Pollution incident reduction plan 2021 - update

May 2021

Wessex Water
YTL GROUP

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Contents

Executive summary

We are an environmental services business. Each day it is our purpose and privilege to protect the environment from the impact of the waste water from 2.9 million people in the area we serve. We aim to ensure that we apply the best available approaches to make certain the water is recycled to the environment without any harm being caused.

2020 has been a very challenging year in several ways – from the impact of Covid-19 on working arrangements and our ability to interact with customers, to dealing with the wettest year since 2014. However, as a company we have adapted to ensure that we continue to deliver a high level of service to our customers and the environment.

Despite our additional focus and greater levels of investment in 2020, we acknowledge that the activities in our Pollution Incident Reduction Plan (PIRP) have not yet delivered the improvements that we were expecting.

To make certain that we reach our targets, this year we have refocused the PIRP and put additional emphasis on proactive activities.

Our Bath in-sewer monitoring trial lasted for two months and looked at IT solutions for actively managing the sewerage network by using existing alarms and monitors, including those under the event duration monitor (EDM) programme. This will be a step forward in turning data into actionable information and knowledge which will lead to more proactive interventions and prevent incidents occurring. We have committed to extend the intelligent sewer depth monitoring trial across our region.

The Wessex Water Guardian community project was officially launched on World Rivers Day last year by Somerset Wildlife Trust and by the end of this February, 34 Water Guardians had engaged with the project.

Pollution root cause analysis for 2020 shows that blockages in sewers are still the dominant cause of pollution incidents and are, once again, mainly caused by wet wipes. Based on this we will also be accelerating our customer and community engagement using our enhanced sewer misuse strategy.

We are committed to reaching and exceeding the targets set out in this plan. Over the next four years our PIRP will continue to develop and evolve to ensure that we protect the environment across our region.

Background

Purpose

One of Wessex Water's four key purposes is to protect and improve the environment.

We consider ourselves an environmental services company – and our aim is to ensure that none of our activities cause environmental pollution.

Many of the activities we carry out have the potential to cause pollution to the water and land environment if something goes wrong. When sewage or even clean water escapes from our systems, it can lead to environmental damage.

Our original pollution incident reduction plan (PIRP) document[1] explains our historical and current water environment pollution performance and our plans to continuously improve.

This document provides an update on the first year of implementing our plan, highlighting work undertaken, our successes, and our key activities and opportunities to develop the plan further during AMP7.

Pollution incident reduction plan (PIRP) approach

Our aspiration is to cause no pollution incidents – delivery of this plan will lead us towards this.

The four main delivery themes for the PIRP are:

- people and process
- assets and maintenance
- customers and stakeholders
- telemetry data and analysis.

Pollution targets

Achieving our aims will take time and in the more immediate future we are aiming to meet the targets set out in the Water Industry Strategic Environmental Requirements:

- serious pollution incidents must continue to trend towards zero
- trend to minimise all pollution incidents (category one to three) by 2025. There should be at least a 40% reduction across the industry compared to numbers of incidents recorded in 2016.

For us this means targeting zero category 1 or 2 incidents and fewer than 69 category 3s from waste water assets by the end of 2025.

[1] The 2020-21 Pollution incident reduction plan and quarterly updates can be accessed at **wessexwater.co.uk/environment**
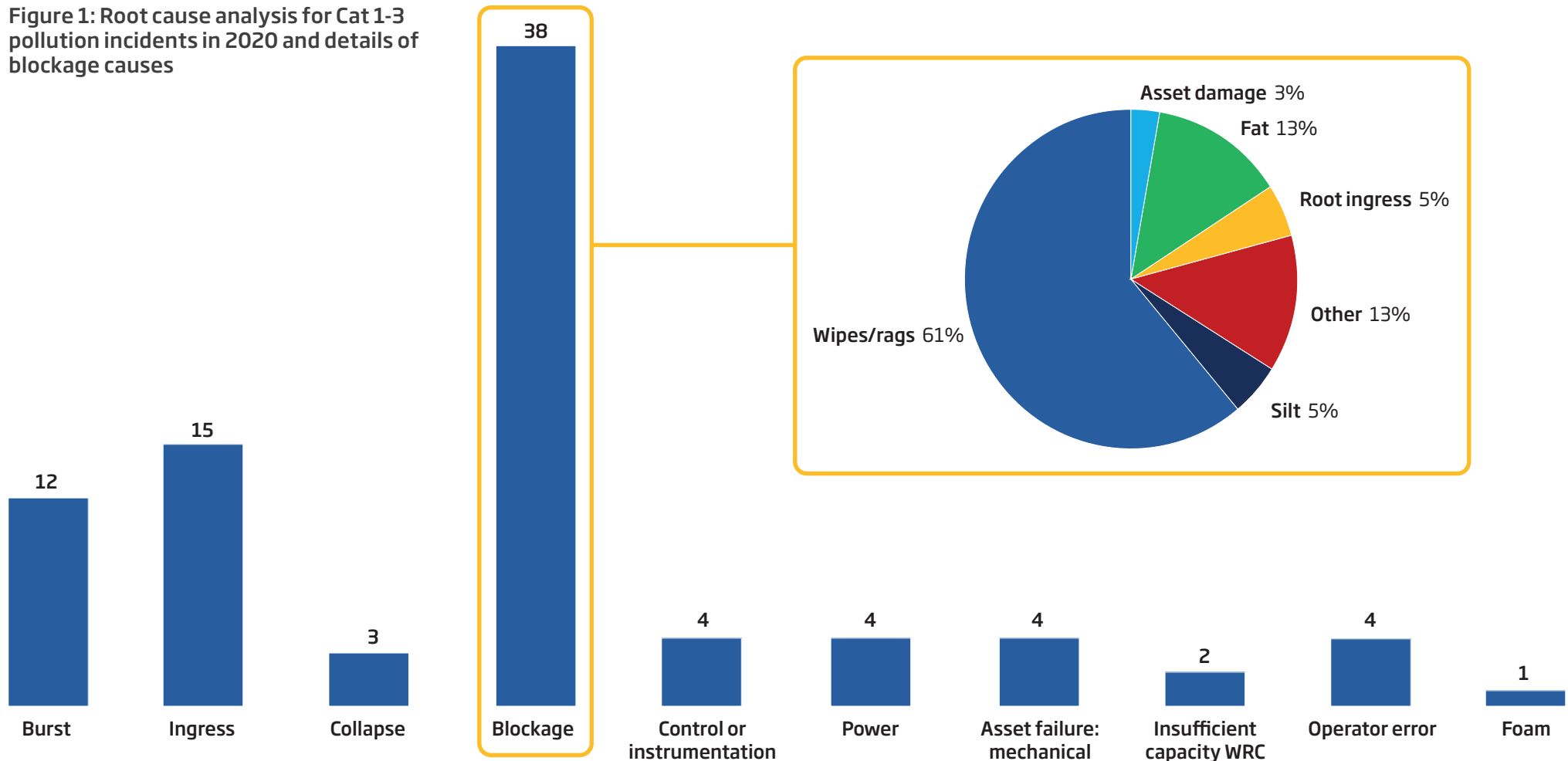
Review of year one

For 2020, we achieved our overall pollution performance target, despite Covid-19 and despite 2020 being the sixth wettest year for the UK since records began. However, the performance is above our five-year average.

The formation of the PIRP has led to an increased focus and heightened awareness of pollutions across the company. With the introduction of initiatives like the pollution mobile app and the Water Guardians, our self-reporting performance has improved to 85%.

Root cause analysis

Analysis of pollution root cause for 2020 shows that blockages in sewers continue to be the dominant cause of pollution incidents and these are predominantly caused by wet wipes.

Figure 1: Root cause analysis for Cat 1-3 pollution incidents in 2020 and details of blockage causes

Pie chart (blockage causes):
- Wipes/rags 61%
- Asset damage 3%
- Fat 13%
- Root ingress 5%
- Other 13%
- Silt 5%

Bar chart values:
- Burst 12
- Ingress 15
- Collapse 3
- Blockage 38
- Control or instrumentation 4
- Power 4
- Asset failure: mechanical 4
- Insufficient capacity WRC 2
- Operator error 4
- Foam 1

A comparison of pollution root cause over the last three years shows that the overall number of blockages has decreased, possibly indicating some impact from the PIRP. There has also been a decrease in incidents due to instrumentation and process treatment capacity. We have also seen an increase in pollutions related to rising main bursts and ingress, both of which can be influenced by the weather, but are also related to asset condition.

A breakdown of blockage types shows that the number of blockages recorded as 'Blockage – other' has decreased since 2018, demonstrating the effect of our activities on improving the identification of pollution root cause.

Figure 2: Root cause analysis trends for 2018-2020 and details of blockage causes trends
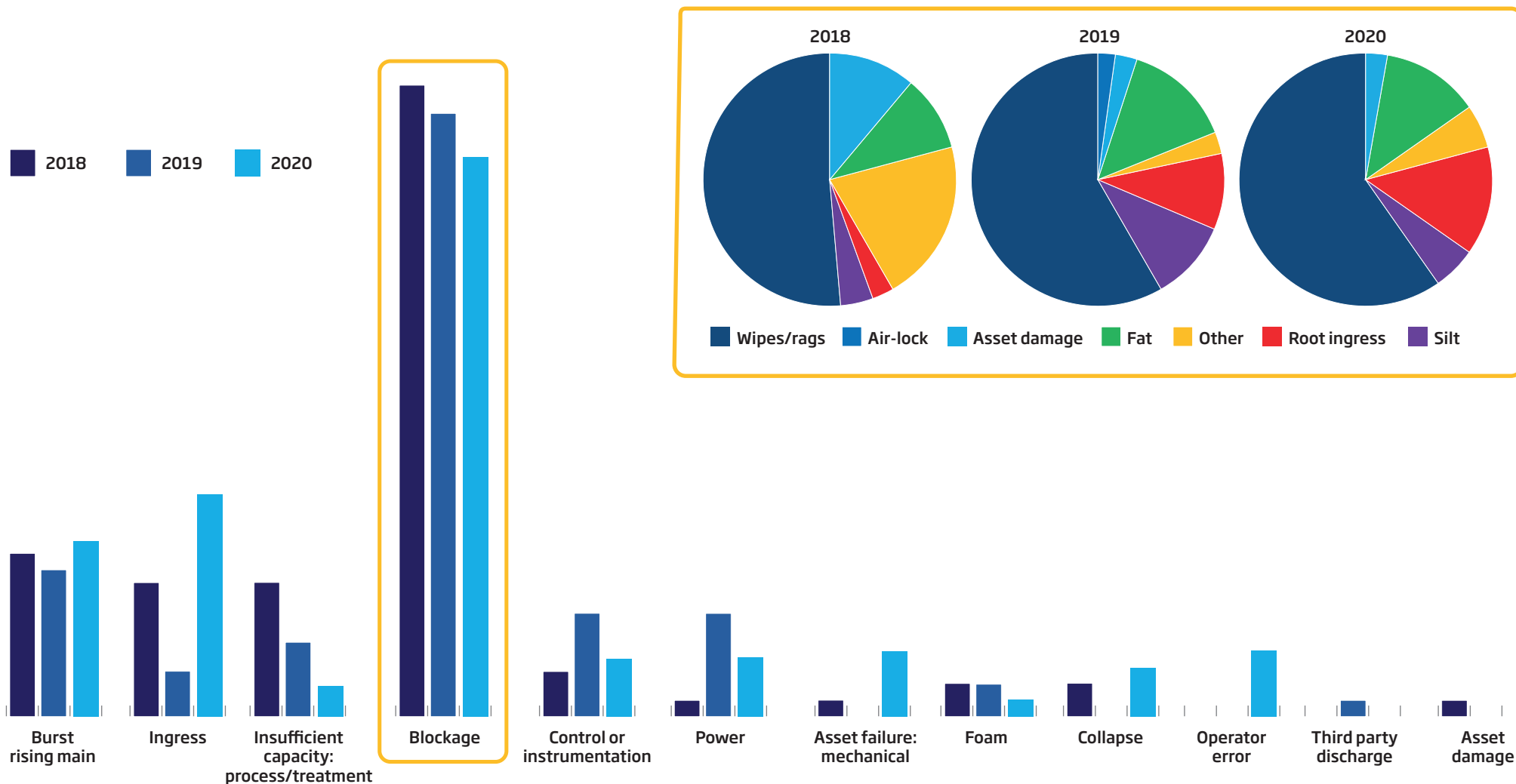
We continue to use root cause analysis and asset performance to identify and prioritise activities to guide our PIRP and help us to achieve our target of fewer then 69 pollutions by 2025.

Asset types

The initial focus of the PIRP has been pollutions from foul sewers since most of our pollutions arise from them. Compared to previous years we can see the impact of the PIRP with a reduction of approximately 30% in the number of incidents from foul sewers.

The focus of the PIRP has been adjusted to advance initiatives like burst detection and expansion of active monitoring of the sewer network using storm overflow level monitoring. The increased monitoring may alert us to more incidents (causing an increase in numbers) but, the alerts will improve the speed of our response and therefore reduce the environmental impact overall. The longer term aim is to be able to use monitoring data to identify issues before they cause an escape of sewage.

Figure 3: Waste water pollution incidents by asset type across our sewerage system, 2018-2020
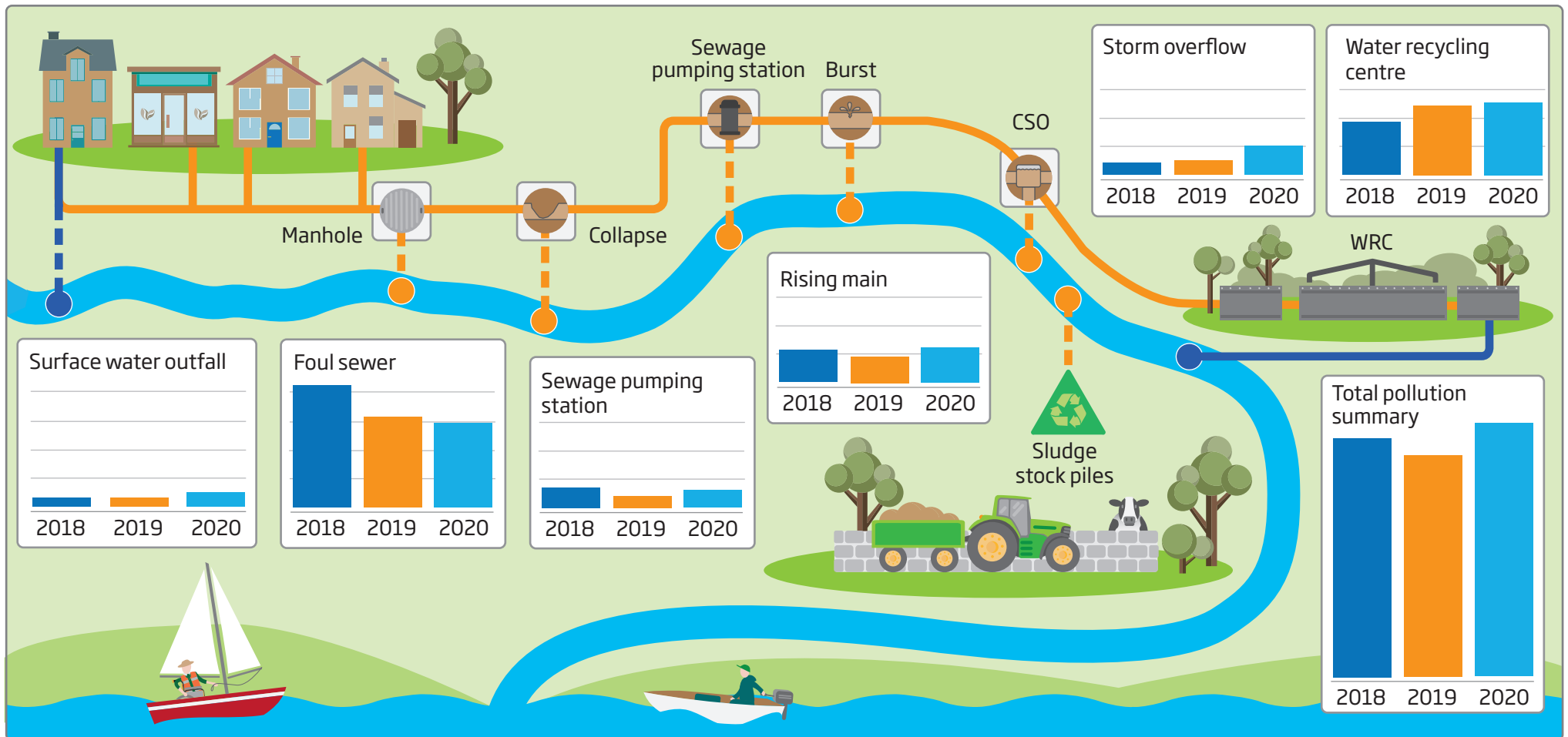
Activities and performance 2020

Overview of activities

Over the last year several of our activities have been affected by Covid-19, but this has enabled us to take a step back in some areas to review our overall approach, eg, the production of the sewer misuse strategy, see page 12.

Despite Covid-19, we have continued with numerous PIRP activities and their progress is summarised in Figure 4. Although only 24 activities are highlighted, there are more than 40 ongoing ones which we have regrouped into preventive and response, some of these are business as usual activities and some are pollution specific.

Details of both the quantitative and qualitative performance of activities listed in the 2020 PIRP can be found in Appendix 2.

As part of our weekly and annual reviews, we re-prioritise different activities depending on their success and pollution numbers. The six items highlighted in bold are the activities that we deem fundamental to the success of our pollution reduction strategy. They are summarised below.

Figure 4: Summary of progress of PIRP prevention and response activities

Prevention				Response			
People and process	Assets and maintenance	Customer and stakeholders	Data and analysis	People and process	Assets and maintenance	Customer and stakeholders	Data and analysis
Prevention policies	**Sewer CCTV – sewer risk model**	**Water Guardians**	**Additional monitoring**	Response policies	**Sewerage investigation assessments**	**Sewer misuse strategy**	Internal pollution reviews
Pollution register	Sewer rehabilitation programme	National and regional behavioural initiatives	**Rising main burst detection and prevention**	Third-party environmental support	Enhanced over-pumping	Improved self-reporting	Environment agency communication
Training and equipment	Enhanced asset maintenance and upgrades	Fat, oil and grease managment	SPS enhanced diagnostics and performance analytics	Resource review	Streamclean	Improved customer correspondence	Environmental surveys

Exceeding   On track   Behind schedule

Key activities

1 Prevention – sewer risk model/sewer CCTV inspection

What have we done?

Using bespoke sewer risk models has enabled us to successfully prioritise and target sewers to prevent pollution incidents. Our success rate in discovering sewers which require maintenance has increased significantly and is now c70%.

A high success rate means that this year we have avoided approximately 10 potential pollution incidents and, in the long run, reduced the risk of future pollutions by addressing these lengths in a rolling maintenance programme of second pass clean/re-CCTV (see Appendix 1, Case study 1).

Despite the impact of Covid-19 on the programme, 115km of network has been issued for CCTV.

Figure 5: Summary of CCTV inspection programme results
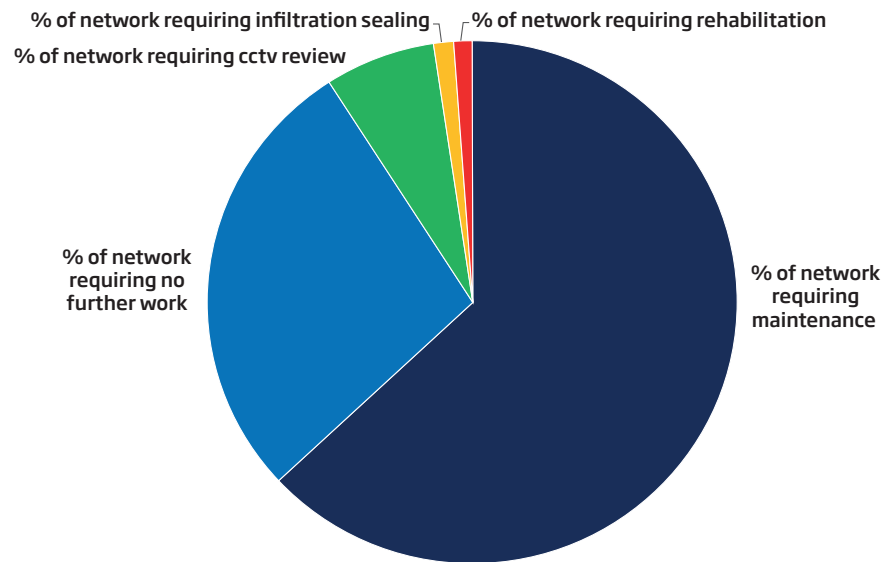
There is currently outstanding survey work to be completed and data to be analysed for this year, but this will roll into the following capital investment year programme. The process of reviewing risk results continues and as more survey data becomes available the models become more accurate and refined.

Lessons learnt?

As a result of a review of our pollution statistics for 2020 and due to the number of pollution incidents caused by sewage entering the surface water network from the foul network, we have changed our modelling approach. We now trace the network upstream of the surface water outfall, which effectively extends the river network, so the potential impact zone now extends to the relevant foul network.

Undertaking CCTV surveys of the network in private land often required more detailed planning to ensure that access to the sewer is possible, which can delay the programme. Some of the network is also in remote areas and requires specialist equipment to enable the survey. Consequently, we have invested in a new CCTV rig which has these capabilities.

Future planned activities?

Next year we will be continuing to analyse the data and plan future rehabilitation and maintenance work accordingly on a rolling programme. The rolling programme of CCTV inspection will also continue; but it will be on a smaller, more focused, scale.

Based on this year's work we have provisionally scheduled the rehabilitation of approximately 4km of network to be completed subject to appraisal and prioritisation.

2 Prevention – machine learning analytics for sewer depth monitoring

What have we done?

The Bath in-sewer monitoring trial lasted for two months and has now come to an end. The aim of the trial was to look at IT solutions for actively managing the sewerage network by using existing alarms and monitors, including those recently installed under the event duration monitor (EDM) programme, while also encouraging companies outside the water sector to bring their thinking to our aim of having no pollution incidents, through our Wessex Water Marketplace.

During the trial we observed the accumulation of c 59 blockages, three of which could have resulted in pollutions had they not been identified early (see Appendix 1, Case study 2).

In addition to the trial, we have also been working with technology providers to direct the development of low cost in-sewer monitors. We are currently trialling 13 monitors in the foul network, in addition to 21 at several supply sites. The trial is progressing well and we are capturing useful data which will help us to expand monitoring once the appropriate data systems are in place.

Lessons learnt?

By presenting the Bath trial to the Wessex Water Marketplace, we have been able to access a wider variety of companies. Although smarter artificial intelligence and machine learning analytical tools are developing quickly, many are still in their infancy.

The trial has shown that a good smart solution could reduce alerts by up to 97% in wet weather and identify partial blockages much earlier than traditional methods. These smart tools have influenced the understanding of network operation.

The trial also highlighted the importance of visualisation and has shown that it is possible to relate rainfall to active alarms. To enable a more preventative approach to EDM management a GIS tool is being developed to help control room users identify alarms in areas where there has been little rainfall.

Although visualisation is key to understanding the multiple factors affecting the network, reducing the alarms on screen is the biggest priority. A high volume of on-screen alarm noise has the potential to mask real issues and prevent us from identifying potential incidents. Our priority is to improve the volume of alarms visible in the control room before enhancing the visualisation further.

Future planned activities?

Based on the success of the Bath in-sewer monitoring trial we plan to expand the capabilities to all existing alarms and monitors within our networks over the next three years. This will allow us to respond to anomalies in the network.

As the in-sewer monitoring technology develops and a mass deployment sensor becomes available at an affordable cost, we plan to undertake an additional trial in a dedicated catchment to measure operational efficiency.

3 Prevention – Water Guardians

What have we done?

The Wessex Water Guardian community project was officially launched on World Rivers Day by Somerset Wildlife Trust (SWT), with the aim of recruiting and training 25 volunteers to cover the River Brue and its tributaries.

By the end of February, 34 Water Guardians had engaged with the project. Between them they monitor approximately 12 miles of the River Brue between East Lydford and East Huntspill; 16 miles of the Brue catchment including the River Sheppey and 35 miles of waterways outside the immediate Brue catchment.

Since the programme began the Water Guardians have recorded more than 130 hours of volunteering. During this period, they have raised concerns over bank damage and slurry runoff. However, no pollutions relating to our network have been

Water Guardians Christine Adamson and Paula Griffin

identified. Where incidents or concerns are identified that do not relate to Wessex Water assets, they are reported directly to the Environment Agency (EA).

Lessons learnt?

SWT have raised several issues with Wessex Water since the project launch. These have included technical challenges, staff timing, undesirable/inaccessible areas and motivation of volunteers. To combat this SWT made several changes to the recruitment process and encouraged volunteers to stick to designated routes.

Future planned activities?

The pilot project has provided us with an opportunity both to identify issues and to trial different ways of working with our partners and volunteers. In the first six months of the 12-month pilot we have already achieved several of the initial objectives.

Based on the positive start to the pilot we are planning to expand the Water Guardian programme further to include other wildlife trusts and river groups. This will allow us to have wide-scale monitoring of waterways in our region.

4 Prevention – rising main burst prevention and detection

What have we done?

The rising main burst detection and prevention programme is a continuation of a programme which started in 2019, where we installed monitors at 75 sites, and in the first year of AMP7 we have installed monitoring on a further 26 rising main systems.

The purpose of burst detection monitoring is to be able to respond quickly to a burst and limit the effects. The monitoring can also identify sites at risk of a burst (see Appendix 1, Case studies 3 and 4).

We currently manage 1,245km of rising main, of which 490km are deemed 'critical rising mains' due to their proximity to main rivers, railways or significant roads or passing through a SSSI. We are now actively monitoring 160km of these rising mains. A further 100km of rising main will be monitored by the end of April 2022.

Lessons learnt?

We have not undertaken the monitoring of flows in this detail before and doing so has highlighted areas where we can improve our detection response from first indications, to obtaining confirmation on-site.

The initial screening selection of rising mains to be monitored has evolved from looking at sites that had previously recorded pollution events to sites which, in the event of a burst, would end up affecting a nearby watercourse or SSSI.

From our AMP6 programme we have gained confidence in our detection techniques by proving that detailed monitoring can work and that this could provide quicker notification of a burst in future.

When reviewing the detected bursts we have identified bottlenecks in the current detection process. We are working to improve the process loop to provide alerts more quickly. This includes increasing the frequency that data is returned from site, quicker processing of this data, and an automated response that links with our existing alarm systems.

Future planned activities?

The programme is continuing and this year we are planning to install a further 25 monitoring systems, as well as developing our duty-point monitoring capabilities.

As well as bespoke rising main monitoring, we are planning to use additional information from our existing assets, eg, identifying sewage pumping station deficiencies before they cause an issue or pollution. We are currently developing this monitoring capability, specifically around pump performance, including, general wear, pump blockage and air locking.

5 Response – sewerage investigation assessments

What have we done?

In 2020, we completed 146 sewerage investigation assessments (SIAs), reports undertaken after a pollution incident or to analyse historical incidents. They focus on identifying the root cause of pollution, as well as proposing interventions to prevent repeat incidents.

Lessons learnt?

A key lesson learnt by undertaking SIAs is that it is vital to have all available information in one document summarising current and historical issues. This avoids duplication of effort throughout the business and the focus is on one report. This has had the added benefit of allowing timely and accurate updates to local EA officers and other relevant parties.

An analysis of pollution root causes, both primary and secondary, identified through the SIAs shows that the main causes of pollutions are blockages, inadequate hydraulic capacity, and infiltration.

Having regular review meetings with the operational and asset planning staff has been critical in confirming actions required following an SIA. The table on page 11 is a summary of the actions that have arisen from SIAs and the subsequent review meetings to help reduce pollutions from recurring in future.

The SIA process has been expanded to look not only at sewerage pollutions but also to move into sewage treatment pollutions. These treatment investigation assessments (TIAs) have required new areas of expertise and technical knowledge and this has proved challenging. The team which completes the SIAs and TIAs has received further training to ensure that the relevant technical details are included so the reports continue to be valuable.

Figure 6: Summary of primary and secondary root cause analysis

Primary root cause analysis

Secondary root cause analysis
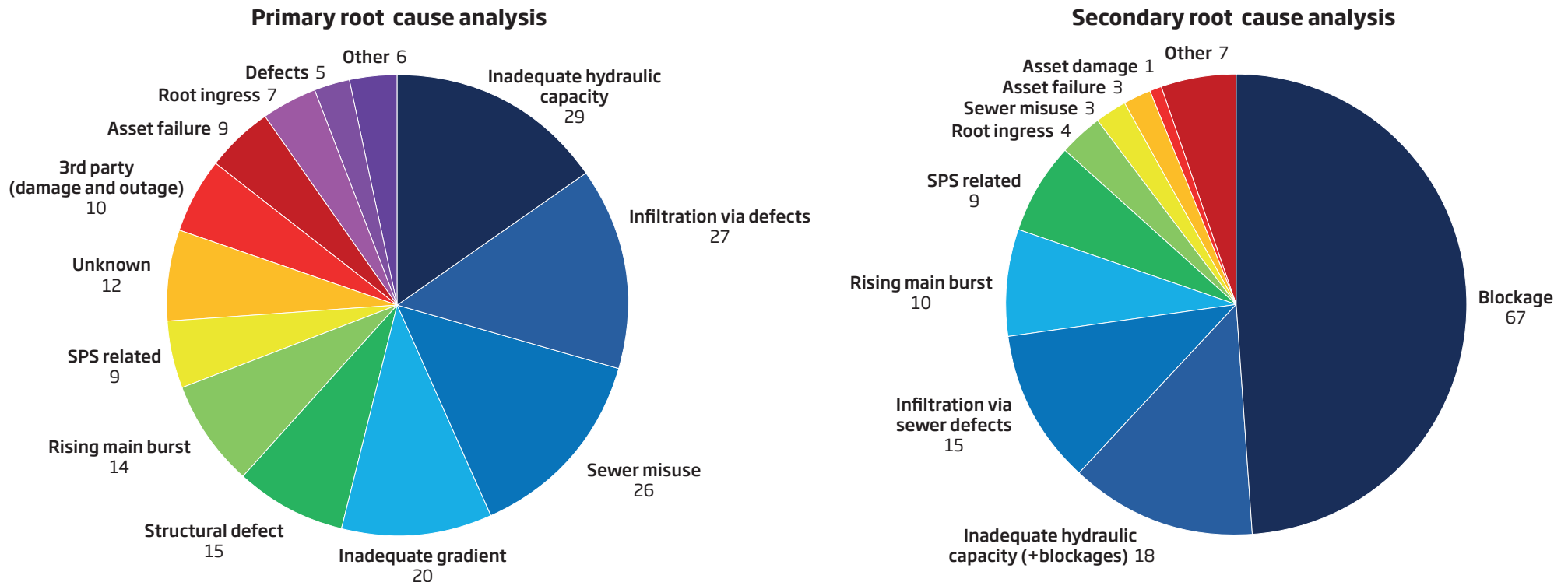
| Proposed actions	Number
CCTV	147
High Level Assessment review	60
Increase routine maintenance	81
SPS/CSO survey	55
Sewer rehab	58
Asset installation	25
Asset review	25
Fat, oil and grease / PR campaign	25
Capital scheme	25
Infiltration investigation	16
SPS/pump upgrade	14
Add to burst detection programme	11
Other*	41

Table 1: Summary of SIA report and meetings actions (*Those grouped into "Other" include no further action, RMIA and asset specifications)

Future planned activities?

As the SIA process has now become standard following pollution incidents, and considering this year's pollution statistics at WRCs, the aim in future is to further expand the TIA process, to provide a more detailed analysis of incident root causes.

In addition to the TIAs, we will also be continuing with rising main investigation assessments (RMIA) following an increase in pollution incidents over the last year. Three RMIAs were completed in 2020, one completed in the first quarter of 2021, with a further six ongoing.

The SIAs, TIAs and RMIAs are proving very successful at identifying actions to take to prevent future incidents. Therefore, improvements are required to better record and keep track of actions, and we are looking at ways to manage these through the corporate pollution register.
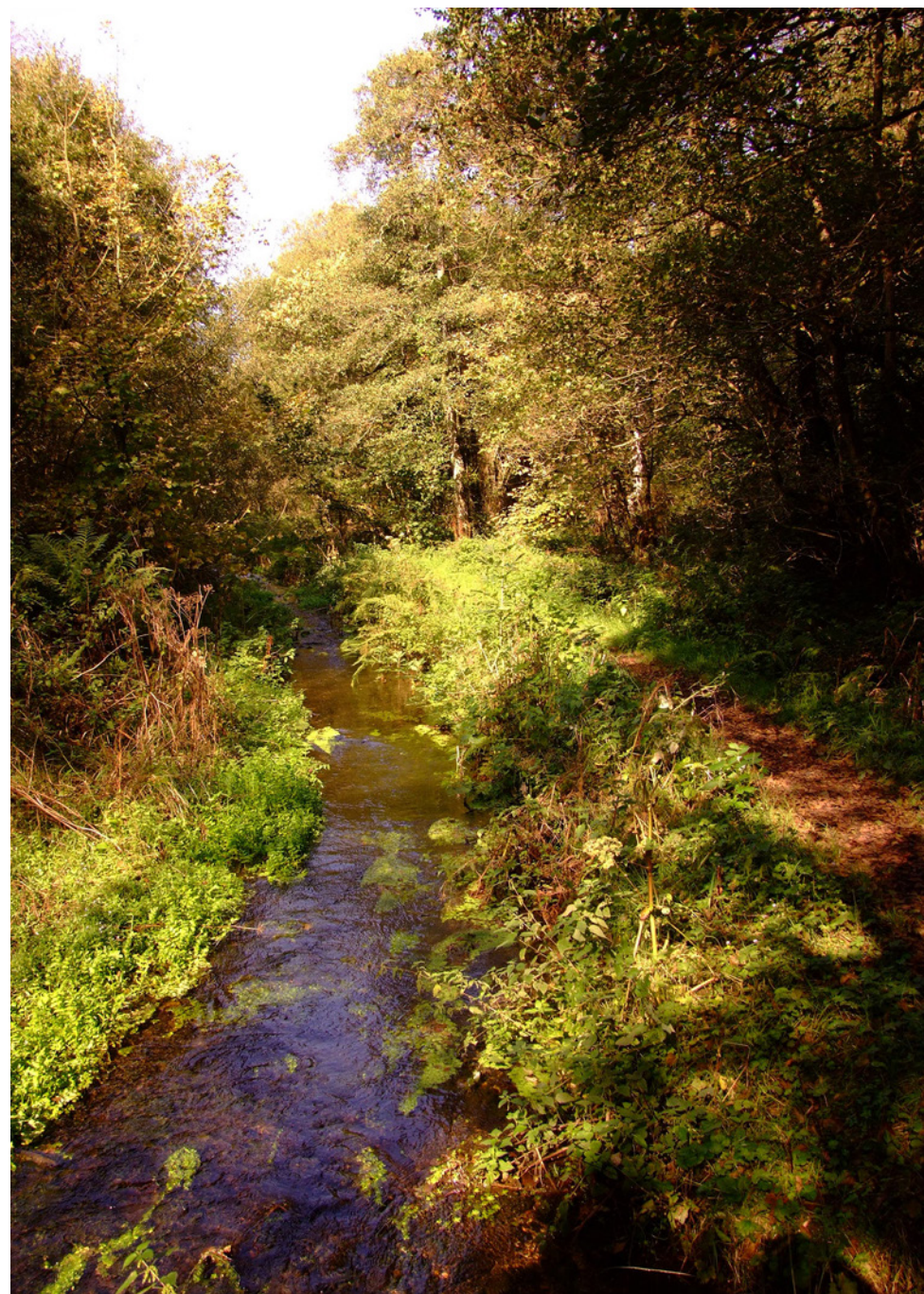
6 Response – sewer misuse strategy

What have we done?

Wessex Water clears approximately 13,000 blockages each year. Approximately 80% of these blockages are caused by sewer misuse, where wet wipes, sanitary products and FOG are incorrectly disposed of into the foul network.

The Covid-19 pandemic has had a significant impact on sewer misuse strategy and some of the customer engagement activities we undertake. We typically attend summer shows, student fairs and organise open door events at sites within our region but these events did not go ahead in 2020.

Covid-19 restrictions have also affected the delivery of our water efficiency in-home audit programme. We had planned to deliver sewer misuse advice and products via this form of engagement but this has not yet been possible – work is underway to re-launch the water efficiency service later in 2021-22.

As a result, we have focused on areas that can be delivered, one of which has been making improvements to the way we communicate with customers after a blockage, to streamline data handling and make it easier to monitor the effectiveness of letters in reducing blockages.

We have developed a more detailed sewer misuse strategy which is presented in figure 7. We have mapped our activities into a framework which shows how we use insight (orange boxes) to shape our delivery activities (blue boxes) and how the impact of these can be measured, and how this will ultimately affect our performance commitments (PC) (green boxes).

We have also strengthened our internal co-ordination processes for customer engagement. Regular meetings take place to review progress data, and plan for and monitor the delivery of activities that form part of the strategy.

Figure 7: Breakdown of sewer misuse strategy
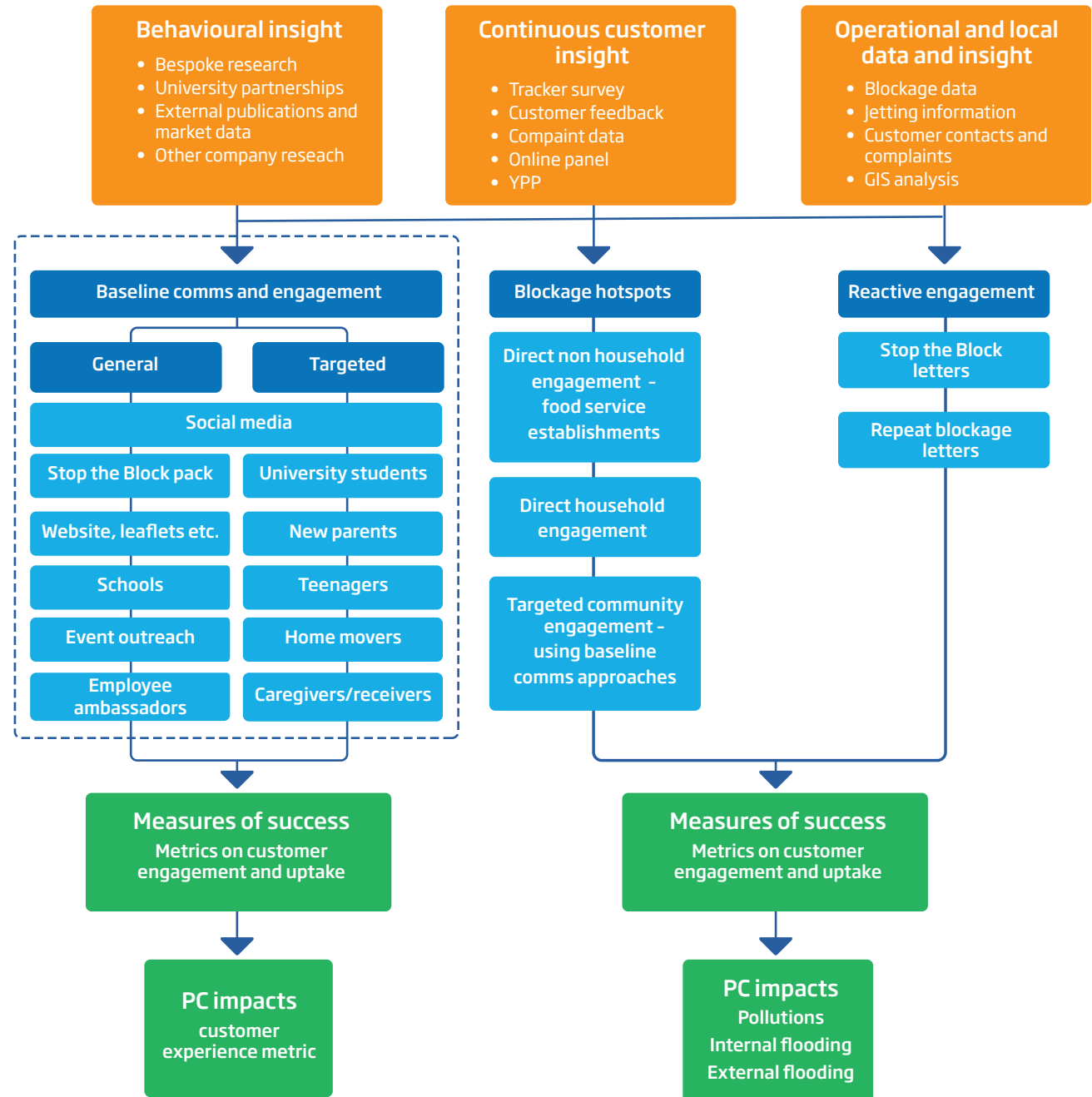
Lessons learnt?

We have made significant advances in the use of operational data for customer engagement processes. These include the geographical analysis of blockage data allowing us to better target communities where sewer misuse causes the most issues.

We have also taken steps to improve our behavioural insight and are using this to shape our strategy in future. For example, reviewing the wording of letters, leaflets, and other customer communications.

The analysis of social media customer engagement data has also helped us to better understand the effect of this form of engagement across all our customer participation workstreams. We continue to explore how best to communicate with customers, promote a variety of activities, and deliver information and advice without saturating our channels of engagement and causing social media fatigue.

Future planned activities?

In early 2021-22 we will be launching a new customer engagement initiative – a Stop the Block free pack offering customers advice and free products to help promote the correct disposal of waste in the bathroom and kitchen, eg, gunk pots, sink strainers, reusable wipes, bathroom bin liners.

We will continue to develop our customer engagement on repeat blockages, taking the opportunity when customers are most aware of the issues and effects of misuse to encourage better flushing and kitchen disposal behaviours.

We are planning a new blockage hotspot targeted engagement programme to focus on areas and locations where regular sewer cleaning is completed. We will also work to create both general and targeted social media content and develop methods by which to measure the success of this engagement.

We continue to refine our sewer misuse strategy, using operational data and behavioural and customer insight to guide the plan. We will be agile in our approach as we test alternative engagement approaches and improve our understanding of the impact of our activities.

PIRP future strategy

Prevention				Response			
People and process	**Assets and maintenance**	**Customer and stakeholders**	**Data and analysis**	**People and process**	**Assets and maintenance**	**Customer and stakeholders**	**Data and analysis**
Prevention policies	**Sewer CCTV – sewer risk model**	**Water Guardians**	**Additional monitoring**	Response policies	**Sewerage investigation assessments**	**Sewer misuse strategy**	Internal pollution reviews
Pollution register	Sewer rehabilitation programme	**National and regional behavioural initiatives**	Rising main burst detection and prevention	Third-party environmental support	Enhanced over-pumping	Improved self-reporting	Environment agency communication
Training and equipment	Enhanced asset maintenance and upgrades	Fat, oil and grease managment	SPS enhanced diagnostics and performance analytics	Resource review	Streamclean	Improved customer correspondence	Environmental surveys

On track   Focus area   Being accelerated

Figure 8: Summary of PIRP year 2 focus areas

A key principle of our PIRP has been to use data to inform our actions. This supports our 'plan – do – review – act' approach, so that we can periodically review data to ensure that we are seeing the results that we expect and, if not, can understand the reasons for that and, if necessary, modify our approach accordingly. Consequently, there are two areas that we will be accelerating over the coming year:

- intelligent sewer networks
- customer and community engagement.

Even with the challenges of Covid-19 we have, in most cases, been able to deliver the initiatives outlined in the PIRP, enabling us to check the effectiveness of the plan as we moved through the last 12 months.

The data provided above shows that our sewer network is an area where we can make the most gains and following our work with intelligent sewer monitoring and

rising main burst detection, amongst other activities, we are modifying our plans to maximise the benefits that we have seen from early work in these areas.

To build upon the work we have done we will be establishing an intelligent sewer monitoring capability to provide extended monitoring in terms of the number of assets monitored. Using data from our EDMs, rising main monitoring and our SPSs we aim to have intelligent monitoring capability at around 1,300 storm overflows and more than 200 sewage pumping stations in sensitive locations.

This data will enable us to vary our approach and respond to changes before a sewer overflows, a rising main bursts or a pumping station fails. It will also allow us to adopt a condition-based approach to maintenance – intervening at the right time and in the right way to maintain reliability.

Evidence from the trial work we have concluded in Bath and from our rising main monitoring programme shows real examples of avoided pollution incidents. Our plan now is to do this at scale and quickly reap the benefits that we have found at a demonstration level.

A large proportion of our pollutions are a result of sewer misuse and through work that we have completed over the last 12-18 months we have seen significant reductions in blockages in areas that we have targeted as hotspots. These areas are selected not only for the frequency of blockages, but also due to their proximity to watercourses and sensitive areas. We will be increasing our activity in this area, focusing on both domestic and commercial customers and helping our customers to reduce misuse of sewers.

Finally, we will be expanding our work with local organisations to increase our network of Water Guardians. Our early work with them has seen amazing engagement from a very passionate group – clearly very focused on making a difference to the environment.

DWMP

Our drainage and waste water management plan (DWMP) will set out our short, medium and long-term investment plans for the waste water network and treatment works. It will identify existing investment needs and how much more will be required in future to address pressures on our assets such as growth, urban creep, climate change and sewer deterioration.

We will assess investment scenarios for the key metrics that are particularly relevant to the PIRP:
- reducing pollution incidents to zero
- improving storm overflow performance to reduce harm
- keeping our WRCs compliant
- reducing hydraulic flooding
- increasing customer behaviour campaigns to reduce blockages
- investing in sewers for longevity so we do not burden future generations
- making sewers watertight to prevent groundwater inundation.

The DWMP will be drafted by summer 2022 and published on our website, **here**. This website and the geographical portal containing the DWMP detail will be updated over the next year to include more drainage strategies, more infiltration reduction plans and our first draft DWMP report and appendices. The DWMP will inform our PR24 business plan and beyond.

Governance

Wessex Water consistently performs in the upper quartile in terms of the number of pollution incidents. However, our board is clear that our long-term aim must be to achieve zero pollution incidents while in the short term reducing them to fewer than 69 incidents a year by 2025.

In order to achieve this, we have developed an internal governance framework comprising several working groups (Figure 9) and documents which follow a 'plan – do – review – act' approach (Figure 10). Each of these groups, which meet throughout the year, offer the opportunity for different aspects and levels of the pollution incident reduction plan to be challenged, as well as developed. This continual process allows the pollution incident reduction plan to be dynamic and continually evolve as data and new working practices develop.

In addition to our pollution incident reduction plan, we have developed an internal working policy document (escape of sewage reduction plan) detailing all our initiatives and the projects associated with the reduction of flooding incidents as well as pollution reduction.

Figure 9: Wessex Water internal governance framework

Figure 10: Overview of Wessex Water internal 'plan – do – review act' process
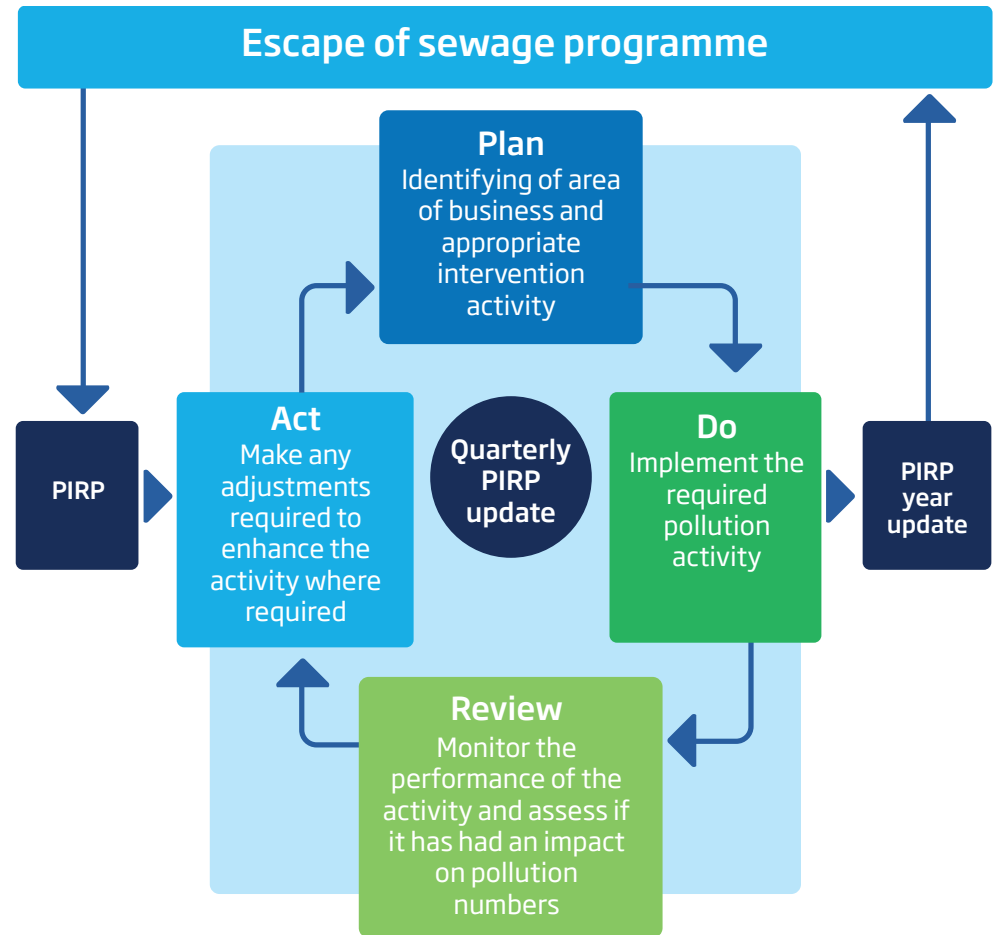
Summary of PIRP related meetings held throughout the year

Governance/ Assurance	Frequency	Detail
Pollution review	Weekly	Incident focused. Opportunity to discuss pollution incidents – response and lessons learnt.
Environment Agency/Wessex Water pollution review	Fortnightly	Regular meetings to discuss historical pollution incidents. Allows us to maintain a good line of communication.
Escape of sewage (EOS) progress meeting	Monthly	Review of the ongoing escape of sewage programme and pollution performance. Opportunity to review programmes finances, plan upcoming projects/initiatives and respond to emerging issues.
EOS financial meeting	Monthly	Review of programme's finances
EOS strategy meeting/ Wessex Water directorates	Quarterly	Review of pollution performance and progress of PIRP activities for the last quarter. Opportunity to identify trends and areas of the business that require further attention in the next quarter
Quarterly PIRP updates	Quarterly	Quarterly update on the PIRP, a document which highlights several case studies and success stories from the programme, while also providing measurable variables which can be used to track our progress.
Investment solutions group (ISG)	Bi-annually	Bi-annual meetings which are attended by directors and other senior management. Presentations and papers are given to provide an update on the ongoing programme to ensure senior engagement.

In line with our aspiration to continue as an industry leader on environmental performance, we will carry on using the Environment Agency's Environmental Performance Assessment as a key performance indicator for the company. It will continue to be an integral part of performance targets across the business, including at executive level.

The governance framework also involves the EA and, recognising the importance of a close working relationship with them, we actively engage with our local EA through regular meetings to help us effectively deliver the PIRP.

Appendix 1 - case studies

1 Sewer risk model hotspot analysis case study: Chipping Sodbury

The sewer risk model flagged the length of sewer running parallel to a watercourse in Chipping Sodbury as high risk. Because the section of the network alongside a tributary of the River Frome is downstream of a CSO, and surrounded by woodland, it was designated high risk with a maximum environmental impact score.

Following the identification of this section, a new CCTV survey was undertaken to investigate and confirm the network's conditions. The survey confirmed that the network had poor structural and service grades with root mass ingress, mass debris, lateral fractures and circumferential fractures. To mitigate the risk of a potential collapse, we completed a full structural lining of 253m of the sewerage network. The illustrations show the initial CCTV, the pre-rehab clean and post rehab.

If this section had not been identified using the sewer risk model and a collapse or blockage had taken place, it is likely that a significant pollution incident could have occurred, with a high environmental impact.

Initial CCTV

Pre-rehab clean CCTV


Post rehab clean CCTV
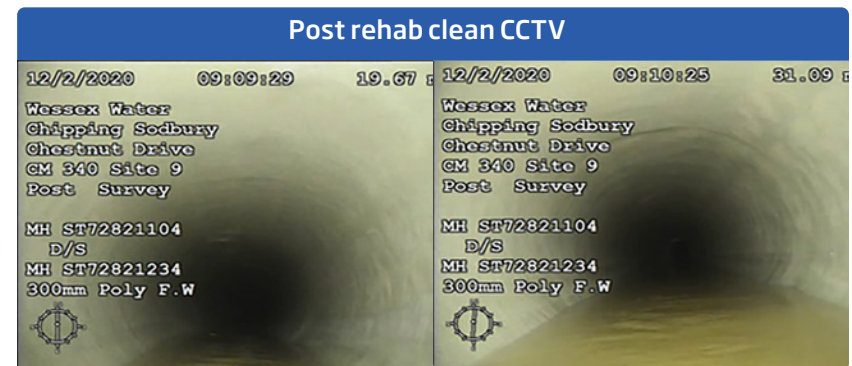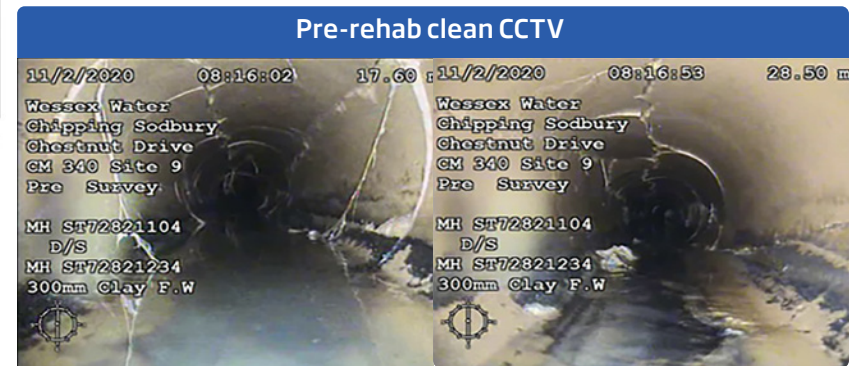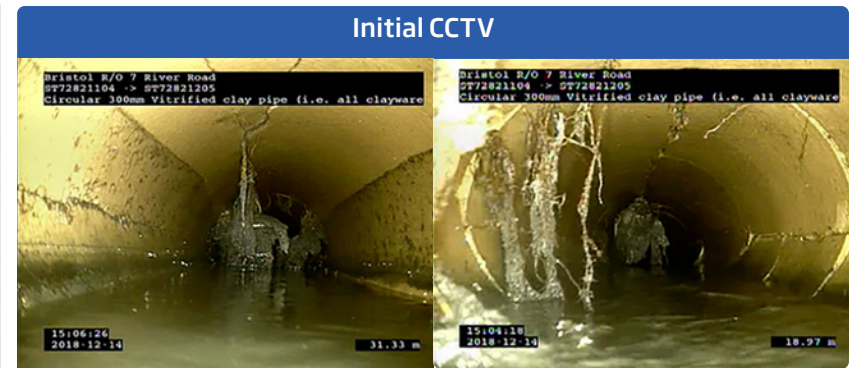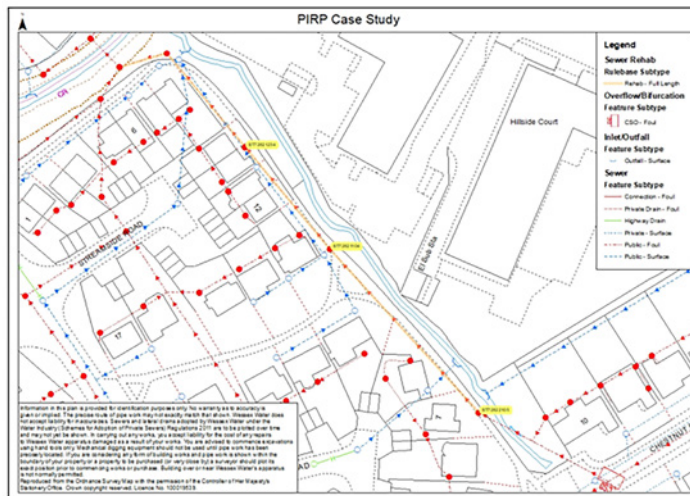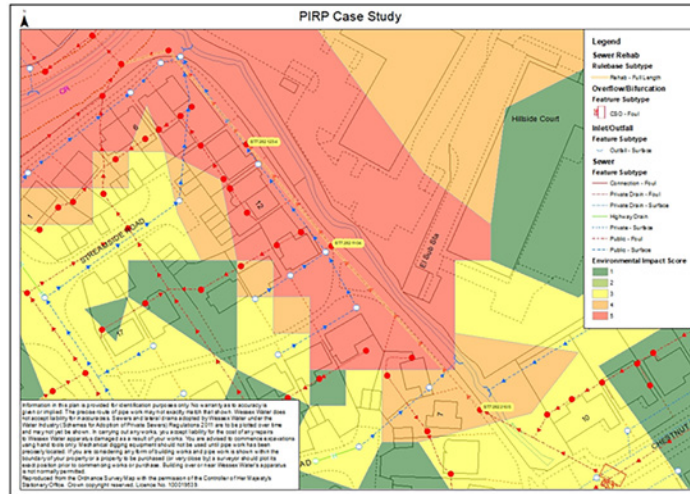
2 Sewage catchment EDM trial case study: Bath in-sewer monitoring trial

During August, one of the companies involved in the Bath In-sewer trial identified a potential partial blockage downstream of Batheaston Mill House combined sewer overflow (CSO), as levels at the CSO had begun to rise outside the normal parameters.

A sewerage crew was alerted to the potential blockage but before they could attend the blockage had cleared itself. However, a second blockage quickly occurred and levels remained high at the CSO. Due to the quick succession of blockages at the site CCTV was arranged to establish whether there was a defect downstream triggering the blockages.

The CCTV showed there was approximately 200m of settled debris downstream of the overflow, which has now been removed, and two sealing rings hanging from joints downstream. These may have contributed to the two blockages and we have now organised for the rings to be removed and a patch liner placed over one of the identified defects.

Incidents like this give us confidence that the In-sewer monitoring trial is producing reliable information that can be scaled up across the region and used to help reduce pollution and sewer flooding incidents.
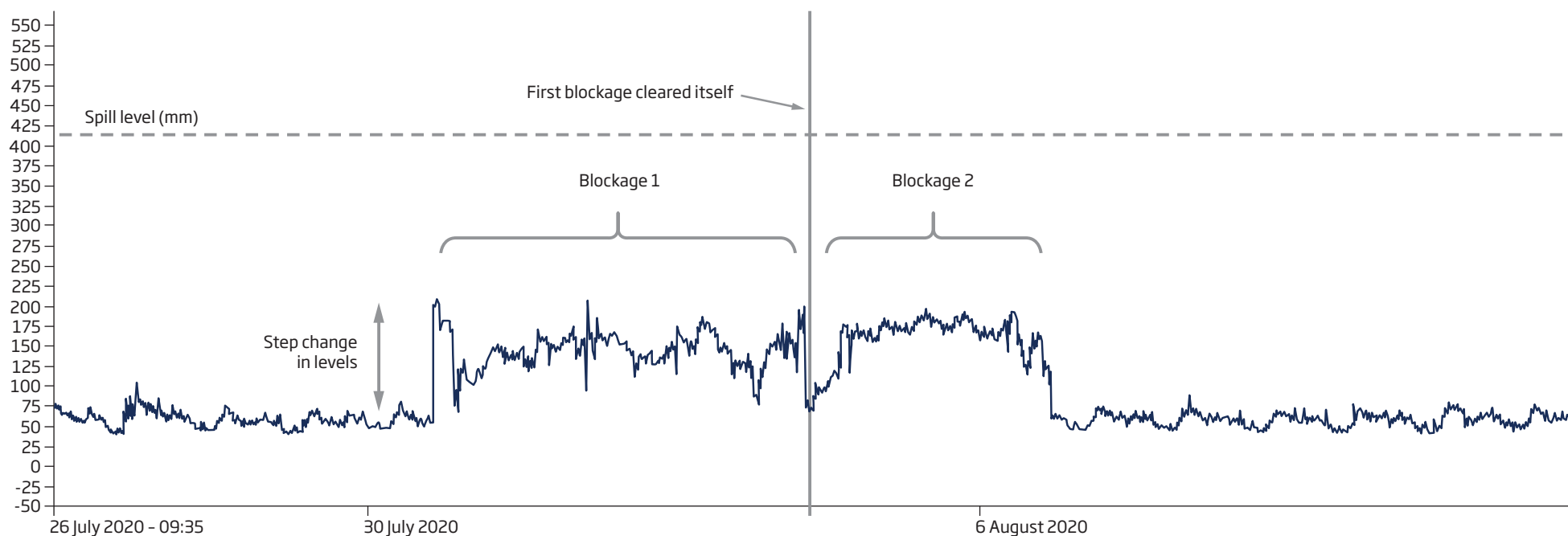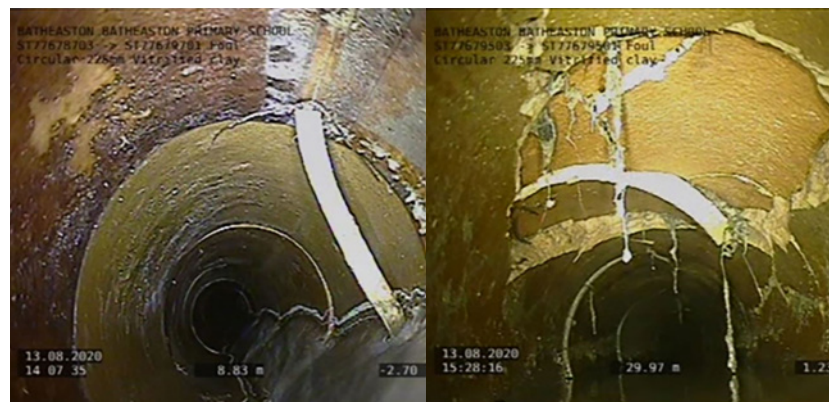
3 Burst detection case study: Crewkerne North Old WRC pre-spill telemetry

Date of incident	13 May 2020	**Water impact category**	N/A – no pollution

We were alerted to an issue at Crewkerne North Old WRC, by a pre-spill alarm from an ultrasonic depth monitor. Within an hour of the alarm we had attended the site and found that the CSO was backing up due to a blockage in the hydrobrake, and at the point of overflowing into the environment.

The blockage was quickly removed, and the main line of the works was cleaned. As a result of a quick response to the pre-spill alarm a discharge to the environment was prevented and a pollution was avoided.

Lessons learnt: the existing telemetry system alarms at pre-spill and spill. This is sufficient information if it is dry and the rate of rise between pre-spill and spill provides adequate time to respond as in the case study above.

However, had it been raining, this problem would have been masked. The Bath proof of concept for intelligent alarms will address this issue and generate alarms when levels are recorded outside the normal expected parameters for the prevailing conditions.

ID: 16999, Crewkerne North Old WRC EDM
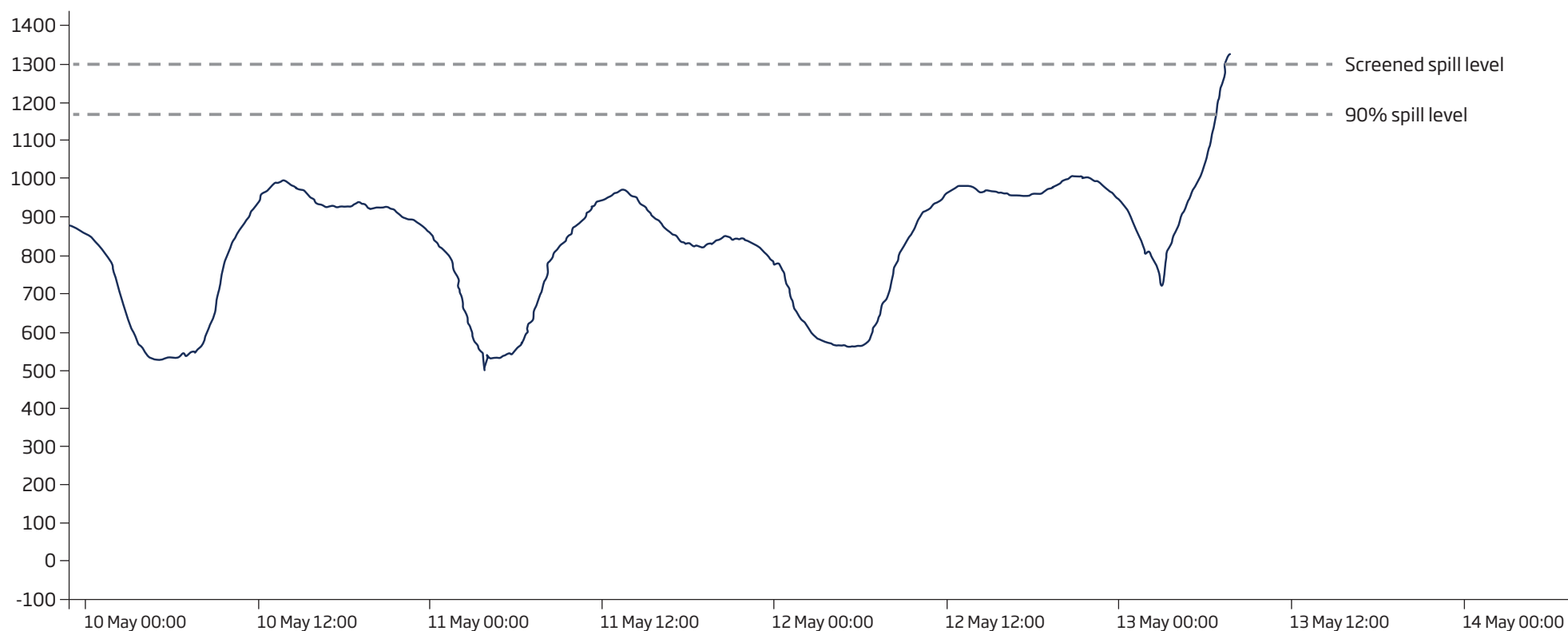
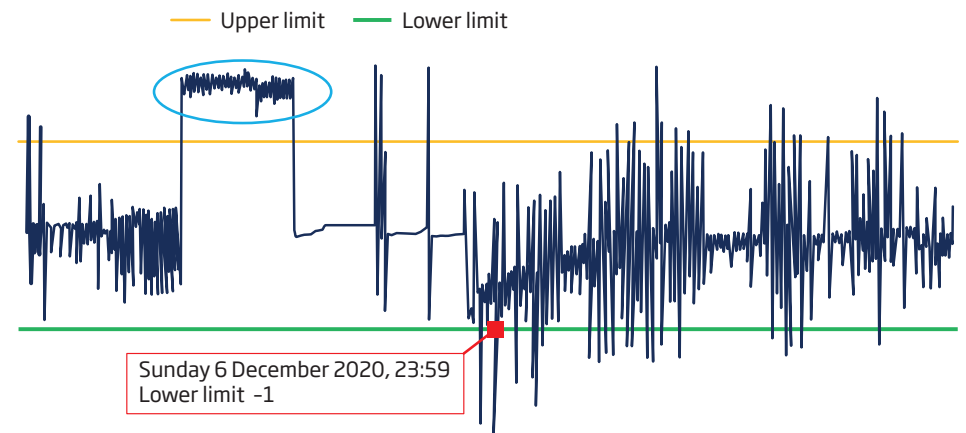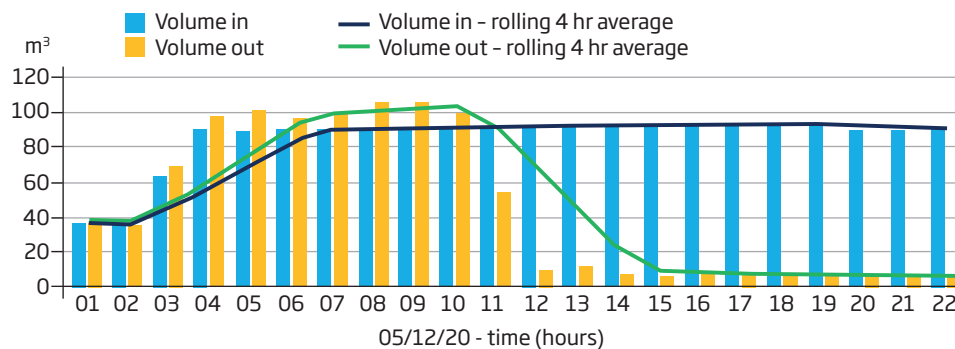## 4 Burst detection case study: Bulbury Lane rising main burst prevention

On Saturday 5 December 2020 a burst main was detected at Bulbury Lane sewage pumping station. An email alert was sent from the burst detection system, reviewed and actioned by 7pm. By 11pm the site had been isolated, and work had begun on resolving the burst. The site was returned to service by 8pm on Sunday. No environmental impact was recorded at the site as the burst did not reach the watercourse.

New hourly communications for the site allowed us to respond more quickly to the burst than we would have previously. Without the increase in communication, we would not have known about the burst until the following morning and it would have been approximately 24 hours from the burst before a tanker could have been mobilised, and a pollution incident would have occurred.

This incident confirms the accuracy of the new burst detection systems and will allow for future alerts to be sent directly to the control room for action, allowing for a faster response. We will also be reviewing our out-of-hours response protocol to ensure improved out of hours performance. The data obtained will also help us to improve the system-curve detection system currently under development.

Hourly flow balancing

Legend:
- Volume in
- Volume out
- Volume in – rolling 4 hr average
- Volume out – rolling 4 hr average

m³ axis: 0, 20, 40, 60, 80, 100, 120

05/12/20 - time (hours): 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22

Legend:
- Upper limit
- Lower limit

Sunday 6 December 2020, 23:59
Lower limit –1

Appendix 2 – Numerical quarterly activity analysis

Below is a summary of the quantitative activities reported in the PIRP quarterly updates.

Theme	Activity (in-period unless otherwise stated)	Unit	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Totals
People and process	Pollution incident training	Nr	99	0*	120	139	358
Assets and maintenance	Length of sewer surveyed	Km	1.3	5.5	4.7	13.9	25.4
	Sewerage investigation assessments completed	Nr	54	21	32	39	146
	Treatment investigation assessments completed	Nr	1	0	0	1	2
	Rising main investigation assessments completed	Nr	0	1	0	1	2
	Length of sewer rehabilitated	Km	0.5	0*	0.424	0.765	2.894
Customers and stakeholders	Summer shows: number of people engaged	Nr	0*	0*	0*	0*	0*
	Student fairs: number of people engaged	Nr	0*	0*	0*	0*	0*
	Attendees at Open Doors events	Nr	0*	0*	0*	0*	0*
	Social media reach	Nr	183,746	135,083	99,486	61,483	479,798
	FSEs investigated	Nr	135	0*	405	77	617
	Personalised letters following blockage incidents	Nr	227	150	334	334	1,045
	Water Guardians engaged	Nr	0*	0*	0*	27	27
Telemetry data and analysis	Cumulative number of intermittent overflows monitored (and % of total)	Nr	970 (75%)	1000 (77%)	1021 (79%)	1056 (82%)	-

*Zero due to the impact of Covid-19

Activity table commentary

Pollution incident training

Pollution training is typically delivered in the form of toolbox talks given to sewerage networks, waste treatment, supply production/distribution and dispatches teams.

Training material is now available to all staff via the online training platform iLearn – empowering them to 'self' train and not be reliant on arranged training courses. To help improve how we respond and deal with blockages, we are in the process of constructing a training jetting unit which will be used to deliver a consistent approach when training new and existing staff, ultimately helping to reduce the risk of pollutions.

Length of sewer surveyed

Sewers are proactively surveyed to try and identify those that require remedial works (eg, cleaning, rehabilitation etc) before pollutions or other sewerage incidents occur.

The Wessex Water sewer investment management planning geo-database model (SIMP) identifies and prioritises lengths considered at high risk of being a source of pollution using various factors including size, distance from a watercourse and if the pipe is downstream of a watercourse.

Sewer surveys have been identified as a key activity in the PIRP on page 7.

Sewerage investigation assessments (SIAs) completed

A SIA is a report undertaken after a pollution incident or to analyse historical incidents, in order to focus on identifying the root cause of the pollution, as well as identifying interventions to prevent repeat incidents by pulling together various sources of data:

- proactive CCTV surveys
- sewerage risk model
- sewerage hotspots
- CCTV downstream of CSOs
- repeat pollutions
- repeat sewerage contacts
- EDM and in-sewer monitoring
- hydraulic sewer models and telemetry.

In 2020, 146 SIAs were completed leading to the following proposed actions being identified.

SIAs have been identified as a key activity in the PIRP on page 10.

Treatment investigation assessments (TIAs) completed

As the SIA process has now become commonplace following pollution incidents, and in light of this year's pollution statistics at WRCs, our aim is to further expand the SIA process to include TIAs so we have a more detailed analysis of incident root causes at WRCs.

Rising main investigation assessments (RMIAs) completed

As well as expanding the SIA process to produce TIAs, we intend to focus on RMIAs following an increase in pollution incidents resulting from burst rising mains.

Length of sewer rehabilitated

Sewers requiring proactive rehabilitation are identified as a result of sewer surveys, including surveys undertaken specifically at locations with a high risk of pollution. By rehabilitating the sewers proactively, we believe that future pollution would have been prevented.

As more sewers are identified for rehabilitation than resource available, the sewer lengths requiring rehabilitation are prioritised.

Customer engagement: shows and fairs

As part of our customer engagement to prevent pollutions and other sewerage incidents due to sewer misuse we attend summer shows and student fairs, and organise open door events to sites within our region. However, as a result of the Covid-19 pandemic, these events have not gone ahead.

We plan to attend these types of events during 2021-22, as the pandemic eases.

Social media reach

During 2020-21, our social media (eg, Facebook, Twitter, LinkedIn, Instagram and Hootsuite) posts have been viewed around c500,000 times. These posts focused on increasing awareness and influence around our core calls for action:

- only flush the three Ps
- put used cooking fat and food scraps in the food waste bin
- as and when appropriate – Bin wet wipes, Don't use wipes, Sanitary products go in the bin and Use reusable products rather than single use.

FSEs investigated

ECAS is a contractor which actively manages food service establishments (FSEs) on our behalf. It engages FSEs to offer unprejudiced advice regarding their fats, oils and grease management.

ECAS is currently managing 735 FSEs across our region including Shaftesbury, Poole, Bristol, Salisbury, Ringwood, Swanage, Bridport, Wellington, Wincanton, Yatton and Chippenham together with other smaller areas. Of the 735 FSEs it manages, 284 have installed grease management systems.

Personalised letters following blockage incidents

Following a blockage or a sewer misuse incident, personalised letters are sent to properties in the surrounding areas by our customer service team. Rather than a generic letter, they will be addressed to the customer and contain photographs of the incident that occurred in their locality.

In the past year, sewer misuse letters have been sent to more than 80 streets in our region. Of streets issued with the letters, 84% have had no repeat incidents, 13% have had one incident, and only 3% have had two or more since the initial letters were sent.

Water Guardians engaged

Water Guardians are volunteers who monitor watercourses, identifying possible pollution incidents and reporting them to Wessex Water. They have been identified as a key activity in the PIRP on page 8.

Number of intermittent overflows monitored

For AMP6 we achieved our target of monitoring 75% of intermittent overflows. For AMP7, our target is for all intermittent overflows to be monitored by 2025.

Qualitative report on progress

Below is a summary of the qualitative activities reported in the PIRP quarterly updates.

Theme	Activity or initiative	Year 1 2020 progress report
People and process	Additional equipment roll-out	Digital ammonia monitors trialled, resulting in 43 monitors being purchased and deployed within sewerage operations.
	Pollution incident register	User acceptance training for new application in April 2020. New pollution incident register up and running; now a business-as-usual application
Assets and maintenance	Artificial intelligence sewer scanning initiative	Used Marketplace approach to assess whether technology could be used to automate the assessment of sewer condition while being surveyed. Nine companies submitted approaches using test footage which were shortlisted to seven companies. These are now being trialled by experts within the business to understand whether any give the business efficiencies required and accuracy in real-life testing.
Customers and stakeholders	Update on events	No face-to-face events due to the Covid-19 pandemic. 4,000 GunkPots and Stop the Block fliers inserted into fresher student goody bags in University of Bath halls of residence.
	Anti-FOG initiatives	For periods throughout the year, FSE visits around the region have been on hold due to coronavirus. 284 food service establishments (FSEs) have now installed grease management systems, which means that more than 80 tonnes of FOG have been prevented from entering the sewer network. Three FSEs have now been recharged for costs associated with blockages they have caused.
	Hotspot competition/ promotions	During the year we have undertaken several trials including a social media communications trial in Trowbridge that reached 18,000 customers, and sending free GunkPots to properties in Yarbury Way in Weston-super-Mare, which was identified as a FOG blockage hotpot. We are currently reviewing our customer engagement strategy for sewer misuse. We plan to have a BAU process in place for customer engagement in hotpot areas by the start of 2021/22.

Theme	Activity or initiative	Year 1 2020 progress report
Customers and stakeholders	Joint waste messaging with local authorities	On hold due to Covid-19 pandemic. This work is on hold until 2021/22 and joint messaging will be reviewed as part of the customer engagement strategy for sewer misuse.
	Partnership working	For periods throughout the year, this has been on hold due to coronavirus as project requires community engagement and face-to-face contact. The Resource West Group is meeting weekly to develop plans to facilitate shifts in consumer behaviour to reduce resource consumption (electricity, gas and water) and promote the correct disposal of waste, as well as protecting more vulnerable members of our community from resource poverty. Initial focus is a campaign in Bristol that we hope to launch in early 2021-22.
	Water Guardians	Somerset Wildlife Trust has now recruited 27 volunteers, covering the Glastonbury, Langport and Taunton areas. The main focus will be on the River Brue catchment. The volunteers have all undergone training by Wessex Water and SWT and been provided with the appropriate PPE.
	National engagement	We have engaged with Defra (water quality), eNGOs (The Rivers Trust; Surfers Against Sewage; Extinction Rebellion Wimborne), Bournemouth, Christchurch, Poole councils, and Philip Dunne MP (chair of the Parliamentary Environmental Audit Committee) to make them aware of our views that mandatory labelling of flushable products should be done through the Water Industry Specification 4-02-06 (aka 'Fine to Flush') and that all other items that might be considered 'flushable' should be clearly labelled 'Do Not Flush' at point of use. We have also responded (via WaterUK) on the CMA consultation on misleading environmental claims **www.gov.uk/cma-cases/misleading-environmental-claims**
	Regional initiatives and events	No face-to-face events due to the Covid-19 pandemic.
	Local initiatives	Customer behaviour working group to look at how we can break customer behaviour somewhere in the journey of purchasing, using and then disposing of wet wipes. This will be ongoing for a few months and the measure of success will be in reducing blockages.

Theme	Activity or Initiative	Year 1 2020 Progress report
Telemetry data and analysis	Sewer depth monitor machine learning	Results of the trial demonstrated that we could see up to 97% reduction in alarms from storm overflows operating as expected in wet weather reaching the control room. We are now entering a procurement phase where we have chosen to take two of the suppliers through to a competitive tender. We are aiming to complete this in the next few months.
	Rising main burst detection	Instrumentation continues to be added at sites to allow bursts to be detected and control systems to be developed following recent bursts and the knowledge gained from them. Detection system continues to improve, we have completed an upgrade to the communication systems enabling data transfer from sites every hour. The burst detection analysis is now taking place when new data arrives and exceptions/anomaly alerts are generated.
	Rising main burst prevention	Trials underway into smart air valves (which alert when blocked/leaking) and resilient air valves (which should handle FOG better).
	Pumping station enhanced diagnostics	Good progress in SPS diagnostics allowing us to move towards a condition-based maintenance strategy and picking up potential issues before full failure. While waiting for the dashboard to be developed further and published (incorporating the 10 'golden rules' of optimum pumping station operation), the existing pumping station scorecard dashboard and the Meniscus dashboards have been used to identify many operational/performance issues with pumps running on, eg, float stuck, partial blockages of pumps or NRVs, non-compliance, deterioration of performance. We are monitoring flow more closely to ensure we're compliant and issuing more pump maintenance based on sites at risk, or with deteriorating performance.
	Inlet works low-flow detection	Currently, three WRCs have been tested and two retrospective bursts would have been detected if this model had been in place when they occurred. Over the next quarter, more sites will be tested with this method to analyse its effectiveness at detecting bursts and blockages. There is also potential for a similar method to be used to detect low flows into SPSs. Where there is no flow meter, a reduction in the number of times a pump has run could also be used to identify problems upstream.

Glossary

AMP7	The seventh asset management period planned by the UK water industry and running from 2020 to 2025.
Category 1 pollution incident	Major, serious, persistent and/or extensive impact or effect on the environment, people and/or property.
Category 2 pollution incident	Significant impact or effect on the environment, people and/or property.
Category 3 pollution incident	Minor or minimal impact or effect on the environment, people and/or property.
Category 4 pollution incident	No impact on the environment.
EDM	Event duration monitor.
eNGOs	environmental non-governmental organization.
FOG	Fat, oil and grease.
GIS	Geographic information system.
HLA	An assessment of flooding incidents to establish the underlying cause, producing high level solutions with cost estimates.
Ofwat	The water services regulation authority.
PIRP	Pollution incident reduction plan.
PR24	Ofwat's price review 2024.
Rising main	A rising main is a sewer which is pressurised, using pumps to move sewage uphill.
SPS	Sewage pumping station.
WRC	Waste water recycling centre.