Pollution Incident Reduction Plan

Wessex Water

March 2020

Wessex Water
YTL GROUP

"We are an environmental services business. Each day we have the purpose and privilege of protecting the environment from the impact of the wastewater from 2.8 million people in the area we serve.

Collecting and treating sewage to protect the environment is at the core of what we do. We take this environmental protection role very seriously.

Operating and maintaining 35,000km of sewers, over 2,000 pumping stations and 400 water recycling centres is a formidable task. Even though we are not in direct control of what is put into the sewer network, we aim to ensure that we apply the best available approaches to ensure the water is recycled to the environment without any harm being caused.

However, things occasionally do go wrong. Sewage or storm water can escape before it should. Our challenge is to do everything we can to prevent this from happening.

This plan identifies how we are doing that. It will take a combination of people, investment, communication and technology. And we have committed an additional £3.7m of expenditure in 2020/21, on top of our normal levels of maintenance, to reduce the number of pollution incidents that arise from the assets we are responsible for looking after."

Andy Pymer
Executive Director Finance and Regulation

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1. Purpose

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

We consider ourselves as 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.

This document explains our historical and current water environment pollution performance and explains our plans to continuously improve.

2. Pollution incident reduction plan (PIRP) approach

The structure of this plan first reviews historical data and root cause analysis of pollution incidents and then explains the actions we are taking, under four delivery themes.

The four main delivery themes are:

- **People and Process**
- **Assets and Maintenance**
- **Customers and Stakeholders**
- **Telemetry Data and Analysis**

In order to deliver a step-up in resources and initiatives we have increased budgets in 2020/21 by £3.7m divided across the four themes in the following way:

Delivery theme	Additional expenditure £k
People and process	500
Assets and maintenance	2,400
Customers and stakeholders	500
Telemetry data and analysis	300
Total	**3,700**

Table 1: Additional expenditure in 2020/21 across delivery themes to deliver the plan

The delivery themes work across three main asset groups:

- our sewerage network (including drains and sewers, pumping stations and pumping mains, attenuation tanks and overflows)
- our water recycling centres (a.k.a. sewage treatment works)
- our water treatment centres and water distribution network.

The plan will be updated every three months to report on progress against the activities, initiatives and their outcomes. A comprehensive review of the plan will take place once a year. The latest progress update is reported in Section 8 below.

There are numerous supporting procedures associated with pollution prevention and response. These are not contained in this document but are highlighted in this plan in *italics*, listed in Section 9 and available upon request.

Words with a definition that may not be widely understood are highlighted in green and explained in a glossary in Section 10.

As well as a number of initiatives that you will find in this plan, we also look to others outside of the water sector to bring their thinking to our aspiration of having no pollution incidents. Our approach is called the Wessex Water Marketplace where there are a number of challenges presented, two of which directly related to pollution incident reduction. These are covered in sections 5.2 and 7.3 of this plan.

3. Historical performance and analysis

Understanding historical performance is key to targeting actions in the most appropriate areas. The review and analysis cycle is vital for ensuring improvements continue and pollution incidents reduce.

3.1 Pollution performance

Pollution numbers have more than halved in the past 20 years. A change in reporting process in 2012 led to an increase in recorded numbers, however in recent years the number of incidents has plateaued at about 80/year.

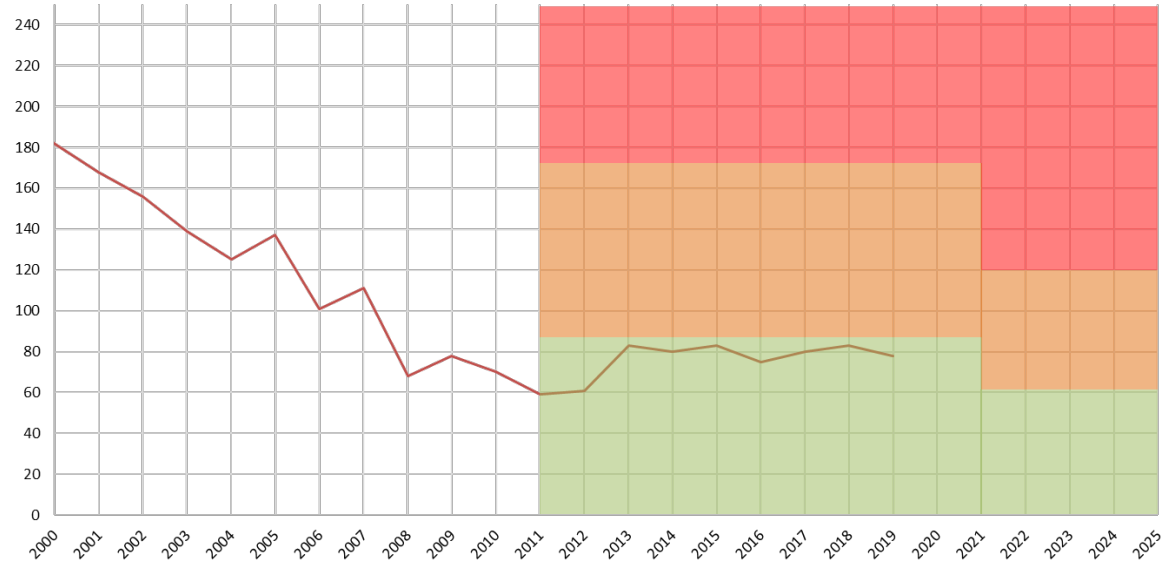


Figure 1 : Total number of recorded Category 1-3 pollutions incidents from wastewater assets.
Environmental Performance Assessment red, amber and green thresholds indicated

The majority of the pollution incidents above are Category 3s. However, a few have been more serious Category 1 and 2s. The table below shows the historical numbers of more serious incidents:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Cat 1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	1
Cat 2	5	16	7	4	5	6	9	4	0	0	0	2	0	5	3	3	2	2	2	0

Table 2: Numbers of Category 1 and 2 pollution incidents
(includes incidents from water supply assets)

3.2 Comparative pollution performance

When normalised against our sewerage network length (to be able to more readily compare companies of different sizes), our pollution performance has historically been better than the sector average.

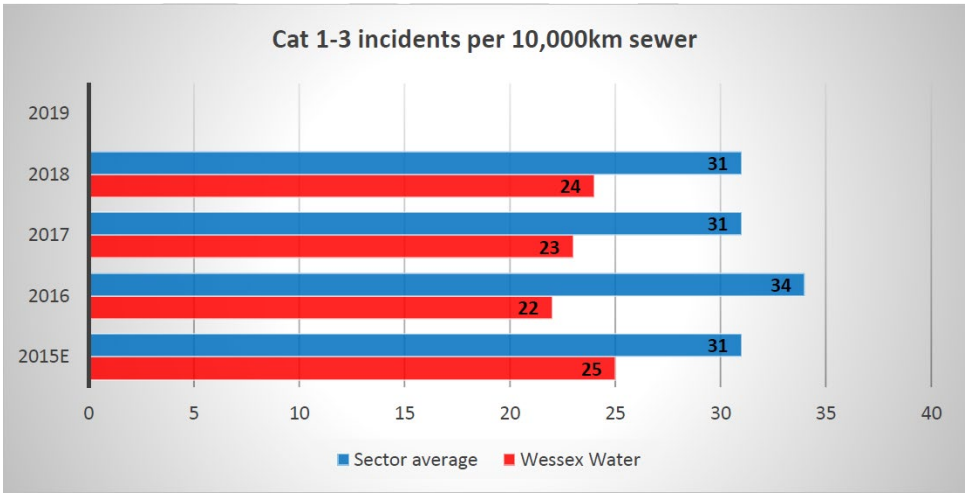


Figure 2: Comparative and normalised water sector pollution incident rates
Source: Water company performance report July 2019

However, there is some way to go to meet our aspiration.

3.3 Pollution Targets

Our aspiration is to cause no pollution incidents.

Reaching our aspiration will take time and in the more immediate future we are aiming to meet the targets as 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 compared to numbers of incidents recorded in 2016.

For Wessex Water this means targeting **zero** category 1 or 2 incidents and less than **61** category 3s from wastewater assets by the end of 2021.

3.4 Root cause analysis

Analysis of the root cause clearly shows that blockages in sewers are the dominant cause of pollution incidents and that these blockages are predominantly caused by wet wipes.

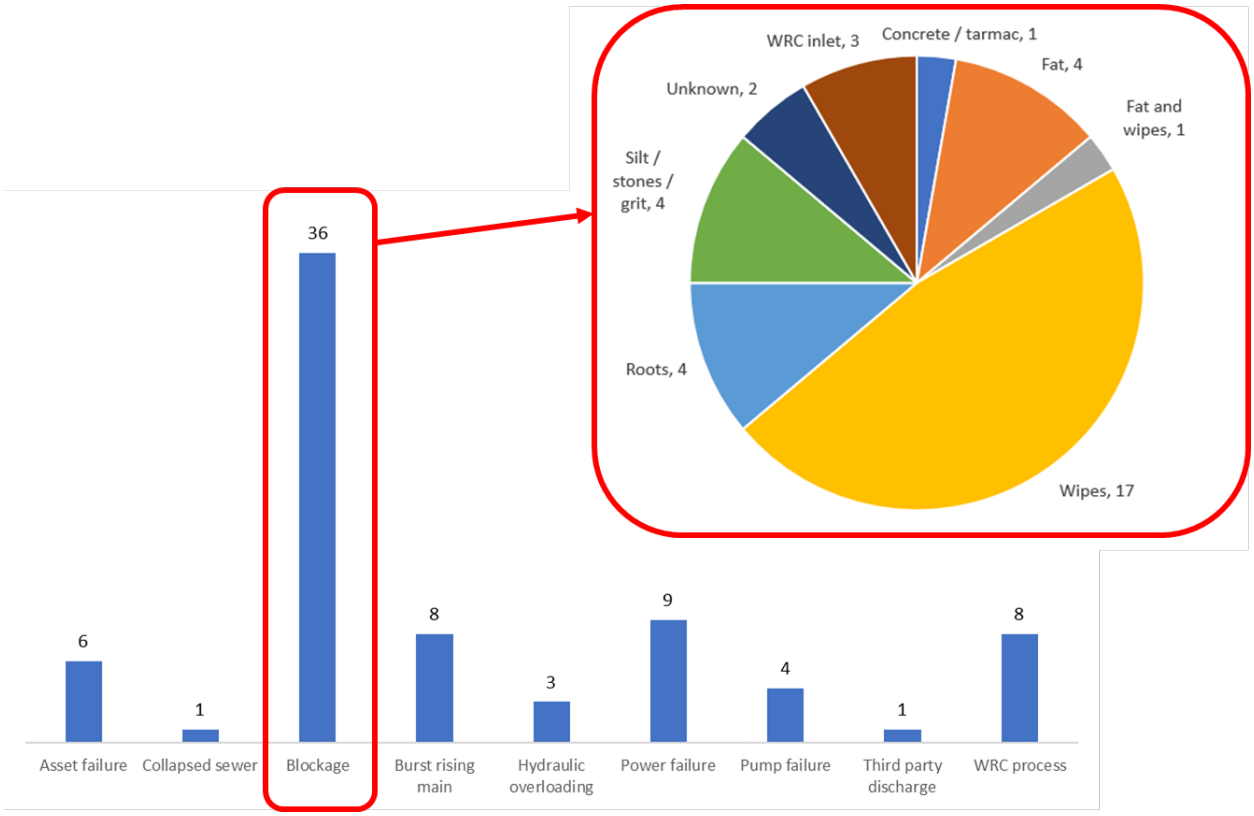


Figure 3: Root cause analysis for Cat 1-3 pollution incidents in 2019 and detail of blockage causes

The assets that pollution incidents arise from are predominantly foul sewers. This generally occurs where a blockage causes sewage to back-up and overflow from a manhole cover. The flow subsequently ends up in a watercourse causing a water pollution.

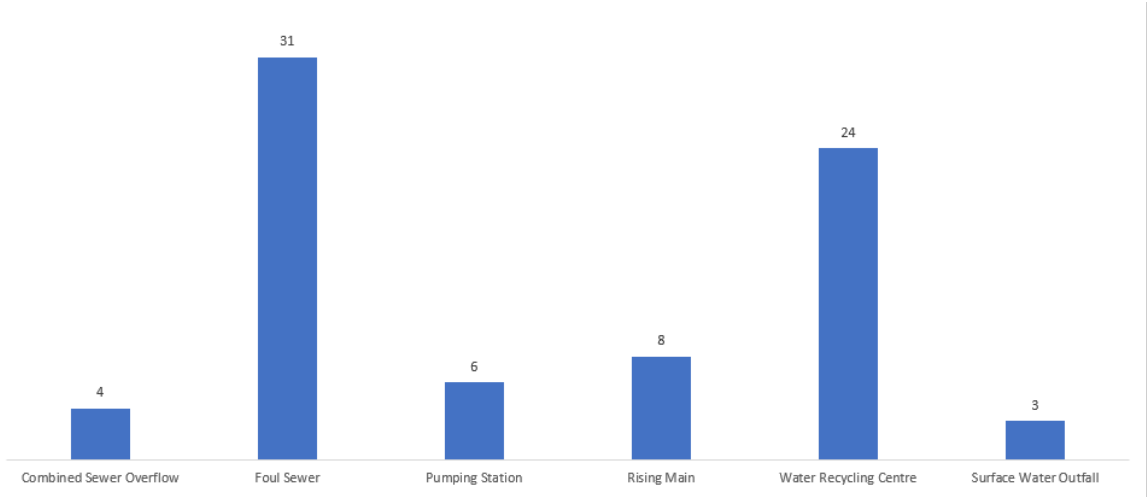


Figure 4: 2019 pollution incidents arising from different asset groups

In 2019 we saw a large increase (from 2018) in reported pollution incidents from water recycling centres. The majority of these were where the treatment process was compromised by mechanical or electrical failures although blockages at the inlet to the works was also a significant contributor.

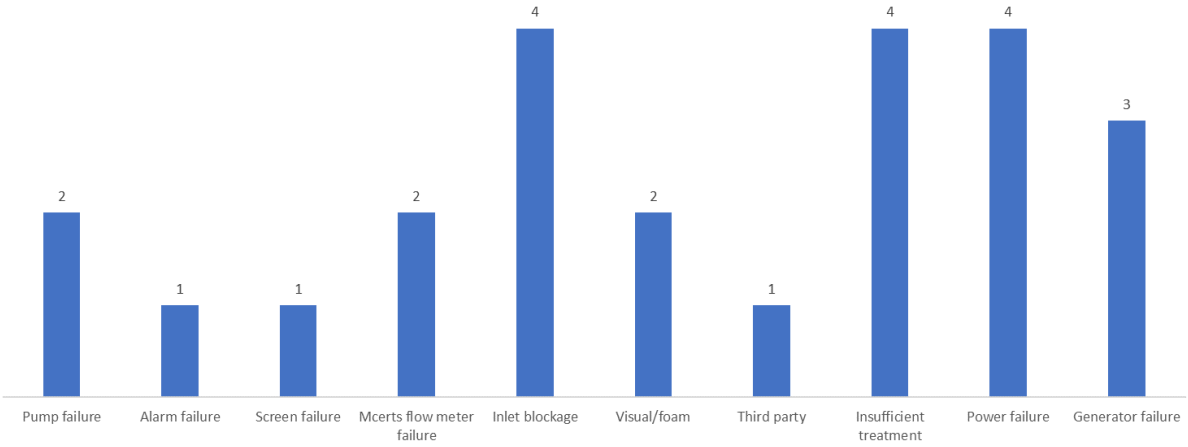


Figure 5: Root cause analysis of pollutions arising from Water Recycling Centres

The following sections of the plan highlight the ways in which we are targeting the root causes of pollution incidents and how we are improving our response to mitigate any impact on the environment.

4. People and processes

This section focuses on our existing and planned approach to ensuring we have the right resources, skills and processes required to reduce the number of pollution incidents. Our processes and procedures are split between Prevention (proactive) and Response (reactive).

There are numerous individuals and teams across our business who have a role in prevention of pollution incidents. The spread of involvement is so widespread across different areas of our business that communication of this information does not fit a single organogram, so we have presented it in two tables below.

Table 3 illustrates the teams and the activities they carry out to prevent pollution incidents occurring in the first place. Planned maintenance, customer engagement and data analysis are key to ensuring our water treatment, water distribution, sewerage and sewage treatment processes perform as they are designed to.

On occasions where there are sewage or potable water escapes that could harm the environment, the speed of response and mitigation factors employed can have a significant effect of reducing any environmental impact. Table 4 illustrates the teams and the activities they carry out when we respond to an incident that may affect the environment.

Table 3: Teams and activities carried out to prevent pollution incidents

Team	Activities to PREVENT pollutions
Sewerage and sewage pumping station crews	- Proactive planned maintenance of sewerage assets (e.g. pumps, air valves, monitors, penstocks, valves, screens)
Treatment operators	- Proactive planned maintenance of treatment assets
Treatment scientists	- Analysis of treatment works performance
Control room	- Alarm status monitoring
Jetvac team	- Proactive planned maintenance of sewerage assets. Including pre- and post-CCTV of sewer cleaning
Pumping station wet well cleaning team	- Proactive planned maintenance of sewerage assets
Performance team	- Data analysis and reporting
Geospatial analysis team	- Sewer risk model development and communication - Hotspot analysis to steer proactive investigation
Geospatial information system team	- Publication and maintenance of geospatial information of our network and environmentally sensitive areas
Asset reliability team	- Scheduling of planned maintenance - Rising main performance data review – detection and analysis of parameters exceeding expected operating boundaries
Sewerage investigation assessment team	- Reactive and historical reviews to steer proactive investigation
CCTV crews	- Proactive CCTV to identify potential problems
Streamclean team	- Proactive investigations to ensure assets are operating correctly e.g. before each designated bathing season
Sewer rehabilitation team	- Sewer rehabilitation delivered using trenchless technology (which causes less disruption than open cut pipe replacement) - Installation of rising main linings
Catchment delivery team	- Working with farmers to support and incentivise them in their activities to prevent pollution
Asset strategy team	- Plan asset investments required to ensure sufficient capacity - Development of operational hotspot tool - Develop and implement strategic technological solutions
Customer behavioural engagement team	- Plan effective initiatives to change how customers use the sewer system - Analysis of behavioural engagement initiatives to determine effectiveness
Network engineering team	- Installation of new monitoring equipment
Correspondence team	- Communication with customers and stakeholders to educate and inform
Anti-Fats, Oils and Grease (FOG) team	- Visiting Food Service Establishments (FSEs) to ensure they are compliant with kitchen management practices
Public relations team	- Create awareness of incidents through the media - Attendance at shows and fairs to educate and inform - Social media campaigns
Community engagement team	- Delivery of educational programme to school children and students
Senior management team	- Provision of adequate budget and resources to meet targets - Influence WaterUK and national policy, Fine to Flush, Defra Waste Strategy

Table 4: Teams and activities carried out in response to pollution incidents

Team	Activities in RESPONSE to pollutions
Sewerage crews	- Respond to incident, inform EA, apply mitigation measures, data/information/evidence gathering and feedback, keep EA updated. - Visit customer if pollution attributed to customer sewer misuse
Sewage pumping station crews	
Treatment operators	
Control room/operational contact centre	- Receive and log calls – make operational managers aware for quick response
Jetvac team	- Provide emergency tankering capacity and major blockage clearance
Tankering team	- Provide emergency tankering capacity
Emergency pump suppliers	- Provision of emergency mobile pumps
Pumping station wet well cleaning team	- Respond to incident to clean wet wells
Performance team	- Check to ensure assets were operating as they should
Asset reliability team	- Review of recent maintenance undertaken
Sewerage investigation assessment team	- Sewerage Investigation Assessment to determine root cause where it is not obvious
CCTV crews	- Gather CCTV information to trace root cause
Streamclean team	- Tracking down misconnections of foul water to surface water systems and ensuring they are corrected - Environmental sampling post incident
Compliance team	- Internal review of incident - Collate incident information and ensure correct categorisation of incident - Monitor data on NIRS database - Communicate with EA environmental officers to ensure correct categorisation of incidents
Repairs and maintenance team	- Respond to and fix bursts and collapses - Clean up after sewage escape
Sewer rehabilitation team	- Respond to and fix partial sewer collapses where trenchless technology can be utilised
Environmental investigation team	- Assess ecological water and land impact of incident
Catchment delivery team	- Assess impact of incidents (including third party) on our reservoir or groundwater catchments
Public health team	- Advise on public health impact of incident
Correspondence team	- Write to customers if pollution attributed to customer sewer misuse
Anti-Fats, Oils and Grease (FOG) team	- Visit customer if pollution attributed to customer sewer misuse
Public relations team	- Manage reactive enquiries from the media and contacts from customers on social media.
Estates team	- Landowner claims for damages following a pollution incident. Assist with land remediation following a pollution incident
Legal team	- Advise on potential enforcement action against third party
Senior management team	- Weekly review meetings with Operational managers and Compliance team

4.1 Processes and Procedures

4.1.1 Prevention policies

Our approach to reducing pollutions starts with maintaining the assets we are responsible for so that they don't lead to escapes of water or sewage that might harm the water environment. Preventative maintenance is the best approach to driving down incident numbers. We have several policies and procedures that set out our approach.

These have all been reviewed and updated in 2019.

Key procedures are:

- *Operational asset management strategy*
- *Sewerage operational maintenance strategy*
- *Water recycling operating maintenance strategy*

4.1.2 Response policies

In 2019, a *Pollution Incident Response - Golden rules grid* was developed to convey the key messages to staff involved in responding to an incident.

Comprehensive *Pollution Incident Response* and *Pollution Incident Sampling* procedures were developed in 2019 to improve our ability to assess the environmental impact of any incident.

To aid our reporting processes and data handling a "Pollution Incident Online" tool has also recently been developed, which allows operators and samplers to record the location of pollution impact, sampling points and the sample data, as well as logging photographic evidence. As this data is collected it is viewable instantly by other members of staff.

The software also has the added benefit of being able to view historical pollutions and data sets (see below). The benefit of this tool is to share information in real time, to improve the timeliness of our response and ensure any escalation that is required happens promptly. The tool also highlights sensitive locations, such as SSSIs where the environmental impact could be more damaging.

Figure 6: Screenshot taken from "Pollution Incident Online"

4.2 Pollution register - consolidation

We recognise the need to standardise pollution incident reporting into one central repository, in the form of a pollution register, meaning there is one single source of information. This will be an improvement from the various arrangements currently across different areas of the business. The figure below shows how the different areas of the business feed into the new Pollution Register.

The functionality within the mobile and desktop applications will mean that field staff are able to capture critical evidence such as photographs, time and date stamped events, sample details and GPS coordinates. Having this near real-time information allows for immediate access for staff to log, update, review and report on incidents.

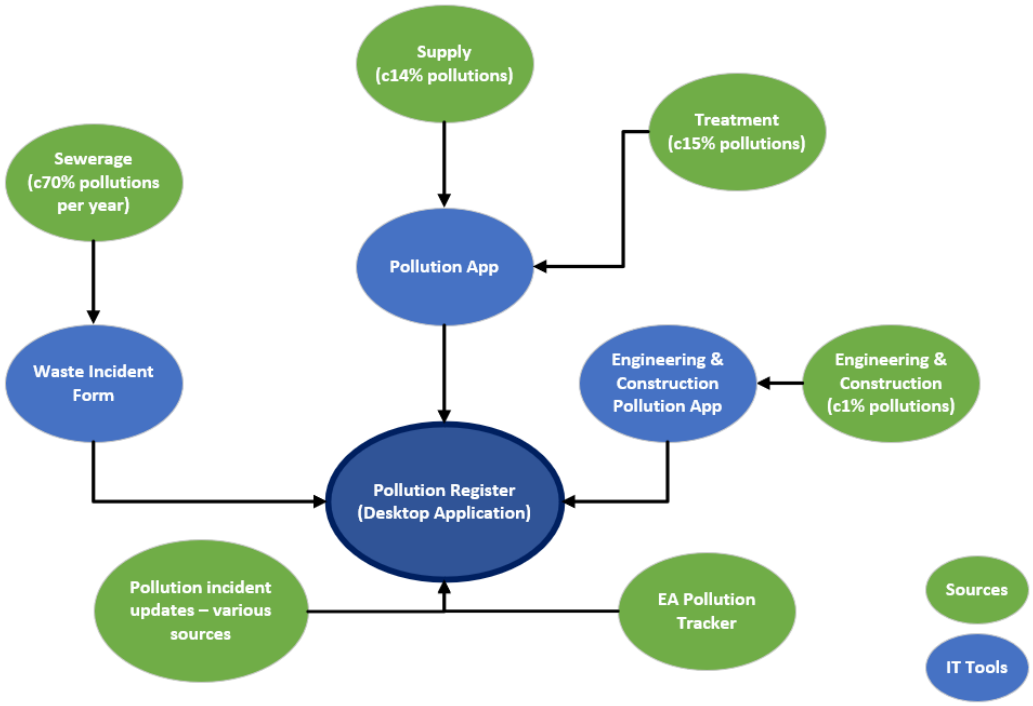


Figure 7: Map of new pollution register under development and planned for completion May 2020

4.3 Training and equipment

4.3.1 Pollution training

'How to respond' to an actual or potential pollution incident is critical for a wide range of staff across the business. We have developed a training programme to increase awareness of our pollution response procedures.

This is particularly important, as the first few hours of the pollution response are critical to reducing impact on the environment.

The delivery progress of our training programme is covered in Section 8. All training records are maintained on our corporate HR system.

4.3.2 Equipment

Ammonia impact from escapes of sewage are a critical factor in assessing the severity of an incident. Currently our staff use ammonia test kits which gives a visual assessment of the ammonia present in the sample.

We are currently trialling digital hand-held meters which will give more accurate readings. Additionally, dissolved oxygen monitors and chlorine monitors (for escapes of potable water) and oil spill kits are being trialled. These will ensure reactive response both limits the impact and gathers the data to quantify the impact.

We have also made kit available for pollution response, particularly straw bales and puddle clay so these can be deployed rapidly to reduce environmental impact, from a central location on a 24/7 basis.

4.3.3 Upskilling sewerage operators

We have instigated several initiatives to upskill staff who work on the sewerage network. These include:

- Jetvac crews being enabled to carry out CCTV
- Sewerage crews being retrained to carry out more effective blockage clearance

4.4 Additional resources

Our increase in focus on pollution reduction has led to an increase in the number of staff working on incident prevention and response. This includes a dedicated Regional Pollution Incident Reduction Manager as well as several new posts.

4.4.1 Streamclean team activities

The Streamclean team currently consists of three two-man teams assisted by a third team member covering where necessary. The team aims to find the sources and causes of pollutions, many of which stem from incorrect domestic drainage arrangements and problems associated with the sewerage system.

The team's activities have now been extended to environmental sampling if an incident happens.

	2017/2018	2018/2019
Proactive		
No. of properties covered	67,000	63,000
No. of misconnected properties	239	323
No. of misconnected appliances	754	1055
Properties passed to Environmental Health	5	6
Reactive		
No. of Investigations	187	140
No. of misconnected properties	65	92
No. of pollution incidents attended	Total: 41* (of which 29 are private pollutions) *4 Pollutions were related to oil pollutions	Total: 13* (of which 13 are private pollutions) *2 pollutions were related to oil pollutions

Table 5 Streamclean team activity

4.4.2 Environmental Investigation Team

We have enhanced our ability to respond to incidents and quantify the impact by extending the scope of and the size of our environmental investigation team so they can now provide environmental support following pollution incidents to identify the level of impact caused as well as their planned investigation work.

This includes additional real-time water quality data collection using ammonia and dissolved oxygen probes, and wider ecological surveys to identify presence and health of aquatic invertebrates, fish species and aquatic plants.

The survey data collected covers the geographical extent of the incident and helps to quantify the impact of the incident compared to baseline levels or Water Framework Directive classification.

The team responds to all Category 1-3 pollution incidents on a same working day basis. During weekends, holiday periods or significant pollution incidents external contractors are deployed to either provide support or assist with remediation work using specialised equipment, such as fish rescue tanks or hydrogen peroxide dosing.

5. Assets and Maintenance

We attend c25,000 sewerage related incidents per year. Around 13,000 of these are where sewers are not flowing properly – usually due to some form of blockage in the pipes. About c2,500 of these incidents end up with sewage flooding outside of buildings, c180 result in sewage flooding inside of buildings and c40 result in sewage reaching watercourses and causing pollution incidents. We employ thirty sewerage crews who are the first responders to customer contacts and ten customer service technicians who follow-up works and undertake customer liaison.

This section explains some of the new initiatives we are carrying out in addition to normal maintenance. Knowing where to increase our maintenance or how to respond quickly requires good data. Analysis of this data informs us where to target our resources.

5.1 Sewer Risk Model

Our sewerage asset base is some 35,000km long – long enough to stretch almost round the world (the equator is 40,000km).

Looking inside the sewers (using CCTV cameras) to determine whether they are fit for purpose is not as easy looking at assets that are above ground. It can also involve a lot of organisation (e.g. road closures) and cost.

We have a significant amount of data about our sewerage network. Our sewer risk model combines all the available data (environmental impact, asset condition, historical incidents, condition surveys etc.) into a single place to enable easy analysis.

Within the sewer risk model there are four main risk categories:

- **Structural risk** primarily driven by asset condition
- **Pollution risk** primarily driven by the environmental impact of an escape of sewage
- **Service risk** primarily driven by the customer service impact of an escape of sewage
- **Capacity risk** primarily driven by hydraulic capacity information

The model provides risk values at individual pipe level for each of the categories, as well as producing an overall risk score.

This is an objective way of identifying the most vulnerable parts of our sewer network, efficiently and with relative ease. The flexibility of the model means that, depending on the outcome sought, weightings for risk calculations can be easily varied. Examples of the various outcomes that the model can be used for are:

- **CCTV survey inspection** - the model results are directly used to identify sewer lengths to be inspected in the short and long term
- **Pollution prevention** – the model results show where to target inspections to reduce the probability of pollutions incidents from the sewer network
- **Flooding prevention** – the model identifies locations of repeated customer incidents such as blockages, restricted toilet use etc. to focus inspections and to influence maintenance activities and customer communication.

- **Drainage and Wastewater Management Plans** – the model provides overall performance indicators on a catchment level for future strategic investment policies
- **Sewer rehabilitation** – the model's risk results are used to calculate a prioritisation score to ensure sewers are rehabilitated in the best order.

The outputs produced from the risk model (see below) are used to calculate costs for sewer CCTV surveys, maintenance and rehabilitation for business and budget planning purposes.

Sewer Risk score	Pollution Model Length of sewer (km)	Service Model Length of sewer (km)	Structural Risk Length of sewer (km)	Capacity Risk Length of sewer (km)
1	964	404	2075	690
2	2717	2580	3829	3392
3	5980	5437	2933	4112
4	4808	2797	3010	2912
5	338	21	95	37
6	2555	5172	4161	4661
8	1818	698	1116	1091
9	555	2632	1942	2191
10	247	39	142	76
12	550	772	1047	1275
15	100	52	186	103
16	32	58	107	117
20	11.1	11.3	32.0	15.9
25	0.1	0.0	0.1	0.2

Table 6: January 2020 Risk scores for four different models within the Sewer Risk Model

Details of how the model has been created, maintained and used is explained in our *Sewer Risk Model Procedure*

5.1.1 Model Outputs – hotspot mapping

Data from the sewer risk model can then be used to illustrate risks geospatially. The figures below illustrate typical hotspot analyses for:

A) Customer contact hotspots
B) Pollution incident hotspots
C) Structural issue hotspots

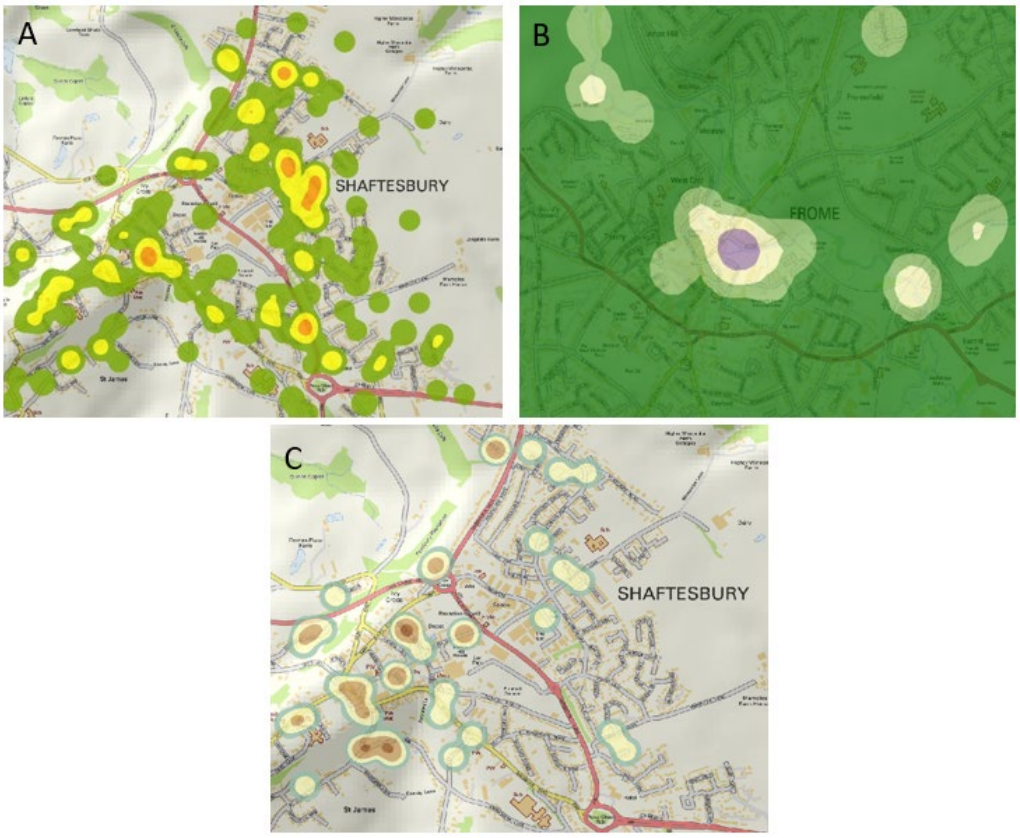


Figure 8: Examples of Sewer Risk Model hotspot outputs

5.2 Sewer CCTV inspection approach and planning

Prioritisation of proactive CCTV inspection of our sewers provides valuable information that can identify problems or potential problems which we can address but which would otherwise end up as future pollution incidents.

Our sewer inspection programme is based on risk and sound logic. The CCTV data obtained from our inspections is then fed back into the sewer risk model.

Our *sewer CCTV inspection procedure* uses the factors and asset survey derived data below. Each of the factors is weighted slightly differently.

- **Risk (R)** - uses the sewer risk model results
- **Cost Benefit Analysis (CBA)** - special factors and individual policies
- **Whole Life Cost Analysis (WLCA)** - date of previous survey and condition grades
- **Cost Effectiveness Analysis (CEA)** - combining different risk categories and spatial distribution

Once the model is complete, each sewer length is given an inspection grade corresponding to each category. There is also a built-in model which assigns a ‘due year’ for inspection to every mapped sewer in our area.

This process defines the annual proactive inspection programme and it is updated daily to incorporate recent CCTV inspections. This allows us to prioritise CCTV surveys in known

operational and structural hotspots. This process is currently managed by our Sewer Investment Management Planner (SIMP) geo-database.

Our SIMP geodatabase provides the following information:

	Structural		Pollution		Service	
Year due for inspection	Total length (km)	CCTV Cost est. £k	Total length (km)	CCTV Cost est. £k	Total length (km)	CCTV Cost est. £k
Within 20 years	603	904	413	619	425	636
Within 15 years	8,942	13,414	10,046	15,070	8,629	12,945
Within 10 years	9,886	14,830	9,330	13,995	10,500	15,751
Within 5 years	1,094	1,641	828	1,242	1,072	1,607
Within 1 year	148	222	56	84	47	70

Table 7: SIMP geodatabase output (February 2020)

The prioritisation models are also updated daily to allocate priority scores on each of the sewer lengths in the SIMP. This allows planning the works further into its respective investment programme (e.g. pollution risk reduction, escape of sewage risk reduction, structural rehabilitation) and determine indicative timescales for delivery.

5.3 Sewer rehabilitation programme

In addition to the above CCTV policy, a similar *sewer rehabilitation and prioritisation procedure* has been created to prioritise sewer rehabilitation and maintenance needs. Like the inspection procedure, this procedure also uses Risk, Cost Benefit Analysis, Whole Life Cost Analysis and Cost Efficient Analysis scoring to produce a prioritisation score.

This determines the short- and long-term sewer renovation priorities.

Prioritisation score	Description
4-5	Urgent rehabilitation - within 1 month
3-4	Short term - within 1 year
2-3	Medium - within 5 years
1.5-2	Long term - within 10 years
1-1.5	Over 10 years

Table 8 Rehabilitation programme priority scoring and actions

Sewers are then grouped into cohorts to allow sewer rehabilitation teams to target sewers which pose the greatest risk in the most efficient way.

5.4 Sewerage Investigation Assessments

It often takes a more detailed analysis to get to the root cause of a problem. Site based staff don't necessarily have the time nor knowledge of the available data to undertake this deep dive analysis.

Consequently, we have expanded our Sewerage Investigation Assessment (SIA) process (see process flow diagram below) to incorporate and examine newly arising pollutions, in

addition to historical pollutions and repeat incidents that have been caused by hydraulic issues.

The investigations focus on identifying the root cause of the pollution, as well as identifying proactive interventions, which have the potential to reduce escape of sewage issues in the future.

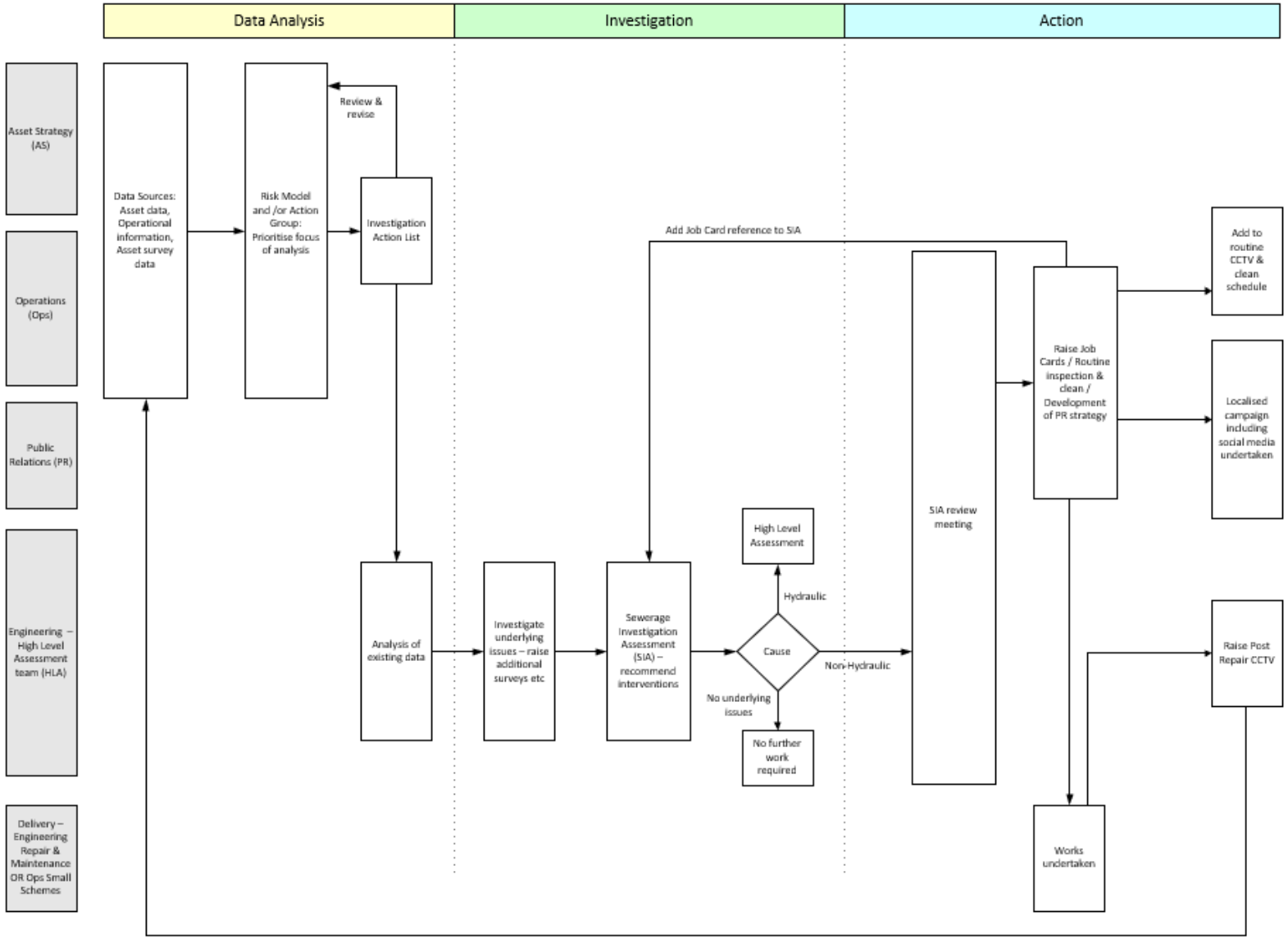
Since the SIA process began to be applied to pollution incidents in 2019, we have undertaken 168 assessments, which have been triggered by either urgent pollution or hotspot analysis. SIAs are reviewed and actioned at regional meetings with operational managers.

These actions may include changes to maintenance frequency, asset improvements or further CCTV inspections.

Source	Started	Initial draft completed and reviewed	Reviewed at meeting with managers
Hot spot analysis	109	79	71
Pollution incident analysis	59	54	31
Total	**168**	**133**	**102**

Table 9: Summary of SIA progress

Figure 9: Sewerage Investigation Assessment process



5.5 Treatment Investigation Assessments

There are c15 water recycling centres where there have been recent and/or multiple pollution incidents.

The 3 largest contributing factors for pollutions arising at water recycling centres are:

- Blockages at inlets
- Electrical or mechanical equipment failure at inlets
- Power failure/failure of back-up generators to operate correctly

We plan to apply the same principles of 'SIAs' (see above) to water recycling centres to establish pollution root causes and suggesting proactive interventions to prevent future reoccurrence. These are called Treatment Investigation Assessments.

Water recycling centre	History of pollution incidents
Glastonbury WRC	10 since 2001 (4 in 2018)
Marshfield WRC	4 in the last 4 years (2 in 2018)
Shepton Mallet WRC	6 since 2001 (1 in 2018)
Shaftesbury WRC	13 since 2001 (3 in last 2 years)
Ringwood WRC	6 since 2001 (2 in last 4 years)
Swanage WRC	8 since 2001 (6 in last 3 years)
Bishops Lydeard WRC	2 in the last 3 years
Blagdon WRC	2 in the last 4 years
Cheddar WRC	4 since 2001 (1 in last 3 years)
Dowlish Wake WRC	3 since 2001 (2 in last 4 years)
Halstock WRC	3 in the last 3 years
Wellington WRC	4 since 2001 (3 in last 4 years)
West Bagborough WRC	4 since 2001 (3 in last 5 years)
Wick St Lawrence WRC	3 in the last 5 years
Yeovil Pen Mill WRC	3 since 2001 (1 in last 3 years)

Table 10: Priority list for Treatment Investigation Assessments

5.6 Enhanced over-pumping resilience

We currently have a contract with a pump supplier for the emergency provision and deployment of over-pumping facilities. In December 2019 the decision was made to increase this service by securing additional services from the supplier. This allows us to provide a rapid response and specialist trained staff to provide an enhanced response capability on a trial basis.

The plan is to use 6 agency drivers on permanent night shifts (18:00 to 05:30) based out of Trowbridge, Chilton Trinity and Yeovil allowing for good regional coverage for first responding.

5.7 Bringing Artificial Intelligence (AI) to sewer scanning

As part of the Wessex Water marketplace, we have put out a challenge to help speed up the coding of sewer CCTV information.

Instead of using technicians to determine the structural and service state of the sewer we are carrying out an initiative to develop AI algorithms to work this out.

This will speed up the process, lower costs and enable us to respond more quickly to any detected problems.

6. Customers and Stakeholders

The root cause of the majority of pollution incidents are blockages caused by customers misusing sewers – mainly by flushing wet wipes and/or pouring fat down the sink.

Tackling the problem at source and encouraging (or making) customers and stakeholders change what they do, is key to reducing pollution incident numbers.

Our customer and stakeholder engagement plan is sub-divided into three levels:

- **National** – tackling the problem with Government and Regulatory bodies, manufacturers and retailers
- **Regional** – general education and awareness covering the broader Wessex Water region. This includes working with local councils and general engagement at events.
- **Local** – specifically targeting geospatial areas ranging from whole sewerage catchments down to street and property level.

Our plan for measuring the successfulness of behavioural engagement initiatives is also discussed.

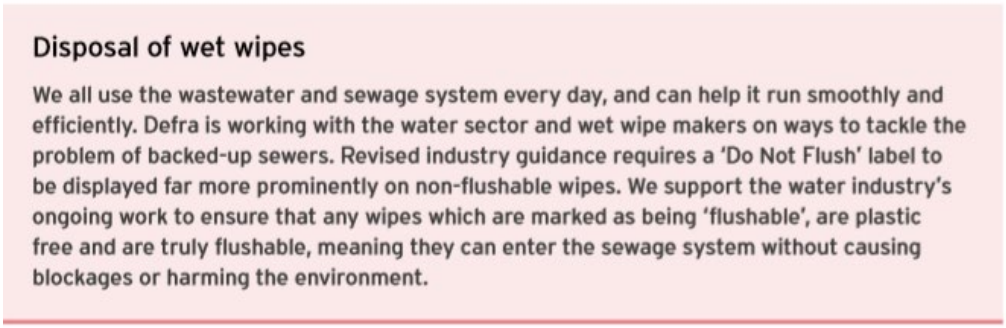
6.1 National engagement

We believe that the country needs a cultural shift in its understanding of the purpose of toilets, sinks and sewers. In our current society there exists an attitude of 'out of sight – out of mind' when it comes to disposal of anything down a sewer.

As a company, we have a long history of campaigning for change, being the first to challenge the use of the word 'flushable' in a complaint to the Advertising Standards Authority in 2016.

We have done and continue to lobby retailers to ensure wet wipes are labelled either 'Do Not Flush' or 'Fine to Flush' if they have passed WIS 4-02-06

We have also challenged Defra on what 'support' they are intending to give us to 'ensure' any wipes marked as flushable are plastic free and truly flushable.



Disposal of wet wipes

We all use the wastewater and sewage system every day, and can help it run smoothly and efficiently. Defra is working with the water sector and wet wipe makers on ways to tackle the problem of backed-up sewers. Revised industry guidance requires a 'Do Not Flush' label to be displayed far more prominently on non-flushable wipes. We support the water industry's ongoing work to ensure that any wipes which are marked as being 'flushable', are plastic free and are truly flushable, meaning they can enter the sewage system without causing blockages or harming the environment.

Figure 10: Extract from page 53 of Defra's Waste Strategy 2018

Nationally, we work with WaterUK and other sewerage companies to tackle this societal issue by engaging with organisations such as the British Retail Consortium and Business in the Community.

6.2 Regional behavioural change initiatives

Twice a year we communicate with all our customers with our magazine. Articles about sewer and sink misuse are a consistent theme.

Messages about what should not be poured down sinks or flushed down the toilet are also contained in bills and welcome packs when people buy a house in our area.

WET WIPE WAR

We took a starring role on BBC One as part of the programme War on Plastic with Hugh and Anita. It allowed us to once again tell the nation about the misery wipes cause when flushed. Pete Orchard reports.

Regular readers will know how we've led the campaign calling on wet wipe manufacturers to properly label their products and not mislead customers by saying wipes are flushable when they're not.

It's a big problem. In fact, the vast majority of the 13,000 sewer blockages we deal with every year are caused by wet wipes being flushed. And the consequences can be horrendous, with some people experiencing sewage flooding in their homes, or in worst case scenarios local watercourses polluted.

So, when we heard that the BBC wanted to focus on wet wipes and the plastic content they contain, we were eager to get involved.

Presenters Hugh Fearnley-Whittingstall and Anita Rani challenged an entire street in Bristol to significantly reduce the amount of single-use plastic in their homes for four months.

The second episode saw Anita and the families visit our water recycling centre in nearby Avonmouth, where they saw for themselves how wet wipes don't break down when flushed down the toilet and generate tonnes of needless waste.

Director of assets and compliance at Wessex Water, Matt Wheeldon, who featured in the programme, said: "We were delighted to invite Anita and the families to Avonmouth, where huge mountains of wet wipes build up after being screened and removed with other unflushable material.

"It allowed us to share with the nation the problems caused by wet wipes and put pressure on wet wipe manufacturers to reconsider the way they market their products."

War on plastic: Presenters Hugh Fearnley-Whittingstall and Anita Rani. Picture courtesy of Keo Films

Fine to flush

A new official standard identifying which wet wipes can be flushed down toilets safely has been produced.

Manufacturers of wipes will be able to feature an official water industry 'Fine to Flush' symbol on their packaging if they pass strict scientific tests.

This symbol will let consumers know that the products will break down in the sewer system instead of clogging up sewers.

Although there has been an increase in products being labelled 'Do Not Flush', there are many wipes on the market labelled 'Flushable' which do not break down quickly when they enter the sewer system, and which would not pass the stringent tests which meet the standard to receive the 'Fine to Flush' symbol.

Some manufacturers and retailers are now starting to realise the importance of ensuring their products meet the new standard.

The organic brand Natracare has launched what it claims to be Europe's first truly flushable moist tissue wipe. The product meets the 'Fine to Flush' standard which means the wipes have passed strict water industry tests which prove they will break down in the sewer system and won't cause blockages.

Also, two Waitrose & Partners toiletry products – Fragrance Free and Lightly Fragranced moist toilet tissues – have successfully achieved the standard.

And last month Kimberly-Clark pledged that it would seek official 'Fine to Flush' approval for some of its wipes.

Remember, only flushwipes that carry the 'Fine to Flush' logo. We recommend other wipes should be put in the bin to stay blockage free.

8 Wessex Water Magazine

Figure 11: Extract from Autumn 2019 customer magazine

The impact and effect of regional campaigns is hard to measure. Measurement of effectiveness is discussed below.

6.2.1 Summer Shows

Regional summer shows provide an excellent opportunity for us to engage directly with customers and encourage behavioural changes with a wide demographic.

In 2020, coronavirus restrictions permitting, we plan to attend the Somerset County Show and the Dorset Country Show, both of which achieve thousands of visitors each year along with some other smaller scale events, such as the Bath Festival Finale Weekend and the Bristol Festival of Nature.

6.2.2 Student Fairs

For the last two years we have attended Fresher's Fairs at the Universities of Bath, Bournemouth and West of England, to engage with students on the topic of sewer misuse. Our 'toiletiquette' campaign materials were inspired by the outputs from the Young People's Panel in 2017. At each fair we had direct engagement with over 1,000 students and gave out free toilet rolls, hair traps and reusable make-up wipes. We used social media posts to reach more customers than just those attending the events.

In 2020 we will be attending more Freshers Fairs to reach a wider audience across the university campuses. As well as attending the fairs and providing giveaways, we will be working with the sustainability departments or environmental societies to do this.

6.2.3 Open doors events

Allowing customers to visit our water recycling centres is an important awareness initiative. It gives us the opportunity to educate and inform customers and show them the impact of wet wipes and fats, oils and grease on our system and the environment.

Figure 12: Open doors event in 2019

In 2020 we plan to open at least 10 of our water recycling centres to customers across our region throughout the first two weeks in June. We will give customer free tours of the sites to show them what happens to what they flush down the toilet or pour down the sink.

The tours will feature a 'plop-up' art gallery with blown-up pictures of wet wipe blockages edited in the style of famous artists. Customers will be able to pick up free items for example gunk pots, bamboo face wipes and hair traps.

6.2.4 Social Media Campaigns

To support the direct customer engagement activities, we will continue to run proactive social media engagement through regular social media posts and via targeted (geographically and seasonally) paid for adverts.

Figure 13: Tweeting about our message at a Freshers Fair

Whilst we can't measure direct links to reduction in sewer misuse from social media campaigns, we can measure levels of engagement and compare how different messages land. KPI's that we will use for measuring success include:

- How many people have read posts
- What engagement we are receiving on posts – likes, comments, shares and the significance of these. Each post gives us an engagement rate (which is the total engagement/number of people who saw the post). We will use this metric to compare posts to see the best performing.
- The number of video views and levels of website traffic where applicable depending on the type of post we push out.
- Stakeholder analysis – who has shared/engaged with our posts.

6.3 Local behavioural change initiatives

6.3.1 Targeting Fats Oils and Grease (FOG)

We are currently working in partnership with the environmental company, ECAS. Their work focuses on working with Food Service Establishments (FSEs) and traders to reduce discharges of FOG and hence reduce pollutions and flooding.

CASE STUDY: Shaftesbury FOG campaign

In 2019, ECAS began a 6 month "Proof of Concept" trial in the Shaftesbury area, which has an on-going FOG problem and has contributed to approximately 14 historical pollution incidents. At Shaftesbury water recycling centre we currently remove >850,000 litres of FOG each year. ECAS have been visiting FSEs, looking at their daily kitchen practices, plus the equipment they have, and offering recommendations and advice to help them become compliant with regulations. To complement the ECAS trial, Wessex has been engaging with domestic customers, as part of the ongoing "Stop the Block" campaign in the same period at local shows.

This has included the Shaftesbury & Gillingham county show, the Shaftesbury carnival as well as a late-night Christmas shopping event in the town centre, all supported by members of staff from our customer engagement and sewerage teams who provided free sewer misuse devices such as gunk pots, hair traps and reusable face wipes. To follow on from this, approximately 4,500 customers living in Shaftesbury received a Christmas card from us which included reminders and top tips on how they should dispose of the FOGs used when cooking their Christmas dinners.

Outcomes from the Shaftesbury FOG campaign are reported in Section 8.

Since the trial began, we have extended it to cover eight more sewerage catchments and have engaged with 135 FSEs. To date 21 FSEs have installed new fat traps and a further are planned to be installed.

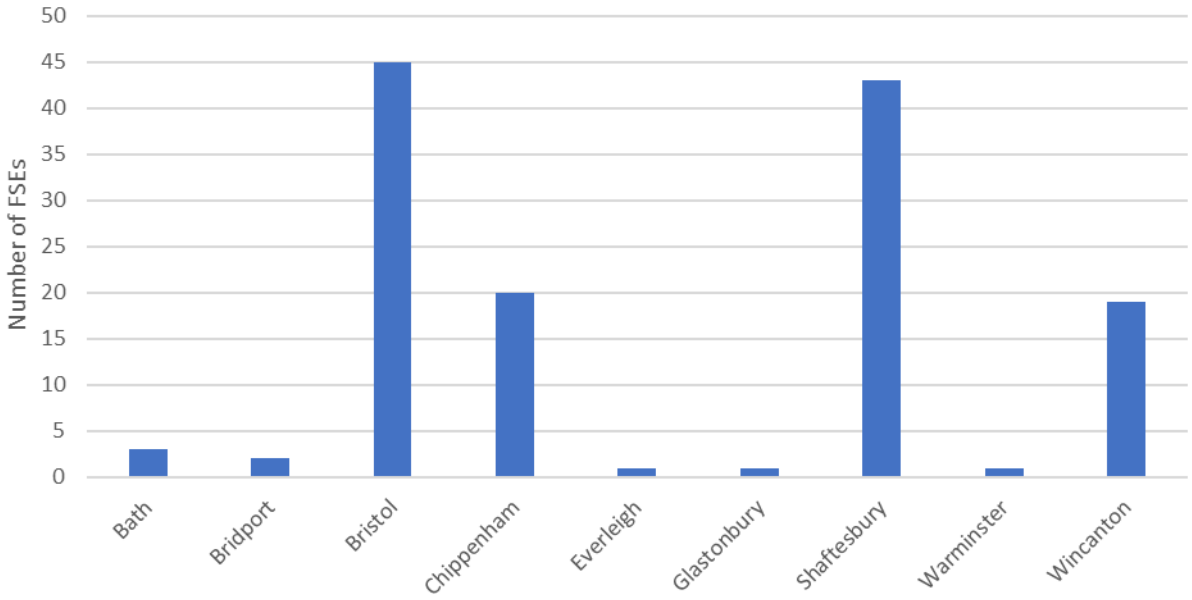


Figure 14: Total number of Food Service Establishments visited since August 2019

6.3.2 Targeted town campaigns

The dual-targeting approach (FSEs & domestic) worked well for Shaftesbury and we plan to mirror this approach for future town campaigns.

We will also we ensure we target towns where we can easily and successfully monitor actual impact our campaign has on the number of blockages. Initial plans will include but will not be limited to the following activities:

- Initial letter drops/postcards to inform of the issue and that we will be doing continual work in the area for some time
- Drop-in sessions at local community venues such as town halls etc.
- Attendance at local existing community events (similar to Shaftesbury carnival etc.)
- Targeted social media posts
- Provision of educational resources such as posters and stickers for public toilets
- Provision of educational resources for staff of FSE's
- Provision of 'fatberg-friendly' stickers for FSE's
- Door-knocking and competitions within hotspot streets
- Visits from education advisers to as many schools as possible within the town
- Joint communications with local councils.

In addition to these targeted campaigns, we will engage with customers on sewer misuse messages during our water efficiency Home Check visits which will take place in specific parts of our region.

To see the effectiveness of these town campaigns, we will carry out customer research before and after the campaign to understand customers' perception and awareness.

6.3.3 Customer behavioural change initiatives

Two thirds of customer-reported blockages occur at properties that have previously reported a blockage. The aim of these projects is to use data on repeat blockage hotspots to target individual towns and locations with an engagement programme that aims to tackle habitual behaviours that are causing the blockages.

Figure 15: Typical example of wet wipes removed from a sewer

Hotspot Competitions/Promotions

We will look to use incentives in hotspot areas similar to those we use on the water distribution side of the business for reporting leaks. If a particular street which has had a number of sewer misuse related blockages can remain blockage free for a certain length of time, we will reward them (for example by making a donation to a local community group).

Bathroom Bin Trial

It is estimated that 54% of households in the UK do not have a bin in their bathroom, and over half of the population keep wipes there. We plan to introduce campaigns in hotspot areas to address this and promote the correct disposal of wipes or the use of alternatives. This might include giveaways of bathroom bins or competitions to win dual-purpose waste/recycling bins for the bathroom.

Joint 'waste' messaging with councils

Local authorities have similar 'what do I do with my waste?' messaging issues. We will look to partner with local authorities to help promote the message of recycling and improving bathroom recycling. Promoting dual-purpose recycling bins for households, primarily for bathroom areas, will support this message.

Partnership working

We will look to engage with compatible partner organisations to help promote our messages. We are currently supporting Somerset Waste Partnerships' 'reusable nappy library' trial. This initiative loans reusable nappies and wipes in local areas to encourage more parents to try reusable alternatives in an effort to convert them to more sustainable and lower sewer impact products. We will ensure that the outcomes of this trial with Somerset Waste Partnership are measurable.

6.3.4 Improving customer engagement following blockages

We currently contact residents upstream of blockages to inform them of the consequences of what they flush/pour. However, we believe there is more we can do to drive behavioural change. We are working to develop specific guidance that can be used by our staff across our business in response to a blockage.

The matrix will detail exactly what should be done by staff at different stages of an incident, depending on the root cause of the problem and whether sewer misuse is a first time incident or a repeat.

Actions will include tailored letters, with images of the contents of the offending blockage, and follow up face-to-face visits by a customer services technician.

As well as creating a protocol to follow; the aim is to utilise the functionality in Microsoft Dynamics customer management system which has an 'Event Management' tool. This tool includes polygon, data extract and auto-letter population and will allow customer facing staff to quickly establish offending properties/localities and create a schedule of works for appropriate information letter drops.

6.3.5 Measuring success of customer behavioural engagement initiatives

Making people change what they flush or pour down the sewers is key to achieving our targeted reduction in pollution incidents. Our experience of behaviour change initiatives has shown that measuring and sustaining success is not easy.

As we increase the number of initiatives we adopt, we intend to enhance the level of baseline measurement, increase the analysis of costs and improve the level of post-initiative effectiveness. In time, we will know which initiatives have a higher cost-benefit ratio for delivering better outcomes.

Pre- and post-initiative measurement will be based around different sizes of geospatial area. These will range from a single street up to a whole sewerage catchment.

We will be measuring incidents of where sewers back-up (usually from partial blockages), numbers of blockages (both in sewers and in pumps), as well as where sewage has actually escaped from the network.

We will be looking at the ability to measure the weight of inorganic contents (such as wet wipes) we remove from the study areas. These measurement points could be where we react to unblock a sewer or a pump, or where we proactively clean sewers or pumping station wet wells. The volumes and weight of screenings arriving at our water recycling centres will also be used to complete the understanding of the effectiveness of trying to change customer behaviour.

Progress with initiatives will be updated in Section 8 of this plan.

6.4 Water Rangers

We are currently carrying out a pilot study in Somerset to recruit Water Rangers. The aims of Water Rangers are:

- To protect and maintain rivers to a high standard, enabling early detection and prevention of potentially damaging pollution incidents.

- To work in partnership with local environmental groups and individuals who are interested in conserving the natural habitat of their local area.
- Promoting the care and concern that Wessex Water has for the environment and the seriousness with which we deal with reported issues for swift resolution and prevention.

This study will be managed by a part-time Project Officer who will support and recruit local community volunteers who will then be asked to report river and watercourse pollution incidents. The pilot project will run for 12 months with a review and assessment at 6 months. We hope to recruit up to 20 volunteers and two local partnerships in the first year.

7. Telemetry Data and Analysis

7.1 Introduction

Pollution incident numbers can be reduced with more data, better information and increased knowledge leading to preventative interventions.

Our sewerage network, the largest source of pollution incidents, has comparatively few monitoring points compared to the length of the network that might lead to a pollution. The table below illustrates this.

Asset	Number or metres	Nr of assets monitored by March 2020
Sewers	c34,838,000m	0
Manholes	>1,000,000	10
Storm Overflows	1,248	936
Pumping stations	2,112	1,600
Rising mains	2,112	70
WRCs	402	253

Table 11: Size of asset base vs number of monitors

Our plan is to increase the number of monitoring points, and also to ensure that any alarms that are raised from monitors are only when our network is operating outside its **normal expected operating boundary for the conditions at the time**, rather than just because levels of sewage are high due to rainfall.

7.2 Additional monitoring points

7.2.1 Intermittent overflows monitoring programme

As of March 2020, 75% of our intermittent overflows (which operate as relief valves in heavy rain to protect properties from flooding) will have event duration monitors installed.

The remaining 25% of overflows are scheduled to monitored over the 5 years between 2020 and 2025. However, we have advanced installation to ensure 100% of overflows are monitored by 2023. Progress with this initiative is reported in section 8.

7.2.2 In-sewer monitoring capabilities

With so many thousands of kilometres of unmonitored sewer lengths, advances in technology will be critical to installing low cost, reliable and accurate monitors.

We are working with technology providers to steer the development of such in-sewer monitoring devices. This will also account for the changes in communication technology from 2/3G to Low Powered Wide Area Network solutions.

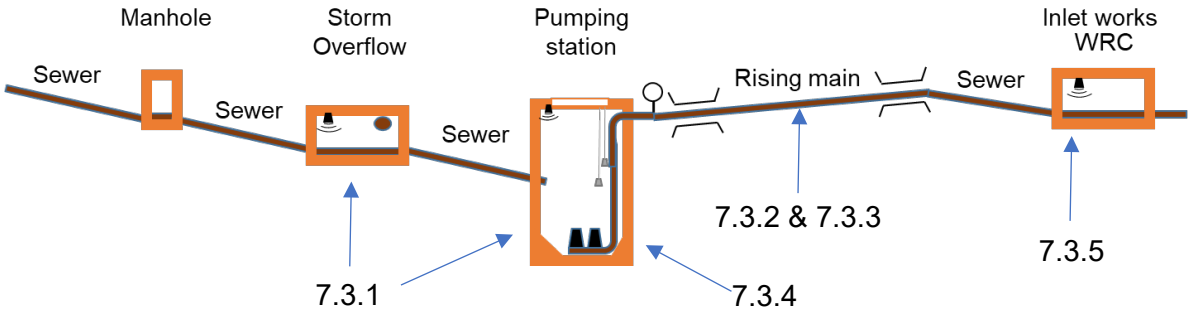
We currently have a trial, using 27 NBIOT (Narrowband Internet-of-Things) loggers (21 on supply sites and 6 on waste sites) to understand the capabilities of NBIOT loggers in the South West. They are monitoring connectivity, signal strength and battery life.

A separate trial is also in the early stages with Metasphere to install 25 more sensors in the sewerage network.

Our plan will develop as new technology trials evolve and new cost-effective, reliable and accurate monitors are proven.

7.3 Data analysis initiatives

We have a number of data analysis initiatives underway utilising existing monitors. The figure below illustrates the location of the monitors on the sewerage network and relevant section of the plan which explains the initiative:



Data analysis initiatives are:

- Sewer depth monitor machine learning
- Rising main burst detection
- Rising main burst prevention
- Pumping station enhanced diagnostics
- Inlet works low flow detection.

7.3.1 Sewer depth monitor machine learning

During rainfall events, storm overflow alarms generally just notify our control room and operators of high sewer levels and permitted spills at overflows. However, there is a growing risk that some overflows may spill prematurely due to insufficient capacity caused by issues such as blockages or pumping incapacity.

During wet weather it is currently difficult to separate expected spills which occur during heavy rainfall from premature spills that are caused by restrictions in the network, usually caused by (partial or total) blockages.

The aims of this trial, which is being procured through the Wessex Water Marketplace Challenge are:

- to develop normal operating boundaries for depth vs rainfall and time of day
- to alarm only when operating outside these machine-learnt parameters

- to continually refine normal operating boundaries over time

Smart algorithm-based tools are now available to provide a level of decision support by applying machine-learning techniques to the data from wastewater depth monitors. These tools are able to predict when performance at a particular monitored point on the network is within the expected range (given the prevailing conditions) or outside the expected range - which might give early warning of a problem.

The Marketplace Challenge went live in October 2019 and is in three phases:

1) Open the historical data from the Bath sewerage catchment (simplified network below) to suppliers to develop a proposal and provide evidence of a viable product
2) Run a near real-time trial with a limited number of suppliers and artificially create blockages to test the product
3) Run a procurement exercise for successful solutions

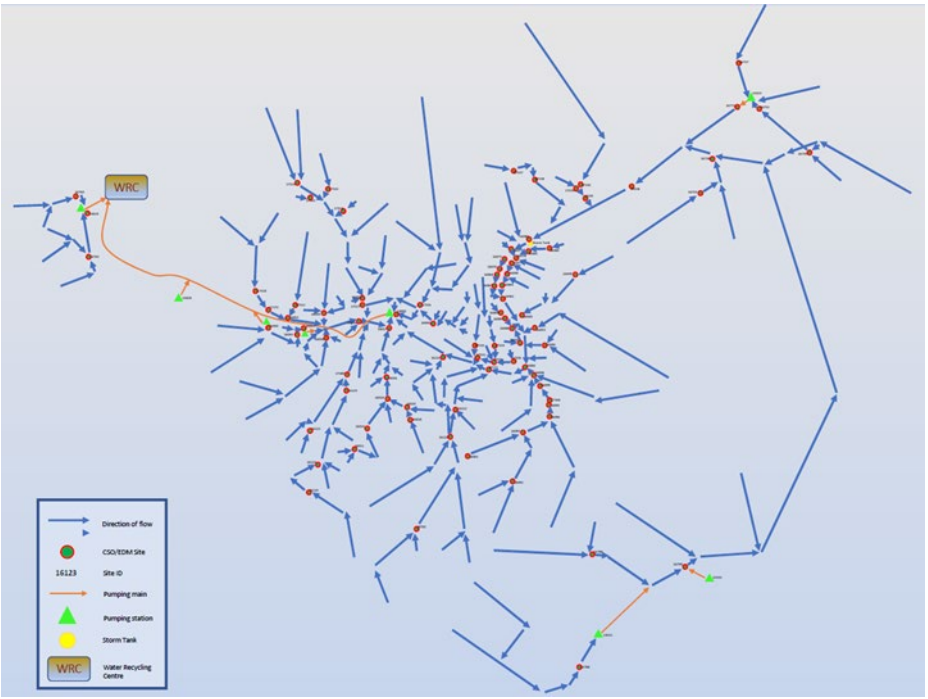


Figure 16: Sewerage network in Bath showing location of data points used for Proof of Concept trial

We expect the companies who are working on this trial to be able to develop expected normal operating boundaries for each monitored point for different rainfall events and at different times of the day.

If and when the sewage depth varies outside this normal operating boundary, we would expect to be notified by an alarm as illustrated in the figure below.

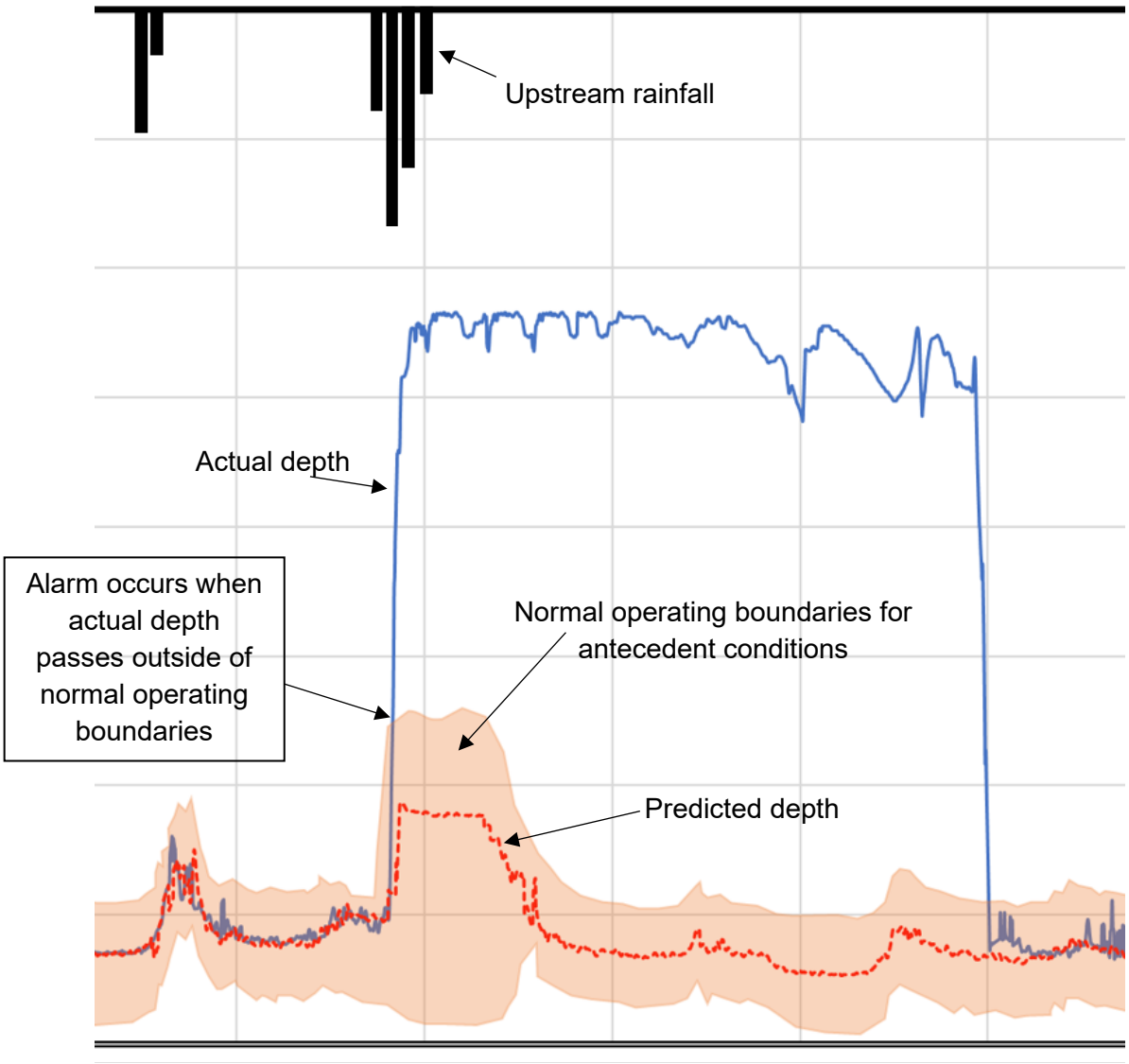


Figure 17: Illustration of normal operating boundaries of sewage depth, versus actual level

In phase 1, sixteen companies responded to the challenge. We have refined these down to a handful for the near real-time trial. The solutions proposed have been quite diverse and large volumes of the data shared has been processed. Several suppliers have demonstrated viable solutions to manage the future of in-sewer monitoring data. The proposals have provided improved visualisation tools and the calculations consider rainfall across the region.

This trial has massive potential as it is scalable across our whole network where monitors are installed.

Progress with this initiative is reported in Section 8.

7.3.2 Rising main burst detection

Within our region there over 2000 rising mains. These are pressurised sewage pumping mains which lift sewage from low points in a network so that sewage can gravitate towards a recycling centre.

High impact (or 'critical') rising mains i.e. those where a burst might impact rivers, SSSIs, railways or significant roads, have been identified. The aim of the burst detection programme is to limit the effects of rising main burst by being notified of it more quickly due to telemetry alarms and therefore be able to respond more quickly to reduce the likelihood of a pollution.

Bursts in rising mains can be detected by a number of ways: Monitoring flow in, flow out, pressure or a combination of these.

We have looked at the profiles of the critical rising mains, how they interact with other pressurised mains and where a burst might result in a water pollution. We have then planned appropriate monitoring that will provide the information required for a quick response.

Monitoring arrangement		Number of rising mains
1	Pressure monitor	17
2	Pressure monitor and Flowmeter	71
3	Volume Balance (Flowmeters)	229
4	Other arrangement	35

Table 12: Proposed monitoring arrangements for critical rising mains

We have already installed a number of burst detection devices. An example of the data received back through our telemetry system is shown in the figure below:

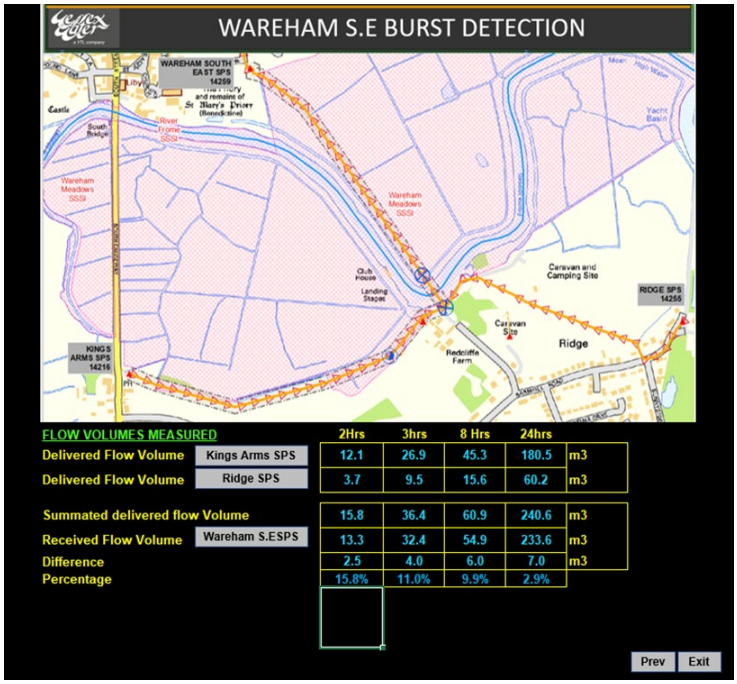
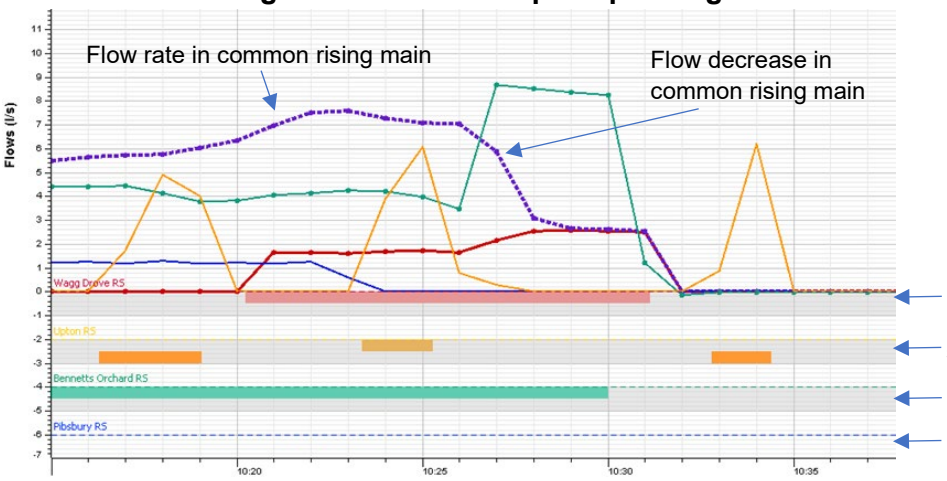


Figure 18: Telemetry data showing summated flow-in and flow-out for a rising main system with two mains connecting into one

CASE STUDY

Investment to date has already resulted in a successful fast response which ensured we were able to respond to a burst before the sewage caused a more significant pollution. In this instance (see figure below) the multiple flowmeters on the four pumping stations feeding a common rising main allowed for the abnormal operation to be detected.

Long Sutton to Huish Episcopi rising main flow rates



The process of identifying this burst was done by visual interpolation of the data. Work is underway to automate the analysis and extend the number of monitors.

Progress with burst detection device installation is recorded in Section 8.

7.3.3 Rising main burst prevention

Prevention is better than cure. We are in the process of improving our knowledge of normal operating boundaries for rising mains using rapid pressure detection equipment.

Similar to the sewer machine-learning project above, this project relies on gathering enough data to be able to understand what 'expected normal' looks like, and then develop the systems to detect variance from normal.

The amount of data required (often at around 128 readings per sec) means that it is not possible to transfer this raw data through our telemetry system. We are working with technology providers to provide local site-based analysis tools to detect abnormalities and create alarms which would then initiate a response action to investigate.

An example of data we use for this type of analysis is shown in the figure below. The first showing the data experienced during normal operating conditions and the latter after a burst has occurred.

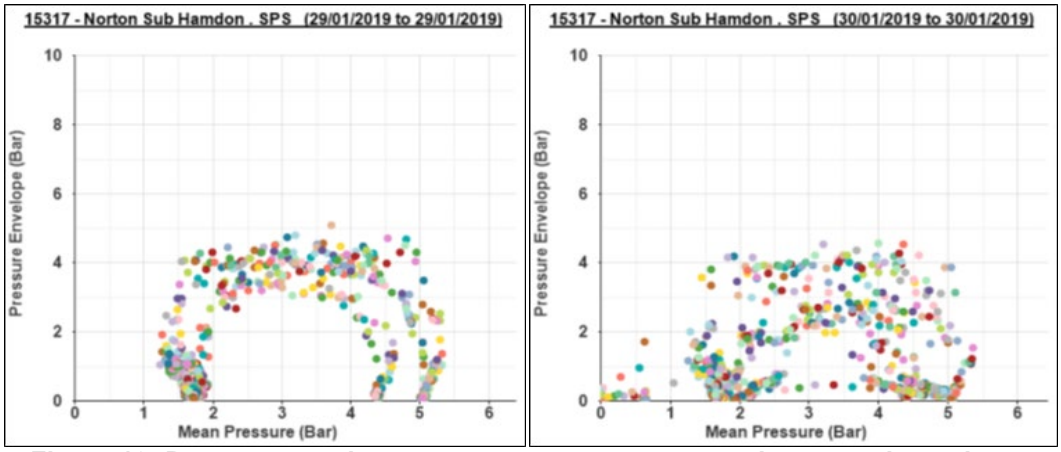


Figure 19: Pressure envelope versus mean pressure graphs pre and post burst

Progress with this initiative is reported in Section 8.

7.3.4 Pumping station enhanced diagnostics

Currently, pumping station performance is assessed by cross-referencing daily pumping hours with available data such as pump run/stop signals, along with sump levels, power, delivered flow, rising main pressure and rainfall, to determine if the operation is within expected operating parameters.

For a small number of sites in the region we have been developing a process which uses rainfall data to predict the expected response in energy usage (pumping hours) for a station.

This initiative is building a model for the relationship between rainfall and pumping hours for all sites to quantify normal operating parameters. Not only will this initiative help with assessing the efficiency of the pumps and identify a deterioration of impeller performance, but also provide indicators that there are upstream blockages (i.e. the pumps are operating below their expected runtime rate) or there has been a rapid deterioration in performance (i.e. the pumps are blocked with wipes).

Progress with this initiative is reported in Section 8.

7.3.5 Inlet works low flow detection

A number of water recycling centres have inlet flowmeters.

We have developed a simple alarm mechanism that is set below the measured dry weather flow from the previous year. The calculation is run daily and a report is produced revealing where flow arriving at the sites is abnormally low.

If a site is flagged, a job is raised for staff to attend site and investigate the potential cause of the low flow. This could be an upstream blockage.

Below is an example of the report output over a week, highlighting 4 sites where the total flow arriving at the works was significantly below the normal expected flow. In the case of the

fourth site (Merriott), an upstream blockage was found and cleared before any escape of sewage occurred.

Site Name	Site Id	Read Date	Total Flow	Flag De	Dry Weather Consent	Dwf Threshold	Comment	Comment
EAST CHINNOCK	13104	27/09/19	35.062	Good	170	37	Low	Genuine low flow
HILMARTON	13148	23/09/19	54.526	Good	120	59	Low	Genuine low flow
KILVE	13168	28/09/19	44.064	Good	312	66	Low	Issues with Pulsar and Inlet pump failed. Fixed
MERRIOTT	13208	25/09/19	176.794	Good	1184	472	Low	Gavin Charles aware, work lined up to resolve. Need to jet line but dry weather required.
MERRIOTT	13208	26/09/19	182.559	Good	1184	472	Low	
MERRIOTT	13208	27/09/19	253.139	Good	1184	472	Low	
MERRIOTT	13208	28/09/19	105.286	Good	1184	472	Low	
MERRIOTT	13208	29/09/19	384.321	Good	1184	472	Low	

Table 13: Exception report of DWF threshold vs actual total flow detected

This solution is scalable and has already identified a number of upstream blockages that could have resulted in a pollution incident.

8. Quarterly progress report

This section of the plan will be updated each quarter. It reports progress against the activities and initiatives detailed in the plan – both quantitively and qualitatively measurable.

In addition, it tracks outcome progress – namely the number of pollution incidents that have occurred.

8.1 Numerical quarterly activity analysis against the plan

Theme	Activity (in-period unless otherwise stated)	Unit	Q1 2020
People and Process	Pollution incident training (cumulative since Sept 2019)	Nr	99
Assets and Maintenance	Length of sewer surveyed	Km	1.3
	Sewerage Investigation Assessments completed	Nr	54
	Treatment Investigation Assessments completed	Nr	1
	Length of sewer rehabilitated	Km	0.5
Customers and Stakeholders	Summer shows: number of people engaged	Nr	0
	Student fairs: number of people engaged	Nr	0
	Attendees at Open Doors events	Nr	0
	Social media reach	Nr	183,746
	FSEs investigated	Nr	135
	Personalised letters following blockage incidents	Nr	227
	Water rangers engaged	Nr	0
Telemetry Data and Analysis	Cumulative number of intermittent overflows monitored (and % of total)	Nr	970 (75%)

8.2 Qualitative quarterly progress report on initiatives

Theme	Activity or initiative	Q1 2020 Progress report
People and Process	Pollution incident register	User Acceptance Training for new application in April 2020, with a planned Go Live in May 2020
	Additional equipment roll-out	Digital ammonia monitors currently being trialled to determine whether or not to replace the existing equipment. Dissolved Oxygen monitors, Chlorine monitors and oil spill kits are also being trialled. Decisions on what equipment will be purchased and where they will be deployed will be made in May 2020
Assets and Maintenance	Artificial Intelligence sewer scanning initiative	After a three-month long development phase where organisations could use the test footage we shared to develop their algorithms, 9 companies submitted final files. These were reviewed by our in-house team for accuracy, and seven were shortlisted for further more detailed reviews to understand their approach and how close they were to having a useable product. We are currently meeting with those companies to review.
Customers and Stakeholders	Update on events	Events programme currently on-hold due to current climate with coronavirus pandemic.
	Anti-FOG initiatives	FSE visits around the region are currently on hold due to coronavirus
	Hotspot competition/promotions	No progress to date
	Joint waste messaging with local authorities	On hold due to coronavirus
	Partnership working	On hold due to coronavirus as project requires community engagement and face to face contact.
	Water rangers	3 outside bodies have been contacted and have showed interest in the project, but the initiative is currenlty on hold due to coronavirus.
	National engagement	A new WaterUK 'Unflushables Steering Group' is in the process of being formed. We are seeking a Chair to lead the national campaign. Andrex Washlets (the market brand leader in flushable wipes) has recently achieved the 'Fine to Flush' standard. We will be advocating this standard is mandatory for all brands.
	Regional initiatives and events	On hold due to coronvirus
	Local initiatives	New approach to personalised customer correspondence and follow-up using Event Management tool in new MS Dynamics customer management systems still being developed.
Telemetry Data and Analysis	Sewer depth monitor machine learning	Sixteen interested companies now whittled down to three. Live data trials from 89 locations will start at the end of April and run for three months. If there is no significant rainfall during this period the trial will be extended with the aim to prove the systems capabilities. Planned simulation of blockage events may be delayed due to coronavirus.
	Rising main burst detection	Works still underway to complete 50 pumping systems by April 30th 2020, 70% complete
	Rising main burst prevention	Proof of Value trial underway
	Pumping station enhanced diagnostics	Proof of concept development in progress, reports to be available in corporate reporting tool (Qlikview). Hierarchy of data/concepts in progress (flow, pressure, power, run-stop signals etc.). Exception reporting tool also being developed. Awaiting data availability (rainfall and telemetry data) in Qlikview and expected by the end of April.

8.3 Pollution incident tracker

The graph will be updated each quarter to show the impact the plan is having on reducing the number of pollution incidents:

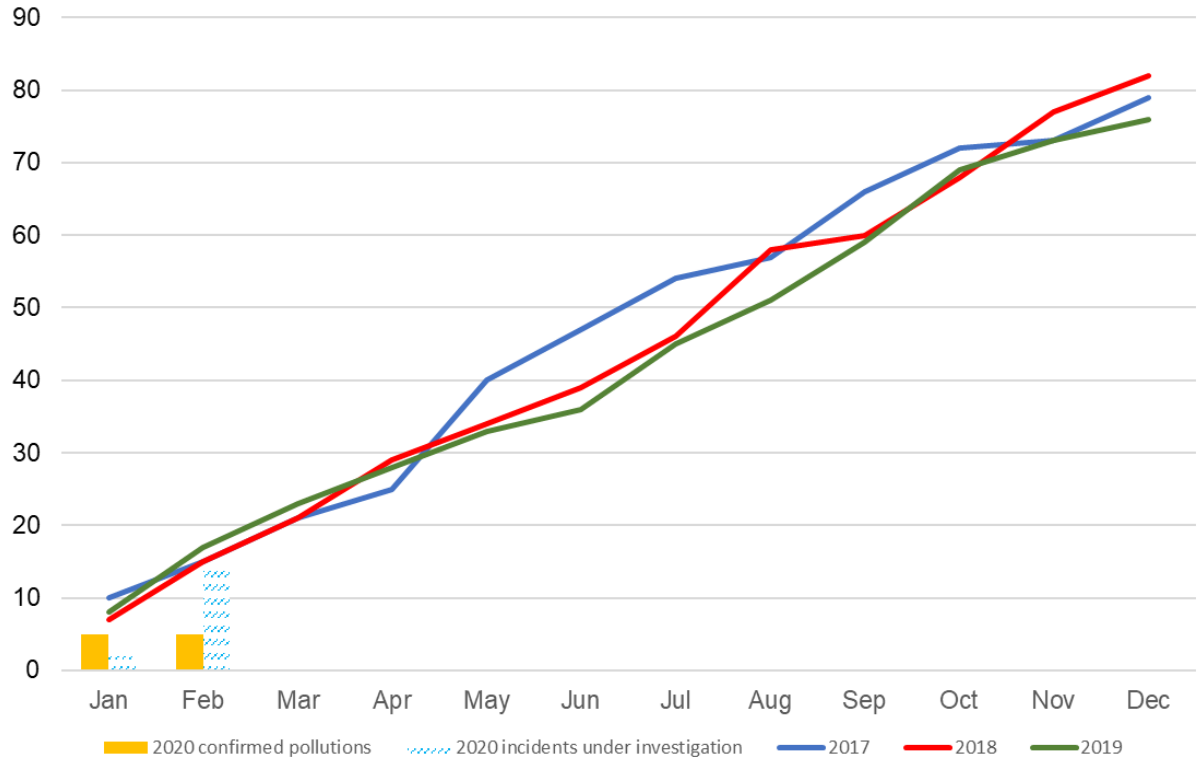


Table 14: Cumulative number of Category 1-3 incidents from wastewater assets

9. Operational maintenance strategies and procedures

Operating and maintaining the assets that protect the environment involves adhering to many procedures.

Below are some of the procedures we use to ensure sewage and potable water stays confined to our assets until it is ready for discharging. Additionally, some of the procedures explain our approach if a pollution incident happens.

Planning procedures

- *Sewer risk model procedure*
- *Sewer CCTV inspection prioritisation procedure*
- *Sewer rehabilitation and prioritisation procedure*

Proactive operation and maintenance strategies

- *Operational asset management strategy*
- *Sewerage operational maintenance strategy*
- *Water recycling operating maintenance strategy*

Reactive procedures

- *Pollution incident response - golden rules grid*
- *Pollution incident response procedure*
- *Pollution incident sampling procedure*

10. Glossary

Term	Explanation
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
Water Industry Strategic Environmental Requirements	Also known as WISER, the Water Industry Strategic Environmental Requirements is an Environment Agency document which sets out the expectations on water companies to deliver water quality and flood resilience standards
Jetvac	A Jetvac is a road tanker that uses vacuum pumps to remove the contents of sewers
Trenchless technology	Repairing the structure of a broken pipe from the inside without having to dig down to it from the surface
Rising main linings	A rising main is a sewer which is pressurised using pumps to move sewage uphill. Lining a rising main extends its life without having to replace it.
NIRS database	**N**ational **I**ncident **R**ecording **S**ystem database held and maintained by the Environment Agency as a record of all pollution incidents to water, land and air.
Environmental Performance Assessment	Annual assessment of water and sewerage company performance carried out by the Environment Agency. Two of the metrics used to assessment performance are about pollution incidents.
Dry weather flow	The expected flow arriving at a water recycling centre in dry weather conditions. This should reflect the base polluting load from sewage from the upstream population and traders and is used to set discharge limits so as to protect the environment.
Inlet	The start of the sewage treatment process that involves mechanical screening to remove inorganic material such as wet wipes, sanitary products and grit.
Service state of sewer	The measure of any amount of grit, tree roots, scale, wipes, fat etc. that might affect the ability of the sewer to operate normally
Young People's Panel	Students who join our Young People's Panel can have their say in the future of our business. Panellists spend a day at our operations centre, learning about the company and spending time with directors and senior managers before being set real-life tasks.
Screenings	Inorganic material physically removed at the inlet to water recycling centre. Mostly consisting of wet wipes, sanitary products, continence products and condoms.

Document revisions

Major version number	Details	Lead contact	Date
1.0	Final draft for Board sign-off	Matt Wheeldon	26 March 2020
2.0	As published on website	Matt Wheeldon	31 March 2020