Tackling storm overflows

United Utilities

Water for the North West

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2. Glossary of terms

Term	Reference	Explanation
CSO	Combined Sewer Overflow	During heavy rainfall the capacity of sewer pipes can be exceeded, which means possible inundation of sewage works and the potential to back up and flood peoples' homes, roads and open spaces, unless it is allowed to spill elsewhere. Combined sewer overflows (CSOs) were developed as overflow valves to reduce the risk of sewage backing up during heavy rainfall.
EDM	Event Duration monitoring	An EDM will measure the frequency and duration of a spill event at the storm overflow. Measurements are recorded via telemetry.
ICM	Integrated catchment models	Dynamic digital representation of a watercourses' catchment hydrology and water quality. These models are calibrated to real time data to represent the water quality impact of urban and diffuse rainfall runoff within the receiving watercourse.
SOAF	Storm Overflow Assessment Framework	Written by the Environment Agency to demonstrate that sewer systems comply with current statutory requirements such as Urban Wastewater Treatment Regulations (UWWTR). The framework shows that any overflow reported to exceed the spill frequency thresholds set out in this document should be investigated. The SOAF assessment is made up of three stages: • Stage 1 – Why is the storm overflow a high frequency spiller? • Stage 2 – Does the storm overflow cause an environmental impact? • Stage 3 – Screening and an initial assessment of options for improvements
SUDS	Sustainable Drainage System	A system designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges
UWWTR	Urban Waste Water Treatment Regulations	Regulations giving effect to the EU Urban Waste Water Treatment, concerned with urban waste water collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors, aiming to protect the environment from adverse effects of waste water discharges.
WFD	Water Framework Directive	2000/60/EC adopted by the Council of Ministers in 2000. This Directive provides a co-ordinated approach to water management within the European Union (EU) by bringing together strands of EU water policy under one piece of framework legislation. Member States must produce River Basin Management Plans that set out a programme of measures aimed at protecting bodies of surface and groundwater. Each plan must include economic analyses of water use and move towards full cost recovery in water pricing. The Directive runs in six-yearly cycles (2009-15, 2015-21, 2021-27). It aims to return all water bodies to good ecological status by 2027. For heavily modified water bodies such as canals, the aim is to reach good ecological potential by the same date.
WINEP	Water Industry National Environment Programme	5 yearly programme setting out environmental improvement obligations for water companies.
WISER	Water Industry Strategic Environmental Requirements	Issued jointly by the EA and Natural England, WISER highlights the main obligations applicable to water companies and describes the environmental, resilience and flood risk obligations that should be taken into account for the development of business plans.

WwTW	Wastewater Treatment Works	A wastewater treatment works is a facility in which a combination of processes (e.g. physical, chemical and biological) are used to treat wastewater and remove pollutants.

3. Introduction

3.1.1. Over many years we have made significant investment to reduce the impact of our operation on the natural environment and to promote natural ecosystems and sustainable water management. This is evident from water quality data which shows that in the North West the impact form water industry operation is no longer the main cause for rivers not meeting "Good" ecological status, agriculture and rural land management has been cited as the most prominent reason for not achieving WFD "Good" status. Customers value the role that we play as custodians and customer engagement shows that there is a strong preference to protect the environment from deterioration and improving service to enhance river quality.

3.1.2. Storm overflows are used in times of high rainfall events, when the sewer system is at capacity and unable to cope with the high volume of dilute sewage. When this occurs a storm overflow will discharge dilute sewage to the environment. This protects properties from flooding and prevents sewage from backing up into streets and homes during heavy storm events. Whilst a significant number of these are unlikely to impact the water quality status of a river body (the Water Framework Directive (WFD) status), they may cause in-class detriment. Unscreened overflows may also pollute watercourses with non-flushable materials such as period products, wet-wipes and other plastics that can break down into micro-plastics.

3.2. Purpose of this document

3.2.1. We recognise that ambitions around storm overflows has changed since the WISER was written and since the development of our AMP7 business plan. In September 2020 a joint taskforce was set up specifically to tackle storm overflows. This group, including economic and environmental representatives from Defra, the Environment Agency, Ofwat, CCW, Water UK and a water company, has indicated that event monitoring will be required on all storm overflows, that further overflow investigations should be undertaken to inform future investment and that we should increase WINEP investment for frequently spilling overflows.

3.2.2. This document sets out our Green Recovery proposal for storm overflows, why we believe additional enhancement requirements should be accelerated from AMP8 into AMP7, details around the schemes and why they have been chosen and the benefits of early delivery of these schemes.

3.2.3. We have divided our storm overflows proposal into three key areas:

(i) Event monitoring of storm overflows to ensure that 100% of permitted storm overflows in the North West are monitored

(ii) Undertaking additional investigations for storm overflows that have been found to spill frequently

(iii) Building new integrated catchment models in areas found to have multiple frequently spilling overflows.

3.3. Structure of this document

3.3.1. Section 4 of this document provides a short summation of the objectives, delivery mechanisms and benefits of our proposals.

3.3.2. Section 5 provides evidence supporting the need for three outcomes detailed within this proposal, and how Green Recovery for storm overflows fits into our long-term planning process for to accelerate improvements at storm overflows.

3.3.3. Section 6 explains the outcome delivery option we are proposing, the reasons why we believe these options represents the optimal approach.

3.3.4. Section 7 provides details on the proposed cost of the Green Recovery investment, breaking down the different aspects of this unit cost, and presenting evidence to demonstrate that these costs are efficient.

3.3.5. Section 8 summarises the level of customer support for environmental improvements and how our Green Recovery investment in the three storm overflow outcomes will contribute towards improvements in this area in the future.

3.3.6. Section 9 outlines the benefits of this investment and considers future deterioration in spill frequency due to climate change.

3.3.7. Section 10 identifies the source of funding and presents the calculated impact of this investment on customers' bills.

3.3.8. Section 11 presents the series of protections we propose for customers to ensure that Green Recovery investment is efficiently incurred and that they are appropriately protected should programme scale of costs change in future.

3.4. Assurance of this submission

3.4.1. We have applied an overarching assurance framework to the green recovery programme. This framework was managed by a dedicated assurance workstream which defined and oversaw the implementation of the governance and assurance activity. The framework identified the key deliverable components of the business case and assigned accountable owners using a RACI matrix. Each key deliverable of the business case was risk assessed against the likelihood and consequence of potential errors. This informed the minimum level of assurance that was required for each deliverable. The assurance process assessed the narrative and evidence provided for each component area against the requirements of the Green recovery programme. Component parts identified as low have been assured by project teams, medium by the economic regulation and corporate audit teams and medium-high and high have received independent specialist external assurance[1].

[1] Further details of our assurance framework can be found at the following url: https://www.unitedutilities.com/corporate/about-us/performance/Assuring-our-performance-2020-25/

4. The case for acceleration

4.1.1. Over the past 18 years, United Utilities has invested £1.2bn improving our overflow discharges to reduce the incidence, volume and impact of spills. This is evident in the North West as the impact of agriculture is now cited as the most common reason for water quality not meeting "good" ecological status. In the North West we experience high levels of rainfall and this leads to higher levels of urban runoff than other regions of the country. We have a higher proportion of combined sewers than any other water company with over 54% combined as a proportion of our legacy public sewers. This legacy means the risk of spills from these systems is higher as they respond quicker to a storm when compared to more separate systems. United Utilities has over 2,200 storm overflows which act as a relief system in period of heavy or prolonged rainfall events. In 2020, spills to the environment from storm overflows became a high profile topic for many stakeholders and customers. Surfers against sewage launched their "End sewage pollution" campaign which received 44,693 signatures. Climate change research carried out on behalf of United Utilities indicates that without action spill performance is likely to deteriorate further in future due to more intense and more frequent rainfall events, with the number of spills from storm overflows forecast to increase by 33% over the next 25 years as a result of climate change.

4.1.2. Our long term ambition is to reduce spill frequency where it has an environmental impact and then to further reduce spills where this can be demonstrated to be beneficial to customers. In recent surveys, customers have shown that they place a high value on their local natural environment and a strong preference to protect the environment from deterioration. When we conducted immersive research with customers one of the most popular service areas for improvement was 'A heathy river to support wildlife' with 57% selecting a desire for improvements. We believe that in the current circumstances, appreciation for accessible natural spaces has increased alongside an ambition to protect and enhance our natural environments with 91% of customers recently surveyed indicating that they really value their local natural environment, and 93% showing strong support for United Utilities doing more to take care of the natural environment.

4.1.3. In the past the Environment Agency (EA) has set event monitoring requirements based on spill frequency and amenity[2] and frequently spilling overflows are investigated as part of our Water Industry National Environment Programme (WINEP). However, there is recognition that more can be done and United Utilities continued investment in developing, enhancing and maintaining hydraulic models of our wastewater network means we now have coverage for 99% of population in the region. This valuable asset allows us to simulate the long term performance of the majority of our overflows to compliment the event monitoring programme. Combining the data from our event monitors and models gives us the capability to understand the performance of nearly all our overflows.

4.1.4. In September 2020 at an industry roundtable event attended by 15 water company chief executives and representatives from Ofwat, the EA, Natural England, Water UK, CCW and the Drinking Water Inspectorate, Environment Minister Rebecca Pow said: *"Despite investment from the industry, the damage inflicted on our environment – our rivers, lakes, streams and the wildlife that rely on them – is still far too great. ... We discussed a number of issues I feel strongly about, including storm overflows, and how we can work together to see much more ambitious improvements"*[3]. In light of this and with

[2] Water companies: environmental permits for storm overflows and emergency overflows https://www.gov.uk/government/publications/water-companies-environmental-permits-for-storm-overflows-and-emergency-overflows/water-companies-environmental-permits-for-storm-overflows-and-emergency-overflows

[3] https://www.gov.uk/government/news/water-companies-challenged-to-improve-environmental-performance

the water industry being invited to do more to promote green economic recovery[4] we are proposing to put forward a plan within this document focussing on storm overflows.

4.1.5. Our plan for storm overflows consists of three outputs:

(i) Outcome 1: Install event duration monitors (EDM) on all permitted storm overflows.

- Having successfully delivered 99.9% of our AMP6 EDM programme, equivalent to over 2000 event duration monitors (EDM), 92% of our storm overflows are now monitored. Through Green Recovery we propose to monitor the remaining 8% of permitted storm overflows, this is based on us delivering 175 additional event duration monitors. We recognise that the number of monitors delivered may change and so any costs recovered will reflect the number of schemes delivered as detailed in section 11 of this document (customer protection). Understanding more about how our network is operating will increase transparency for customers and enable us to investigate frequently spilling overflows and help identify the root cause of the spills, and which solutions may be effective in reducing spill frequency.

(ii) Outcome 2: Undertake 300 additional storm overflow investigation at frequently spilling overflows.

- Where we have new data from the AMP6 EDM programme that shows a storm overflow to be spilling frequently we want to investigate these overflows and help to identify the root cause of the spills, and which solutions may be effective in reducing spill frequency. As a result, for Green Recovery we are proposing to accelerate investment from AMP8 to undertake an additional 587 Stage 1 SOAF investigations (*Why is the storm overflow a high frequency spiller?)* and 300 additional Stage 2 and Stage 3 SOAF investigations (*Does the storm overflow cause an environmental impact?* And *Initial assessment of options for improvements*). Without Green Recovery these investigations would be undertaken in AMP8.

(iii) Outcome 3: Build three new integrated catchment models in areas found to have many frequently spilling overflows to inform future improvement schemes.

- Integrated catchment models (ICMs) will assess the impact of overflows on water quality of the receiving watercourse under wet and dry weather conditions and help us to identify where catchment solutions may be appropriate in comparison to conventional storage solutions. For Green Recovery we are proposing to build three new ICMs. These models will ensure that our future plans are fit for purpose.

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/902487/green-recovery-letter-to-water-companies-200720.pdf

5. Evidence of need

5.1. Introduction

5.1.1. The Environment Agency and Natural England's Water Industry Strategic Environmental Requirements (WISER) document provides details of our environmental obligations. This document identifies actions to be undertaken by water companies in order to improve water quality and ecology, to protect the environment, and provide a more resilient service[5].

5.1.2. Climate change can have a significant impact on water quality and overflow discharges, bringing periods of hotter and drier weather followed by more frequent storm events and prolonged periods of rainfall. In the hotter months watercourses can be more sensitive to storm discharges due to reduced dilution while in the wetter period overflows will discharge more frequently and for longer. Balancing the everyday running requirements of our system with the extremes that are brought about through climate change pose a particular capacity challenge. Through our drainage and wastewater management plan (DWMP) we are investigating possible scenarios that will impact our operation as a result of climate change. These scenarios will influence our future plans and options development.

5.1.3. Storm overflows feature several times within the WISER. There is a clear ambition to improve resilience and as part of a future drainage strategy to monitor overflow in particular those of high or medium significance and use the data to influence future spill reduction plans. In AMP6 we installed event monitors on over 2000 overflows. The data gathered from these monitors has and will continue to be used to identify frequently spilling overflows to be investigated. The outcome of these will identify potential cost-beneficial spill reduction schemes.

5.1.4. We recognise that ambitions around storm overflows has changed since the WISER was written. We have prioritised delivery of Event Duration Monitoring (EDM) on overflows using the EA's risk based approach and now that we have accomplished this we want to go further to ensure that all storm overflows are monitored. This ambition has also been shared by members of the Storm Overflows Taskforce, a group set up to drive improvements in overflow performance[5].

5.1.5. Where an event monitor has indicated that an overflow exceeds the high frequency spiller threshold, an investigation should be undertaken. Sites identified for an investigation are those that are reported to spill greater than the thresholds set out in the storm overflow assessment framework (40 times on average if 3 years of data is available, 50 times on average if 2 years of data is available, and 60 times on average if only 1 year of data is available)[6]. In AMP7 we already have 195 existing planned investigations, which were reflected at PR19, and we are now proposing to undertake a further 587 Stage 1 investigations and 300 Stage 2 and 3 Investigations as part of our Green Recovery proposal.

5.1.6. In order to identify sustainable solutions for managing storm water and to provide greater environmental and social benefits we propose to build three new ICM models. These models will inform our future spill reduction plans.

[5] Press release, Taskforce sets goal to end pollution from storm overflows: https://www.gov.uk/government/news/taskforce-sets-goal-to-end-pollution-from-storm-overflows

[6] Storm Overflow Assessment Framework: http://www.water.org.uk/wp-content/uploads/2018/12/SOAF.pdf

5.2. Outcome 1: Install event duration monitors (EDM) on all permitted storm overflows

5.2.1. In AMP6 we successfully installed over 2000 event monitors on priority storm overflows. This programme of work covered 92% of all storm overflows. Installation of these monitors has enabled us to understand how our network reacts in times of high intensity or prolonged rainfall events. From this data we are able to investigate whether a spill event has had any visible environmental impact and even carry out further analysis on any spurious data reading.

5.2.2. The Storm Overflows Taskforce is a new Taskforce set up to bring together representative of Defra, Ofwat, the EA and Water UK to set out the future ambitions and targets for storm overflows. It is likely that recommendations from this group will influence the future Environment Bill and therefore future legislation. The Storm Overflows Taskforce has indicated that event monitoring will be required on all storm overflows and so we believe this will be a requirement in AMP8.

5.2.3. Having already delivered event monitoring on our highest priority storm overflows, we want to improve our coverage to ensure that 100% of our permitted storm overflows are monitored. This ambition aligns to that of the Storm Overflows Taskforce which has indicated that this will be one of their short-term targets. The WISER identifies that it is good practice to monitor discharges from storm overflows. To date, a risk-based approach has been taken to ensure that the highest priority assets are monitored. We recognised that the ambition around overflows has shifted since the WISER was written and therefore believe this should be a priority to monitor all storm overflows and anticipate this to be a requirement in future updates to the WISER.

5.2.4. Through Green Recovery we propose to install event monitoring on the remaining 8% of unmonitored overflows, we propose to install up to 175 new event duration monitors on all unmonitored storm overflows by 31st March 2023. We recognise that the number of monitors required may change, costs recovered will reflect the number of monitors installed based on the unit rates specified in Table 4.

5.3. Outcome 2: Undertake 300 additional storm overflow investigations at frequently spilling overflows

5.3.1. The storm overflow assessment framework (SOAF) was written by the Environment Agency to demonstrate that sewer systems comply with current statutory requirements such as Urban Wastewater Treatment Regulations (UWWTR). Any overflow reported to exceed the spill frequency thresholds as set out in Table 1 of the SOAF guidance document should be investigated. The thresholds are based on the number of years an event monitor has been installed and the average annual number of spills reported.

5.3.2. In preparation for AMP7, 195 sites were identified for investigation and inclusion in the WINEP v3. These sites were recognised as enhancement projects in our 2019 Final Determination and are planned for delivery in AMP7. Irrespective of Green Recovery, we had already chosen to accelerate this programme to complete all 195 WINEP requirement by March 2023. This has afforded us capacity to deliver some additional investigations in AMP7. These additional investigations would otherwise be delivered in AMP8 under the current U_INV WINEP driver.

5.3.3. Since defining our AMP7 programme we have installed over 1,600 new EDMs and as a result we have significantly increased our monitoring capacity and knowledge of our systems. From this data we have identified 587 new sites that meet or exceed the SOAF spill thresholds for an investigation.

5.3.4. Our Green Recovery proposal would deliver Stage 1 (*Why is the storm overflow a high frequency spiller?)* of the SOAF investigation on all 587 sites with 300 going forward onto Stage 2 (*Does the storm overflow cause an environmental impact?*) and Stage 3 screening (*Initial assessment of options for improvements*). This phased approach in the delivery is in recognition of lessons learned during the delivery of our AMP7 programme. By taking a phased approach we will target the highest priority sites and group overflows into catchments to create efficiency in the investigations but also allow us to identify and adopt a catchment solutions approach where appropriate with early engagement with local stakeholders. This will also minimise the number of changes to the programme which is essential for successful delivery in a short timeframe.

5.3.5. By delivering an additional 300 Stage 2 and Stage 3 investigations in AMP7, we aim to bring the majority of the resulting environmental improvement schemes into AMP9 or earlier and commence work to identify any efficient and holistic solutions earlier, on a catchment wide basis. By doing this we will deliver more efficient catchment solutions that are more likely to drive a cost-beneficial solution.

5.3.6. The figures below demonstrate various delivery scenarios for SOAF investigations. Figure 1 shows our AMP7 WINEP profile and anticipated AMP8 delivery profile. Figure 2 reflects our decision to accelerate our AMP7 WINEP requirements to ensure that all investigations are completed by FY23 with a view of increasing the number of environmental improvement schemes in AMP8, our anticipated AMP8 programme is also shown. By accelerating our AMP7 investigations we are able to accommodate some additional investigations in FY24 and FY25 as shown in Figure 3. Figure 3 shows our accelerated AMP7 programme plus our Green Recovery proposal for SOAF investigations, as a result 300 investigations have been accelerated from AMP8 into FY24 and FY25. As a result of this the anticipated AMP8 profile for investigations will be complete two years earlier than originally forecast.

Figure 1 - The number of storm overflow assessment framework (SOAF) investigations undertaken in each year (stage 2 and beyond). The figures reported in FY21-FY25 align to the dates in WINEP v3, the figures reported in FY26-FY30 are based on a theoretical profile for AMP8 SOAF investigations.

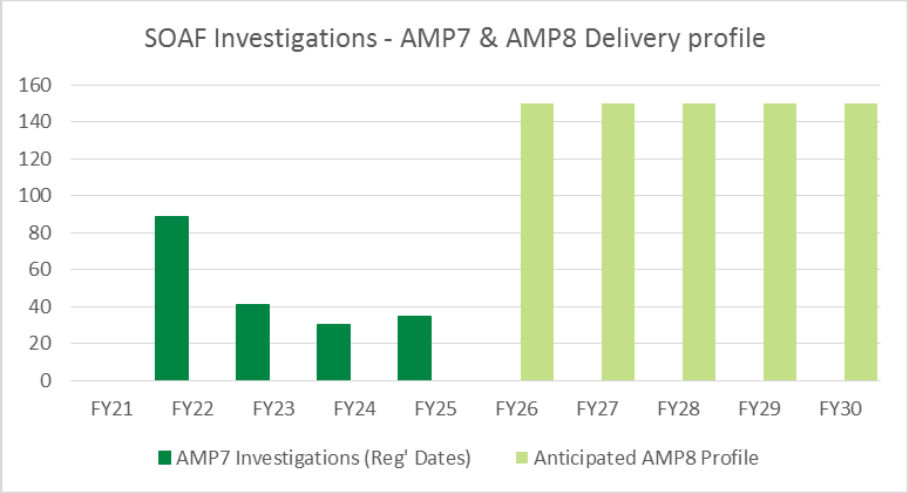


Figure 2 - The number of storm overflow assessment framework (SOAF) investigations undertaken in each year (stage 2 and beyond). The figures reported in FY21-FY25 align to the accelerated AMP7 profile, the figures reported in FY26-FY30 are based on a theoretical AMP8 profile.

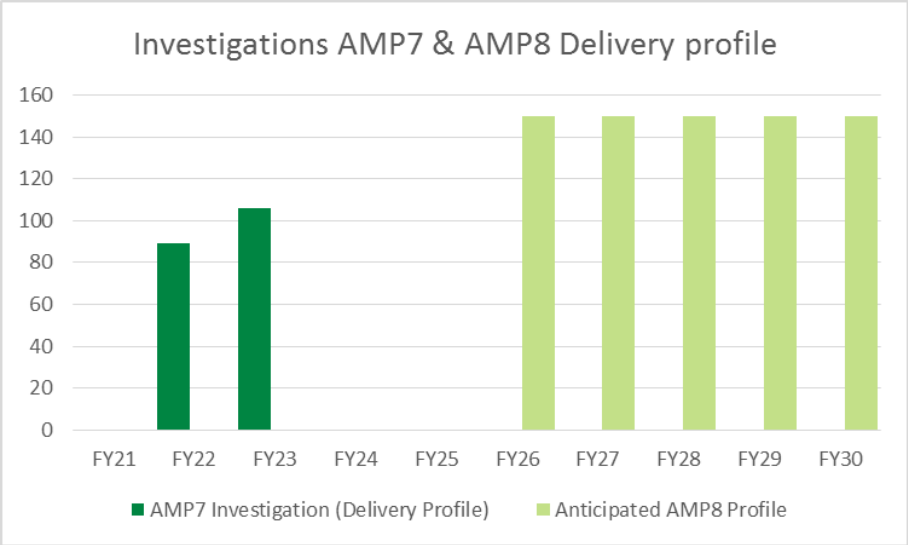
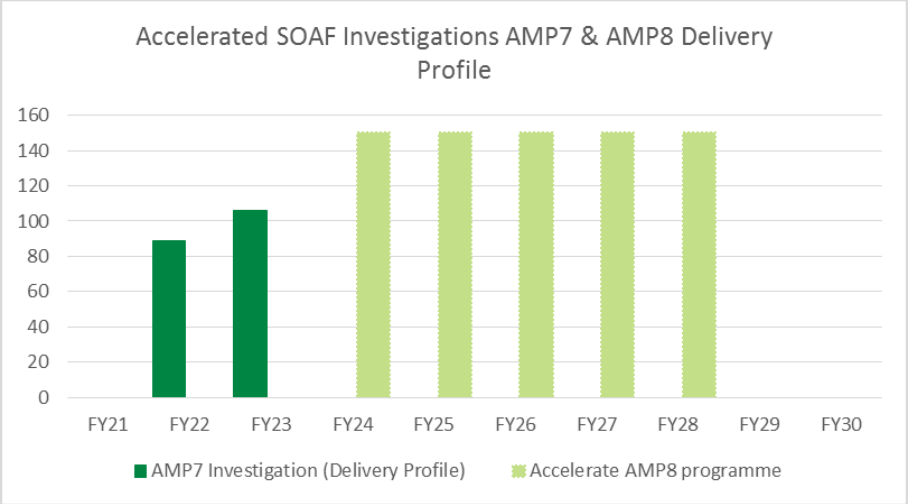


Figure 3 - The number of storm overflow assessment framework (SOAF) investigations undertaken in each year as proposed within our Green Recovery submission. Note any schemes with a delivery date after FY25 will form part of our AMP8 business plan.



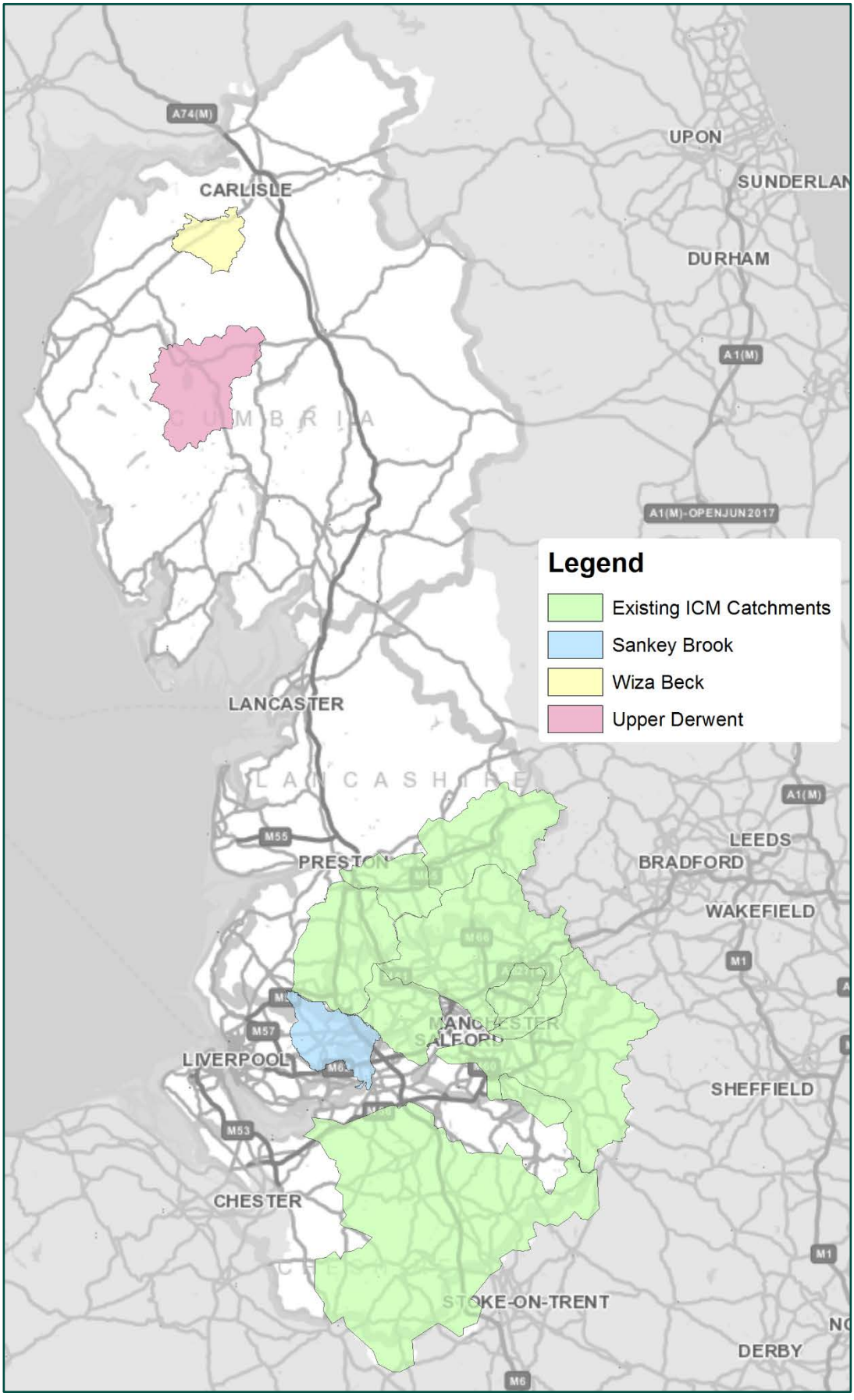
5.3.7. By undertaking additional investigations in AMP7 we are able to maintain a skilled team across United Utilities and our supply chain throughout AMP7 which will drive efficiency in delivery and which would not be possible with a stop start programme. In addition, the earlier that we are able to undertake the investigation the longer we have to plan and optimise future improvements to ensure that the best environmental improvement schemes are identified.

5.4. Outcome 3: Build new integrated catchment models to inform future improvement schemes

5.4.1. Our integrated catchment models (ICMs) are a dynamic digital representation of a watercourses' catchment hydrology and water quality. These models are calibrated to real time data to represent the water quality impact of urban and diffuse rainfall runoff within the receiving watercourse. The urban contributing catchment is represented through our sewer network models that represent all overflows, surface water outfalls and wastewater treatment works contributions. The ICMs are used to assess the water framework directive status of a watercourse and are used to identify where there is non-compliance and its root cause. A significant advantage of the models is they can represent both

dry weather and wet weather conditions and are able to replicate the impact of climate change. United Utilities has built ICMs for a significant portion of the region and these have been used to inform overflow and Wastewater Treatment Works (WwTW) needs for the multiple WINEPs. We have identified three river watersheds where we'd like to expand our modelling coverage as they contain a high number of frequently spilling overflows. These catchments and locations are shown in below.

Figure 4 - A map of the North West including the locations of our existing integrated catchment models and where, through Green Recovery, we propose to build additional integrated catchment models.



5.4.2. The key to building an integrated catchment model is having suitable data for calibration. This requires capturing long term water quality trend data and sampling dry and wet weather events to replicate the impact of the overflows. As a minimum we collect a full summer period for each catchment. Due to lab capacity we would have to phase the data collection over two summers in an overall three year programme including the model build and calibration, needs assessment to develop a model suitable to look at options. To deliver this extended ICM programme would require planning to start in late 2021 to facilitate surveys in 2022 and 2023 and allowing time to build and calibrate the models.

5.4.3. The Water Framework Directive states that all water bodies should meet good ecological status by 2027 subject to a cost beneficial solution being identified. The three locations that have been identified for ICM models are all classified as moderate or below and therefore further intervention and improvements are required within these location to meet good ecological status.

5.4.4. Integrated Catchment Models have a number of significant benefits, including;

(i) The ability to fully understand the whole catchment contribution;

(ii) The ability to identify which asset(s) is contributing most to non-compliance;

(iii) As the watercourse model is linked to a detailed network model it allows us to test a full range of options including surface water management and green solutions;

(iv) The models also allow us to identify holistic solutions by integrating our network, treatment works and watercourse to be able to take a systems thinking approach to options;

(v) By developing options ahead of AMP8 it affords us time to identify multiple stakeholder opportunities early giving us the best chance to deliver wider catchment benefits;

(vi) The ICMs are also a useful asset for future drivers and have been used to support our water resource strategy, impacts of abstractions and droughts;

(vii) Our current ICMs have helped us work with the Environment Agency to develop innovative storm water treatment alternatives to conventional solutions;

(viii) The current SOAF process focuses on each individual overflow in isolation. This limits the scope to take a catchment approach and tends to drive isolated solutions. Early evidence from the AMP7 programme has highlighted the difficulty in supporting a cost beneficial case for an asset on its own. Taking a catchment approach means we are able to look at catchment solutions with benefits to multiple overflows. This drives down the cost per site and should support more efficient, holistic and cost beneficial solutions in the future; and

(ix) A significant number of our existing ICM models were built in AMP5 and these catchment models have been invaluable in informing our future programmes. The foresight taken at that time has meant UU have been able to develop integrated solution opportunities in subsequent AMPs. Without investing in these integrated models, future overflow assessments would have to revert to single asset approach to meet the often tight regulatory deadlines and a resource constrained market. Through investment in this AMP we will give ourselves the best opportunity to realise a truly holistic approach to future investment in our overflows.

6. Evidence of optimised option

6.1. Introduction

6.1.1. The requirements of the event monitoring installations and storm overflow assessment framework (SOAF) investigations are quite prescriptive and therefore the range of options for consideration is not broad. In AMP6 we undertook a significant programme to install event duration monitoring (EDM) on the majority of our storm overflows, as a result we are confident in our ability to deliver addition event monitoring equipment in AMP7.

6.1.2. Whilst we have only just started the AMP7 SOAF investigations, we are working closely with the Environment Agency to ensure that our process and outputs from the current investigations meet the statutory requirements and satisfy the Environment Agency's expectations. All information and learning that we have gained through working closely with the Agency in the delivery of our AMP7 SOAF obligations has been shared with the industry via the Intermittent Task and Finish group or the sub-group, the SOAF Practitioner's working group.

6.1.3. Any new investigations that are brought forward from AMP8 will follow the same methodology and processes as those currently being delivered in AMP7. The outcome of the accelerated investigations will inform the development of our wastewater environmental enhancement programmes in AMP8 for implementation in AMP9 and beyond. A robust understanding of the role our discharges play in the wider ecosystem is important in terms of confirming the need for intervention and also to allow an integrated catchment approach to find the most cost beneficial solution to enhance natural capital.

6.1.4. The integrated catchment models that have been identified for construction in AMP7 will play a pivotal role in the development of our future environmental enhancement programmes. The catchments selected have been identified as areas with a significant number of frequently spilling overflows, however these models will be used to tackle a range of environmental issues identified through our drainage and wastewater management planning processes. These models will complement the range of models that we already have to increase the population equivalent or river catchments covered by ICMs.

6.2. Outcome 1: Install event duration monitors (EDM) on all permitted storm overflows

6.2.1. A robust understanding of the role our discharges play in the wider ecosystem is important for the development of future environmental enhancement schemes. Monitoring of overflows is the first step in understanding how our assets are operating in periods of heavy or prolonged rainfall. In AMP6 we installed event monitoring on the majority of our assets using the EA's risk-based approach. We recognise that the ambition around overflows is changing quickly; we have seen more interest in overflows and overflow performance over the past year. In addition, the Storm Overflows Taskforce has indicated that it would like to see all storm overflows monitored. All discharges have the potential to impact on the environment and therefore we believe it is a priority to install EDM on all permitted storm overflows.

6.2.2. Our Green Recovery proposal is that we will install 175 event duration monitors (EDM) at permitted storm overflows that are currently unmonitored. All new installations will follow the same methodology as any funded AMP7 enhancement schemes with a U_MON1 driver within the WINEP, which also mirrors our AMP6 EDM installation programme. We will use our extensive knowledge and experience gained through the delivery of over 2000 event monitors to ensure efficient delivery of

this programme. To protect customers and to recognise that the number of monitors installed many vary, only monitors that have been delivered will be funded through this process.

6.3. Outcome 2: Undertake 300 additional storm overflow investigation at frequently spilling overflows

6.3.1. Our Green Recovery proposal aims to deliver 587 Stage 1 SOAF investigations, with 300 being chosen to go forward for Stage 2 and Stage 3 screening in the final two years of AMP7 (FY24 and FY25). Stage 3 (*Assess Options*) is a two-stage screening process; an initial cost benefit assessment and, where appropriate, a detailed assessment. Where the benefits are likely to be greater than cost these sites will go through to Stage 4 when a decision on schemes to promote improvement schemes for delivery in future WINEPs.

6.3.2. The EA's storm overflow assessment framework (SOAF) is very prescriptive, as a result a range of options cannot be considered. However, we have taken some of our lessons learnt through the delivery of AMP7 programme to improve this proposal. To reduce the number of changes within the programme and therefore become more efficient, we propose to undertake Stage 1 of the SOAF investigation for all storm overflows that meet or exceed the spill threshold. Stage 1 of the SOAF investigation involves detailed analysis of spill data, rainfall data and modelled data to determine the true reason for an overflow to be spilling frequently. Only sites that require a Stage 2 investigation will be considered for the 300 new investigations that we will deliver in AMP7 for Green Recovery, any remaining will be delivered in AMP8 subject to funding. Through this process we are likely to identify some improvements that can be implemented in AMP and therefore provide benefit sooner.

6.3.3. Following the completion of Stage 1, the 300 sites going forward to Stage 2 and Stage 3 and where an option is cost beneficial to a Stage 4 decision, will be prioritised using the following criteria:

(i) Spill frequency;

(ii) Water body amenity;

(iii) River dilution;

(iv) Customer complaints;

(v) The volume of spill or length of time spilling;

(vi) Overflows within the same modelled catchment. For example we would look to include all overflows within a river reach if they are in breach of the SOAF thresholds (modelled and monitored), this is more efficient and allows a catchment based approach. Using the modelled data gives us a forecast of the likely spill frequency which will be supported by the results from the EDM installations proposed. The proposed programme for EDM installations will ensure we have recorded data to support the modelled predicted frequency and confirm we exceed the spill frequency threshold; and

(vii) Data reliability. We will look to see if we have a strong correlation between the monitored and modelled spill frequency. Where there is not a strong match further investigation is required to determine the reliability of each dataset and mitigation actions identified. Where the mitigation requires a more detailed investigation i.e. further model verification, adjustment to the EDM, where possible these will be programmed for a later delivery to ensure the investigation uses the most accurate data affording the best opportunity for a future cost beneficial spill reduction scheme.

6.4. Outcome 3: Build new integrated catchment models to inform future improvement schemes

6.4.1. Integrated catchment models (ICMs) are sophisticated tools used to represent a watercourses' catchment hydrology and water quality. These models are used to identify areas or assets that are contributing to non-compliance of a water body. The ICMs are able to take data from multiple sources to test a range of scenarios or options for sustainable water management within a catchment. Current storm overflow investigations consider overflows in isolation, we want to use ICMs to identify holistic solutions for managing spills and other water quality issues by integrating our network, treatment works and watercourse. We want to take a systems thinking approach to options development with a view of creating more efficient, holistic and cost beneficial solutions in the future. Without these models a more conventional approach to managing high spilling overflows will be taken which is likely to yield fewer improvement schemes due to limitations in identifying cost beneficial schemes.

6.4.2. A large proportion of our population is covered by integrated catchment models. We propose to build three new catchment models to cover the highest priority areas, see Figure 4 above.

6.4.3. In order to develop a catchment wide or innovative solution we need the tools (models) to be able to provide the evidence to the Environment Agency that we can meet the regulatory driver. These models have allowed us to; rationalise multiple Combined Sewer Overflows (CSOs) into a single discharge improving spill compliance with WFD standards, we have been able to integrate the network and the treatment works to address multiple drivers and minimise the size of conventional storage tanks, utilise capacity in our existing network to reduce the need for new storage tanks, and assess the performance of alternative options including storm water treatment and sustainable drainage systems (SuDS). Examples include improvement schemes at Failsworth WwTW and Croston CSO:

(i) Failsworth WwTW – we have multiple WFD water quality drivers on the WwTW final effluent and inlet and storm tanks overflows. By developing an integrated network and WwTW solution we were able to reduce the storage solution requirement by 30,000m3.

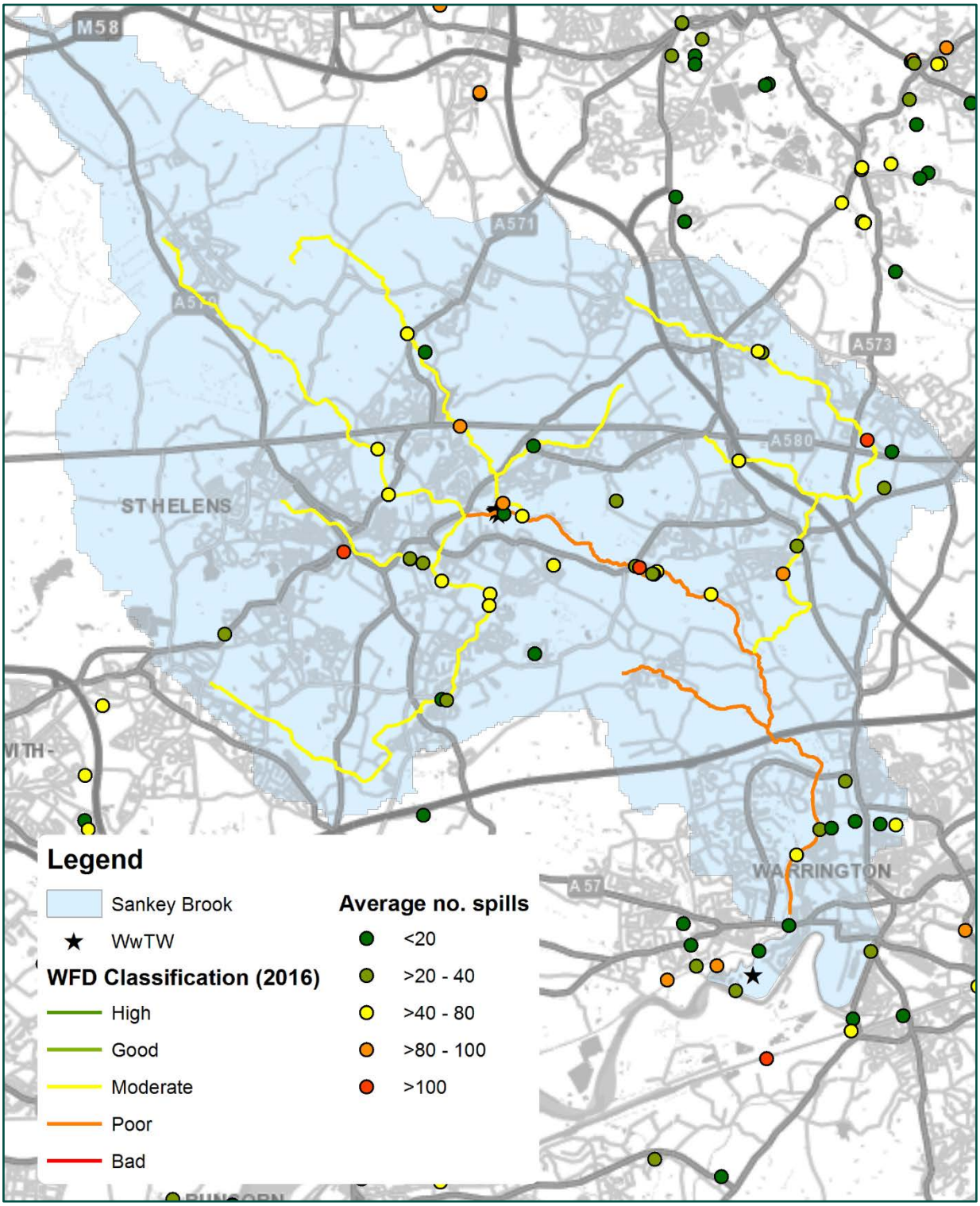
(ii) Croston CSO (CHR0012) – we have used our models to assess alternative storm water treatment options which has resulted a wetland treatment solution being identified as the preferred option comparted to a conventional storage solution.

6.4.4. The three catchments that have been chosen have been done so due to them having a high number of frequently spilling overflows within the catchments. Details of these catchments can be found below.

Sankey Brook Catchment

6.4.5. Sankey Brook is located near Warrington in Cheshire. The catchment is made up of seven small watercourses (see Figure 5) and flows for approximately 18 miles. We have two wastewater treatment works (WwTWs) and have identified 12 storm overflows that frequently discharge into Sankey Brook serving a population equivalent of circa. 400,000. This catchment suffers from physical modifications and has a number of water quality pressures from various contributors which prevent this catchment meeting good ecological status. Urban and transport, and agriculture and land management are the two highest contributors for this catchment not achieving good status, this identifies a good opportunity for United Utilities to work in partnership to deliver a fair share of improvements within this catchment. An integrated catchment model for this area will be invaluable in identifying these opportunities and improvement solutions for more than just overflows.

Figure 5 - Sankey Brook catchment



6.4.6. Through the development of our drainage and wastewater management plan (DWMP), Warrington North WwTW and the resulting catchment has been identified as an area of significant growth. Using local planning data, the household population is forecast to increase by 14% by 2030 and 27% by 2050. In addition climate change research carried out on behalf of United Utilities indicates that spill performance is likely to deteriorate further due to more intense and more frequent rainfall events. This will place more pressure on WwTWs and result in more spills and flooding as a result of climate change. An integrated catchment model could help to identify potential catchment solutions that

could offset the loads at the WwTW, the development of a catchment plan would consider various factors such as frequently spilling overflows and the final effluent at St. Helens WwTW which is a known contributor in preventing this Brook meeting WFD good ecological status for phosphorus however to date a cost beneficial solution has not been identified.

6.4.7. The proposed Sankey Brook ICM will include the contributing waterbodies as shown in Table 1 below. We will focus on Sankey Brook from Rainford Brook to the Mersey confluence (including tributaries), with water quality sampling focusing on this reach. The confluence with the Mersey would be the terminal point of the model.

Table 1 - Sankey Brook ICM contributing waterbodies and the reasons for not achieving good status.

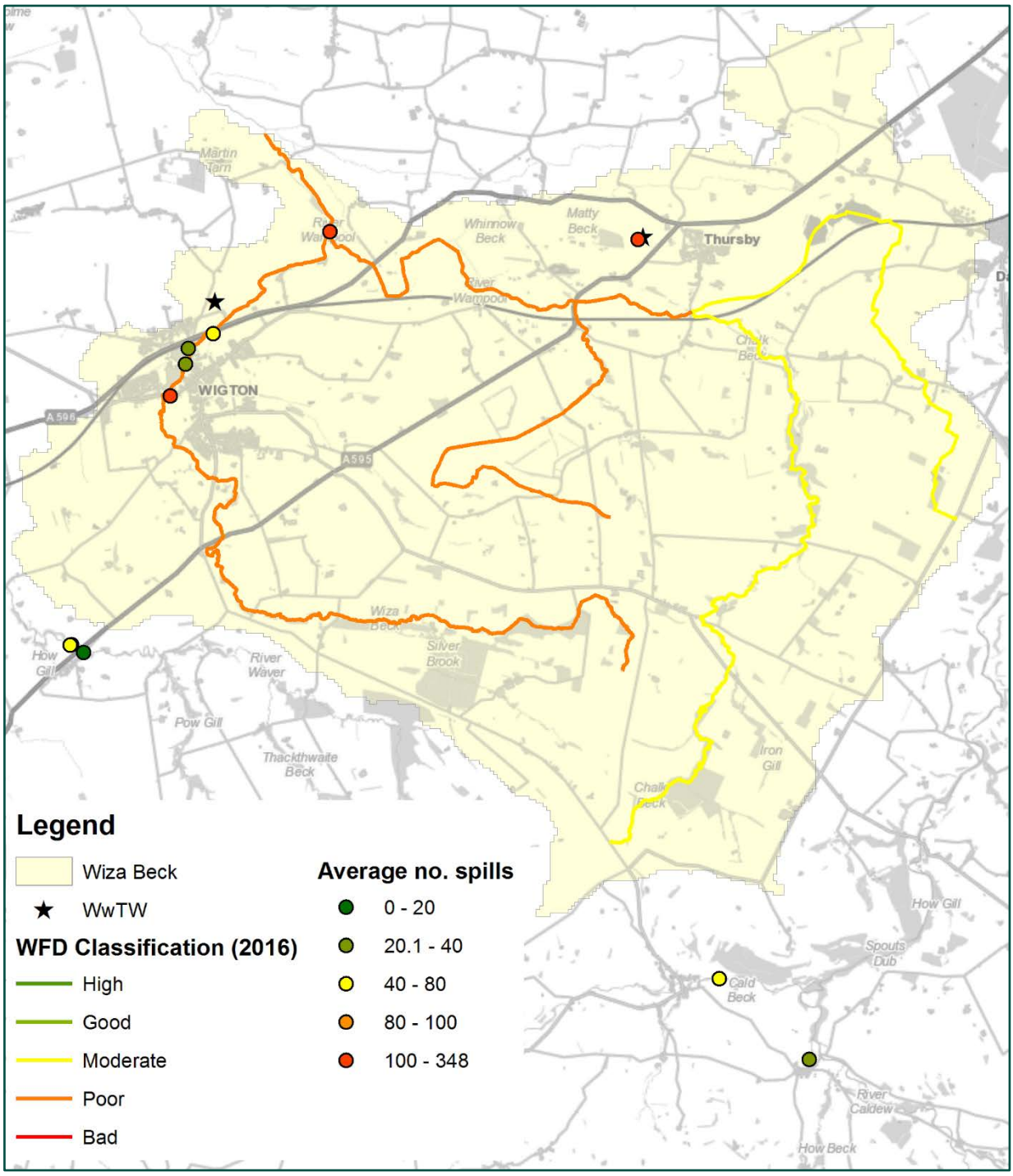
Name of Waterbody	Waterbody ID	Current (2019) WFD Classification	Issues Preventing Good status	Comment
Sankey Brook (Rainford Brook to Mersey)	GB112069061200	Poor	Pollution from rural areas (4) Pollution from waste water (2) Physical modifications (1) Pollution from towns, cities and transport (3)	**Detailed ICM - sampling focus.** Model to confluence with Mersey
Sankey Brook (Hardshaw Brook to Rainford Brook)	GB112069061180	Moderate	Physical modifications (1)	-
Sutton Brook	GB112069061170	Moderate	Physical modifications (2)	Tributary
Hardshaw (Windle) Brook	GB112069061210	Moderate	Pollution from rural areas (2) Physical modifications (2) Pollution from towns, cities and transport (5)	Tributary
Rainford Brook	GB112069061240	Moderate	Pollution from rural areas (6) Physical modifications (4) Pollution from towns, cities and transport (1)	Tributary
Black Brook (Mersey Estuary)	GB112069061230	Moderate	Pollution from abandoned mines (2) Physical modifications (4)	Tributary
Millingford (Newton) Brook	GB112069061220	Moderate	Pollution from abandoned mines (3) Physical modifications (6) Pollution from towns, cities and transport (8)	Tributary

Wiza Beck

6.4.8. Wiza Beck is located within the Lake District in the North of our region. Wiza Beck is a predominantly rural catchment made up of four watercourses, see Figure 6, and flows for approximately 16km. We have two small wastewater treatment works (WwTWs) and have identified three storm overflows that frequently discharge and an additional three modelled to spill greater than the thresholds into this catchment serving a population equivalent of circa. 10,000. Climate change research indicates that spill performance is likely to deteriorate further due to more intense and more frequent rainfall events this will put more pressure on existing WwTWs and is likely to result in more spills from storm overflows.

6.4.9. This catchment has a WFD ecological status of “Bad”, the main reason for not achieving good status is due to agriculture and rural land management. The rural nature of this catchment lends itself to potential catchment solutions for any improvements to water quality within this area. An integrated catchment models would help to identify opportunities and improvement solutions for more than just overflows.

Figure 6 - Wiza Beck catchment



6.4.10. The proposed Wiza Beck ICM will include the contributing waterbodies as shown in Table 2 below. There will be a detailed focus on Wiza Beck, with water quality sampling focusing on this reach. The confluence with Pow Beck would be the terminal point of the model.

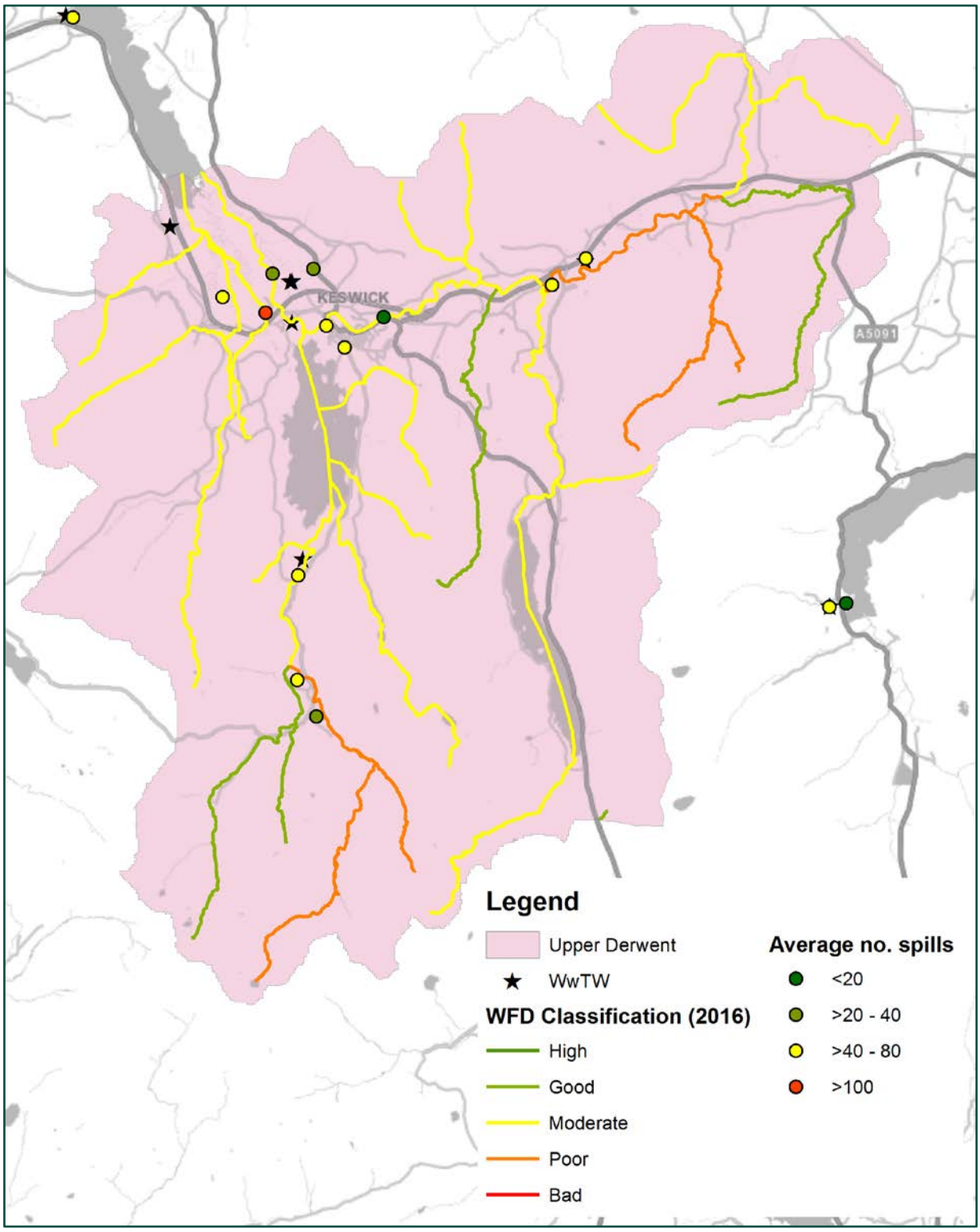
Table 2 - Wiza Beck ICM contributing waterbodies and the reasons for not achieving good status

Name of Waterbody	Waterbody ID	Current (2019) WFD Classification	Issues Preventing Good status	Comment
Wiza Beck	GB102075073410	Bad	Pollution from rural areas (1) Physical modifications (1)	Model to confluence with Pow Beck
Gill Beck (Wiza Beck)	GB102075073450	Moderate	Pollution from rural areas (1) Physical modifications (1)	
Wiza Beck	GB102075073390	Poor	Pollution from rural areas (3) Physical modifications (2)	**Detailed ICM - Sampling focus**
Chalk Beck	GB102075073380	Bad	-	

Upper Derwent

6.4.11. Upper Derwent is located at the heart of the Lake District in the North of our region. This area boasts some of the most beautiful natural landscapes and is home to some iconic lakes such as Bassenthwaite and tributaries that have been designated Special Area of Conservation (SAC). For this reason it is a key tourist destination, in particular around Keswick. We have identified this area as having a high number of frequently spilling overflows, in addition this area has been identified as having high levels of infiltration. An integrated catchment model of this area would help to identify opportunities and improvement solutions to minimise the impact of storm overflows.

Figure 7 - Upper Derwent catchment



6.4.12. We have four WwTWs and have identified three storm overflows that frequently discharge into this catchment serving a population equivalent of around. 6,500. An additional seven storm overflows have been modelled to spill greater than the SOAF threshold. Climate change research indicates that spill performance is likely to deteriorate in the future due to more intense and more frequent rainfall events which will put more pressure on existing WwTWs and result in more spills to the environment from storm overflows.

6.4.13. The proposed Derwent ICM will include the contributing waterbodies as shown in Table 3 below. There will be a detailed focus on the Derwent upstream of Bassenthwaite Lake, with water quality sampling focusing on this reach. The entry point to Bassenthwaite Lake would be the terminal point of the model.

Table 3 - Upper Derwent ICM contributing waterbodies and the reasons for not achieving good status

Name of Waterbody	Waterbody ID	Current (2019) WFD Classification	Issues Preventing Good status	Comment
Derwent US Bassenthwaite Lake	GB112075073561	Moderate	Pollution from abandoned mines (1)	**Detailed ICM - Sampling focus** Model to u/s of Bassenthwaite Lake
Derwent - Stonethwaite Beck to conf Greta	GB112075070410	Moderate	Physical modifications (1)	
Derwent - headwaters to conf Stonethwaite Beck	GB112075070330	Moderate	-	
Newlands Beck	GB112075070440	Moderate	Pollution from abandoned mines (3)	

7. Evidence of efficient delivery

7.1. Introduction

7.1.1. Our engineering delivery teams have provided robust cost estimates for all outcomes identified within this document to ensure we have confidence in our ability to delivery these schemes efficiently and to the costs identified within this document.

7.1.2. The requirements of the event monitoring installations and storm overflow investigations are very prescriptive and therefore there are not a range of options that can be considered for the delivery of these outcomes. We have delivered a large programme of event duration monitors in AMP6 which has provided us with extensive data to inform cost forecasts. We have used our knowledge of previous programmes combined with market testing to identify robust costs for this outcome. We have set up an integrated team with the Environment Agency and other suppliers to facilitate information sharing and to develop the current storm overflows assessment framework. This process has resulted in some changes to the delivery of our programme compared to what was assumed at PR19 and through the delivery of these requirements in AMP7 we have been able to produce better cost forecasts for this programme which is reflective of the work carried out.

7.1.3. To ensure we have robust cost estimates for our integrated catchment models (ICMs) we have used a costed breakdown for specific ICM catchments that were provided on a competitive basis in a previous AMP, we have applied current competitive rates for resources to bring the estimates up to date. Sampling costs have been estimated using similar ICM work undertaken in AMP6 and in AMP7.

7.1.4. Our forecast for the three outcomes identified within this programme is £7.876m in FY17/18 prices. For installation of EDM our forecast is £2.477m and for SOAF investigations and ICMs combined our forecast is £5.399m.

7.2. United Utilities' contribution to delivery

Outcome 1: Install event duration monitors (EDM) on all permitted storm overflows

7.2.1. Over the past five years we have installed over 2000 event monitors on storm overflows. The installation of these monitors formed part of our statutory requirement as named schemes in the WINEP and received enhancement funding at final determination in both 2014 and 2019. We have used evidence from our previous project builds in AMP6 and AMP7 and extensive knowledge though delivery of a large EDM programme to inform the costs of this programme.

7.2.2. The cost of installing EDM in AMP6 is not comparable with those costs that will be generated for similar activity this AMP due to the cost associated with permit applications. This is a new charge for AMP7 and can account for up to 8% of the total cost of a single EDM installation.

7.2.3. Our forecast for this programme is £2,695,574 (FY20/21 prices) for installation of EDM at remaining sites. The specific locations will be determined post submission and shared with the Environment Agency. Our current assumption assumes a maximum of 175 new monitors however we will only be funded for those delivered based on the unit rate given in Table 4.

Outcome 2: Undertake 300 additional storm overflow investigation at frequently spilling overflows

7.2.4. We have set up an integrated team with the Environment Agency and other suppliers to facilitate information sharing and to develop the current storm overflows assessment framework. Through the Intermittent Task and Finish group and sub-groups we have played a pivotal role in sharing

information and knowledge gained through early delivery of our storm overflow investigations and engagement with the Environment Agency in AMP7.

7.2.5. Having started to deliver our AMP7 programme of investigations and through liaising with the Environment Agency to ensure we get the best environmental output, we have a better understanding of what is expected from this programme and how much it has costed us to deliver upon the Agency's requirements. This knowledge has been used to build up our programme costs for Green Recovery.

7.2.6. For Green Recovery we have defined the costs for each stage of the storm overflow assessment framework (SOAF) with the view that not all schemes will go through every stage of the assessment. For our Green Recovery proposal we have committed for stage 1 to be completed for 587 sites and from this to take forward 300 sites into Stage 2 and Stage 3 screening. Without completing Stage 2 and Stage 3 screening we will not know how many will go forward from this point however we have used information gathered through the delivery of our current programme to provide a robust estimation of cost.

7.2.7. Our forecast for this programme is £4,148,174 (FY20/21 prices) for 587 undergoing Stage 1, 300 sites undergoing Stage 2 and stage 3 screening and 150 undergoing Stage 3 full detailed cost benefit analysis. The cost breakdown for each stage can be found in Table 4. When we developed the PR19 SOAF programme, no water company had delivered any investigations so the cost estimate was based on a number of assumptions, i.e. how many sites will need asset surveys, how many will need water quality sampling, the level of evidence for the Stage 3 cost benefit screening. Working with industry Task & Finish groups and the Environment Agency has highlighted a higher level of evidence is required for the Stage 3 options development, including full assessment of conventional and nature based solutions. This has meant more investigation into the catchment to identify surface water management options and a more detailed benefit assessment.

7.2.8. To support this it is imperative our network models (and river models) are fit for purpose for the assessment. A conservative model, i.e. that over predicts spills and volumes, is useful at a planning level but could lead to an overestimate of the costs to reduce spill frequency. This could lead to us identifying very few sites with improvement schemes that pass a cost benefit assessment due to disproportionately weighting the capital costs. This has led to a much more detailed assessment of the model vs EDM data to establish the best tool for this assessment. This increased level of assessment with a requirement to undertake water quality surveys at all sites has led us to review the assumptions made at PR19. The costs proposed as part of Green Recovery reflect this increased scope and are informed by the actual costs of delivery of the early AMP7 WINEP SOAF investigations.

7.2.9. In addition to the information we've shared throughout the delivery of our early AMP7 SOAF programme we have taken an active role, alongside colleagues from Welsh Water, to develop and trial the new storm overflow assessment framework methodology for transitional and coastal (TRaC) sites. United Utilities will run Stage 2 with Welsh Water running Stage 3 of this SOAF methodology, we will share and review the results from each stage to ensure we are happy with the assessment. The outputs of this trial will be communicated back to the Intermittent Task and Finish Group early in the 2021. If the methodology is recommended by the T&FG for endorsement by Strategic Water Quality and Waste Planning Group (SWQWPG) then this will be used by all companies who have TRaC sites within their WINEP. Without an agreed methodology and without United Utilities taking a leading role in trailing this methodology, several companies would be unable to deliver upon their current WINEP requirements in AMP7.

Outcome 3: Build new integrated catchment models to inform future improvement schemes

7.2.10. Continued improvements in our models and model data is important in ensuring that data remains accurate, reliable and complete. We have been investing in our model maintenance programme by undertaking new flow surveys and updating our models which has resulted in more accurate model data. We can use model performance data to forecast the expected performance of an overflow, for many of our overflows this data can be compared to EDM data. The EDM data informs our future model enhancement programme, identifying where we need to invest in enhancing the model to ensure it is fit for purpose for greener solutions i.e. Sustainable Drainage Systems (SUDS) and surface water separation.

7.2.11. These updated models have been used to inform our current AMP7 SOAF investigations and have been used in the development of our DWMP. Investing time and money in updating our models will provide a more robust approach to solution development and future planning making sure that our future investment plans are fit for purpose.

7.2.12. Our ICMs are dynamic modelling tools that can take information from our network models and apply the information to the catchment in question. To enhance our coverage and capability for possible catchment interventions we propose to build three new ICMs. The cost of building an ICM will vary for each catchment. The forecast for this programme is £2,068,693 (FY20/21 prices).

8. Evidence of customer support

8.1. Introduction

8.1.1. In November we conducted a quantitative survey followed by a two day qualitative online pop up community using our Water Talk customer panel to understand our customers' attitudes and level of engagement towards drainage and wastewater. The results from this have shown that customers care about their local natural environment and have shown a desire to protect the environment from deterioration. From this research 71% of customers were found to engage with the environment in their local area, with 93% agreeing that United Utilities should do everything that they can to take care of the natural environment in which they operate. This is an increase from previous years where PR19 research identified that 54% of people surveyed supported improvements to enhance river quality (PR19 Chapter 5, Great Service to Customer - UUW105). The increase may be a result of more people spending time within their local areas and enjoying more outdoor activities as a result of COVID-19.

8.1.2. When surveyed about our Green Recovery proposal 75% of customers supported our storm overflows proposal with 80% willing to accept the associated bill increase.

8.1.3. The three programmes of work identified within this document are all precursors to the development of long-term plans for storm overflows. Without the data and information gathered by undertaking these projects we would be unable to develop a robust and sustainable long-term plan for tacking overflows.

8.2. Customer support

8.2.1. Our research has shown that customers care about the environment. When asked about our Green Recovery proposal, customers indicated strong support for our initiatives regarding storm overflows with 80% in support of a bill increase to deliver our proposal.

8.2.2. In recent months we have seen several news articles published on impacts of overflows. For example, In July The Guardian published an article "Exclusive: water firms discharged raw sewage into England's rivers 200,000 times in 2019"[7], this article among others raised public interest and awareness around the operation of overflows and identified that more can be done to reduce the impact of these assets. A petition to "End sewage pollution" was handed to the Secretary of State for Environment, Food and Rural Affairs with 44,693 signatures calling for improvements to water quality monitoring and tighter legislation to manage sewage pollution. As a result of the increasing pressure to reduce the impacts of storm overflows in the UK, in September 2020 the Storm Overflows Taskforce was created. The Storm Overflows Taskforce includes representatives from; Defra, the Environment Agency, Ofwat, CCW, Water UK and a water company and will be of significant influence when setting the future ambitions for storm overflows.

8.2.3. Shortly afterward, in October The Sewage (Inland Waters) Bill was launched. This bill proposes several improvements relating to storm overflows including that all storm discharges should be monitored, the reliance on storm overflow reduced and biological or nature-based treatments should be adopted where practicable. Whilst it will be some time before we know if this bill will be converted into legislation, it has received widespread support from environmental charities and NGOs, the rivers trust reports: *Ali Morse, Water Policy Manager at The Wildlife Trusts and Chair of environmental*

[7] The Guardian (1st July 2020): https://www.theguardian.com/environment/2020/jul/01/water-firms-raw-sewage-england-rivers

coalition Blueprint for Water, said: "This Bill could be the driving force behind big changes to benefit people and wildlife, encouraging water companies to implement more 'nature-based' solutions to protect our waterways. These include purpose-built ponds to capture rainwater, stopping it from overwhelming sewers and releasing raw sewage into rivers. Regulators and Government must ensure water companies prioritise these measures. Customers want to see this too. People expect rivers to be clean enough to swim in, and healthy enough to support thriving wildlife"[8].

8.2.4. Through the development of our DWMP we have identified environmental needs with the North West and specifically we have identified where we have frequently spilling overflows.

8.2.5. In November we conducted a quantitative survey followed by a two day qualitative online pop up community using our Water Talk customer panel to understand our customers' attitudes and level of engagement towards drainage and wastewater. The results revealed that household customers have shown a strong preference to protect the environment from deterioration and enhance river quality. For our Green Recovery proposal we have developed three discrete programmes of work that will support the development of a long-term plan for storm overflows. By bringing forward this programme of work from AMP8 we hope to accelerate future environmental improvement schemes including spill reduction schemes and boost our opportunities to work in partnership to deliver future environmental and social improvements.

[8] The Rivers Trust (14th October 2020): https://www.theriverstrust.org/2020/10/14/private-members-bill-launched-in-bid-to-tackle-river-pollution/

9. Additional benefit of acceleration

9.1. Introduction

9.1.1. Our Green Recovery proposal aims to bring forward likely programmes of work from AMP8 into AMP7 to promote early development and implementation of environmental and social improvement plans for storm overflows. The schemes identified within this document are statutory requirements and would otherwise be delivered in AMP8.

9.1.2. We recognise that there are shifting attitudes towards overflows and that government's ambition is changing to promote improvements in water quality and spill reduction. This ambition is likely to result in a significant, long-term programme of work to deliver improvements. Particularly in the North West where 54% of sewers are combined and therefore more vulnerable to heavy or prolonged periods of rainfall which will become more prevalent due to climate change. Recent results from DWMP analysis indicate that spill volume will increase by 23% over the next 25 years, we will use this data to inform future improvement plans to ensure that we take into account climate change and increasing rainfall which has the most significant impact on spill volume compared to other changing factors such as population growth and urban creep (paving over driveways, house extensions etc.).

9.1.3. Acceleration of Green Recovery work allows us to start apprenticeship schemes to train up the next generation of modellers to support such an ambitious programme, in addition it will ensure that subject experts are retained within the field. This programme will provide 12 additional jobs to deliver the three outcomes identified within this document, this does not include additional work that is likely to materialise in the future as a result of this project, this additional work will be required to deliver improvements at storm overflows.

9.2. Outcome 1: Install event duration monitors (EDM) on all permitted storm overflows

9.2.1. Understanding more about how our network is operating will enable us to investigate frequently spilling overflows, help identify the root cause of the spills and indicate which solutions may be effective in reducing spill frequency. This will allow us to plan investments for the future which protect our environment, reduce pollution and improve our future service. The earlier event monitoring devices are installed the sooner we can start to capture and report data from these assets and the more data we will have to inform our future drainage and wastewater management plan.

9.3. Outcome 2: Undertake 300 additional storm overflow investigation at frequently spilling overflows

9.3.1. Plans to accelerate our current, funded programme of SOAF investigations provides us the opportunity to deliver additional investigations in AMP7. We will deliver our current regulatory commitment of investigations by 2023 and we have already started to engage with the Environment Agency on this ambition. As a result we are confident that we are able to accommodate additional investigations within AMP7.

9.3.2. Similarly, our proposal to deliver 587 Stage 1 investigations of which 300 will be taken forward to later stages of investigation, we believe that we are providing a steady programme of work in AMP7 and AMP8. This programme is likely to give rise to significant, long-term investment in overflows which will give confidence to ourselves and our contractors to maintain and grow their workforce to meet

the demand of these investigations and future improvement schemes to reduce the impact of storm overflows.

9.3.3. We plan to deliver an additional 300 SOAF investigations in the final two years of AMP7. These investigations would otherwise be undertaken in AMP8. By bringing forward this investigation programme by at least two years will ensure that we are able to complete more investigations in time for consideration within our AMP8 WINEP. By doing this, some improvement schemes may be delivered up to five years sooner than they would have been if we did not accelerate this programme due to the nature of our funding cycles and WINEP development process.

9.3.4. Storm overflow investigations provide an in-depth assessment into how our network operates. Whilst delivering our current AMP7 investigation programme we are identifying some operational issues which we can be address within the AMP and therefore provide environmental benefits early. By delivering more investigations in AMP7 we will increase the likelihood of finding more interventions that can be delivered early to reduce spill frequency.

9.3.5. Accelerating SOAF investigations from AMP8 will allow more time to develop long-term catchment plans. We will have up to 24 months to engage with local stakeholders to share data and identify areas where partnerships may help to deliver a project or provide additional benefit when undertaking a project. We will also look for alternative funding options and alternative delivery routes through this process. It takes a long time to develop plans in partnership due to the priorities and pressures of all partners. By delivering some investigations early we can engage our partners earlier to develop local catchment plans which will target areas to provide the largest environmental and social benefits. Our long term plans will be published within our DWMP and will be aided by the development of our new and existing ICMs.

9.4. Outcome 3: Build new integrated catchment models to inform future improvement schemes

9.4.1. Integrated catchment models can take over two years to build due to time it takes to undergo river sampling, laboratory analysis and building of the model. We propose to build three new ICMs in AMP7, these models will inform the solution development and long-term environment plans including improvement plans for storm overflows. By bringing these schemes into AMP7 we are able to manage our sampling programme and laboratory resources. If we do not build these models in AMP7 then they will not be ready to inform plan development in AMP8 and beyond.

10. Sources of funding

10.1. Introduction

10.1.1. The three outcomes identified as part of our Storm Overflows Green Recovery proposals are all environmental enhancement schemes and therefore should receive enhancement funding.

10.1.1. Funding for our green recovery plan will be accounted for in a midnight adjustment. Customers will therefore be protected in the event of none delivery as only complete schemes/ stages will be eligible for this adjustment.

10.1.2. To demonstrate compliance with our regulatory obligations, we produce evidence to demonstrate completion of a scheme, this will be shared with Environment Agency upon request. The Environment Agency will review and where appropriate, sign-off the output. All statutory schemes will be named in the WINEP with an AMP8 delivery date.

10.2. Third party funding or other support

10.2.1. The delivery of the new EDM installations, additional SOAF investigations and new ICMs can all be linked to environmental enhancement drivers. The requirements themselves are very prescriptive and as such there is no room to consider alternative options or third party funding for the delivery of these schemes. However these projects are the building blocks for a wider programme of work looking to tackle storm overflows. When developing improvement schemes, we will look to invest in a range of options and delivery routes in order to deliver the most environmentally and socially beneficial schemes within a catchment. Our “accelerating partnerships to deliver natural solutions” document identifies a range of opportunities and partnerships such as the use of sustainable drainage options and working with local authorities to improve river water quality. We intend to utilise these opportunities to deliver environmental improvements and reduce spill frequency from overflows, our storm overflows proposal will enable the identification of these opportunities.

Outcome 1: Install event duration monitors (EDM) on all permitted storm overflows.

10.2.2. Installation of event monitoring has previously been funded through enhancement funding. Direct third party funding is not available for the installation of these meters however data from the installation of these monitors will be used to understand how our assets are performing. This data can be used to detect assets that are spilling frequently and require investigation and can be used to identify where we might be having an impact on the local environment and therefore where we may need to undertake additional work in the future.

Outcome 2: Undertake 300 additional storm overflow investigation at frequently spilling overflows

10.2.3. Undertaking SOAF Investigations have previously been funded through enhancement funding. Direct third party funding is not available for the completion of these investigations however where a SOAF investigation indicates that a solution may be cost beneficial, we will look to engage local stakeholder and third parties to identify opportunities within a given catchment. Where a partnership scheme has been identified we will look at alternative funding and delivery options in order to deliver a scheme at the lowest whole life cost. We will look for additional opportunities when working in partnership for example reducing flooding in addition to spill reduction.

Outcome 3: Build new integrated catchment models to inform future improvement schemes

10.2.4. Building new ICMs has previously been funded though enhancement funding. Direct third party funding is not available for building of these models however we recognise that ICMs are a great way of engaging with local stakeholders and Environmental Regulators. These models provide detailed information about a catchment and the elements which contribute to water quality within the area. Where possible we will work with NGOs and the Environment Agency to share information and identify areas for potential partnerships for knowledge sharing, best practice and delivery of storm overflow improvement plans in the future.

10.3. Customer funding and bill impact

10.3.1. Customer funding and bill impact for this Green Recovery proposal is discussed in GR0001 – Supporting a Green Economic Recovery in the North West. The proposed bill impact in 2020/2021 prices is a 6p increment on the average annual household bill.

10.4. Company contribution

10.4.1. United Utilities has one the highest percentage of storm overflows that are monitored (92% of storm overflows monitored) as a result we are able to report more transparently on the operation of our assets. We are committed to improving the future performance of our overflows and this Green Recovery proposal identifies several projects which will inform the development of our future improvement plans for tackling storm overflows.

10.4.2. We have a strong track record for our enhanced modelling capability. With 99% of the North West population covered by a network model we have some of the best coverage in the UK.

10.4.3. Continued improvements in our models and model data is important in ensuring that data remains accurate, reliable and complete. We have been investing in our model maintenance programme by undertaking new flow surveys and updating our models which has resulted in more accurate model data. Improvements made in AMP7 have been funded through our maintenance budget and have supplemented the cost of SOAF investigations where due to changing scope costs have been greater than originally forecast.

10.4.4. Our models are important tools in forecasting future performance and in particular have been a key component in the ongoing development of our DWMP, the outputs from our models have been used to forecast long-term overflow performance to understand the potential impact that climate change, in particular rainfall, has on our overflows. This information will be used to inform solution development. Where we have ICMs these will be used to identify possible catchment interventions including green solutions.

11. Customer protection

11.1.1. Any funding received to deliver a Green Recovery scheme will not be reflected in customer until AMP8.

11.1.2. Delivery of the three outcomes proposed within this document will enhance our understanding of how storm overflows operate within the North West and will provide a foundation in which we can build a sustainable plan to reduce the impact of these overflows.

11.1.3. We have developed a standard funding mechanism for schemes that are completed for Green Recovery, this will be similar to our AMP7 WINEP uncertainty mechanism. We will only seek to recover from customers the cost for EDMs, SOAF investigations and ICMs that are delivered, see Table 4.

11.1.4. The total cost to deliver the three outcomes identified within this document assuming full delivery is £7.876m in FY17/18 prices.

Table 4- The totex unit rate identified for the three storm overflow outcomes identified within this document, costs are in FY20/21 prices. The costs identified within this table reflect the values that will be recovered through the midnight adjustment.

Scheme	Allowed totex unit rate
Event duration monitors	£14,207 per unit, £15,403 including permitting
SOAF investigation – stage 1	£2,100 per Investigation
SOAF investigation – stage 2	£2,675 per Investigation
SOAF investigation – stage 3	£5,225 per Investigation
SOAF investigation – stage 4	£3,775 per Investigation
ICM – Sankey Brook	£516,263
ICM – Wiza Beck	£516,263
ICM – Upper Derwent	£549,746