SRN41 Wastewater WINEP Monitoring Enhancement Business Case

2nd October 2023
Version 1.0

from Southern Water

Contents

Glossary

Acronym	Term
WINEP	Water Industry National Environment Programme
EA	Environment Agency
NE	Natural England
DWMP	Drainage and Wastewater Management Plan
MCERT	EA's monitoring certification scheme
R&V	Risk and Value
EPA	Environmental Performance Assessment carried out annually by the EA
EDM	Event Duration Monitoring
CIP	Chemicals Investigations Programme
SSSI	Site of Special Scientific Interest
WFD	Water Framework Directive
UPM	Urban Pollution Monitoring
RNAG	Reason for not achieving good ecological status
ASP	Activated Sludge Plant
TAL	Technically Achievable Limit
PE	Population Equivalent
SPS	Sewage Pumping Station
NRT	Near Real Time

1. Executive summary

Monitoring of our wastewater activities will help us demonstrate compliance with our permits and allow us to monitor the effects of wastewater discharges on the natural environment.

To do this, we will work to install the following:

- Additional flow monitoring and event duration monitors to MCERTS standard at storm and emergency overflows,
- MCERTS monitoring of trade effluent discharges, and
- Monitors which will continuously monitor the quality of the water up and downstream of our qualifying intermittent and continuous discharges.

Due to concerns around affordability and deliverability, some of the work required will be phased into future AMPs, as per the Secretary of State's steer and our own proposals. This phasing work will focus on emergency overflow discharges and continuous water quality monitoring requirements.

Due to the prescriptive nature of the requirements for high standards of monitoring equipment and the requirement for them to be MCERTS-standard there are limited options to consider for these drivers. We will however look for efficiencies wherever possible in the programme.

We have carried out benchmarking to challenge the cost efficiency of our proposals and have applied efficiency assumptions to future costs compared to historical costs.

Summary of Enhancement Case	
Name of Enhancement Case	WINEP – monitoring wastewater compliance
Summary of Case	We propose investments at storm overflows, treatment works inlets and emergency pumping stations in monitoring equipment to demonstrate permit compliance with flow to full treatment and to demonstrate emergency overflows are not discharging when they should not. We also propose investing in a service to provide continuous water quality monitoring data to show the impacts of our activities on receiving watercourses.
Expected Benefits	Understanding how our assets are performing in a dynamic environment of wastewater collection and treatment is vital. The investment we propose will help to demonstrate compliance with permitted activities and alert us if anything should go wrong. The investment will meet requirements for: • Increasing frequency of data transmission • Certification of monitoring installations to demonstrate they meet the high standards required to deliver reliable results • Flow monitor installations that align with best practice and provide bypass arrangements to allow for maintaining the monitors
Associated Price Control	Wastewater network plus
Enhancement TOTEX	£140 million
Enhancement CAPEX	£139.8 million
Enhancement OPEX	£0.4 million
Is this enhancement proposed for a direct procurement for customer (DPC)?	No. There are no individual schemes that are greater than £200m whole life totex, and the investment needed is varied and dispersed throughout our area.

2. Introduction and Background

This document explains:

(a) how we have developed the needs for enhancement investment,
(b) the process for options development,
(c) how we have ensured our costs are efficient, and
(d) how customers are protected from non- or late delivery.

The document finishes with a conclusion summarising each section and setting out our recommendations.

Under the WINEP monitoring drivers we will install, upgrade and certify event duration monitors to report at 2-minute intervals on storm and emergency overflows, along with reporting spill frequency and duration. We will also install MCERTS pass forward flow monitoring at uncertified storm and emergency overflow locations.

MCERTS certified flow monitoring will also be installed on Water Treatment Works (WTW) trade effluent discharges to sewer where specific requirements are met.

We will work with others to facilitate the installation of continuous water quality monitors which will provide data for both storm overflows and treated final effluent.

All of the above investment will ensure we can demonstrate compliance with wastewater permit conditions, respond in a timely fashion to operational incidents and demonstrate progress with our ambitions to improve storm overflow performance.

Table 2-1: Summary of our wastewater WINEP investment proposal

WINEP area	AMP8 totex, £m (2022/23 prices)	WINEP drivers	Number of WINEP actions
Monitoring wastewater compliance	140.2	U_MON3	284
		U_MON4	251
		U_MON6	128
		EnvAct_MON	5
Monitoring trade effluent discharge to sewer from water treatment works	0.235 These costs are in water cost table, row CW3.24	EPR_MON1	1

2.1. Phasing guidance

The investment required to complete the scope of the WINEP we developed through following the EA's guidance was very material and raised considerable affordability and deliverability concerns. However, we have fully adopted the guidance received from the Secretary of State (5th July 2023) to phase our work across multiple AMP periods. This ensures our submission on monitoring is compliant with current guidance.

Our phased WINEP delivers the best value solutions to make sure our WINEP delivers the maximum benefits it can within the scope of the improvements we need to make. As per the steer, we will deliver the WINEP in full, but over a slightly longer period due to the constraints on deliverability and affordability.

U_MON6

We have phased the U_MON6 driver, as per the Secretary of State's steer and further guidance, issued 18th August 2023. We have 510 sites in our WINEP which fall under the monitoring of emergency overflow operation on network sewage pumping stations driver. Of these 510 sites, 390 require the installation of Event Duration Monitoring (EDM) and MCERTS pass forward flow monitors. Many of these schemes are likely to include civil engineering work.

The steer requires that companies prioritise monitor installation at high-risk sites during PR24 and phase other installations over future price reviews. The EA has provided further guidance saying that we can propose to reduce the number of sites by 75% and deliver 25% in AMP8 with the rest phased beyond AMP8.

We have reprioritised our initial list of 510 sites, and we now propose to complete 128 sites in AMP8 and 382 sites in AMP9. As per the PR24 Phasing FAQ document, we will work with the Environment Agency to compile a revised site list for the U_MON6 driver based on DEFRA's criteria.

The effect of the rephasing this work reduces our AMP8 WINEP costs by £95.5 million of totex.

Table 2-2: Phasing of emergency overflow monitoring programme

Driver	Total number of sites on WINEP	Number of WINEP actions to complete in AMP8	Number of WINEP actions to rephase beyond AMP8
U_MON6	510	128	382

Continuous water quality monitoring

Due to our concerns around deliverability and affordability, we have phased the continuous water quality monitoring drivers as per the Secretary of State's steer.

We fully support the aims of continuous water quality monitoring and have been trialling this approach as part of our Storm Overflows taskforce. However, the technology solutions being proposed are expensive and currently produce variable results. Issues of access, maintenance, legal costs and safety of staff have not been fully considered at this point. The strong feedback from our customers is that this is an action more suited for delivery via the Environment Agency. This provides a level of independence from water companies that customers and stakeholder's support.

We are proposing to use an independent third-party to install and operate the monitors across the country. This could be through the Environment Agency or another nominated regulator. Water companies would pay an annual service charge for provision of this data. The approach should be phased, piloted, tested to ensure that the data quality, reporting approach and public access is developed and tested.

We had included an outline AMP8 cost of £100m in our original WINEP submission as a holding line. Our current plan is based on an annual charge for a third party provider, which lowers AMP8 costs and improves deliverability risks and benefits affordability. We are currently reviewing the recently released updated driver guidance issued 18th August 2023[1] and will update our plans as required in due course.

We are assuming an £8 million per annum charge that starts in the third year of the AMP8 period.

[1] See Environment Agency Information Letter: EA/19/2023, issued 18th August 2023

3. Needs Case for Enhancement

3.1. Monitoring storm overflows and full to full treatment

Storm overflows are an important necessity in relieving pressure on the sewerage system during periods of heavy rain which in doing so, may present a public health risk due to their impact on water quality.

There are WINEP drivers that support the monitoring of compliance at storm overflows and wastewater treatment works. U_MON3 driver requires certified event duration monitoring (EDM) at any overflow where the flow passed forward for full treatment is controlled, for example at the WTW or the last in line overflow at a wastewater pumping station. U_MON 4 drivers require these same flow-limiting overflows to have certified monitoring of the Flow Passed Forward (FPF) for full treatment at the treatment works.

We have had a programme of progressively fitting EDMs at storm overflows, as required by previous WINEPs under the standards applicable at the time. However, new guidance for AMP8 requires all monitors to be certified to MCERTS standard and for high amenity sites to provide data every 2 minutes rather than every 15 minutes. This requires additional investment in telemetry and data management, as well as a programme of certification through inspections and testing of the installations by qualified certifiers. We anticipate that some sites will need additional investment and potentially replacement monitors due to the changes in guidance and MCERT requirements, despite having only installed the EDMs relatively recently.

The MCERT standard for flow monitoring requires appropriate positioning of the flowmeter, with certain lengths of straight pipe either side of it, if it is an inline flowmeter. Some types of flow monitor also require the ability to by-pass the flowmeter during cleaning and inspections. Such by-pass pipework is not installed routinely at our treatment works and pumping stations meaning that many installations require civil infrastructure to meet MCERT requirements. At some sites this could mean a complete inlet works rebuild.

Based on site-level assessment of existing infrastructure and comparison with MCERT standards we have included the following in our WINEP:

Table 3-1: Summary of EDM and flow monitoring under U_MON3 and U_MON4 drivers

WINEP Driver code	Description	Number in AMP8 WINEP
U_MON3a	Existing U_MON3 overflow operation monitor will be MCERTS certified; may need some improvement work requiring MCERTS inspector assessment to obtain certification	238
U_MON3b	Installation and MCERTS certification of a U_MON3 overflow operation monitor which was not included in AMP7. There may in some unusual cases also be a need for a new discharge operation monitor (EDM) to be installed as well.	46
U_MON4a	Existing front-end flow passed forward flow monitors which were AMP7 U_MON4 outputs will move from 15 to 2-minute flow monitoring. This may require work at the monitor and/or elsewhere to allow the additional monitoring data to be received and processed.	0
U_MON4b	Existing front-end flow passed forward flow monitors that were AMP7 U_INV2 outputs capable of being MCERTS certified in AMP7 (so no U_MON4 in PR24) will move from 15 to 2-minute flow monitoring. This may require work at the monitor and/or elsewhere to allow the additional monitoring data to be received and processed.	28

U_MON4c	Installation and MCERTS certification of a front-end flow monitor, monitoring at 2-minute intervals, where the AMP7 U_INV2 investigation concluded that there was no suitable existing flow monitor for measuring flow passed forward flow. The work required will involve civils which could range from installing a new flume and monitor to an entire rebuild of a WwTW inlet works.	211
U_MON4d	Installation and MCERTS certification of a U_MON4 flow passed forward flow monitor, monitoring at 2-minute intervals, which was not included in AMP7.	0
U_MON4e	Installation and MCERTS certification of a U_MON4 flow passed forward flow monitor, monitoring at 2-minute intervals, which was not included in AMP7. The work required will include civils which could range from getting MCERTS certification of an existing flow monitor to an entire rebuild of a WwTW inlet works.	12

3.2. Emergency overflows

Sewage pumping stations and rising mains are a potential source of pollution incidents. The Environment Agency permits intermittent discharges of sewage effluent in an emergency from pumping stations on the sewer network. Emergencies are caused by power or equipment failure, including rising main bursts. Permit requirements to monitor the frequency and duration of discharges from emergency overflows are being introduced at PR24 given the potential significance of discharges of raw sewage in emergency situations.

We are required to install monitors that will provide information on the duration and frequency of emergency overflow operation to MCERTS standard to improve the accuracy and consistency of the reported information. Improved transparency over the use of emergency overflows will help us understand the scale of emergency discharges and drive future improvements.

Event duration monitoring with telemetry will be used to indicate the discharge status (discharge/no discharge) at 2-minute intervals, or whenever a discharge starts and stops. The operational status of the EDM (operational/not operational) will also be recorded at each 2-minute interval as a minimum. At some locations there is the need for investment to accommodate the monitors and house telemetry outstations.

There are complexities at many locations where the emergency overflow is at the same location as a permitted storm overflow, or uses common assets (e.g. discharge pipes). Here, we need to be able to distinguish between an emergency and permitted storm spill. The way to do so is through monitoring pass forward flow being delivered by the pumping station whilst the overflow is operating. Where flow monitors need to be installed, they will record the flow passed forward at 2-minute intervals. The operational status of the flowmeter (operational/not operational) shall also be recorded at each 2-minute interval as a minimum, which is the requirement set out in the AMP8 driver guidance.

Following a comprehensive review by subject matter experts of our pumping stations, permitted emergency overflow permits and site operation, our AMP8 WINEP includes the below. The numbers listed in table 32 are also consistent with the phasing steer provided by the Secretary of State.

Table 3-2: Monitoring programme for emergency overflows

WINEP Driver code	Description	Number in AMP8 WINEP
U_MON6a	Install MCERTs EDM monitoring only (pumping stations permitted for emergency overflows only)	23
U_MON6b	Install MCERTs EDM monitoring and civils (pumping stations permitted for emergency overflows only)	7
U_MON6c	Install MCERTs EDM monitoring and associated MCERTS pass forward flow monitoring to differentiate storm and emergency (pumping stations permitted for emergency overflows only)	0
U_MON6d	Install MCERTs EDM monitoring, associated MCERTS pass forward flow monitoring and civils to differentiate storm and emergency (pumping stations permitted for emergency overflows only)	98
U_MON6e	Permit change only	0

3.3. Water treatment works trade effluent monitoring

The EA guidance requires Water Treatment Works trade effluent discharges to sewer to have MCERTS certified flow monitoring to allow their performance against permit conditions to be better evidenced. WINEP requires flow monitoring to be installed as early as possible in the 2025-30 period.

To qualify, all water treatment works trade effluent discharges which don't have MCERTS certified flow monitoring with a maximum flow over 50m3/day and with numeric limits for BOD, COD or metals are required to fit new monitors, **unless all the criteria** (a) to (d) below are met.

(a) Permitted maximum flow is less than 1000 m3/d.
(b) The dilution of the discharge is >50:1 at mean flow in the receiving water
(c) No numeric limits for priority hazardous, priority substances or specific pollutants for which environmental quality standards have been set (excluding chlorine).
(d) Following water quality modelling techniques confirmation that the discharge is not directly to or significantly affecting waters designated under the Habitats, Birds, Bathing Waters or Shellfish Waters Directives or a Water Framework Directive Protected Area.

Following a full review of all our water treatment works permits by internal subject matter experts we have one site which fits the criteria requiring such flow monitoring in AMP8, Rogate WSW according to the WINEP driver guidance. We have therefore proposed the MCERTS certified flow monitoring equipment to be installed at Rogate as part of our WINEP.

The costs for installing the trade effluent monitor at Rogate are included in the water WINEP table, CW3, row CW3.24.

3.4. Continuous water quality monitoring

A new requirement in the Environment Act 2021 is a provision for water companies to monitor river water quality upstream and downstream of assets that discharge to a watercourse. The EA has issued WINEP guidance for these requirements for implementation in PR24.

The objective of these drivers is to provide monitoring data in the receiving environment to assess and report on the impact of storm overflows and WwTW discharges. This information will inform the long-term assessment of asset contribution to ecological harm. A secondary objective is to improve transparency of overflow operation to regulators and the public. There is a requirement for the publication of data in near real-time. The relevant WINEP drivers support the implementation of continuous water quality at coastal, estuarine, and inland water bodies. These drivers are applicable for both storm overflow discharges and WTW final effluent discharges.

The EnvAct_INV1 and EnvAct_MON4 drivers ensure that continuous water quality monitoring is provided upstream and downstream of all storm overflows and WTW discharges to inland watercourses. The guidance includes the requirement for investigations to assess suitability for monitoring in estuaries to meet the requirements of the Environment Act 2021.

EnvAct_INV2, EnvAct_MON2, EnvAct_INV3 and EnvAct_MON3 drivers relate to coastal and inland complex environments (for example lakes, canals, and groundwater). These drivers are non-statutory and included with post-PR24 completion dates for EnvAct_MON2 and EnvAct_MON3 but are provided in recognition of water company desire to better understand any water quality impacts from storm overflows and WTW discharges to these environments.

EnvAct_MON5 relates to making the continuous water quality monitoring data accessible in near real time (NRT). Although it is not a specific obligation in the Environment Act 2021 it is likely to be required as part of the implementing legislation. Providing these data in NRT to the public will continue to improve the transparency of storm overflow operation and water quality.

Following the phasing steer provided by the Secretary of State in July 2023, provision of continuous monitoring at will be undertaken at an initial 25% of high priority sites. These sites will be classified as per DEFRA guidance released in August 2023.

4. Best Option for Customers

There are limited options to consider due to the prescriptive nature of the requirements for high standards of monitoring equipment and for them to be MCERTS-standard. The solution at every site is to install the required monitor(s) and where appropriate ensure they are certified and can provide data centrally at the prescribed frequency through appropriate telemetry outstations and data handling facilities. Where possible, we will install the same type of equipment across the region in similar types of location to minimise operation and maintenance costs through holding common strategic spares.

4.1. Consideration of Direct Procurement for Customers

Our WINEP is a material programme of investment. However, it does not readily meet Ofwat's Direct Procurement for Customers (DPC) criteria. The most material investments are on existing sites with operational assets, and there are none by themselves with a whole life cost of >£200 million totex. Nevertheless, we have carefully considered what could be grouped together for a programme of work that might be attractive to the market through DPC or other alternative financing and delivery approaches.

We do not consider the flow monitoring and EDM programmes on our treatment works to be suitable for DPC. However, our view is that the installation of continuous environmental water quality monitors could be carried out through a third party. We expand on our proposal in section 4.5 below.

4.2. Event duration monitoring

We are installing event duration monitoring under two scenarios:

- MCERTS certified overflow operation monitoring at treatment works pass forward flow location or last in line sewage pumping station overflows
- MCERTS certified monitoring of emergency overflow operation on network sewage pumping stations

Requirements for MCERTS certified EDMs at treatment works and last in line sewage pumping station overflows were identified by studies and investigations completed in AMP7. The investigations identified the scope of work required to upgrade the existing assets to MCERTS standard at each of the locations where flow monitoring upgrade is also required (see below). To provide best value, existing assets will be retained wherever possible. Where the existing assets cannot be certified because of inaccuracy of existing instrumentation, we have allowed for replacement of the assets.

Monitoring of emergency overflow operation on network sewage pumping stations emerged as a late requirement in the WINEP process, so we have focused our efforts around listing the sites where we know from experience that installation of new flow measurement facilities will be difficult due to restricted access, depth of excavation required, etc. For other sites, we have assumed that the large majority would require medium levels of upgrade.

Opportunities for innovation and cost efficiency are limited on drivers where MCERTS certification is required, as an independent MCERTS inspector must be satisfied that the installation meets all the requirements of the MCERTS specification.

4.3. Flow monitors

We are proposing flow monitoring in two different types of location:

- at wastewater treatment works or last in line sewage pumping station overflows
- to monitor pass-forward flows during emergency overflow operation on network sewage pumping stations.

Requirements for wastewater treatment works and last in line sewage pumping station overflows were identified by studies and investigations completed in AMP7. These investigations identified the scope of work required to upgrade the existing assets to MCERTS standard at each of the locations. To provide best value, existing assets will be retained wherever possible. Where the existing assets cannot be certified because of physical configuration or inaccuracy of existing instrumentation, we propose replacing the assets. The need for civil works was assessed on a site-by-site basis through speaking to colleagues on our flow monitoring team.

Monitoring pass-forward flows during emergency overflow operation on network sewage pumping stations emerged as a late requirement in the WINEP process, so we have focused our efforts around listing the sites where we know from experience that installation of new flow measurement facilities will be difficult due to restricted access, depth of excavation required, etc. For other sites, we have assumed that the large majority would require medium levels of upgrade.

Opportunities for innovation and cost efficiency are limited on drivers where MCERTS certification is required, as an independent MCERTS inspector must be satisfied that the installation meets all the requirements of the MCERTS specification.

4.4. Telemetry outstations and data handling assumptions

Previous EA guidance on flow monitoring and spill monitoring required 15-minute interval reporting. For PR24, the new EA guidance is that reporting needs to improve to 2-minute interval reporting. To meet this requirement, existing instrumentation and telemetry installations on many sites will need to be upgraded or replaced.

An additional consequence of upgrading to 2-minute interval reporting is that new improved data capacity and handling systems, including management and maintenance of data, will be needed to manage considerably more data. We have therefore allowed for provision of the additional capacity needed as part of the EDM and flow monitoring WINEP costs, to provide customers with extra confidence in the data being produced.

4.5. Continuous water quality monitoring

The Environment Act 2021 introduced a requirement for water companies to monitor sewerage assets and the impact they have on their local environment, and to publish data from those monitors, as well as from event duration monitors, within an hour of operation. The two duties in the Act place a renewed focus on monitoring the water quality in receiving waters and increasing public transparency of impacts from discharges.

This is a significant monitoring programme that needs to be established across our region. It will capture the local impacts of discharges from storm overflows and our continuous discharges from sewage treatment works. We will need to monitor for key contaminants which can lead to harm for aquatic life. It will increase industry, scientific and public knowledge of the effects of storm overflow and final effluent discharges on the environment.

We fully support the aims of continuous water quality monitoring and have been trialling this approach as part of our CSO taskforce, especially in terms of publication of data through our Beachbuoy App. However, there are many challenges in terms of delivering these new requirements. For example, the technology solutions being proposed are expensive and currently produce variable results. Issues of access, maintenance, legal costs, safety of staff, security of measuring equipment on site have not been fully considered at this point.

The strong feedback from our customers is that this is an action that should be delivered by the Environment Agency. This provides a level of independence from water companies that customers and stakeholder's want, support and trust. Our suggested solution would be to use an independent third-party, such as the EA,

to install and operate the monitors through a DPC type approach. Water companies would pay an annual service charge for provision and publication of the data. The approach should be phased, piloted, tested to ensure that the data quality, reporting approach and public access is developed and tested. We believe that this provides the following advantages:

- Technology and processes are developed for the industry as a whole
- Customers start to pay for the data as it becomes available, once the monitor installation challenges have been addressed
- Consistency of reporting across the industry, avoiding multiple formats that would confuse the public
- Reduces cost for supply and installation of equipment
- EA has knowledge and experience of this activity across England, and local knowledge
- Single platform for all data nationally
- Greater trust in the outcomes.

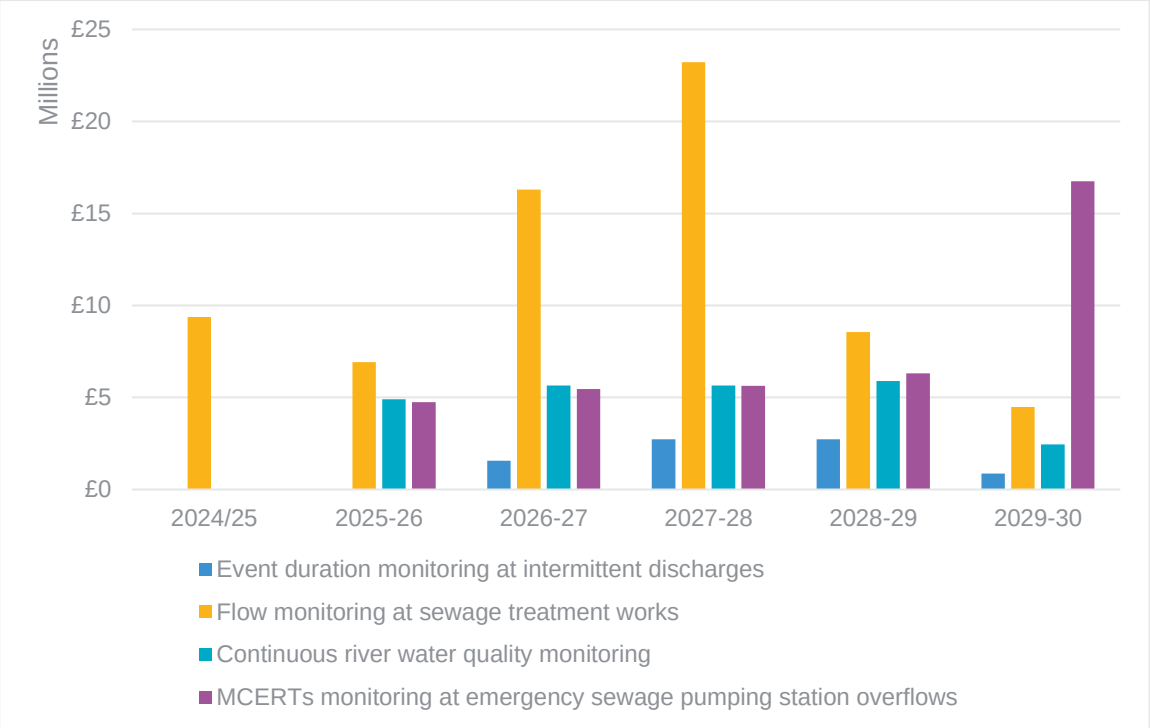
We supported Defra with the development of the policy for the implementation of these requirements of the Environment Act through the provision of data and cost information. This enabled us to determine the number of monitors required and the costs to implement the initial WINEP guidance from the EA. The results were the need for 2004 monitors at a cost of £98million in AMP8 and £166m in AMP9.

We have included a cost of £25 million for AMP8 to meet the requirements of the Act, which is based upon the purchase of the data from a single national organisation at a cost of £8 million per year from year 3 onwards. However, discussions are ongoing. New guidance was issued by Defra and the EA in August. We are currently assessing the impact of the new guidance on the scope and cost of the monitoring requirements in our region. Converting to an annual charge lowers AMP8 costs and improves deliverability risks and benefits affordability.

5. Cost Efficiency

Our standard enhancement solution costing approach, described in Part B of the SRN15 Cost and Option Methodology Technical Annex was followed to estimate the costs of the monitoring programme. This approach involves pricing solutions based on the best available information for the expected scope and the cost of that scope, and applying standardised allowances based on analysis of historical data for indirect costs, risks and overheads. The level of design development completed determines the granularity of scope that is available and therefore the specific costing approach to use. Costs are predicted using our libraries of standardised and regularly updated cost models developed from historical cost data augmented with industry information where required. These cost libraries are benchmarked internally and externally by our Cost Intelligence Team to understand relative cost efficiency, and further benchmarking has been performed for the chosen option.

Figure 5-1 Breakdown of AMP8 monitoring expenditure by activity and year



During the costing process for these drivers a benchmarking exercise was carried out to challenge the cost efficiency of our proposals. As described in greater detail below, this exercise showed that we had higher costs for PR24 than we did at PR19. To offset this, we have applied an efficiency of 10% to all of our costs to bring ourselves more in line with our expected peer's costs, based on benchmarking.

We have not approached third parties for any contribution to the costs of monitoring activities and compliance on our treatment works. Our stakeholders typically consider this to be fully our responsibility. However, we do consider there is an opportunity for wider collaboration on continuous water quality monitoring, and we present our proposed approach to funding and provision of such environmental information in Section 5.5 below.

5.1. Event duration monitors

We have a lot of experience of installation of spills monitoring in AMP7. Our PR24 costs are based on the actual average cost per installation that we have experienced in AMP7. In addition, we have added on the cost of MCERTS certification of each installation. A small allowance has also been made for OPEX costs to

cover the maintenance and periodic inspection and re-certification of installations. MCERTS certification was not required for EDM in AMP7.

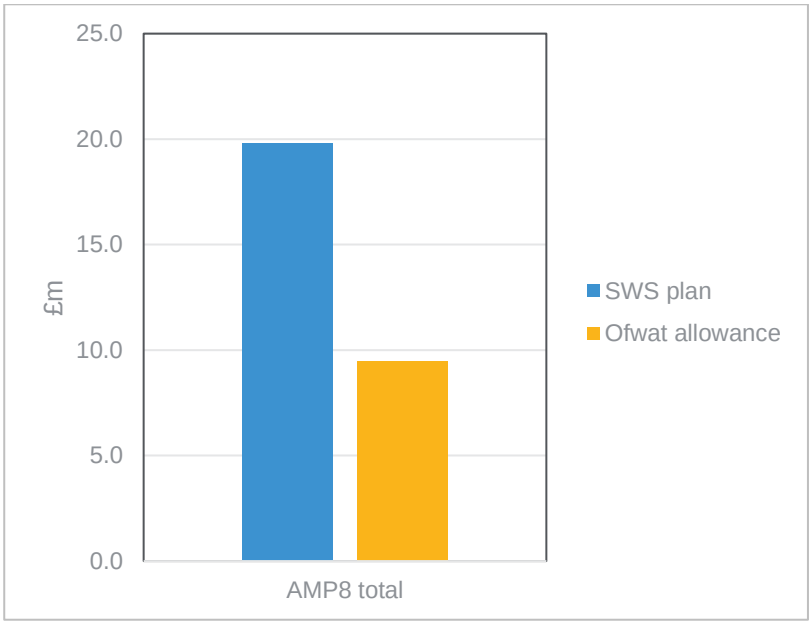
Comparison with Ofwat's PR19 enhancement EDM cost model

At PR19, Ofwat applied industry median costs of installations and permit applications separately.

Early benchmarking of our pre-efficiency costs shows that according to Ofwat's PR19 cost curves, our PR24 costs are considerably higher than the PR19 model would allow. However, this is not a like-for-like comparison as there are additional requirements, which increase our AMP8 costs compared to those in AMP7. These include:

- Reporting at 2-minute intervals rather than 15-minute intervals
- Additional data transfer and IT storage requirements
- MCERTS standard for equipment
- There are also a number of sites where civil works are needed to allow for the installation.

Figure 5-2: Comparison between Ofwat's PR19 unit cost and our AMP8 pre-efficiency costs for EDMs



The increase in costs compared to AMP7 are due to a considerable number of EDMs requiring civil works to install them to meet MCERTS standards and to facilitate the capture, transmission and storage of a considerable increase in data from moving from 15- minute to 2-minute recording.

5.2. Flow monitors

Many of the requirements for flow monitoring were identified by studies and investigations completed in AMP7. The investigations identified the scope of work required to upgrade the existing assets to MCERTS standard at each of the locations. Each site was then categorised according to the size of site, and the complexity of the work needed to get it up to the required standard, using the criteria on the following table. A notional solution was developed and costed for each category of site, and these unit costs were then applied to all sites. The costs by category are detailed in
Table 5-1 .

Table 5-1 Flow monitoring costing by category

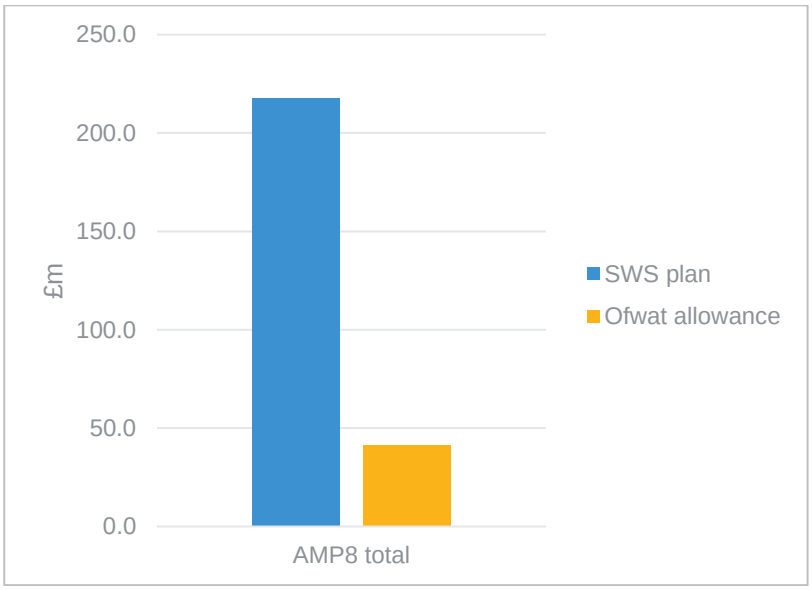
Site Category	Site PE		Total Project Cost (2022-23 costs)
	Min	Max	
Low - New MCERTS compliant flowmeter only.	0	5,000	£73,193
Low - New MCERTS compliant flowmeter only.	5,000	10,000	£74,500
Low - New MCERTS compliant flowmeter only.	10,000	100,000	£156,986
Low - New MCERTS compliant flowmeter only.	100,000	400,000	£210,531
Medium - New flowmeter and associated bypass pipework to enable inspection and cleaning (FFT). Allow for overpumping / tankering to enable works to be installed.	0	5,000	£162,241
Medium - New flowmeter and associated bypass pipework to enable inspection and cleaning (FFT). Allow for overpumping / tankering to enable works to be installed.	5,000	10,000	£179,658
Medium - New flowmeter and associated bypass pipework to enable inspection and cleaning (FFT). Allow for overpumping / tankering to enable works to be installed.	10,000	100,000	£578,783
Medium - New flowmeter and associated bypass pipework to enable inspection and cleaning (FFT). Allow for overpumping / tankering to enable works to be installed.	100,000	400,000	£1,420,132
High - New bypass & pipework required on the FFT Magmeter for means of cleaning and maintenance. New/extension of chamber required. Excavation required.	0	5,000	£215,725
High - New bypass & pipework required on the FFT Magmeter for means of cleaning and maintenance. New/extension of chamber required. Excavation required.	5,000	10,000	£242,056
High - New bypass & pipework required on the FFT Magmeter for means of cleaning and maintenance. New/extension of chamber required. Excavation required.	10,000	100,000	£664,201
High - New bypass & pipework required on the FFT Magmeter for means of cleaning and maintenance. New/extension of chamber required. Excavation required.	100,000	400,000	£1,560,931

Comparison with Ofwat's PR19 flow monitoring cost model

At PR19 Ofwat benchmarked new monitors and upgrades together. Some companies indicated they had sites where capital investment was needed to be able to install the monitor and/or telemetry outstation, in some cases involving large inlet scheme rebuilding at treatment works. Ofwat considered these bespoke costs and made off-model additional allowances for three companies, following a deep dive.

On a simple comparison, our total requested flow monitoring costs of are 5 times greater than an equivalent estimated allowance based on Ofwat's PR19 model. Much of this gap is due to the fact that we may not be comparing like with like, as Ofwat's cost curves are not reflective of the higher level of standards required at PR24.

Figure 5-3: Comparison between Ofwat's PR19 unit cost allowance and our AMP8 pre-efficiency costs for flow monitoring



The cost of installing the flow monitor is typically dwarfed by the civil investment changing our inlet works to facilitate MCERT compliant equipment. We identified the benchmark position, as shown above, but this was deemed to not be directly comparable due to the PR24 requirement for all monitoring projects to be MCERTS compliant. Therefore, our analysis of our peer's positions determined that a reduction of 10% of our costs would put us in a comparable position.

5.3. Flow monitoring at emergency overflows

The Environment Agency's U_MON6 WINEP driver guidance states that where a pumping station has both a permitted storm overflow and a permitted emergency overflow, we are required to install event duration monitoring (EDM) and pass forward flow monitoring to clearly distinguish between compliant discharges made in wet weather, and those discharges made during emergency scenarios.

Of the 520 wastewater sites listed under the U_MON6 driver, 390 fall into this category. These sites would not have appropriate pass forward flow monitoring already in place and installing the monitor required by the driver is highly likely to require civils work in the form of extensive modifications to the affected sites.

This is because the MCERTS flow monitoring guidance prescribes that to be certified, flow monitors need, for example:

- Defined minimum of straight lengths of pipe of uniform section both upstream and downstream of the sensor
- Suitable depth of the channel being measured (where appropriate)
- The ability to by-pass the monitor to allow for cleaning and maintenance

These requirements were published in 2020, after the PR19 price review and are set out here: MCERTS - part 3 - performance standards and test procedures for water flowmeters (publishing.service.gov.uk). Our asset standards for pumping stations and emergency overflows did not previously include these requirements which have only recently been confirmed.

Monitoring pass-forward flows during emergency overflow operation on network sewage pumping stations emerged as a late requirement in the WINEP process, so we have had insufficient time to survey all the sites prior to submitting our WINEP. Therefore, we have assumed that the large majority of sites would require medium levels of upgrade, apart from a 15 of our very large and more complex sites where we are familiar

with the pumping stations and know how difficult it will be to install new flow meters due to restricted access, depth of excavation required, etc. We have used operator knowledge and desk-based assessments of as-built drawings to validate our assumptions.

We used a cost estimating tool that our strategic delivery partners developed for the U_MON4 driver. In theory the scope of work to install new flow monitoring and EDM under the two drivers is similar (U_MON4 mostly at WTWs, U_MON6 mostly at network combined storm and emergency overflows).

We sorted the U_MON6 sites by size based on based on the permitted pass forward flow, as follows:

- < 10 l/s – Small
- 10 to 100 l/s – Medium
- 100 to 1000 l/s – Large
- >1000 l/s – Very Large

In the absence of comprehensive site specific information, we assumed the U_MON6d sites were mostly medium complexity.

Our low complexity site costings assume we can install a new MCERTS compliant flowmeter without any capital works requirements.

Our costs for medium complexity sites assume a new flowmeter and associated bypass pipework to enable inspection and cleaning (FFT). They allow for overpumping / tankering to enable works to be installed.

Our costs for high complexity sites assume new bypass & pipework is required on the FFT Magflow meter for means of cleaning and maintenance and that a new or extension of inspection chamber is installed, requiring excavation.

We developed costs for these items for each size band from cost curves which are based on ours and industry outturn data to produce our U_MON6 costs.

The need to provide bypass pipework around all new Magflow meters to allow them to be removed for cleaning and maintenance is a significant contributor to the overall cost, and is one reason why our costs will be out of line with any benchmarks based on PR19 information.

We note that at PR19 Ofwat made allowances for three companies in addition to the unit cost monitor allowance for capital improvements at inlet works to be able to accommodate a flow monitor to the necessary standards. We cannot avoid the capital requirements of the MCERTS specification. We were involved in industry groups which discussed the standards and requirements with the EA.

5.4. Telemetry outstations and data handling

In costing treatment works and last in line sewage pumping station monitoring needs, we have used insight from our technical experts to determine that telemetry outstations will need to be upgraded / replaced on 60 sites to comply with the new 2-minute reporting interval requirements, at an average cost or [redacted] per site. We have also determined that we will need to upgrade our telemetry servers to handle the increased volumes of data generated by the new 2-minute reporting interval requirements, and have allowed a cost of £1m, spread over the costs of all flow monitoring sites.

Due to emergency overflow monitoring being a later WINEP requirement, we have used our internal knowledge to determine that telemetry outstations will need to be upgraded / replaced on a proportion of sites to comply with the new 2-minute reporting interval requirements. As we do not yet have any survey data on these sites, we have allowed an average cost of [redacted] per site in our cost estimates. We have not included any allowance for upgrading our telemetry servers to handle the increased volumes of data generated by the new 2-minute reporting interval requirements, assuming that this cost is already covered under the treatment works and sewage pumping stations. However, we have included an increase in OPEX

costs for additional staff resources to analyse and report on the additional data that will be generated. We have assumed three additional FTE.

5.5. Continuous water quality monitoring

We have been supporting Defra with returns of information on their cost commissions. For each of the scenarios set out by Defra, we have provided:

- Current estimate of total cost of monitoring requirements,
- Total CAPEX estimate,
- CAPEX estimate excluding land /planning costs,
- Total land/planning cost estimate,
- OPEX estimate (10yr),
- Estimate of total number of monitors required,
- Number of clusters,
- Total number of assets in clusters,
- Average number of assets per cluster,
- Total CAPEX Cost (PR24),
- Total CAPEX Cost (PR29)

We have developed our cost information based on GIS analysis of discharges, and several different scenarios, as defined by Defra, based on clustering. The assumptions made in our costings are set out in Table 5-2.

Table 5-2: Assumptions used for cost of continuous water quality monitoring

General
Monitoring costs do not include an uplift for potential land and power requirements.
Monitoring numbers and costs assume two monitors per site/cluster even for estuarine and coastal as actual numbers will not be known until investigations have been completed. This is a conservative approach to ensure sufficient funding is secured.
Monitoring costs assume five years of OPEX; this is the same approach as was provided in the Defra cost scenario commissions.
More detailed costing will be provided once the new technical guidance is issued and this work is revised.
Estuaries
Per unit cost for monitors tripled for coastal and estuarine monitors to cover cost of boats and skippers, etc.
It is assumed that - as per proposal by EA/Defra at October workshop - that estuarine investigations will be split into two AMPs: a national investigation programme in AMP8 and local investigations in AMP9. It is assumed that Southern Water will contribute funding for one of its bigger estuaries in AMP8.
The AMP9 local investigations have been costed at a lower rate than the national AMP8 investigation as it is assumed that learning from AMP8 will create efficiencies. Also, there are a number of smaller local estuaries which will be slightly cheaper to investigate.
Complex Inland
Investigation costs for complex inland sites ([redacted] per investigation) are based on cheaper canal and lake investigations but more costly groundwater investigations (could top [redacted]).
Coastal
Per unit cost for monitors tripled for coastal and estuarine monitors to cover cost of boats and skippers, etc.

6. Customer protection

There are no specific performance commitments (PCs) that provide customer protection for our WINEP monitoring programme. We are proposing an overarching WINEP price control deliverable to protect customers from non-delivery of all elements of the WINEP that are not covered by a PC, which we set out in SRN38 Water Industry National Environment Programme (WINEP) Technical Annex.

7. Conclusion

Section	Key Commentary
Introduction & Background	Our AMP8 WINEP provides an opportunity to upgrade existing and install new event duration monitors and pass forward flow monitors, to install new MCERTS discharge flow monitoring on WTW effluent discharges and to monitor water quality related to intermittent and final effluent discharges in near real time. The installation of the above will help us to demonstrate compliance with wastewater permit conditions, respond in a timely fashion to operational incidents and demonstrate progress with our ambitions to improve storm and emergency overflow performance.
Need for Enhancement Investment	The need for investment is statutory. Ensuring compliance with WwTW storm overflow operation and WTW trade effluent permit flow conditions will contribute to the delivery of WFD objectives of Good Ecological Status (GES) in receiving water bodies. Given the importance and potential impact of discharges of crude sewage from emergency overflows during dry weather, monitoring to MCERTS standard is required to improve the accuracy of the reported data. The Environment Act 2021 contains multiple clauses on storm overflows with a clear direction to reduce the impact and number of discharges from storm overflows. Gathering continuous water quality (WQ) monitoring data will further improve the understanding of any impact from storm overflows and WwTW discharges on the receiving environment and help identify necessary improvement actions. Providing these data in near real time (NRT) to the public will continue to improve the transparency of storm overflow operation.
Best Option for Customers	There are limited options to consider due to the prescriptive nature of the requirements for high standards of monitoring equipment and for them to be MCERTS-standard. The solution at every site is to install the required monitor(s) and where appropriate ensure they are certified and can provide data centrally at the prescribed frequency through appropriate telemetry outstations and data handling facilities. Where possible, we will install the same type of equipment across the region in similar types of location to minimise operation and maintenance costs through holding common strategic spares.
Cost Efficiency	We have carried out a benchmarking exercise to challenge the cost efficiency of our proposals. This exercise showed that we had higher costs for PR24 than we did at PR19. Much of this is due to the need for higher standards and a significant increase in the need for civil works. To offset this, we have applied an efficiency of 10% to all our costs. In addition, we have applied efficiency assumptions to future costs compared to historical costs.
Customer Protection	There are no specific performance commitments (PCs) that provide customer protection for our WINEP monitoring programme. We are proposing an overarching WINEP price control deliverable to protect customers from non-delivery of all elements of the WINEP that are not covered by a PC, which we set out in SRN38 Water Industry National Environment Programme (WINEP) Technical Annex.