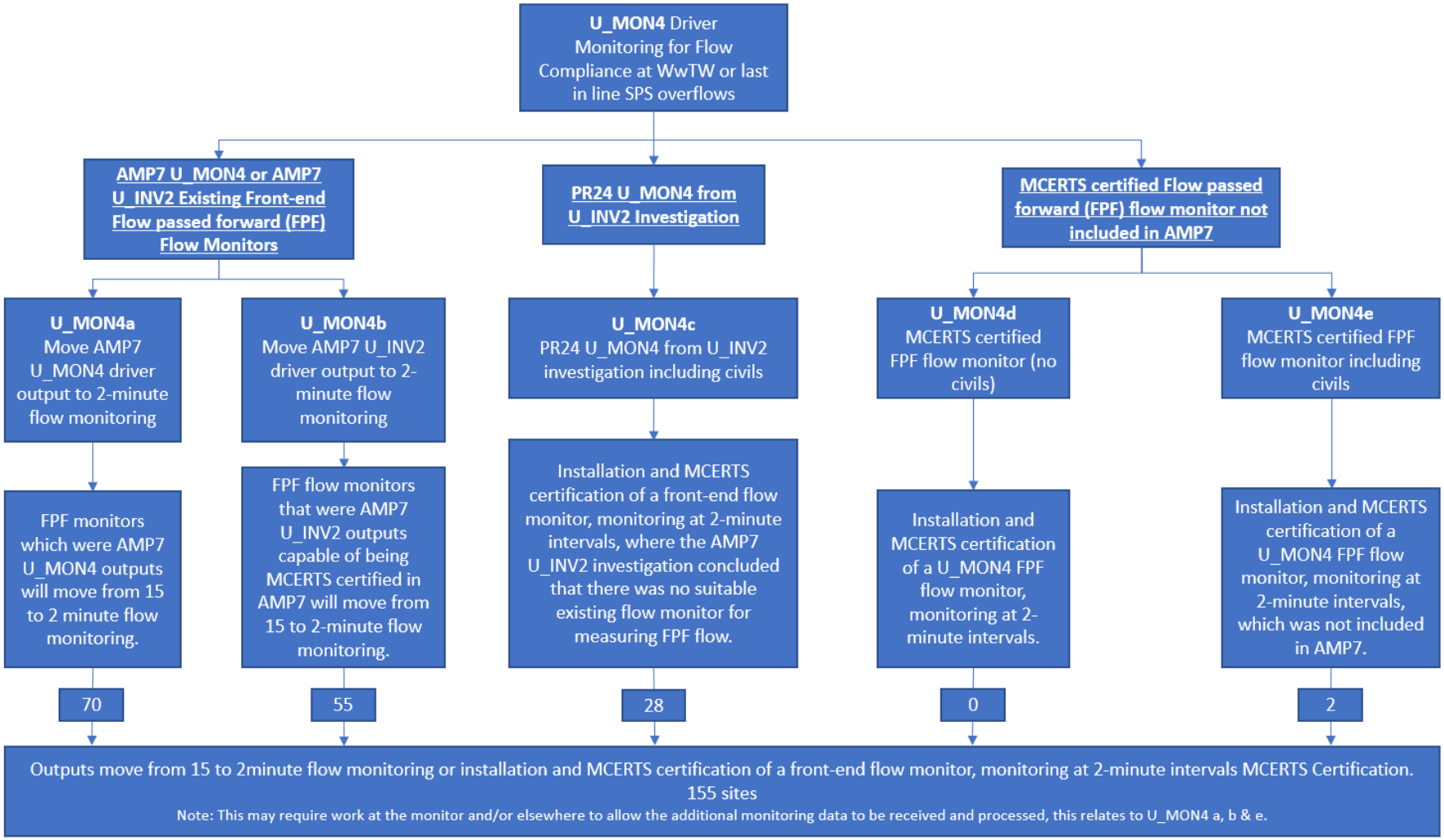


Figure 2 shows the process we have used to identify the MCERTS certified FPF flow monitoring at STW or last in line SPS overflows (U_MON4). 155 sites were identified from AMP7 WINEP investigations (U_INV2) which concluded that a new or substantially altered FPF monitor was required to change the flow monitoring interval from 15 to 2 minutes. These must be delivered as early as possible in PR24, which the guidance states will be before the end of 2026 at the latest and where possible by the end of 2025.

FIGURE 2: SITE ALLOCATION TO U_MON4 DRIVER SUB-COMPONENTS



2.2.2 Compliance monitoring for trade effluent discharges from WTW (EPR_MON1)

MCERTS flow monitoring (EPR_MON1) is required at WTW for trade effluent discharges with a maximum flow over 50m^3/day and with numeric limits for biochemical oxygen demand (BOD), chemical oxygen demand (COD), or metals. Table 5 shows that this is a statutory requirement, the timing of which is dictated by the guidance.

TABLE 5: PR24 WINEP DRIVER GUIDANCE FOR MONITORING OF FLOW COMPLIANCE

Driver code	Description	Legal obligation	Tier 1 outcome	PR24 data tables enhanced category
EPR_MON1	MCERTS certified WTW Total daily volume flow/max flow rate monitoring. By 31 December 2026 Where preferable by end of December 2025.	Statutory	Water company action to protect the environment from the effects of WTW trade effluent discharges.	Water network+ price control - Trade effluent discharge flow monitoring

Table 6 shows the list of 11 sites agreed with the EA which require monitoring installed as early as possible in PR24 including the operating regions of Essex and Suffolk (ESW) and Northumbrian (NWL).

TABLE 6: LIST OF TRADE EFFLUENT MONITORING NEEDS (EPR_MON1)

Need name	Region	Need description	Root cause
Barsham WTW	ESW	Required to meet MCERTS Certification.	No current MCERTS certified Total daily volume flow/max flow rate monitoring.
Benhall WTW	ESW		
Broken Scar WTW	NWL		
Broome WTW	ESW		
Fontburn WTW	NWL		
Holton WTW	ESW		
Honey Hill WTW	NWL		
Mendlesham WTW	ESW		
Mosswood WTW	NWL		
Wearhead WTW	NWL		
Warkworth WTW	NWL		

As all the requirements for monitoring flow compliance are new statutory requirements which are separate from the AMP7 deliverable, there is no overlap with any AMP7 funding. All requirements relate to new monitors or changes to monitors because of a new standard and as a result, these are not related to base expenditure. There is no double counting with monitors in the growth programme as the list of sites is different.

2.2.3 Compliance monitoring of emergency overflow operation on network SPS (UMON6)

The requirement is to install MCERTS certified monitors at all network SPS with an existing permitted emergency overflow. This will improve our understanding of emergency overflow operation and improve the transparency and public confidence in the data. The monitors must record the frequency and duration of sewage discharges made during emergency discharges. Where a pumping station is also a permitted storm overflow, it must also have an FPF monitor.

Table 7 shows that this is a statutory requirement. The timing of delivery was set out in an information letter received from the EA on 18 August 2023[5]. A final list of sites to delivered in AMP8 will be agreed with the EA before 15 December 2023.

TABLE 7: PR24 WINEP DRIVER GUIDANCE FOR MONITORING OF EMERGENCY OVERFLOW OPERATION ON NETWORK SPS

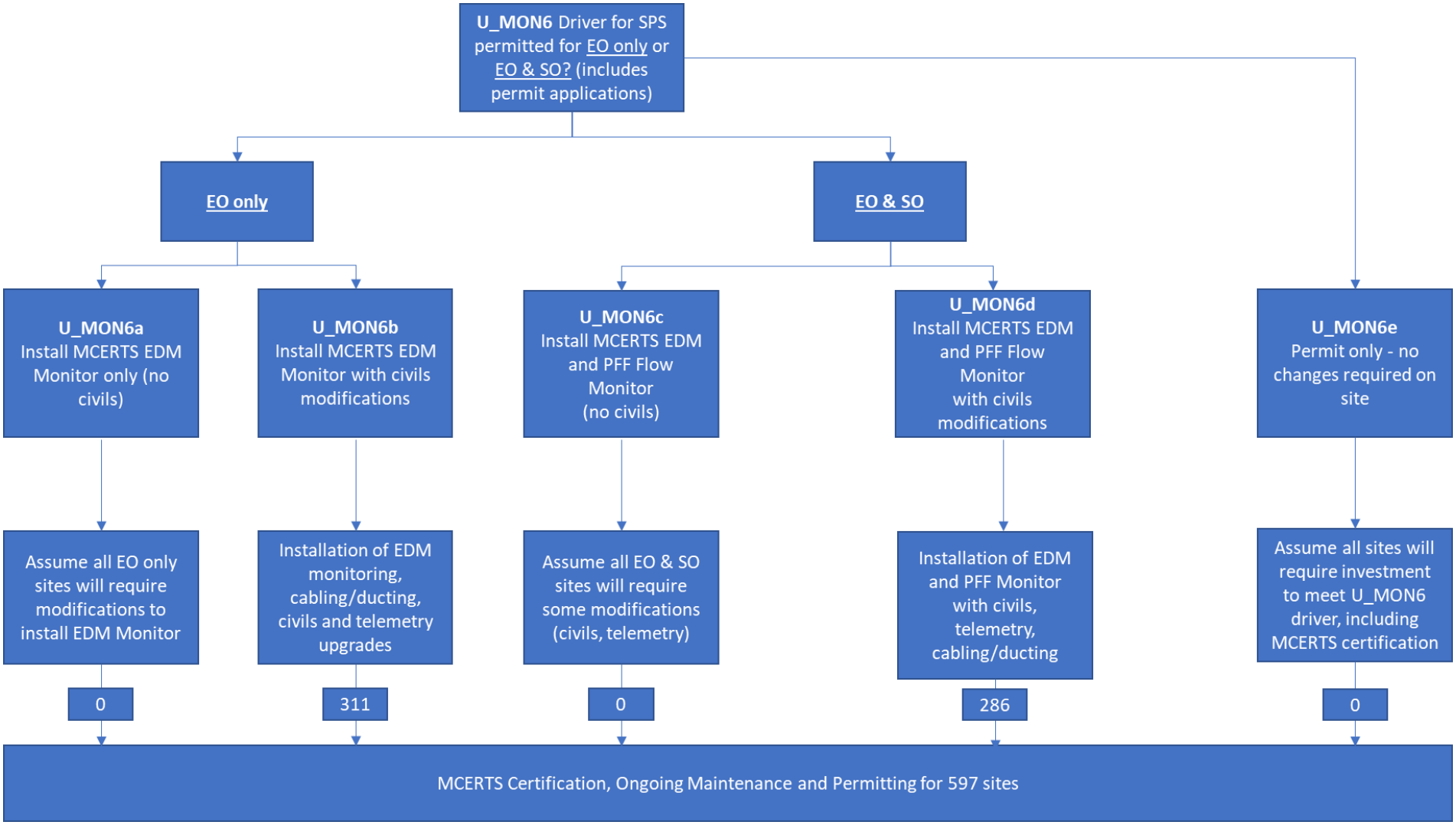
Driver code	Description	Legal obligation	Tier 1 outcome	PR24 data tables enhanced category
U_MON6	MCERTs certified monitoring of emergency overflow operation on network SPS 25% by 31 March 2030[6] 75% by 31 March 2035	Statutory	Water company actions to protect the environment from the effects of urban wastewater collection and discharges.	Wastewater network+ price control - MCERTs monitoring at emergency SPS overflows

Figure 3 shows that 597 SPS sites require investment over AMP8 and 9. A full list of sites is included in Appendix A.

We reviewed all our SPS for the required MCERTs certified monitoring of emergency overflow operation. As this is a new statutory requirement for AMP8, our SPS would not keep to the new requirements without investment. Therefore, there is no overlap with any previous funding in AMP7. All requirements relate to new monitors and there is no overlap with base expenditure or any other programmes of investment[7].

[5] Information letter EA/19/2023, Environment Agency, 2023
[6] Information letter, Environment Agency, July 2023
[7] Five sites are also U_MON 3 and 4 (refer to Appendix A)

FIGURE 3: SITE ALLOCATION TO U_MON6 DRIVER SUB-COMPONENTS



2.2.4 Continuous river water quality monitoring

The objective of these drivers is to investigate/carry out pilots to determine the best monitoring strategy for continuous monitoring; to install monitoring at high priority sites and to carry out further investigations to inform PR29 planning. This will provide near real time monitoring data in the receiving environment to inform actions to protect the environment from the effects of discharges from storm overflows and STWs.

The drivers apply to all STWs discharges and permitted overflows including:

- Combined Sewer Overflows (CSOs) on the sewer network;
- storm discharges at pumping stations;
- inlet CSOs at STW; and
- storm tanks at STW.

Our plan for continuous water quality monitoring has been developed in accordance with the WINEP framework. Table 8 shows that there are four statutory drivers and Table 9 shows that there are three non-statutory drivers which will be used to inform PR29 planning. The timing and magnitude of investment is dictated by the guidance.

TABLE 8: PR24 WINEP GUIDANCE FOR ENVIRONMENT ACT WATER QUALITY MONITORING INLAND WATER COURSES AND ESTUARIES – STATUTORY DRIVERS

Driver code	Driver description	Explanation	Legal obligation	Completion date	PR24 data tables enhanced category
EnvAct_INV1	Estuarine: Investigations/pilots to assess site suitability for continuous water quality monitoring of the receiving environment to assess any impact from storm overflows and STW discharge outlets.	These investigations shall gather information to inform the best monitoring strategy that is delivered in EnvAct_MON1.	Statutory	• All sites by 30 April 2027 • Investigations/pilots at High Priority Sites to inform PR24 • EnvAct_MON1 schemes should be delivered early in the PR24 timeframe as installation will be required by 31 March 2030 • Investigations/pilots at non-high priority site must conclude by 30 April 2027 to inform PR29 planning	Continuous river water quality monitoring
EnvAct_MON1	Estuarine: Installation of continuous water quality monitoring of the receiving environment to assess any	Parameters include temperature, conductivity and dissolved oxygen	Statutory	• High priority by 31 March 2030 • Low priority by 31 March 2035	Continuous river water quality monitoring

Driver code	Driver description	Explanation	Legal obligation	Completion date	PR24 data tables enhanced category
	impact from storm overflows and STW discharge outlets.	It may also be desirable to include turbidity, chlorophyll and ammonium (in low saline conditions) as site specific parameters.		• Installation should be phased over the period 2025-2030 • All other sites: 31 March 2035 • Installation should be phased over the period 2030-2035	
EnvAct_MON4	Inland watercourses: Installation of continuous water quality monitoring of the receiving watercourse upstream and downstream of storm overflows and STW discharge outlets.	Parameters include levels of dissolved oxygen, temperature & pH values, turbidity, levels of ammonium & derived ammonia.	Statutory	• High priority by 31 March 2030 • Low priority by 31 March 2035 • Installation should be phased over the period 2025-2030 • All other sites: 31 March 2035 • Installation should be phased over the period 2030-2035	
EnvAct_MON5	Develop and implement the ability to publish continuous water quality monitoring data in near-real time in a standardised format.	Companies are expected to work together as a sector to make sure continuous water quality monitoring data is accessible.	Statutory	• By 31 March 2027	

TABLE 9: PR24 WINEP GUIDANCE FOR ENVIRONMENT ACT WATER QUALITY MONITORING COASTAL AND INLAND COMPLEX WATERCOURSES – NON-STATUTORY DRIVERS

Driver code	Description	Legal obligation	Required by date	PR24 data tables enhanced category
EnvAct_INV2	Inland complex: Investigations/pilots to assess site suitability for continuous water quality monitoring of the receiving environment to assess any impact from storm overflows and STW discharge outlets.	Non-statutory	• By 30 April 2027 • Investigations at both high priority and non-high priority sites must conclude by 30 April 2027 to inform PR29 planning	Continuous river water quality monitoring
EnvAct_MON2	Inland complex: Installation of continuous water quality monitoring of the receiving environment to assess any impact from storm overflows and wastewater treatment works discharge outlets. To include ability to assess ecological harm.	Non-statutory	• 31 March 2035	
EnvAct_INV3	Coastal: Investigations/pilots to assess site suitability for continuous water quality monitoring of the receiving environment to assess any impact from storm overflows and STW discharge outlets.	Non-statutory	• By 30 April 2027 • Investigations at both high priority and non-high priority sites must conclude by 30 April 2027 to inform PR29 planning	

Table 10 shows there is one statutory investigation and two non-statutory investigations which are required to be completed by 30 April 2027. These are either required to inform AMP8 delivery or PR29 planning.

TABLE 10: LIST OF INVESTIGATIONS FOR ENVIRONMENT ACT CONTINUOUS WATER QUALITY MONITORING

Driver	Need Description	Number investigations
EnvAct INV1 Investigations – Estuarine (by mid AMP8)	To make sure that continuous water quality monitoring is provided upstream and downstream (and extra locations if required in the case of EnvAct_INV1 & MON1) of all storm overflows and STW discharges to inland watercourses and estuaries to meet the requirements of the Environment Act 2021.	1 investigation
EnvAct INV2 Investigations – Inland Complex (by mid AMP8)	Investigation to better understand any water quality impacts from storm overflows and STW discharges to inland complex environments.	1 investigation
EnvAct INV3 Investigations – Coastal (by mid AMP8)	Investigation to better understand any water quality impacts from storm overflows and STW discharges to coastal environments.	1 investigation

The methodology in the PR24 WINEP driver guidance[8] was followed to correctly review all our sites against the EA's requirements and identify the sites required for monitoring installations.

[8] PR24 WINEP driver guidance - Environment Act Continuous Water Quality Monitoring, version 0.3, Environment Agency

- We identified all our storm overflows and STW discharge points and checked against our Event Duration Monitoring (EDM) Annual Return 2022. We then identified the different receiving environment type for each, from the PR24 guidance, and identified common outfalls, resulting in a clear list of all discharges that require monitoring.
- We have prioritised the list of sites (the location of the discharge or the cluster of discharges as determined above), using the four high priority criteria elements as defined by the Department for Environment, Food and Rural Affairs (Defra). If any one of these four criteria was met the site was deemed high priority:
  - Reason for Not Achieving Good Status (RNAGS);
  - sensitive inland waters;
  - designated shellfish water; and
  - designated bathing water.
- Where multiple discharges were identified at or within 50m of each other, they are considered a 'cluster' and considered a single discharge for water quality monitoring planning purposes. Since the original guidance was issued, Figure 4 shows that Defra have proposed multiple clustering scenarios which affects the number of needs in AMP8. This business case is based on the original guidance where the number of continuous monitoring sites as a worst-case scenario is 2,138, with 187 high priority sites being delivered in AMP8, and 951 sites in AMP9. These numbers will change when we apply the new clustering guidance and exemptions.

FIGURE 4: CLUSTERING SCENARIOS

The list of needs for Environment Act continuous water quality monitoring is summarised in Table 11.

TABLE 11: LIST OF NEEDS FOR ENVIRONMENT ACT CONTINUOUS WATER QUALITY MONITORING

Driver	Need/Driver Description	Number of sites
EnvAct MON1 Monitoring Installation – Estuarine (by end of AMP8)	Estuarine: Installation of continuous water quality monitoring of the receiving environment to assess any impact from storm overflows and STW discharge outlets.	139 sites
EnvAct MON2&4 Monitoring Installation – Inland and Inland Complex (by end of AMP8)	Inland watercourses: Installation of continuous water quality monitoring of the receiving watercourse upstream and downstream of storm overflows and STW discharge outlet. Based upon the applied modelling there are no inland complex locations identified. This may change based upon the new technical guidance.	1048 sites
EnvAct MON5 Publish Water Quality Monitoring Data (by mid AMP8)	Develop and implement the ability to publish continuous water quality monitoring data in near-real time in a standardised format. Reporting requirement.	
EnvAct MON1-5 Laboratory installation and operation	Provide laboratory capacity to support operation of EnvAct monitoring.	

We are not requesting enhancement investment for activities which were funded at previous price reviews. There is no overlap with base expenditure, because these are all new WINEP requirements which require new monitoring to meet the new standard. Any extra reporting and laboratory process capacity is specifically related to the installation of new monitoring.

In AMP7, we are deploying 22 monitors in high priority sites under our River Pledge 4 (non-statutory) using base expenditure. This will inform our AMP8 programme for inland rivers with the aim of improved efficiencies once AMP8 starts.

2.2.5 Link to Long Term Strategy

This investment is needed as part of the 'protecting the local environment' investment area under our **Long-Term Strategy** (LTS) core pathway. It is needed to introduce final effluent, in-river upstream, and downstream monitoring to get a greater understanding of environmental impacts of treated water by 2030 as we committed to in our drainage and wastewater management plan (DWMP). This will deliver against one of our **ambitious pledges for our coasts and rivers** to get a greater understanding of the environmental impacts of treated water by 2030.

We consider this is to be a low / no regret investment because it is needed to meet statutory requirements in 2025-2030. We are legally obligated under the Environment Act to deliver this investment for priority sites by 2030 and for all relevant sites by 2035. The profiling of this investment is dictated by the draft WINEP guidance. The guidance requires us to carry out investigations and monitor installation for priority sites in 2025-30 and investigations at non-priority sites during 2025-2030. We therefore consider this investment is necessary in 2025-2030 to deliver our LTS.

We expect to need to invest in monitors in 2030-2035. This will be determined by the results of the investigations carried out for these sites in 2025-2030.

2.2.6 Factors outside of our control

There are three factors that are currently outside of our control, which relate to the guidance still being developed by the EA in collaboration with the companies. These are:

- For the MCERTS guidance for pumping stations, which is required for event duration monitoring of emergency overflows and FPF monitoring at network pumping stations, we have used the expert judgement of our subject matter experts and our external MCERTS assessor and existing MCERTS standards for STWs to inform our needs for the certification, calibration, and maintenance of measurement devices.
- For the MCERTS standard for overflow operations & FPF monitoring at STW or last in line SPS overflows, we have based our investment proposals on the draft standard, the EA's driver guidance (for example, 2-minute recording) and existing flow MCERTS standard.
- For continuous water quality monitoring, we have based our investment proposals on the EA's driver guidance[9]. At the time of writing, it is unclear if monitors will be required to MCERT standard, although some level of operating assurance will be required which is being assessed by consultants on behalf of the EA.

2.3. CUSTOMER SUPPORT FOR THE NEED

These projects are all a consequence of statutory requirements, and so we have not discussed the specific needs with customers. That is because our research shows that customers expect us to meet our statutory obligations, and it is not appropriate to discuss delaying or phasing investment where there are no alternatives to meet the statutory requirement to deliver our part of WINEP.

Our research shows that customers support investment in the environment, including wider environmental and social benefits – though they do not necessarily think they should always pay for this through their water and wastewater bills. In particular, our customers rank dealing with sewage effectively and improving the quality of rivers as two of their "medium" priorities (**prioritisation of common PCs**, NES44).

In our **qualitative affordability and acceptability testing** (NES49), customers supported our "preferred" plan which included these monitoring projects. Customers found this plan acceptable because it focused on the right things, is good for future generations, and is environmentally friendly. Customers who did not find this plan acceptable said that this was expensive, and water companies should pay out of their own profits. We did not ask specifically about monitoring (as our individual items were limited only to the largest investments), but customers supported maintaining rivers and reducing pollution (NES49). In our **quantitative research** (NES50), 74% of customers supported our preferred plan, including this investment.

[9] PR24 WINEP driver guidance - Environment Act Continuous Water Quality Monitoring, Environment Agency

We were not able to carry out additional customer research on the scope for different phasing options, due to the timing of these requests. Instead, we discussed this with the Water Forum, who had supported us in proposing phasing – in particular, we advised that the same objective could be met by having monitors only downstream of point discharges (rather than upstream too), which would reduce the investment needed substantially.

We discussed the final phasing options briefly with the Water Forum, who recognised the challenge the company, industry, regulators and customers face in respect of the structure, funding and delivery the significant investment required going forward. They indicated, in the short time available, that in the context of the EA request, our proposals looked reasonable. However, the Water Forum asked for further information on risk to customers and the environment on emergency overflows and water quality monitoring proposals and would have liked us to have had the opportunity to do some specific testing of customer opinion (which the tight timetable has not allowed).

We agree. We would expect to carry out more consultation on any changes under the new guidance before agreeing a final plan, including with our customers.

3. BEST OPTION FOR CUSTOMERS

3.1. BROAD RANGE OF OPTIONS

3.1.1 Range of options to meet monitoring compliance

The WINEP Options Development guidance[10] does not require us to develop an unconstrained list of options for monitoring compliance, as the driver requirements are specific about the type and frequency of monitoring required. For example, the solutions for U_MON4 were agreed with the EA following AMP7 investigations which determined whether a new or substantially modified flow monitor was required to monitor at 2-minute intervals. These requirements of the solution are embedded in the list of needs agreed with the EA for AMP8.

Table 12 shows the options considered against our optioneering hierarchy and that there is genuinely only one applicable option for each site. Categories of options considered are:

- Eliminate – identification of processes and practices that can be stopped possibly by stakeholder management or by challenging the need for existence. Eliminate options are likely to have the lowest costs to deliver the benefit. This does not apply to monitoring as this is a statutory requirement to install monitors or carry out investigations to determine new requirements.
- Collaborate – working with stakeholders to re-assign the issue or co-fund. Costs can be shared with third parties either to deliver the same or an extra level of social and environmental benefit. No opportunities for cost sharing of monitoring has been identified.
- Operate – improved operational management practices to enhance existing capacity. All needs relate to the installation of new equipment or substantial modification of existing equipment.
- Invigorate – invest in the existing infrastructure to improve performance. These options will provide an increased level of benefit and may be of a lower cost than fabricate options. In this case some interventions relate to achieving MCERTS certification to make sure existing equipment is measuring to the correct standards.
- Fabricate – new assets to augment or replace existing. These options are likely to have the highest costs. Green options will have lower carbon and potentially higher biodiversity and amenity benefits but are not relevant to this business case.

[10] PR24 WINEP Options development guidance Annex 4: PR24 WINEP options development requirements, Environment Agency

TABLE 12: MONITORING COMPLIANCE TOTEX HIERARCHY

Option	MCERTS certified FPF overflow operation monitoring (U_MON3)	MCERTS certified FPF flow monitoring (U_MON4)	MCERTS certified WTW trade effluent monitoring (EPR_MON1)	MCERTs certified monitoring of emergency overflow operation (U_MON6)
Continue business as usual	Does not meet statutory requirement	Does not meet statutory requirement	Does not meet statutory requirement	Does not meet statutory requirement
Eliminate	Not feasible and will not keep to the AMP8 driver	Not feasible and will not keep to the AMP8 driver	Not feasible and will not keep to the AMP8 driver	Not feasible and will not keep to the AMP8 driver
Collaborate	Not applicable	Not applicable	Not applicable	Not applicable
Operate	Not applicable	Not applicable	Not applicable	Not applicable
Invigorate	Obtain MCERTS certification to keep to AMP8 driver (149 sites)	Not applicable	Not applicable	Obtain MCERTS certification for existing EDM monitors (267 site of UMON_6d)
Fabricate	Not Applicable	Install MCERTS Certification flow monitoring (30 sites) Increase data recording frequency from 15min to 2mins (125 sites)	Install MCERTS Certification flow monitoring (11 sites)	Install MCERTS Certification EDM monitors (311 of which 78 are in AMP8 sites, UMON_6b) Install MCERTS Certification flow monitors (286 sites of 72 are in AMP8, UMON_6d)

For each of these options we have confirmed that it meets the statutory requirement and is technically feasible to implement.

3.1.2 Range of options to meet the need continuous river water quality monitoring

The PR24 guidance[11] for investigations states that we must include assessment of the appropriate siting of monitoring equipment and assessment of the most appropriate monitoring parameters for that environment. It may also extend to testing different monitor types. The technologies we propose to utilise for the investigations are summarised in Table 13.

TABLE 13: MONITORING TECHNOLOGIES FOR INVESTIGATIONS BY WATER BODY TYPE

Water body	Technologies Investigated
Coastal	Buoy-mounted sondes, satellites, drones
Estuarine	Buoy-mounted and land-mounted sondes, satellites, drones
Inland	Land-mounted sondes, drones, and others (TBC)

Table 14 shows that four options have been developed for continuous river water quality monitoring and screened to make sure they meet the statutory obligation and are technically feasible.

[11] PR24 WINEP driver guidance - Environment Act Continuous Water Quality Monitoring, version 0.3, Environment Agency

TABLE 14: OPTIONS SCREENING FOR CONTINUOUS WATER QUALITY MONITORING

Options	Meets Statutory Obligation?	Technically feasible?	Screening outcome
Continue business as usual	No	Yes	**Discarded –** This does not meet statutory requirement to install continuous river water quality monitoring
Monitoring - Kiosk/ Pump An aluminium cabinet on an elevated platform. Samples are pumped to the probe located within the cabinet. All modules within the cabinet are based on lean principles (minimum equipment and time). Land purchase may be required.	Yes	Yes	**Carried forward**
Monitoring - Field Sonde installation A portable suitcase installation suitable for locations where a kiosk cannot be installed, for example where access to land may be legally or physically difficult. Probes are installed and remain directly within the watercourse.	Yes	No	**Discarded** – We believe this solution has several risks, as it is more susceptible to damage from natural storm events and vandalism. Installation and maintenance required is much more challenging from a health and safety perspective, because the equipment is located directly in the watercourse and frequent access is required for maintenance. This may change following confirmation of final technical guidance and detailed on site surveys.
Monitoring – Innovation Use of drones	No	No	**Discarded** – There are concerns about this solution due to limitations in the waterbody area and the need for further research and development. This option would not meet statutory obligations or be technically feasible for the majority of inland locations; however, we do believe there could be opportunity for the use of drones on estuarine and coastal waterbodies, investigations which will be developed following the publication of the technical guidance.
Sonde Maintenance facility at Howdon Sondes require regular replacement and maintenance and location of a new building facility at provisionally at Howdon alongside our existing laboratory.	Yes	Yes	**Carried forward**
Northumbrian Water data processing Carried out process and reporting of river water quality data as a standalone company. This would consist of a server and data processing and rep	Yes	Yes	**Carried forward**
Collaborative data processing Carry out collaborative data processing and sharing of river water sampling data with other water companies via combined project	Yes	Yes	**Carried forward**

One option was carried forward for monitoring, one option for a maintenance facility, and two options for data processing and reporting.

3.1.3 Options Development

Monitoring Compliance

Detailed MCERTS guidance has yet to be released for the monitoring of emergency overflow operation at SPS and certified FPF overflow operation and FPF monitoring. We have therefore engaged with internal and external experts to make sure our costs best reflect the anticipated requirements, especially with respect to civils.

For monitors to be installed on emergency overflows at SPS, we have identified 319 pipe diameters to enable an allocation to large or small. Where a large pipe diameter was allocated, that site has a by-pass arrangement around the magflow meter chamber. A bypass is required on the larger sites where a rodding point is not feasible to provide the ability to isolate and depressurise the flow meter for inspection and maintenance. The 104 unidentified existing pipe diameters were allotted in proportion to the identified sites for each subgroup. The breakdown of sites is summarised in Table 15.

TABLE 15: U_MON6D PIPE ALLOCATION

Pipe diameter*	Total number of sites	Identified	Allotted
Small	229	172	57
Large	38	28	10
Small	144	110	34
Large	12	9	3

Note: *Small <= 300mm, Large >300mm

For MCERTS certified FPF monitoring we have made the following assumptions:

- The Certificate of Conformity is still valid for the U_MON3 installations and thus no extra civil, mechanical, or electrical works are required to achieve MCERTS certification.
- All U_MON4 AMP7 sites will be installed with MCERTS certification. Site visits have been carried out for all sites to make sure the scope accurately reflects requirements[12].
- For MCERTS certified WTW trade effluent monitoring (EPR_MON1), discussions have taken place with operational teams for ten of the sites to understand the power supply, gradient, telemetry and land availability issues. Based on the feedback from the works managers of the WTWs, magnetic flow monitors were proposed for laminar or smooth flows in the WTW sites, with the pipe diameters equal or slightly smaller to achieve the full-bore flow conditions. Warkworth, which was a late addition to the programme, has not yet been assessed.

Continuous Water Quality Monitoring

For the kiosk/pump option, we developed a list of scopes from our desktop assessments. Given the number of sites and to aid the scope development, we categorised the sites as being ‘easy’ or ‘difficult’:

- An 'Easy Site' is a secure site with good access, already NWL owned.

[12] PR24 Option Development Report: U_MON3, U_MON4 & EPR_MON1, Northumbrian Water, November 2022

- A 'Difficult Site' is located on land not owned by us, which requires provision for access paths, security fencing, third party liaison, working in flood plains among other constraints.

In the optioneering process we noted that:

- key challenges are land access and security;
- the instrumentation will require calibration once per month, equating to 103 sensors calibrated per day (end of AMP9); and
- the interpretation of 250,000 datapoints per day (end of AMP9) will be required.

3.2. BEST VALUE

As there is genuinely only one option for investigations, certification, installation, and maintenance, our plan is based on the least cost option. As we move into the delivery process, we will look at alternative locations for the siting of the monitor maintenance building and will conclude whether it is feasible to develop a central data processing facility.

We have carried out a benefits assessment for monitor installations using our value framework, which incorporates the Wider Environmental Outcomes Metrics[13] and is embedded into our portfolio optimisation tool, Copperleaf. Benefits are scored over time for a 30-year time horizon. Our benefits assessment is shown in Table 16 and the associated monetary values in Table 17 which are based on PR19 values. The investigation and installation of monitoring has benefits related to net zero. It is the resulting actions that we undertake following installation of monitoring which realise other environmental benefits. We have therefore not included these in this business case as we would be double counting.

TABLE 16: BENEFITS FOR EACH MONITORING DRIVER

Options carried forward	NWG Value framework measures	WINEP Wider Environmental Outcomes
Continue business as usual As is position	Embedded carbon emissions	Net zero
MCERTS certified FPF flow monitoring (U_MON4)	Embedded carbon emissions	Net Zero
MCERTs certified monitoring of emergency overflow operation MCERTs certified monitoring of emergency overflow operation (U_MON6)	Embedded carbon emissions Operational carbon emissions (where data available)	Net Zero
MCERTS certified WTW trade effluent monitoring	Embedded carbon emissions Operational carbon emissions (where data available)	Net Zero

[13] WINEP Wider Environmental Outcome Metrics V2.1, Environment Agency, April 2022

TABLE 17: RANGE OF BENEFITS IDENTIFIED FOR MONITORING COMPLIANCE & CONTINUOUS MONITORING

Value measures	Description	Unit	Value	WEO	Performance Commitment
Operational Carbon	t/CO2e /year	tCO2e	£256.2*	Net zero	Yes - GHG
Embedded Carbon	t/CO2e /year	tCO2e	£256.2*	Net zero	No

Note: *£ value per tonne of CO2e in 2025/26, annual increase (varying rate) reaching £378.6/t CO_2e in 2024/55

Table 18 and Table 19 show how the 'do nothing' and preferred option contribute against the regulatory obligations.

TABLE 18: PREFERRED SOLUTION FOR MONITORING COMPLIANCE

Option	Status	MCERTs certified monitoring of emergency overflow operation (U_MON6) Reason	MCERTS certified FPF overflow operation & flow monitoring (U_MON3 & 4) Reason	MCERTS certified WTW trade effluent monitoring (EPR_MON1) Reason
1	Continue business as usual	Do Nothing – Does not meet statutory obligation	Do Nothing – Does not meet statutory obligation	Do nothing – not compliant with AMP8 driver
2	Preferred Solution	MCERTS certified monitoring of emergency overflow operation on network SPS • compliant with AMP8 driver • contribute to align with Environment Act 2021 requirements to monitor and report on the operation of storm overflows • contribute to monitoring to MCERTS standard to improve the accuracy of the reported data • contribute to improve understanding of emergency overflow operation and improve transparency and public confidence in the data	Obtain MCERTS certification, and install MCERTS certification flow monitoring and increase flow monitoring data recording frequency • compliant with AMP8 driver • contribute to the delivery of WFD objectives of Good Ecological Status (GES) in receiving water bodies • contribute to the 25 Year Environment Plan objectives • contribute to ensuring that the Urban Wastewater Treatment Regulations (UWWTR) 1994 requirements • contribute to the delivery of outcomes from the Storm Overflows Taskforce	Install MCERTS certification flow monitoring • compliant with AMP8 driver • contribute to the delivery of WFD objectives of Good Ecological Status (GES) in receiving water bodies • contribute to the 25 Year Environment Plan objectives

TABLE 19: PREFERRED SOLUTION FOR RIVER WATER QUALITY MONITORING

Option	Status	Investigations Estuarine, Coastal and Inland Complex (EnvAct INV 1,2,3) Reason	Monitoring Estuarine, Inland and Inland Complex ENVAct MON 1,2,4) Reason	Reporting (ENVAct MON 5) Reason
1	Continue business as usual	Do Nothing – Does not meet statutory obligation	Do Nothing – Does not meet statutory obligation	Do nothing – not compliant with AMP8 driver
2	Preferred Solution	Investigations: • compliant with AMP8 driver • Contribute to informing the optimum solution to monitor estuarine, coastal and inland complex water bodies • contribute to align with Environment Act 2021 requirements to monitor and report on the impact of operation assets upon the environment	Monitoring: • compliant with AMP8 drivers • contribute to align with Environment Act 2021 requirements to monitor and report on the impact of operation assets upon the environment • contribute to the delivery of WFD objectives of Good Ecological Status (GES) in receiving water bodies • contribute to the 25 Year Environment Plan objectives	Reporting: • compliant with AMP8 driver • contribute to align with Environment Act 2021 requirements to monitor and report on the impact of operation assets upon the environment • contribute to the delivery of WFD objectives of Good Ecological Status (GES) in receiving water bodies • contribute to the 25 Year Environment Plan objectives

3.2.1 Cost benefit appraisal to select preferred option

We have carried out a robust cost benefit appraisal within our portfolio optimisation tool which compares our 'do nothing' option against our single option. This calculates a net present value (NPV) over 30 years in accordance with the PR24 Guidance. The ratio is calculated by dividing the present value of the profile of benefits by the present value of the profile of costs over the appraisal period of 30 years.

Costs and benefits have been adjusted to 2022/23 prices using the CPIH Index financial year average. The impact of financing is included in the benefit to cost ratio calculation. Capital expenditure has been converted to a stream of annual costs, where the annual cost is made up of depreciation/RCV run-off costs and allowed returns over the life of the assets. Depreciation (or run-off) costs are calculated using the straight-line depreciation over the appraisal period. To discount the benefits and costs over time, we have used the social time preference rate as set out in HM Treasury's *The Green Book*[14].

All options selected are the least cost options that meet the statutory requirements. The output of this assessment and the NPVs are included in Table 20 and Table 21.

[14] The Green Book, HM Treasury, 2022)

TABLE 20: BENEFIT TO COST RATIO AND SELECTED OPTIONS MONITORING COMPLIANCE

Driver	Option	NPV 30 years £m	Type of option
U_MON3	MCERTS certified FPF overflow operation monitoring at STW or last in line SPS overflows – 149 sites	-0.9259	Preferred option
U_MON4	MCERTS certified FPF flow monitoring at STW or last in line SPS overflows – 155 sites	-7.188	Preferred option
U_ MON6	Install MCERTS certified EDM Monitors with civils modifications – 597 sites (over AMP8 and 9)	-105.093	Preferred option
EPR_MON1	MCERTS Monitoring for WTW with trade effluent discharges – 11 sties	-1.404	Preferred option

TABLE 21: BENEFIT TO COST RATIO AND SELECTED OPTIONS CONTINUOUS WATER QUALITY MONITORING

Driver	Option	NPV 30 years £m	Type of option
EnvAct INV1	Investigations - Estuarine (by mid AMP8)	-0.299	Preferred option
EnvAct INV3	Investigations - Coastal (by mid AMP8)	-0.299	Preferred option
EnvAct INV2	Investigations - Inland Complex (by mid AMP8)	-0.299	Preferred option
EnvAct MON2&4	Monitoring Installation - Inland and Inland Complex (by end of AMP8) – 1,048 sites (807 'difficult' sites, 241 'easy' sites)	-129.308	Preferred option
EnvAct MON1	Monitoring Installation - Estuarine (by end of AMP8) - 139 sites (107 difficult sites, 32 easy sites)	-40.879	Preferred option
EnvAct MON5	Software platform / data serve - Publish Water Quality Monitoring Data (by mid AMP8) r	-0.443	Preferred option
EnvAct MON1-5	Laboratory installation and operation	-1.420	Preferred option

The benefits and investment for our preferred option for monitoring are included in Table 22 and Table 23. We will continue to refine the profiling of benefits and expenditure as we continue to work with our strategic delivery partner to carry out further design work and optimisation of the programme for delivery.

TABLE 22: INPUTS FOR TABLE CWW15 – BENEFITS BEST VALUE OPTION

EA/NRW environmental programme	Benefit	Units	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	Total
Flow monitoring at STWs	Embedded carbon	t/CO2e		149.540					
Trade effluent discharge flow monitoring	Operational carbon	t/CO2e		1.84	1.86	1.82	1.76	1.74	8.46
	Embedded carbon	t/CO2e		121.38					
MCERTs monitoring at emergency SPS overflows	Embedded carbon	t/CO2e		2503.170	1642.540	1642.540	1642.540	1231.910	8662.700
Continuous river water quality monitoring	Operational carbon	t/CO2e						720	720
	Embedded carbon	t/CO2e		4,856	3,769	3,769	3,769	2,827	18,990

TABLE 23: INPUTS FOR TABLE CWW3 AND CW3 - ENHANCED EXPENDITURE

EA/NRW environmental programme		2023/24 £m	2024/25 £m	2025/26 £m	2026/27 £m	2027/28 £m	2028/29 £m	2029/30 £m	Total £m
Flow monitoring at STWs UMON 3&4	Capex		4.342	2.567	-	-	-	-	6.908
	Opex		-	0.021	0.104	0.104	0.104	0.104	0.437
	Totex		4.342	2.588	0.104	0.104	0.104	0.104	7.345
Trade effluent discharge flow monitoring	Capex			1.424	-	-			1.424
	Opex			0.008	0.008	0.008	0.008	0.008	0.040
	Totex			1.432	0.008	0.008	0.008	0.008	1.472
MCERTs monitoring at emergency SPS overflows UMON6	Capex			22.701	22.701	22.701	22.701	22.701	113.503
	Opex				2.950	2.950	2.950	2.950	11.800
	Totex			22.701	25.651	25.651	25.651	25.651	125.305
Continuous river water quality monitoring (including INV)	Capex	-	-	20.836	26.137	25.477	25.439	25.439	123.328
	Opex	-	-	-	0.205	0.479	0.752	1.026	2.462
	Totex			20.836	26.342	25.956	26.191	26.465	125.79

3.3. THIRD PARTY FUNDING

No opportunities for third party funding have been identified for the installation of monitors because these are monitors which are either installed on our sites or in the river. We are continuing to explore the opportunity to develop a joint solution to processing and reporting of river water quality data with other water companies. This has not yet reached a point where we have a joint solution.

3.4. DIRECT PROCUREMENT FOR CUSTOMERS

We assessed the septic tanks programme against the direct procurement for customers (DPC) guidance (see our **assessment report**, NES38). This report initially concluded that this could be suitable for direct procurement for customers (DPC). This was because this was larger than the £200m whole-life totex threshold and is separable/discrete. We, among other companies, raised concerns that these monitors would be owned and operated by water companies – as these will be predominantly used to assess the compliance of water companies, and this does not appear to create a suitable arms-length arrangement. A DPC would have supported confidence from customers and communities that this was being reported accurately and robustly, and we suggested that data could be provided as Open Data – with water companies, the public, and the EA all receiving equal access to this data.

However, Ofwat's **updated technical discreteness guidance on DPC**, published on 3 July 2023, means that water quality monitoring is excluded from DPC under the programme scalability test. Therefore, our water quality monitoring programme is not eligible for DPC. We discuss this assessment further in **A6 – deliverability** (NES07). We still consider that Open Data is important for river water quality monitoring, to support confidence from customers and communities. We intend to publish this data under our **open data strategy** (NES76), once these monitors are installed.

3.5. CUSTOMER VIEWS INFORMING OPTION SELECTION

Our research shows that customers support investment in the environment, including wider environmental and social benefits – though they do not necessarily think they should always pay for this through their water and wastewater bills. In particular, our customers rank dealing with sewage effectively and improving the quality of rivers as two of their "medium" priorities (**prioritisation of common PCs**, NES44).

In our **qualitative affordability and acceptability testing** (NES49), customers supported our "preferred" plan which included these monitoring projects. Customers found this plan acceptable because it focused on the right things, is good for future generations, and is environmentally friendly. Customers who did not find this plan acceptable said that this was expensive, and water companies should pay out of their own profits. We did not ask specifically about monitoring (as our individual items were limited only to the largest investments), but customers supported maintaining rivers and reducing pollution (NES49). In our **quantitative research** (NES50), 74% of customers supported our preferred plan, including this investment. We will engage with our customers further on changes to our plans for river water quality monitoring under the new guidance (see section 2.3).

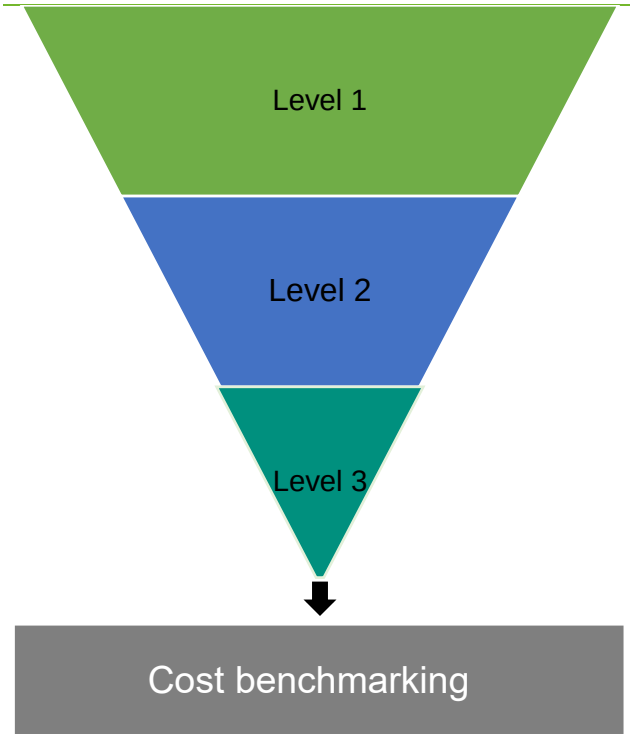
4. COST EFFICIENCY

4.1. APPROACH TO COSTING

4.1.1 Cost methodology

A full description of our costing methodology is contained in Appendix A3 - Costs (NES04). Figure 5 sets out our costing hierarchy.

FIGURE 5: PROCESS COST ESTIMATION



Level – 1 (confidence: - 50% to +100%)

Costing is carried using our costing curves. Costing occurs at an overall asset level. For example, package plant or a pumping for a certain population.

Level – 2 (confidence: - 50% to + 50%) –

Costing is carried out using our costing curves. Costing occurs for each of the main items of scope. For example, the length of rising main and the size of the pumps.

Level – 3 (confidence: - 20% to +30%)

Detailed bottom-up cost of all items taking into consideration factors such as ground conditions.

Cost benchmarking

We have benchmarked 3% of the U_MON4 options against the available cost curves from other companies.

Our costing has been carried out by our costing partners (Mott MacDonald) using our cost models. They have then been benchmarked against our costing partner's cost database and independently assured by PwC and internal audit as they have been loaded into data tables. Table 24 shows the level of costing certainty that has been applied to each of the drivers in this business case.

TABLE 24: COST LEVELS

Driver	Option	Costing Level	Source
U_MON3	MCERTS certified FPF overflow operation monitoring at STW or last in line SPS overflows – 149 sites	3	NWL costing tool
U_MON4	MCERTS certified FPF flow monitoring at STW or last in line SPS overflows – 155 sites	3	NWL costing tool
U_ MON6	Install MCERTS certified EDM Monitors with civils modifications – 597 sites (over AMP8 and 9)	2	NWL costing tool
EPR_MON1	MCERTS Monitoring for WTW with trade effluent discharges – 11 sties	2	NWL costing tool
EnvAct INV1,2 and 3	Continuous water quality monitoring investigations	1	Independently costed
EnvAct MON2&4	Monitoring Installation - Inland and Inland Complex (by end of AMP8) – 1,048 sites (807 'difficult' sites, 241 'easy' sites)	2	NWL costing tool
EnvAct MON1	Monitoring Installation - Estuarine (by end of AMP8) - 139 sites (107 difficult sites, 32 easy sites)	2	NWL costing tool
EnvAct MON5	Software platform / data serve - Publish Water Quality Monitoring Data (by mid AMP8)	1	NWL costing tool
EnvAct MON1-5	Laboratory installation and operation	2	NWL costing tool

For MCERTS certified FPF flow monitoring (U_MON4) all site options have Level 1 costs. An exercise was carried out to assess the cost confidence of these options by producing Level 2 costs for five higher value/complex sites. Our selection process for this cost exercise identified two sites without storm returns, process returns, or washwater with >£100k NPV, and three sites with storm return, process return or washwater requirements with >£150k NPV. The outcome of the Level 3 cost exercise resulted in a 15% to 30% reduction in total capex costs compared to the Level 1 cost.

4.1.2 Options providing cost efficiencies

We have identified two types of delivery efficiencies that we have considered in constructing the case, which are:

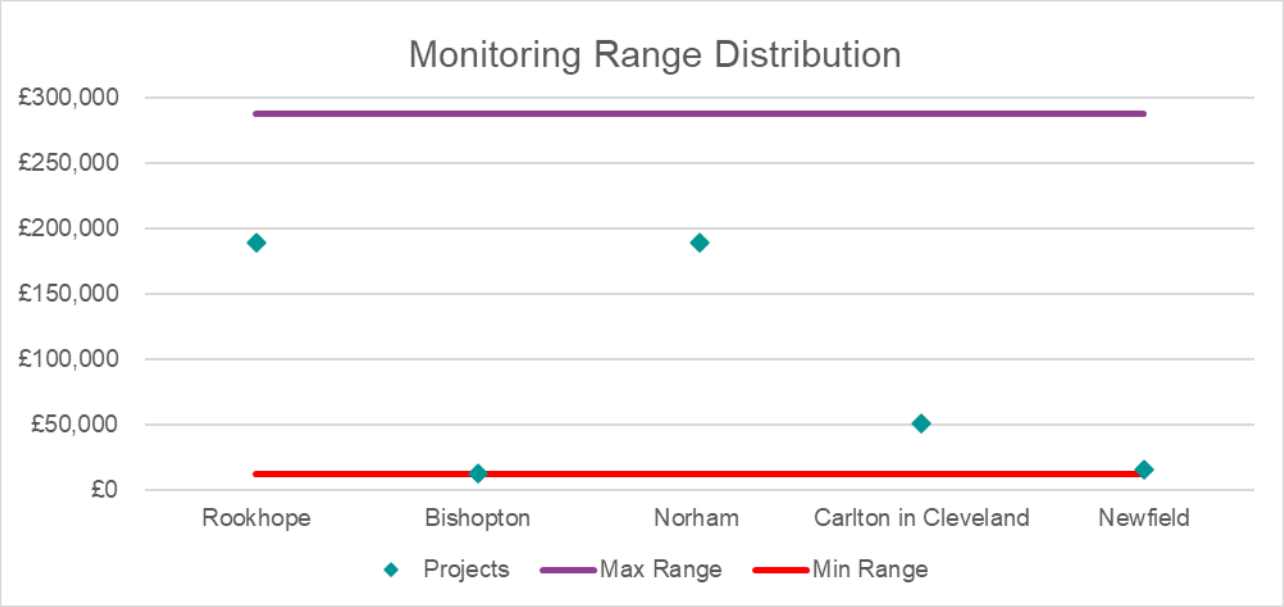
- the opportunity to replace monitors at the same time in a geographical area; and
- procurement efficiencies in bulk buying of monitors.

4.1.3 Cost benchmarking

For monitoring, we benchmarked five U_MON4 options to install MCERTs certified flow monitors against comparable water and wastewater companies and indirect costs against the cost curves for six other companies in our costing partner's database. The chosen projects were the ones that have been through a more robust bottom-up costing method at Level 2.

Figure 6 shows we have carried out the benchmark analysis at varying sizes within the range to compare against the industry position for these projects. Reviewing projects at varying ranges of value allows for interrogation of the costs produced at individual ranges of the curves and price data utilised in costing.

FIGURE 6: COST DISTRIBUTION RANGE



The benchmarking exercise compares the Northumbrian Water estimated costs against six comparable water and wastewater companies from England and Wales based on data provided by our independent delivery partner. A mean average of these companies has been used as the benchmark with a 25th percentile and 75th percentile provided as a suitable range.

The cost comparisons have been calculated using each company's latest cost curve database. This should provide a suitable comparison as we understand that these cost curve databases have been used to build up each company's PR24 submission. The costs generated by each cost curve are based on the sizing information included in each monitoring project estimate. The benchmarked costs have been adjusted for inflation using CPIH[15] and have a price base of Q2 2022.

For U_MON4 Monitoring our costing partner has benchmarked where it is possible to carry out an equitable comparison and this ranges between four and two other companies depending on the asset type, as shown in Table 25. A mean average of these companies has been used as the benchmark with a 25% percentile and 75% percentile provided as a suitable range.

[15] The Consumer Price Index, including owner occupiers' housing costs (Office for National Statistics)

TABLE 25: NUMBER OF COMPARATORS USED FOR BENCHMARK

Scope item analysed	Comparators used for benchmark	Data points per curve	Total data points per benchmarked item
NWL SDD Manhole	2	119	238
Ducts and Draw Pits	3	250	750
Cabling	3	1	3
Pumping Station	3	42	126
Cabling Tray	5	1	5
In-trench pipework	1	3249	3249
Access cover	3	1410	4230
Flow Control device	1	1	1
Storm outfall	1	1	1
Telemetry	1	1	1
Total			**8,604**

We have benchmarked on direct costs which are directly attributable to the project such as plant, labour, material, and equipment and on indirect costs which are related to design, site setup, professional support, and other costs not directly related to the construction aspect of a project. Our indirect costs have been bench marked as 63.4% of direct costs 10.46% below the industry average as we describe in our appendix **A3 - Costs** (NES04)

Table 26 shows that we are on average 8% below the benchmark. Newfield is slightly outside of the 75th percentile range due to the cost of the flow control device. On a small project like this, there is a higher cost volatility on individual assets compared to a larger project.

TABLE 26: BENCHMARK OF DIRECT COSTS FOR U_MON4

Investment	Option type		Northumbrian £	Benchmark £	25%ile £	75%ile £	Delta* £	Delta %**
Rookhope	MCERTS certified monitors	FFT	£187,281	£208,894	£159,588	£250,660	-£21,615	-10%
Bishopton	MCERTS certified monitors	FFT	£12,093	£13,079	£7,070	£16,758	-£986	-8%
Norham	MCERTS certified monitors	FFT	£188,036	£196,966	£152,864	£233,189	-£8,930	-5%
Carlton in Cleveland	MCERTS certified monitors	FFT	£50,310	£63,111	£52,201	£77,883	-£12,802	-20%
Newfield	MCERTS certified monitors	FFT	£15,855	£11,313	£8,269	£10,289	£4,542	40%
Total			**£453,575**	**£379,992**			**-£39,791**	**-8%**

Notes: * Delta = Northumbrian – Benchmark
** Delta % = Delta ÷ Benchmark

In addition to benchmarking of direct asset costs, we conducted an analysis of client and contractor indirect costs, comparing our own project and contract overheads to data provided by six comparator water companies. A larger number of comparator companies is available for indirect costs than for direct costs. Table 27 shows that our indirect costs are calculated as 63% of direct costs, which is 10% below the industry benchmark.

TABLE 27: BENCHMARK OF INDIRECT COSTS

Indirect cost type	Northumbrian cost	Benchmark cost	Delta
Total Contractor Indirect	37%	48%	-11%
Total Client Indirect	27%	26%	1%
Total Project Indirect	63%	74%	-10%

Table 28 shows that when direct and indirect costs are combined, we are 14% below the cost benchmark.

TABLE 28: SUMMARY FOR MONITORING INCLUDING INDIRECT COSTS

Investment name	Option type	Northumbrian	Benchmark	Delta*	Delta %**
Rookhope	MCERTS certified FFT monitors	£306,017	£363,183	-£57,166	-16%
Bishopton	MCERTS certified FFT monitors	£19,760	£22,739	-£2,979	-13%
Norham	MCERTS certified FFT monitors	£307,252	£342,445	-£35,193	-10%
Carlton in Cleveland	MCERTS certified FFT monitors	£82,207	£109,725	-£27,518	-25%
Newfield	MCERTS certified FFT monitors	£25,907	£19,669	£6,238	32%
Total		**£741,142**	**£857,761**	**-£116,618**	**-14%**

Notes: * Delta = Northumbrian – Benchmark
** Delta % = Delta ÷ Benchmark

4.1.4 Factors affecting cost allowance

There are no specific factors which are unique to Northumbrian Water.

4.1.5 Transitional spend

We have included transitional expenditure for MCERTS certified FPF flow monitoring at STW or “last in line” SPS overflows (U_MON4) as they need to be delivered in 2025, to meet the obligation no later than December 2026.
The FPF monitoring installation and MCERTS certification is required as early as possible in PR24. We have therefore included £4.342m in 2024-25 for this line (CWW12.4).

As required under Ofwat's methodology, this is eligible for transition funding because:

- There is sufficient and convincing evidence to justify the early start (that is, these need to be delivered as early as possible in AMP8, see section 2).
- The investment has early statutory deadlines in the next price control period.
- The expenditure relates to statutory requirements in WINEP.

5. CUSTOMER PROTECTION

5.1. PERFORMANCE COMMITMENT

There are no performance commitments which provide customer protection for the installation of monitoring for:

- compliance monitoring of overflows at STW or last in line SPS;
- compliance monitoring of emergency overflow operation on network SPS;
- compliance monitoring of trade effluent discharges from WTW; and
- continuous river water quality monitoring.

However, the ability of STW and SPS to monitor flow is likely to lead to an increase in the number of detectable pollutions and more accurate measurement of spills under the storm overflows performance commitment.

The ability of the STW to treat load will be covered under the discharge permit compliance (numeric) metric which is a common performance commitment. This measure is based on the calendar year and has an underperformance payment should the commitment not be achieved.

Compliance against flow permit measures is not currently covered by a performance commitment but will become a statutory requirement which will form part of the EA's environmental performance assessment during AMP8, leaving the company open to prosecution should they fail to meet statutory requirements.

Installation of MCERTS certified monitoring is covered under permit requirement for each pumping station. Annual EDM, emergency overflow and storm overflow reporting requirements are part of EPR permit condition therefore providing protection to customers.

There are no third-party funding arrangements.

5.2. PRICE CONTROL DELIVERABLE

Our approach to determining Price Control Deliverables (PCD) is outlined in Section 12.3 of **A3 – Costs** (NES04). In Table 29, we assess our monitoring related enhancements to test if the benefits are linked to performance commitments, against Ofwat's materiality of 1%, and to understand if there are outcome measures that can be used. Our assessment has highlighted that the benefits we expect to deliver through our AMP8 WINEP programme will not be measured through performance commitments. Therefore, we propose a PCD to make sure customers are protected through delivery of our WINEP programme.

TABLE 29: ASSESSMENT OF BENEFITS AGAINST THE PCD CRITERIA

Enhancement scheme	Benefits linked to PC?	Materiality	Possible outcomes?
Wastewater WINEP – monitoring (NES30)	Pass – benefits are environmental or investigations	Pass – 9.4%	• Outcome difficult to measure effectively - monitoring • Customers could be protected through an output measure based on delivery of schemes

Our WINEP programme is set by the EA, which determines the statutory and non-statutory investments we should make. The EA assures that WINEP actions are delivered to the agreed timeframe, and environmental obligations are met. We therefore propose a PCD that makes sure that costs are returned to customers either where the EA has decided that a project is no longer required, or where we have not delivered to the agreed timeframe and/or environmental obligations have not been met (according to the EA). A summary of our PCD for WINEP programme delivery is outlined in Table 30.

TABLE 30: SUMMARY OF THE PRICE CONTROL DELIVERABLE FOR OUR WINEP PROGRAMME DELIVERY TO PROTECT CUSTOMERS

Description of price control deliverable	**Delivery of WINEP projects as specified in our WINEP enhancement cases** (NES17, NES18, NES19, NES28, NES29, NES30, NES31, NES34).
Measurement and reporting	We will report on the delivery of WINEP projects at the next price review (PR29), including specifying the individual projects that have been delivered, not delivered, or that the EA has decided are no longer required (under the EA's WINEP alterations process). This is in addition to the WINEP guidance which specifies how we will need to report progress against delivery of the WINEP actions and tracking and reporting WINEP delivery in a transparent and auditable manner.
Conditions on allowance	Projects must be delivered to the specification agreed with the EA under WINEP.
Assurances	The EA will confirm that WINEP actions have been delivered to the agreed timeframe, and that environmental obligations have been met. As set out in the WINEP Guidance[16], there will be regular liaison between water companies and the EA to discuss progress, risks and issues associated with the delivery of the WINEP programme and to identify any alterations. The EA uses the WINEP measures sign-off, technical review and audit guidance for assurance that the environmental obligations as set out in the WINEP are completed as planned.
Price control deliverable payment rate	We will return funds back to customers for individual projects, as specified in Table 2 and (for NES30) – 4 individual schemes are to be delivered by the dates specified. The completion rate for monitoring will take account of how many monitors have been installed compared to the number of monitors agreed with the EA in the final plan.
Impact on performance in relation to performance commitments	None

[16] Water industry national environment programme (WINEP) methodology, Environment Agency, 2023

We propose a single PCD for most of our WINEP programme delivery (with the exception of storm overflows). This should:

- Be set according to individual project costs, rather than a “per project” unit cost. This is because these costs vary considerably, and a single rate would create an incentive to deliver more of the cheapest projects (at the expense of more expensive projects). Ofwat’s guidance in IN23/05 identifies this incentive and expects us to set out scheme level deliverables where costs vary significantly across schemes (so our approach here is consistent with the guidance).
- Not include an automatic penalty for non-delivery (beyond returning the costs to customers). This is because this PCD includes projects where the EA has decided these are no longer required, which should not lead to a penalty. If we did not deliver a project that is required (and where we had not agreed a change with the EA), we would not meet our statutory obligations and so this does not require an extra incentive to deliver.
- Change according to the EA’s WINEP alterations process. In 2020-25, our ODI for WINEP delivery does not automatically take into account projects that are removed from WINEP by the EA – but this should be for the EA to determine. Costs should be returned to customers for projects that are not required, without further interventions needed from Ofwat.

This is an aggregated PCD across all our WINEP schemes except for storm overflows. We chose to aggregate these PCDs because most of our WINEP enhancement cases or projects would not be individually material, and these share the same reporting, assurance, and conditions.

APPENDIX A: PR24 LIST OF SITES (MONITORING COMPLIANCE)

TABLE 31: LIST OF SITES

No.	Sites	WFD Management Catchment	WFD Operational Catchment	U_MON3 (149 Needs)	U_MON4 (155 Needs)	U_MON6 (5 of 597 Needs)
1	Aldbrough STW	Tees	Tees Middle	X	X	
2	Aldin Grange (Bear Park) STW	Wear	Browney	X	X	
3	Allendale STW	Tyne	Allen	X	X	
4	Alnmouth STW	Northumberland Rivers	Aln	X	X	
5	Alnwick STW	Northumberland Rivers	Aln	X	X	
6	Amble STW	Northumberland Rivers	Lyne and Druridge Bay Coast	X	X	
7	Aycliffe STW	Tees	Skerne	X	X	
8	Bardon Mill STW	Tyne	South Tyne Lower	X	X	
9	Barkers Haugh STW	Wear	Wear Lower and Estuary	X	X	
10	Barnard Castle STW	Tees	Tees Middle	X	X	
11	Barton STW	Tees	Tees Middle	X	X	
12	Belford STW	Northumberland Rivers	Berwick to Alnmouth Coast	X	X	
13	Bellingham STW	Tyne	North Tyne Upper	X	X	
14	Belmont STW	Wear	Wear Lower and Estuary	X	X	
15	Berwick STW	Tweed	Tweed River	X	X	
16	Billingham STW	Tees	Tees Lower and Estuary	X	X	
17	Birtley STW	Tyne	Tyne Lower and Estuary	X	X	
18	Bishop Auckland (Vinovium) STW	Wear	Wear Lower and Estuary	X	X	
19	Bishop Middleham STW	Tees	Skerne	X	X	
20	Bishopton STW	Tees	Tees Lower and Estuary	X	X	
21	Blanchland STW	Tyne	Derwent Tyne	X	X	
22	Blyth STW	Northumberland Rivers	Blyth	X	X	X
23	Blyth STW	Northumberland Rivers	Blyth	X	X	
24	Blyth STW	Northumberland Rivers	Blyth	X	X	
25	Boulmer STW	Northumberland Rivers	Aln	X	X	
26	Bowburn STW	Wear	Wear Lower and Estuary	X	X	
27	Bowes STW	Tees	Tees Middle	X	X	
28	Bran Sands - Cargo Fleet CSO at Cargo Fleet SPS	Tees	Tees Lower and Estuary		X	
29	Bran Sands - Middlebeck CSO at Cargo Fleet SPS	Tees	Tees Lower and Estuary		X	

No.	Sites	WFD Management Catchment	WFD Operational Catchment	U_MON3 (149 Needs)	U_MON4 (155 Needs)	U_MON6 (5 of 597 Needs)
30	Bran Sands STW (Municipal)	Tees	Tees Lower and Estuary	X	X	
31	Bran Sands STW (Municipal)	Tees	Tees Lower and Estuary	X	X	
32	Bran Sands STW (Municipal)	Tees	Tees Lower and Estuary	X	X	
33	Bran Sands STW (Municipal)	Tees	Tees Lower and Estuary	X	X	
34	Bran Sands STW (Municipal)	Tees	Tees Lower and Estuary		X	
35	Brancepeth STW	Wear	Wear Lower and Estuary	X	X	
36	Broomhaugh STW	Tyne	Tyne Upper	X	X	
37	Browney STW	Wear	Browney	X	X	
38	Butterknowle STW	Wear	Gaunless	X	X	
39	Butteryhaugh STW	Tyne	North Tyne Upper	X	X	
40	Cambois STW	Northumberland Rivers	Blyth	X	X	
41	Carlton and Redmarshall STW	Tees	Tees Lower and Estuary	X	X	
42	Carlton in Cleveland STW	Tees	Leven Northumbria	X	X	
43	Cassop STW	Wear	Wear Lower and Estuary	X	X	
44	Chester Le Street STW	Wear	Wear Lower and Estuary	X	X	
45	Chilton Lane STW	Tees	Skerne	X	X	
46	Cockfield STW	Wear	Gaunless	X	X	
47	Consett STW	Tyne	Derwent Tyne	X	X	
48	Cotherstone STW	Tees	Tees Upper	X	X	
49	Cramlington STW	Northumberland Rivers	Blyth	X	X	
50	Crookhall STW	Wear	Browney	X	X	
51	Dipton STW	Tyne	Derwent Tyne	X	X	
52	Dunstan STW	Northumberland Rivers	Berwick to Alnmouth Coast	X	X	
53	East Tanfield STW	Tyne	Tyne Lower and Estuary	X	X	
54	Edmondsley STW	Wear	Wear Lower and Estuary	X	X	
55	Eppleby STW	Tees	Tees Middle	X	X	
56	Esh Winning STW	Wear	Browney	X	X	X
57	Felton STW	Northumberland Rivers	Coquet Lower	X	X	
58	Fir Tree STW	Wear	Wear Middle	X	X	
59	Fishburn STW	Tees	Skerne	X	X	
60	Fourstones STW	Tyne	South Tyne Lower	X	X	
61	Frosterley STW	Wear	Wear Upper	X	X	

No.	Sites	WFD Management Catchment	WFD Operational Catchment	U_MON3 (149 Needs)	U_MON4 (155 Needs)	U_MON6 (5 of 597 Needs)
62	Gainford STW	Tees	Tees Middle	X	X	
63	Garrigill STW	Tyne	South Tyne Upper		X	
64	Great Ayton STW	Tees	Leven Northumbria	X	X	
65	Great Broughton STW	Tees	Leven Northumbria	X	X	
66	Greatham STW	Tees	Tees Lower and Estuary	X	X	
67	Haggerston Castle STW	Northumberland Rivers	Berwick to Alnmouth Coast	X	X	
68	Haltwhistle STW	Tyne	South Tyne Lower	X	X	
69	Hamsterley STW	Wear	Wear Middle	X	X	
70	Hawthorn STW	Wear	Seaham Peterlee Coast	X	X	
71	Haydon Bridge STW	Tyne	South Tyne Lower	X	X	
72	Heddon on the Wall STW	Tyne	Tyne Lower and Estuary	X	X	
73	Hendon STW	Wear	Wear Lower and Estuary	X	X	
74	Hepscott STW	Northumberland Rivers	Blyth	X	X	
75	Hexham STW	Tyne	Tyne Upper	X	X	
76	Holy Island STW	Northubria TraC	Northubria TraC	X	X	
77	Horden STW	Wear	Seaham Peterlee Coast	X	X	
78	Howdon STW	Tyne	Tyne Lower and Estuary	X	X	
79	Humshaugh STW	Tyne	North Tyne Lower	X	X	
80	Hustledown STW	Wear	Wear Lower and Estuary	X	X	
81	Hutton Rudby STW	Tees	Leven Northumbria	X	X	
82	Ingleby Greenhow STW	Tees	Leven Northumbria	X	X	
83	Kelloe STW	Wear	Wear Lower and Estuary	X	X	
84	Kirklevington STW	Tees	Tees Lower and Estuary	X	X	
85	Knitsley STW	Wear	Browney	X	X	
86	Lanchester STW	Wear	Browney	X	X	
87	Lockhaugh STW	Tyne	Derwent Tyne	X	X	
88	Longhorsley STW	Northumberland Rivers	Coquet Lower	X	X	
89	Longnewton STW	Tees	Tees Lower and Estuary	X	X	
90	Low Wadsworth STW	Wear	Wear Middle	X	X	
91	Low Worsall STW	Tees	Tees Lower and Estuary		X	X
92	Lowick STW	Northumberland Rivers	Berwick to Alnmouth Coast	X	X	
93	Lynemouth STW	Northumberland Rivers	Lyne and Druridge Bay Coast	X	X	
94	Marske STW	Tees	Saltburn Coast	X	X	
95	Melsonby STW	Tees	Tees Middle	X	X	
96	Mickleton STW	Tees	Tees Upper	X	X	

No.	Sites	WFD Management Catchment	WFD Operational Catchment	U_MON3 (149 Needs)	U_MON4 (155 Needs)	U_MON6 (5 of 597 Needs)
97	Middleton-in-Teesdale STW	Tees	Tees Upper	X	X	
98	Milfield STW	Till	Till River	X	X	X
99	Moorsholm STW	Tees	Saltburn Coast	X	X	
100	Morpeth STW	Northumberland Rivers	Wansbeck	X	X	
101	Nenthead STW	Tyne	South Tyne Upper	X	X	
102	New Moors STW	Wear	Gaunless	X	X	
103	Newbiggin STW	Northumberland Rivers	Lyne and Druridge Bay Coast	X	X	
104	Newfield STW	Wear	Wear Lower and Estuary	X	X	
105	Norham STW	Tweed	Tweed River	X	X	
106	Otterburn STW	Tyne	Rede	X	X	
107	Pegswood STW	Northumberland Rivers	Wansbeck	X	X	
108	Pity Me STW	Wear	Wear Lower and Estuary	X	X	
109	Plawsworth STW	Wear	Wear Lower and Estuary	X	X	
110	Powburn STW	Till	Till River	X	X	
111	Ramshaw STW	Wear	Gaunless	X	X	
112	Romaldkirk STW	Tees	Tees Upper	X	X	
113	Rookhope STW	Wear	Wear Upper	X	X	
114	Rothbury STW	Northumberland Rivers	Coquet Lower	X	X	
115	Sacriston STW	Wear	Wear Lower and Estuary	X	X	
116	Sadberge STW	Tees	Skerne	X	X	
117	Seaham STW	Wear	Seaham Peterlee Coast	X	X	
118	Seahouses STW	Northumberland Rivers	Berwick to Alnmouth Coast	X	X	
119	Seahouses STW	Northumberland Rivers	Berwick to Alnmouth Coast	X	X	
120	Seaton Carew STW	Tees	Tees Lower and Estuary	X	X	
121	Sedgefield STW	Tees	Tees Lower and Estuary	X	X	
122	Sedgeletch STW	Wear	Wear Lower and Estuary	X	X	
123	Sherburn STW	Wear	Wear Lower and Estuary	X	X	
124	Sherburn STW	Wear	Wear Lower and Estuary	X	X	
125	Shilbottle STW	Northumberland Rivers	Coquet Lower	X	X	
126	Skinningrove STW	Tees	Saltburn Coast	X	X	
127	Slaley STW	Tyne	Tyne Upper	X	X	
128	Snitter (&Thropton) STW	Northumberland Rivers	Coquet Upper	X	X	
129	Staindrop STW	Tees	Tees Middle	X	X	

No.	Sites	WFD Management Catchment	WFD Operational Catchment	U_MON3 (149 Needs)	U_MON4 (155 Needs)	U_MON6 (5 of 597 Needs)
130	Stamfordham STW	Northumberland Rivers	Pont	X	X	
131	Stanhope STW	Wear	Wear Upper	X	X	
132	Stokesley STW	Tees	Leven Northumbria	X	X	
133	Stressholme STW	Tees	Skerne	X	X	
134	Sunderland Bridge STW	Wear	Wear Lower and Estuary	X	X	
135	Swainby STW	Tees	Leven Northumbria	X	X	
136	Togston STW	Northumberland Rivers	Lyne and Druridge Bay Coast	X	X	
137	Tow Law STW	Wear	Wear Middle	X	X	
138	Trimdon STW	Tees	Skerne	X	X	
139	Tudhoe Mill STW	Wear	Wear Lower and Estuary	X	X	
140	Ulgham STW	Northumberland Rivers	Lyne and Druridge Bay Coast	X	X	
141	University STW	Wear	Wear Lower and Estuary	X	X	
142	Wall STW	Tyne	North Tyne Lower	X	X	
143	Wark STW	Tyne	North Tyne Lower	X	X	
144	Washington STW	Wear	Wear Lower and Estuary	X	X	
145	West Rainton (Leamside) STW	Wear	Wear Lower and Estuary	X	X	
146	West Woodburn STW	Tyne	Rede	X	X	
147	Western Area STW	Wear	Wear Upper	X	X	
148	Whalton STW	Northumberland Rivers	Pont	X	X	
149	Whittingham STW	Northumberland Rivers	Aln	X	X	
150	Whorlton STW	Tees	Tees Middle	X	X	
151	Willington STW	Wear	Wear Lower and Estuary	X	X	
152	Windlestone STW	Tees	Skerne	X	X	
153	Winston STW	Tees	Tees Middle		X	
154	Witton Gilbert STW	Wear	Browney	X	X	
155	Wooler STW	Till	Till River	X	X	X

TABLE 32: U_MON 6 SITE LIST (597)

U_MON6 sites					
Acklam Street Middlesbrough WWP	Christon Bank WWP	Golden Lion WWP	Malvern Drive Stokesley WWP - Meter 2	Richard Street Langbaurgh WWP	Tanfield Lea WWP
Acklington Prison WWP	Church Lane Guisborough WWP	Golf Course Road WWP	Manor Farm Egglescliffe WWP	Ridge Estate WWP	Teal Farm WWP
Acomb WWP	Clara Vale WWP	Gordon Terrace WWP	Manor Quay WWP	Riding Mill Village WWP	Tees Bridge WWP
Acreford Court Guidepost WWP	Cleadon Village WWP	GRANVILLE TERRACE CSO, ADJ JUNC GRANVILLE TERR/LORD ST, REDCAR, CLEVELAND	Marchlyn Crescent WWP	Ridley Street Blyth WWP	Teesside High School WWP - Meter 1
Aislaby Quay WWP	Cleasby WWP - Meter 1	Greencroft Gorecock Lane WWP	Margrove Park WWP	Riversdale Way WWP	Teesside High School WWP - Meter 2
Aislaby Road WWP	Cleasby WWP - Meter 2	Greencroft Mowlems WWP	Marine Drive WWP	Riverside Amethyst WWP	Temple House WWP
Aldbrough St Johns WWP	Cleasewell Hill WWP	Greenhead Coach House WWP	Market Dock WWP	RIVERSIDE DEVT.PUMP STN, CHESTER LE STREET, CO. DURHAM	THE BOATHOUSE PS, NEWBURN, NEWCASTLE-UPON-TYNE
Alnmouth WWP	Cleveland Ind Est WWP	GREENLEAS PUMPING STATION	Marske Bydale WWP	Rose Cottage WWP	THE FENS ESTATE SPS, HOW END ROAD, THE FENS, HARTLEPOOL
Alston WWP	Clockwood Stockton WWP	Greenways Spennymoor WWP	MATFEN PUMPING STATION E, MATFEN	Rothbury Aln D C WWP	The Hills Stockton Storm WWP
Amble Harbour WWP	Coach Lane Benton WWP	Greystones WWP	MATFEN PUMPING STATION F, MATFEN	Royal Quays WWP	The Ings Redcar WWP
Anick Grange WWP	Cockfield WWP	Gut Road WWP	Meadow Grange WWP	Runnymede Road No1 WWP	The Larches Bardon Mill WWP
Applethwaite Gdn Church Hill WWP	Copeland Row Wear WWP	Hadston WWP	Meadow Vale WWP	Runnymede Road No2 WWP	The Larches Hexham WWP
Ashington Business Park WWP	Cornfield Road Stockton WWP	Hallwood Close WWP	Meadowdale Chilton WWP	Rushyford WWP - Meter 1	The Leas WWP
Ashwood Park WWP	Cornforth Lane WWP	Hamsterley Mill WWP	Metal Bridge WWP	Rushyford WWP - Meter 2	THE ROPERY P.S., ST PETERS BASIN, NEWCASTLE UPON TYNE

U_MON6 sites

Atlas Wynd Yarm WWP	Cornhill on Tweed WWP	Hardwick Camp WWP - Meter 1	Metro Centre Gateshead WWP	Sadberge East WWP	The Stanners Warkworth WWP
Atlee Terrace WWP	Coronation Street WWP	Hardwick Camp WWP - Meter 2	Middlesbrough Road WWP	Salisbury Road WWP	THE STRAY STORM SEWAGE RETENTION TANK
Aycliffe Village WWP - Meter 1	Cotehill Drive WWP	Harraton WWP	Middleton Hall WWP	Saltburn WWP	THE WYND PUMPING STATION EO, AMBLE, NORTHUMBERLAND
Aycliffe Village WWP - Meter 2	Cowpen Bewley Billingham WWP	Harrowgate Hill Mayfair WWP	Milburn Park Ashington WWP	Saltmeadows WWP	Thorntons Close WWP
Ballast Hill WWP	Cox Green WWP	Harrowgate Hill Whessoe WWP	Milk Market WWP	SCEMERSTON NO. 2 SPS	Thorpe Street Hartlepool WWP - Meter 1
Bamburgh The Wyndings WWP	Coxhoe Paradise Farm WWP	Hartford Bridge WWP	MILLFIELD CSO	Scotswood Road No1 WWP	Thorpe Street Hartlepool WWP - Meter 2
Bamburgh WWP	Craghead WWP	HARTLEPOOL RENAISSANCE DEVT, JACKSON DOCK, HARTLEPOOL, CLEVELAND	MONARCH RD/AMETHYST RD, NEWCASTLE BUSINESS PARK, NEWCASTLE UPON TYNE	Scotswood Road No2 WWP	Thorpe Thewles WWP - Meter 2
Barrington Park WWP	Craster North WWP	Hartley Caravan Site WWP	Montalbo Road WWP	Scotswood Road No3 WWP	Thorpe Thewles WWP - Meter 1
Bayard Woods WWP	Craster South WWP	Harton Low Staithes WWP	Morpeth Road WWP	Scotswood Road No4 WWP	Thropton Snitter Terminal WWP - Meter 2
BEACON AVENUE SPS	Crathorne Hambleton WWP	HAUGH LANE IND.EST., HEXHAM, NORTHUMBERLAND	NEASHAM EJECTOR STATION SPS	Scremerston No 1 South WWP	Thropton Snitter Terminal WWP - Meter 1
Beacon Lane Sedgefield WWP	Cresswell Caravan Park (OOS) WWP	Headlam WWP	NEASHAM ROAD PUMPING STATION	Scremerston No 2 North WWP	Throstles Nest WWP
Beadnell Car Park WWP	Cresswell Village WWP	Hebburn Riverside WWP	NEASHAM ROAD PUMPING STATION STRAIT LANE STRAWBERRY COTTAGE	Seaham Hall WWP	Thurlow Grange WWP

U_MON6 sites

Beadnell Harbour WWP	Crimdon Dene WWP	Hebburn Village WWP	NEPTUNE YARD PUMPING STATION, NO.1 OUTFALL, NEWCASTLE-UPON-TYNE	Seahouses Harbour WWP	Tilery Stockton Storm WWP
Beadnell Septic WWP	Crofton Way West Denton WWP	Heddon Military Road WWP	Netherton Park WWP	Seahouses Mitchell Avenue WWP	Timothy Terrace WWP
Belford WWP	Crookgate WWP	HENDON STW PUMPING STATION	Newbrough WWP	Seahouses St Aidans WWP	Tockets Bridge WWP
Bennets Walk Storm WWP	Cross Fell WWP	Heugh Road Craster WWP	Newburn Industrial Estate WWP	Seamer WWP	Toft Hill WWP
Benton Road WWP	Culross Denshaw WWP - Meter 1	High Coniscliffe WWP	Newburn WWP	SEATON PUMPING STATION	TOFTS FARM EAST INDUSTRIAL ESTATE P
Benton Way Outfall 48 WWP	Culross Denshaw WWP - Meter 2	High Hauxley WWP	Newport WWP	Seaton Croft Annitsford WWP	Tollesby Manor WWP
Berwick Golf Course Club House WWP	Dalton Piercy WWP - Meter 1	High Leven WWP	Newton Bewley WWP	Seaton Sluice WWP	Towhouse WWP
Berwick No 1 Old Bridge WWP	Dalton-Le-Dale WWP	High Spen WWP	Newton Hall WWP	Seghill No 1 WWP	Travel Lodge Whitemare Pool WWP
Berwick No 10 East Ord WWP	DARLINGTON GRANGE PARK P.S., FAVERDALE, DARLINGTON, CO.DURHAM	High Stables WWP	NEWTON PARK FOUL SPS	Seghill No 2 WWP	Trimdon Colliery WWP
Berwick No 11 Quay Wall WWP	Davy Bank WWP	Highfields WWP	NICKY NACK SPS EO, CROXDALE, CO.DURHAM	Seghill No 3 WWP	TRIMDON VILLAGE SPS
Berwick No 2 Dock Road WWP	Dene Hall WWP	Hilton Stockton WWP	Normanby Beck WWP	SPS	Trimdon Village WWP
Berwick No 3 Bridge Street WWP	Dene Park WWP	Hiveacres WWP	North Blunts WWP	SPS, BEDFORD STREET, NORTH SHIELDS	TWO SEWAGE PS, PONT, LEADGATE, CO.DURHAM
Berwick No 5 Berwick Station WWP	Deneside Chase WWP	Hole Lane Sunniside WWP	NORTH BLYTH PUMPING STATION	Sharpness Point WWP	Tyne Street WWP
Berwick No 6 Tweedside Trading Estate WWP	Deptford WWP	Holmes Close WWP	North Dock WWP	Sherbourne Park WWP	TYNE VIEW PUMPING STATION, WALLSEND, NEWCASTLE UPON TYNE

U_MON6 sites

Berwick No 7 Magdalene Field WWP	Derwent Park WWP	Holywell WWP	NORTH GROYNE PS EO, NORTH SHIELDS, TYNE & WEAR	Shields Road WWP	Usworth Hall WWP
Berwick No 9 Westfield WWP	Derwenthaugh WWP	Horden Dene WWP	North Hylton WWP	SHINCLIFFE PUMPING STATION, SHINCLIFFE	VALLEY GARDENS PUMPING STATION
BERWICK UPON TWEED SPS	Dial Stobbs WWP	Horncliffe Berwick WWP	North Lea WWP	Shincliffe Village WWP	Valley Gardens WWP
Biddick Burn WWP	Dilston Haugh WWP	Hummerbeck WWP	North Wylam WWP	Shotton Lane WWP	Victoria Rd WWP
Birkdale Gardens WWP	Dinnington East WWP	Hummersknott WWP	NORTON SPS, STOCKTON ON TEES	Skinner Burn Road WWP	Viking Industrial Park WWP
Bishopton Mill WWP	Dinnington West WWP	Hunter House Hartlepool WWP	Nunthorpe No 1 WWP	Skinningrove WWP - Meter 1	Vulcan Street WWP
Black Close Ashington WWP	DOBSON CRESCENT P.S., ST PETER'S BASIN, NEWCASTLE UPON TYNE	Hurworth Place WWP	Nursery Park Ashington WWP	Skinningrove WWP - Meter 2	Wagonway Rd WWP
Blackhall Mill WWP	Dock Road WWP	Hurworth Place WWP - Meter 1	Oakerside WWP	Skippers Lane Industrial WWP	Walbottle WWP
BLACKWELL SCAR PUMPING STATION, BLACKWELL SCAR, DARLINGTON, CO.DURHAM	Don Valley WWP	Hurworth Place WWP - Meter 2	Old River Tees WWP	Slaggyford WWP	Wapping Burn WWP
Blaney Row WWP	Douglas Gardens WWP	Hutton Rudby WWP	Ouseburn East WWP	Smith Street WWP	Wapping St Outfall 61-63 WWP
Blyth Bates WWP	Downe Street WWP	HYLTON RIVERSIDE DEVT PS, HYLTON, SUNDERLAND, TYNE & WEAR	Ouseburn West WWP	Smiths Dock Road WWP	Waren Mill WWP
Blyth No 01 WWP - Meter 1	Dundas Street Stockton WWP - Meter 1	Ingleby Barwick Sand Hill WWP	Ovingham WWP	Snowdon Road WWP - Meter 1	Wark On Tweed WWP
Blyth No 01 WWP - Meter 2	Dundas Street Stockton WWP - Meter 2	INLET & OUTLET SEWAGE P.S'S, HOLY ISLAND STW, HOLY ISLAND, NORTHUMBERLAND	Owton Manor WWP	Snowdon Road WWP - Meter 2	Warkworth No4 Beal Bank WWP

U_MON6 sites

Blyth No 02 WWP	Durham Road Wingate WWP	International Paints WWP	Pallion WWP	Soft Leas Hartlepool WWP	WARKWORTH PUMPING STATION
Blyth No 05 WWP	DWELLINGS AT NEW WINNING P.S	JARROW PRETREATMENT WORKS	Palmers Green WWP	SOFT LEAS SPS, 1 VOLLUM RISE, HARTLEPOOL, CLEVELAND, TS24 0LR	Warren Court Ashington WWP
Blyth No 06 WWP	East Ford Road WWP	Jarrow Slake WWP	Parklands WWP	SOUTH GREEN LANE SPS, 8 ORPINE COURT, ASHINGTON, NORTHUMBERLAND, NE63 8JQ	Warrenby WWP
Blyth No 07 WWP	East Hartford WWP	Kilton Lane Brotton WWP	PATTEN WAY PUMPING STATION, PATTEN WAY, PEGSWOOD, NORTHUMBERLAND	South Shields Pilot WWP	Warrior Park Hartlepool WWP
BOATHOUSE LANE SSO NO2, STOCKTON ON TEES, CLEVELAND	East Holburn Outfall 69 WWP	King Street Seahouses WWP	Patterson Street WWP	South Shore Road East WWP	Warrior Quay Hartlepool WWP
Boldon Lane WWP	East Sleekburn WWP	Kingsmere WWP	Pattinson North WWP	South Wylam WWP	WARSDELL STREET PUMPING STATION
Bonny Grove WWP	East Tanfield WWP	Kirkby WWP	Pavilion WWP	Southend Seaton Carew WWP	Welbeck Rd West WWP
Borden Chemicals WWP	Eastwood Villas Prudhoe WWP	Kirklevington WWP	Pelton WWP	Southgate Wood WWP	Wellfield WWP
Boulmer Old Sargeants Mess WWP	Ebchester WWP	LADY PARK PUMPING STATION LAMESLEY	Pembroke Drive WWP	Southwick Shipyard A WWP	Wellington Drive Wynyard WWP
Bournemoor WWP	Eglingham WWP	LAKES CSO, ADJ NEWCOMEN TERRACE, REDCAR, CLEVELAND	Peth Head WWP	SOWERBY CRESCENT SEWAGE P S, STOKESLEY	Wellington Lane WWP
Bowburn Edna Street WWP	Eland Haugh WWP	Lambton WWP	Philipburn Dene WWP	SOWERBY CRESCENT SPS	Wentworth Place WWP
Bowburn Ind Estate WWP	ELAND LANE NEW SEWAGE P.S.	Lamesley WWP	Pine View Villas WWP	Spillars WWP	WEST ALLOTMENT P.STN., WEST ALLOTMENT, NORTH TYNESIDE
Brafferton Darlington WWP - Meter 1	Eland Lane WWP	Lanehead WWP	Pipewell Gate WWP	SPRING LANE HOUSING DEV'T P S, SEDGEFIELD	West Cornforth WWP

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Brafferton Darlington WWP - Meter 2	Elemore Vale WWP	LANGLEY PARK SEWAGE P S, LANGLEY PARK	Plantations WWP	Spring Lane WWP	West Farm Grange WWP
Brasside WWP	Eltringham Prudhoe WWP	Langton Beck WWP	Point Pleasant WWP	Springhill WWP	West Holborn Outfall 71 WWP
BRIDGE END PUMPING STATION, STAMFORDHAM, NORTHUMBERLAND	Elwick WWP	Langton Court WWP	Ponteland Riverside Foul WWP	SPS THE OVAL, RIVERSIDE PARK, BYKER	WEST LANE SCHOOL CSO
Bridge Street Hartlepool WWP	ENGINE DENE PUMPING STN, WYLAM	Leadgate WWP	POPLARS SPS	St Barnabus WWP	West Street Yarm WWP
Broken Scar (Picnic Area) WWP	Escomb WWP	Leasingthorne WWP	POPLARS SPS, RUSHYFORD	St Peters WWP	West Woodburn WWP
Brooklands WWP	ESH WINNING P STN EO, ESH WINNING, CO DURHAM	LEVEN PARK PUMPING STATION	Port Clarence East Foul WWP	ST.GERMAIN'S LANE	Westburn Mews WWP
Brunswick Village WWP	Eston WWP	Leven Park WWP	Port Clarence West Foul WWP	Staigs Garth WWP	Western Road Rosehill Road PS EO, Wallsend Newcastle Upon Tyne
Brus Hartlepool WWP - Meter 1	Etal WWP	Levenside No1 WWP	Portland Terrace WWP	Staindrop WWP	Western Way Ponteland WWP
Brus Hartlepool WWP - Meter 2	FACEBY SPS, STOKESLEY	Levenside No2 WWP	Potter Street WWP	Stamfordham Road WWP	WHARTONS FARM PUMPING STATION
Burdon Main Row WWP	Faceby WWP	Leyland Bridge WWP	Pottery Bank WWP	Stanley Hall WWP	Whartons Farm WWP
Burdon Park WWP	Fairfield Industrial Park WWP	Limekiln Gill WWP	Pottery Lane WWP	Stannington St Mary's WWP	Whiskey Jacks WWP
Burnbridge WWP	Fairmoor WWP	Linden Hall WWP	Preston Farm City Cars WWP	Stannington Station WWP	Whitburn Steel WWP
Burnhope WWP	Fallowfield Ashington WWP	Lindisfarne WWP	Prince Consort Road WWP	STANNINGTON VILLAGE PUMPING STN, MORPETH, NORTHUMBERLAND	Whitebridge Park WWP
Burniston Lane WWP	Fallowfield WWP	Linton WWP	Princess Way WWP	Stapleton WWP - Meter 1	Whitton Le Wear SPS 1 (LOW LANE SPS)
Butteryhaugh WWP	FALSTONE AND STANNERSBURN PS	Lintonville WWP	Prudhoe Council Yard WWP	Stapleton WWP - Meter 2	Willow Green Otterburn WWP
Byers Green WWP	Fatfield WWP - Meter 1	Lithgoe Close WWP	Prudhoe WWP	Startforth Deerbolt WWP	Wincomblee B WWP

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Calf Fallow Stockton WWP	Fatfield WWP - Meter 2	Little Haven WWP	PUMPING STATION AT HENDON STW	Startforth Lendings WWP	Wincomblee C WWP
Callington Close WWP	Felton WWP	LIVERTON MINES SSO	PUMPING STATION EMERGENCY O/FLOW, NORTH SEATON	Station Hotel WWP	Wincomblee Rd A WWP
Cambois C3 WWP	Ferryboat Lane WWP	Liverton Railway WWP	Quarry Lane WWP	Station House Bardon Mill WWP	Windsor Park New Kyo WWP
Cargo Fleet WWP	Ferryhill North WWP	LOANING BRIDGE PUMPING STATION, EASINGTON	Quebec WWP	Stephenson Street WWP	Witton Park WWP
Carlton Green Leas WWP	Fish Quay WWP	Low Hauxley WWP	Queen Alexandra Bridge WWP	Stephenson Way WWP	Witton Way WWP
Carlton Village WWP	Floaters Mill WWP	Low Heworth Lane WWP	Queensport Close Stockton Storm WWP	Steppey Lane WWP	Woodbridge WWP
Castle Eden WWP	Follingsby Lane WWP	Low Mill Embleton WWP	Radcliffe Road WWP	Stobhill No2 WWP	Woodham Bridge WWP
Castle Vale WWP	FORMER YARM STW SITE PUMPING STN, YARM, CLEVELAND	Low Newton WWP	Raf Boulmer WWP	STOBHILL SPS, STOBHILL	WOODLANDS GRANGE SPS, FOREST HALL
Castlegate WWP	Forrest Park WWP	Low Pittington WWP	Ramshaw WWP	STOBS FORD SPS, MORPETH	Woodlands Hexham WWP
Castletown Way WWP	Forth Banks WWP	Low Quay WWP	Ravensdowne Barracks WWP	Stokesley West End WWP	WOODLANDS PUMPING STATION NO 3 EO, WARKWORTH, Northumberland
Cawledge Industrial WWP	Friars Goose Felling WWP	Low Southwick WWP	Red Row Bedlington WWP	Stonebridge WWP	Woodside Wynyard WWP
Caxton Way WWP	FRONT ST,SHERBURN, 200 M STH OF FRONT ST, SHERBURN, CO.DURHAM	Low Stanners WWP	RED ROW SPS	Strawberry Cottage WWP	WOOLER PUMPING STATION, WOOLER, NORTHUMBERLAND
Charrington Avenue WWP	FRONT STREET PUMPING STATION, FRAMWELLGATE MOOR, DURHAM	LOW WORSALL PUMPING STATION SEPTIC	Redburn WWP	Strawberry Terrace WWP	Worsall Road Stockton WWP
Chatton WWP	Fulbeck Morpeth WWP	Lumley WWP	Redcar Zetland WWP	Sunderland Road WWP	Wylam West WWP

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Chester Dene WWP	Fulmar Road WWP	Lynemouth Dene House WWP	Redwell Lane WWP	Sunny Brow WWP	York Hill Spennymoor WWP
Chesterton Avenue WWP	FURNESS SEWAGE P.STN, HAVERTON HILL, STOCKTON-ON-TEES, TEESSIDE	Mainsforth Terrace WWP - Meter 1	Redworth Hall WWP	Swarland Fence WWP	
Chesterton Avenue WWP - Meter 1	Glasshouse WWP	Mainsforth Terrace WWP - Meter 2	Rennington WWP	Tame Bridge WWP	
Chilton Lane WWP	GLENTOWER GROVE CSO, GLENTOWER GROVE, SEATON CAREW, HARTLEPOOL	Malvern Drive Stokesley WWP - Meter 1	Rennys Lane WWP	Tameside Stokesley WWP	