

## **The PR24 U\_MON6 driver: MCERTS certified monitoring of emergency overflows at sewage pumping stations**

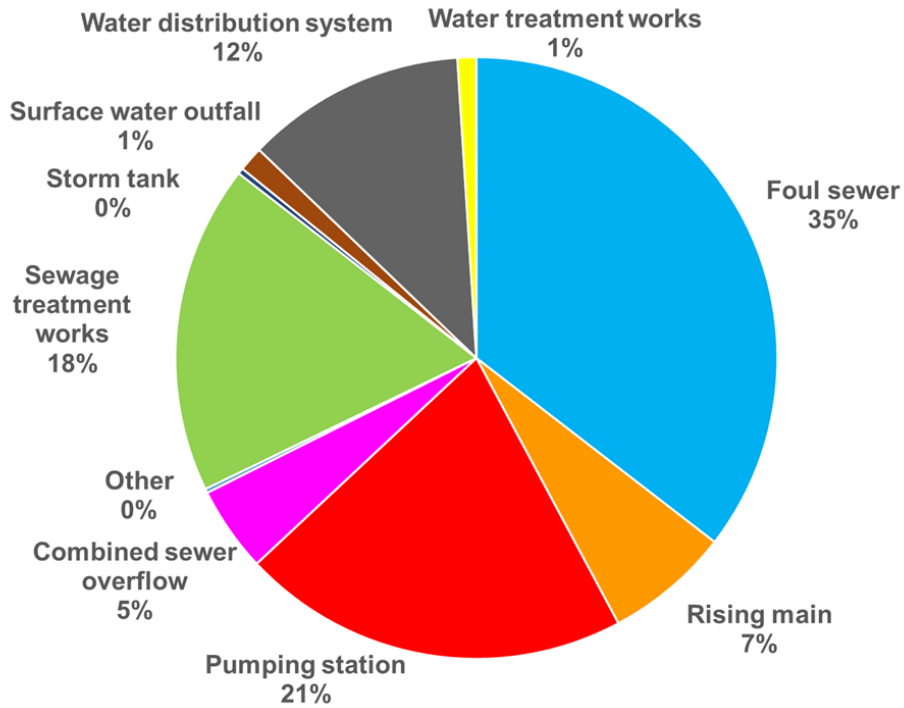
### **Summary**

Sewage pumping stations are a significant source of pollution incidents. The Environment Agency permits discharges of sewage in an emergency at approximately 7000 pumping stations in England. To reduce the risk of discharges occurring, permits usually require back up measures such as emergency storage, standby pumps and standby power. Telemetry warning systems of site failure and overflow operation are also normally required. The Environment Agency is now planning to improve the monitoring of pumping station emergency overflows with the inclusion of MCERTS certified event duration monitoring (EDM) through the U\_MON6 driver of the PR24 Water Industry Environment Programme (WINEP). This aligns with the EDM programme for storm overflows that should complete this year (December 2023). However, MCERTS certification is being introduced to improve the accuracy of the monitored data. The monitoring is also being extended to include MCERTS certified monitoring of pass forward flows at sites which operate as storm overflows as well as in emergencies. This allows emergency discharges to be distinguished from legitimate wet weather operation. It also enables pass forward flow compliance assessments to be introduced for the storm overflows. The driver will shine a light on the performance of sewage pumping stations and will have implications for pollution incident recording and pumping station investment. Due to the cost of the monitoring the work will be phased across AMP8 and AMP9 with prioritisation based on Defra's priority areas. The first approximately 1750 sites (25%) will be delivered by 2030.

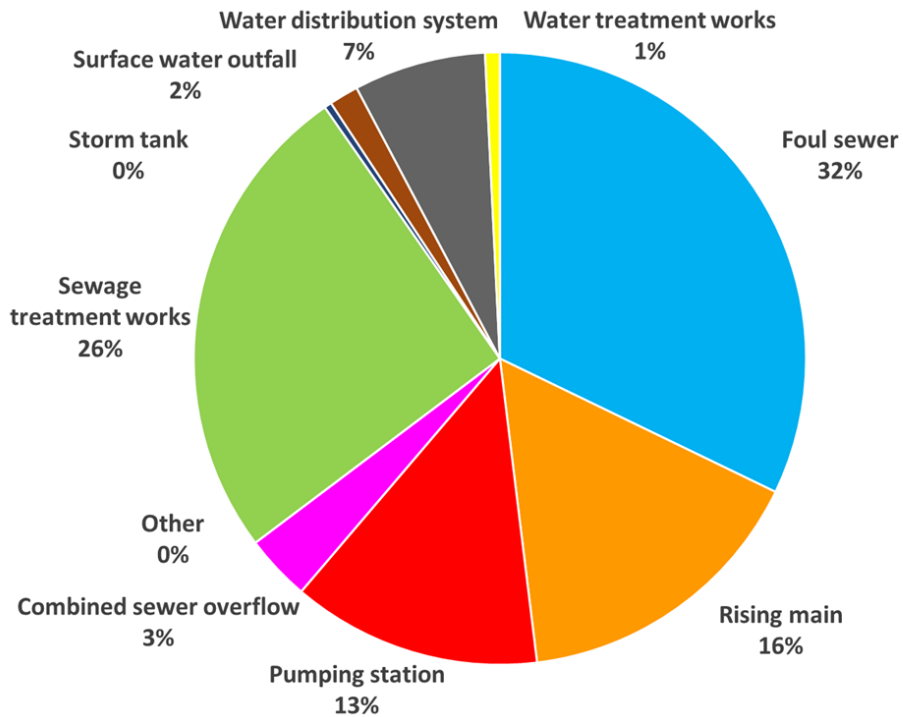
### **Background**

Sewage pumping stations and their rising mains are a significant source of pollution incidents. Over the last five years 21% of pollution incidents were attributed to pumping stations, while 7% were attributed to rising mains (Figure 1). For serious pollution incidents, rising mains were slightly more important, making up 16% of serious incidents, while pumping stations were responsible for 13% of incidents (Figure 2). Overall, sewage pumping stations and their associated rising mains are typically responsible for just under one third of all incidents. They are the second largest source of pollution incidents after foul sewers.

The Environment Agency permits discharges of sewage in an emergency at approximately 7000 sewage pumping stations in England. By permitting emergency discharges the Environment Agency seeks to reduce the likelihood of pollution incidents occurring by requiring measures under the permit which reduce the likelihood of pumping station failure and the overflow of sewage into nearby watercourses. These measures are known as key protection measures and include various requirements such as standby pumps, storage, standby power, tanker access and over pumping facilities. Telemetry warning systems are also normally required to warn of pumping station failure and the operation of the emergency overflow.



**Figure 1.** Percentage of category 1 – 3 pollution incidents between 2018 and 2022 by asset type.



**Figure 2.** Percentage of serious pollution incidents (category 1 and 2) between 2018 and 2022 by asset type

### Purpose of the driver

The U\_MON6 driver will introduce standardised MCERTS certified monitoring and reporting of the frequency and duration of discharges made in an emergency at sewage pumping stations. It will align with the event duration monitoring (EDM) programme for storm overflows which should be completed by the end of this year. The driver will also be used to introduce flow passed forward compliance assessments for pumping stations which are permitted to operate as storm overflows as well as in an emergency. Standardised monitoring and reporting of emergency discharges will improve understanding of pumping station performance, drive investment, and increase public transparency.

### What's involved?

Event duration monitors will be installed at approximately 7000 sewage pumping stations to detect sewage levels at the overflow, and to record the frequency and duration of discharges made during pumping station failures (Figure 3). Where pumping station overflows are permitted to operate in storm as well as in an emergency, flow monitors will also be installed to record the flow pumped forward to the downstream sewer (approximately 3600 sites – Figure 4).

The monitoring will require certification under the Environment Agency's Monitoring and Certification Scheme (MCERTS). This is a quality assurance mechanism to ensure that the EDMs and flow monitors are operating to the required accuracy. Product standards for the monitors are available along with standards for installation and operation. MCERTS should improve the accuracy and reliability of the data, improve public confidence, and aid compliance monitoring.



**Figure 3.** Event duration monitors at sewage pumping stations.

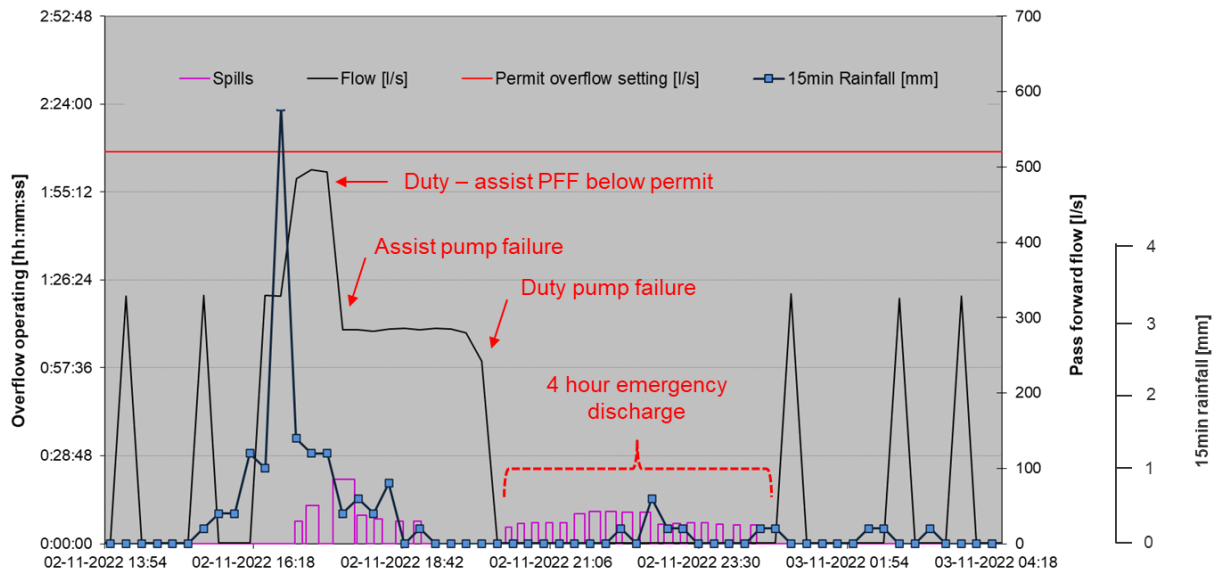
The main reason for including pass forward flow monitoring at pumping stations which also have permitted storm overflows, is to enable discharges in an emergency to be clearly distinguished from legitimate operation in wet weather. There have been pollution incidents during or after wet weather when discharges were believed to be due to compliant storm sewage spills, when instead the pumping station had failed. These incidents often involve air locks or soft blockages where the pump will

continue running but will pass forward little or no flow. By recording the flow passed forward while the overflow is spilling, we can clearly identify those spills that are the result of site failure. Flow monitoring will provide useful data to companies on pump performance and rising main condition. It will also allow operational improvements such as low flow protection systems for pumps.



**Figure 4.** Pass forward flow meters at sewage pumping stations.

The inclusion of pass forward flow monitoring will enable the Environment Agency to assess compliance with permit requirements to pass forward a minimum flow before the storm overflow operates. An example is shown in Figure 5. Deteriorating pump and/or rising main condition is usually responsible for pass forward flows dropping below original design output and permit values. For more complex sites with multiple pumps and duty – assist arrangements, individual pump failures may result in significant step downs in pass forward flow (see Figure 5), leading to much larger non – compliant storm discharges. Compliance assessments will identify these problems.



**Figure 5.** Example of pass forward flow problems at a sewage pumping station during wet weather, ranging from varying degrees of non – compliance with the storm overflow setting, to full pass forward pump failure and discharges of sewage in an emergency.

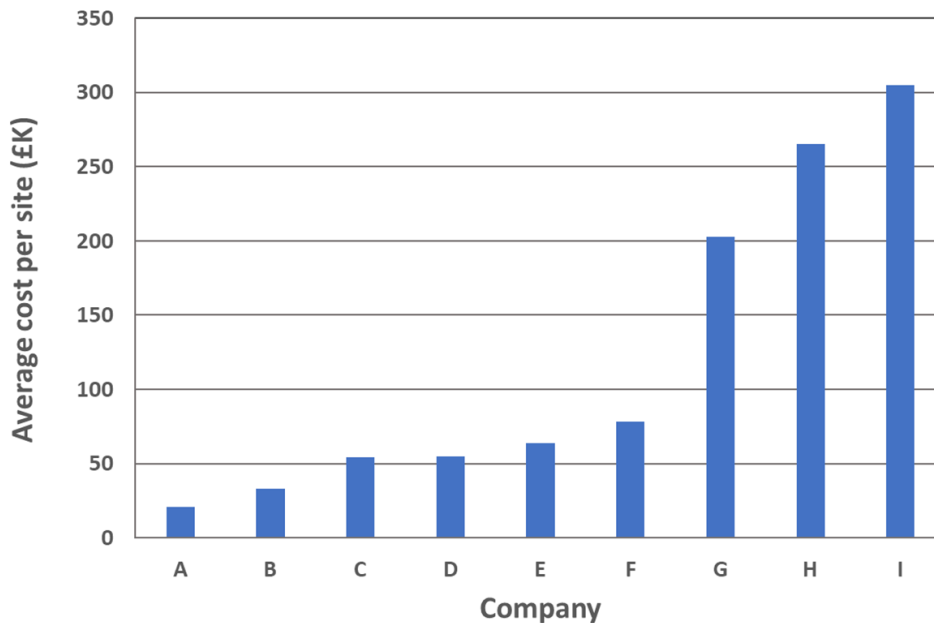
### Costs and phasing

Estimating the cost of the monitoring for PR24 planning was difficult. Although the number of sites is well known from permit records, there is no unit cost for a site, particularly where flow monitoring is needed. Sewage pumping stations with permitted emergency overflows range in size from very small sites with 100mm diameter rising mains to large complex sites on trunk sewers and at the inlet to sewage treatment works with multiple large diameter rising mains. These large sites are likely to require major civil works to provide flow meters, associated access chambers and bypass pipe work. Cost estimates for the companies varied widely (Figure 6). Initial estimates by May 2023 ranged from approximately £30K per site on average to £300K.

Due to the potentially high cost of the monitoring, combined with other high-cost programmes for storm overflow improvements and continuous water quality monitoring within PR24, the monitoring will be introduced in phases. In PR24 25% of the sites will be delivered followed by the remaining 75% in PR29 (2030 – 2035). The first 25% (approximately 1750 sites) will target sewage pumping stations discharging to watercourses in Defra’s priority areas. These include:

- Sites of Special Scientific Interest (SSSIs)
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- Ramsar sites
- Urban Wastewater Treatment Regulations sensitive areas
- Chalk streams
- Designated bathing waters
- Designated shellfish waters

- Waterbodies failing to achieve good ecological WFD status due to intermittents – probable or confirmed

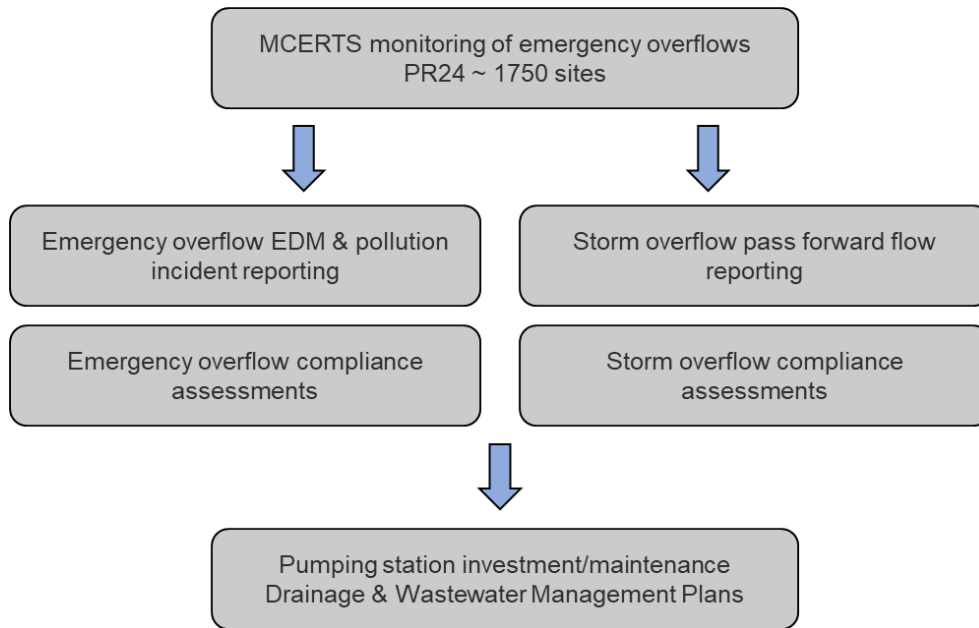


**Figure 6.** Average cost per site of the U\_MON6 driver at a company programme level May 2023.

### Implications

The process for PR24 is summarised in Figure 7 below. The monitoring driver will shine a light on the performance of sewage pumping stations. Standardised monitoring and annual reporting of emergency discharges is likely to result in increased numbers of pollution incidents being reported in the Environment Agency’s annual Environmental Performance Assessment (EPA) for water and sewerage companies.

Monitoring of compliance with storm overflow pass forward flow requirements is likely to identify problems with routine performance at pumping stations. For example, investigations into six pumping stations within a sewage treatment works’ catchment found potential compliance problems at four out of the six sites where pump rates were significantly below pass forward flow permit requirements (Table 1). Reasons for recorded pump rates being below permits varied from permit and flow meter errors, to pump condition, rising main condition (roughness), and the condition of air valves on the rising mains. It is likely that as the monitoring is expanded compliance problems will be found. In turn this will prompt better investment in pumping station maintenance.



**Figure 7.** Summary of PR24 U\_MON6 process.

**Table 1.** Comparison of permitted overflow setting and pass forward pump rates at six sites.

Site	Permit overflow setting (l/s)	Pass forward pump rates	% of permit
A	700	350	50
B	8	4	50
C	25	16	64
D	18	13	72
E	11	11	100
F	15	15	100