Dŵr Cymru
Welsh Water

To:	Better River Quality Task Force
From:	Sharon Ellwood (DCWW - Head of wastewater assets)
Subject:	DCWW Storm Overflow Investment Plan
Date:	26.06.2023

1. Introduction

Intermittent discharges, commonly known as combined sewer overflows but now termed storm overflows (SO), are at the height of political and customer interest. Revised government legislation has been published in England complimented by revised environmental regulatory guidance and strategic delivery mechanisms to form improvement plans. Within Wales, the Storm Overflows form a key part of the Better River Quality Taskforce (BRQTF) action plan which set the direction of travel for improvements to SOs operated by water companies operating wholly or mainly in Wales. These action plans are subject to change in response to evidence gathered, definitions of environmental harm refined and improvements delivered.

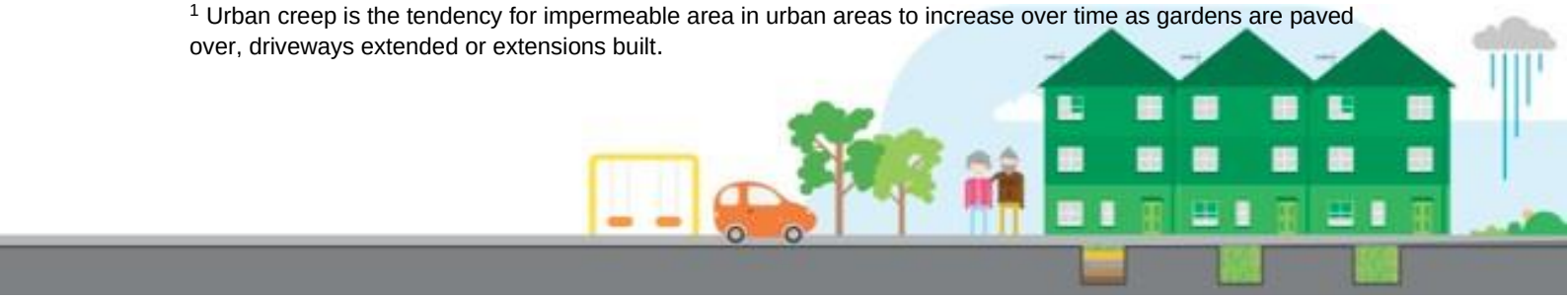
Many of our customers are served by combined sewer networks in which foul sewage and rainfall runoff from roads, roofs and land drainage (in some areas) is drained through a single set of pipes and pumping stations. These drainage systems are integrated into our urban drainage systems to a greater or lesser extent with sewer flows following heavy rainfall routinely increasing 20 fold or more and some catchments taking many days before they finish draining down through drainage and sewerage infrastructure.

Storm overflows are key components of combined sewerage networks serving to reduce the risk of sewage flooding for customers and businesses. Normally SOs release highly diluted sewage at times when the flows in rivers and streams are high and the impact should be low. Transition and coastal waters are not affected in the same way as inland waters as hydraulically they not react to heavy rainfall events in the same way that rivers and streams do. In addition historically many SOs have been improved to limit the frequency of operation where that is needed to protect bathing or shellfish waters.

However, it is becoming clear that the combined effects of climate change, growth and urban creep[1] means that sewerage and drainage networks have to deal with increased rainfall and more rapid run-off which will increase the frequency and volume of discharges from overflows. The effect of this is that the impact of SOs is changing and potentially more damaging over time. They have also become an increasing concern for customers and stakeholders and can have a visibly negative aesthetic impact in areas where customers dispose of wet wipes and other inappropriate materials to sewer.

The last company-wide investment programme period that targeted improved water quality through action / investment at selected storm overflows was carried out between AMP2 and 4. These programmes of work were funded through the NEP to meet urban waste (typically to resolve unsatisfactory intermittent discharges and screening based on aesthetic requirements), bathing and shellfish water quality obligations between 1995 and 2010. Recent investment in Storm Overflows through the NEP have targeted monitoring, further improvements in bathing and shellfish waters in specific areas in response to modelling or sample evidence to show the impact of those discharges on

[1] Urban creep is the tendency for impermeable area in urban areas to increase over time as gardens are paved over, driveways extended or extensions built.



compliance.

2. Current Regulation

Permits for storm overflows are regulated in Wales by NRW and in England by the EA. Permits are issued by both organisations under the Environmental Permitting Regulations and follow detailed technical guidance. The current version of NRW's technical guidance can be found at https://naturalresources.wales/media/2124/how-to-comply-with-your-environmental-permit-additional-guidance-for-water-discharge-and-groundwater-from-point-source.pdf.

Regulation of storm overflows is designed to support compliance with environmental regulations. The most important regulations in this context are the Urban Waste Water Treatment (UWWTR), Bathing Water, Shellfish Water and Water Framework regulations. Other water quality objectives may also need to take the impact of SOs into account, for example measures to reduce total nutrient loads in sensitive waters, but the contribution of SOs is generally minor in those cases. The regulations also recognize the need for SOs to protect customers and communities from sewage flooding that would otherwise occur in the absence of such relief points in combined sewerage systems.

SOs can be classified as satisfactory, substandard or unsatisfactory. Under the current guidance SO's are unsatisfactory if they:

- *cause significant visual or aesthetic impact due to solids or sewage fungus;*
- *cause or makes a significant contribution to a deterioration in river chemical or biological class;*
- *cause or makes a significant contribution to a failure to comply with Bathing Water Quality Standards for identified bathing waters;*
- *operate in dry weather conditions;*
- *operate in breach of permit conditions provided that they are still appropriate;*
- *cause a breach of water quality standards (EQS) and other EC Directives and/or cause unacceptable pollution of groundwater.*

Unsatisfactory SOs are not compliant with the UWWT Regs and historically water companies invested to improve these sites as described in the introduction. Substandard SOs are sites that have not been designed to modern standards and can be operated as now provided they do not become unsatisfactory.

In addition to additional measures to protect or improve particular bathing or shellfish waters, investment to improve the monitoring of SOs has been undertaken. Monitoring has been rolled out over the last 10 years and over 99% of DCWW's SO's now have spill event duration monitoring (EDM) installed. Results have been reported to regulators and published on its website since 2016. EDM monitoring allows DCWW to determine and report to regulators if a SO, previously improved to meet an average spill frequency target, has reached a level such that it is unlikely to occur under normal annual rainfall in that area. In such cases a report on the reasons why the site has breached its trigger and maintenance measures are implemented to restore the required performance.

The primary means of determining a SO's compliance with its permit under the current guidance is to ensure it is passing forward the flow specified in the permit and, where specified, storage is fully utilized before a discharge occurs. In addition, storage should not be used before the minimum pass forward flow is met. The minimum flow to be retained for treatment, varies depending on the type of SO and the environmental quality objective to be achieved in the receiving waters and is normally specified in the permit for the site.

Other important criteria are used to determine these minima, such as the maximum infiltration (I_{MAX}) when calculating the required storm tank storage at a WWTW and the detailed technical guidance specifies how these should be measured – for instance the data used to calculate I_{MAX} should not include dry weather occasions.

Although the conditions under which SOs are classified are based on guidance originally agreed by a quadripartite group of regulators, industry, administrations and Ofwat in 1993 to describe how the UK would comply with the new UWWTD (and the Regulations under which it was implemented in the UK) which governs emissions to the environment. These are the basis under which current guidance has been developed and SOs have been improved.

3. AMP7 Investment Programme

AMP7 Maintenance Investment

In AMP7 maintenance investment funding has been set aside to ensure that SOs meet their permit requirements[2]. Funding for maintaining compliance with permit requirements is taken from DCWW's base maintenance allowance and not from the NEP or enhancement programme.

To date in AMP7 the SOAF investment programme has meant that we have invested / plan to invest £8m in capital maintenance to restore compliant performance at storm overflows found to operating below their permit requirements during investigation. We are investing, or have completed work, on 148 sites to reduce spills. All of these sites are expected to show a reduction in discharge frequency as a result of the maintenance investment.

In addition. maintenance investment to restore flow pass forward performance at our WWTWs is currently forecast to be £32m and should benefit approximately 95 sites which will reduce the likelihood of storm tanks on those sites operating earlier than they should.

As described above SOs improved under previous investment programmes to limit average annual discharge frequency (typically near bathing or shellfish waters) that breach a predetermined spill frequency will have maintenance investment of £16.4m in AMP7 of which £7.8m has already been spent. These are sites with Trigger Event Notice conditions in their permits and a total of 80 sites have "triggered" since 2015 of which 38 have been resolved (with 18 in this investment period).

As a result DCWW's maintenance investment is expected to ensure compliant performance at 261 SOs in AMP7 and should lead to a reduction in overall spill frequency.

AMP7 Quality Investment

DCWW has approximately 2300 storm overflows. Investment to manage or reduce the impact of our overflows in AMP7 comes from a mix of maintenance and quality investment funding to enhance the performance of DCWW's assets beyond that currently required level to meet their permit conditions.

At PR19 DCWW developed an industry leading program under the Storm Overflow Assessment Framework (SOAF) to investigate the impact of over 600 frequently spilling CSOs throughout AMP7 and then prioritise investment on sites where the cost benefit of reducing the environmental impact of

[2] Some SOs may need a mix of quality and maintenance investment to ensure they meet water quality objectives.

the SO met the criteria set out in the framework. This programme is in progress with DCWW assessing the listed CSOs along with around an additional 200 SO impact assessments funded through additional investment made available by board at the end of 2021.

Investment to meet these obligations in AMP7 was identified under the National Environment Programme (NEP) in Wales or Water Industry National Environment Programme (WINEP) in England. The codes for this investment are listed below in table 1:

Driver code	Description
U_INV	UWWTR spill frequency reduction investigation and Cost Benefit appraisal.
U_IMP4	UWWTR spill frequency reduction scheme

Table 1 - PR19 Regulatory Driver Paper for storm overflows

In addition to the sites identified for assessment, this programme is expected to fund actual improvements at around 15 SOs in AMP7. DCWW has also released additional funding to accelerate the AMP8 investment programme, made available as a result of its "not for profit" operating model.

4. The Better River Quality Task Force and Long Term Planning

Welsh Government is leading a multi stakeholder Better River Quality Taskforce (BRQTF). This was established to "to evaluate the current approach to the management and regulation of overflows in Wales, to set out detailed plans to drive rapid change and improvement" and the development of a "Storm Overflow Action Plan". The task force is chaired by NRW and includes representatives from WG, Ofwat, Afonydd Cymru, the Consumer Council for Water, DCWW and Hafren Dyfrdwy. The goals of the task force are

- Supporting the Welsh Government to achieve their environment and climate change ambitions,
- Reducing the adverse impact of any overflow discharges on the environment by targeting investment and taking regulatory action where required to deliver improvements.
- Working within the existing regulatory framework to ensure water and wastewater companies effectively manage and operate their network of sewers. Regulators will use their existing powers to drive the right outcomes and hold companies to account.
- Gathering greater evidence of the impact on our rivers through improved monitoring of both the discharge and the receiving water and through this drive towards truly smart networks making best use of technology and real time control.
- Working with the public to tackle sewer misuse.
- Working with the public and stakeholders to improve the understanding and role of overflows in Wales.

Tackling SOs is seen as only one of several elements that need to be addressed if we are to improve river quality in Wales. The BRQTF also recognise SO's role in protecting customers and businesses from flooding and historic investment by water companies to reduce impact and improve monitoring and understanding.

However the demands on SOs to protect customers from increased and/or more intense rainfall, growth and urban creep means that some of that historic investment has been undermined and their impact on

the environment has increased over time. This situation is expected to deteriorate further without changes to the way sewers and other drainage networks in Wales are managed and improved. DCWW has developed its initial Drainage and Wastewater Management Plan to look at the long-term impacts of these changes on the performance of our network. Cycle 1 has been a learning process for how this is best achieved, and the learning is feeding into the second management planning cycle.

A key concept will be how we provide sufficient "capacity" in DCWW's and other operators drainage networks to meet current and future needs for the areas we serve. This concept is a critical consideration in the DWMP planning process. In the next cycle the DWMP is expected to provide much more detailed information to support investment planning for AMP9 and beyond. In the meantime, DCWW has used the results of its current investment programme to provide an initial forecast of investment needs out to 2050 but in the expectation that this will be refined and informed by the DWMP process.

5. Storm Overflow Impact Assessment

SOs can have an impact on water quality and ecology of a river. Impact is assessed in line with the methodology set out in the SOAF and is be based on the worst scoring of either aesthetic, ecological or UPM water quality modelling assessments set at the FIS and 99%ile standards required to support a salmonoid river irrespective of the actual river class. Consequently, the criteria for ecological impact and subsequent classification of SOs is based on three key elements:

- Water quality impact
- Suitability of aesthetic controls
- Modern design standards (inclusive of flow)

Once assessed, SO impact will be classified into the following categories – see table 2 below. The largest section of the SO improvement programme in AMP8 will be based on these criteria and, subject to approval at Final Determination, investment under these drivers will aim to reduce the impact of any SO improved under this criteria to No/Very Low in one step. An additional environmentally precautionary step we are adopting is that the design of the improvement will be based on upstream water quality meeting good or excellent ecological status under WFD. This means that even if water quality upstream is currently below this standard as a result of other causes, the improved SO will still support good or excellent ecological status in the water body if those other causes are resolved and the SO will not be a "reason for not achieving good" (RNAG).

Impact
Severe +
High/Very High
Moderate
Low
No / Very low

Table 2 – impact categories

Results of the SO impact assessments carried out to May 2023

DCWW has completed ecological impact assessments on 253 frequently spilling SOs. The results for this are shown in the table 3 below.

Impact	Sites	Percentage	Average Spills	Average Duration
Severe +	77	30%	83.1	777.6
High/Very High	42	17%	96.7	865.1
Moderate	51	20%	74.3	577.4
Low	23	9%	94.3	835.5
No / Very low	60	24%	83.6	700.3
Total	253	100%	86.4	751.2

Table 3 – CSO impact by spill frequency and duration

For this sample of sites we have extrapolated these data to all[3] SOs spilling 40 times per year or more on average to provide an initial estimate of their impact. All SOs will have their impact assessed by 2030 with priority given to sites spilling to high priority waters. Of importance to note is the finding that spill frequency and duration are not, on their own, a good indicator of impact for this group of frequently spilling SOs.

The breakdown of DCWW's SO spill frequency is summarised in table 4 below.

Avg Annual Spill Frequency (2021)	% of SOs (2021)	% of SOs (2022)
<= 5	26%	30%
6-10	7%	9%
11-39	28%	25%
>= 40	39%	36%

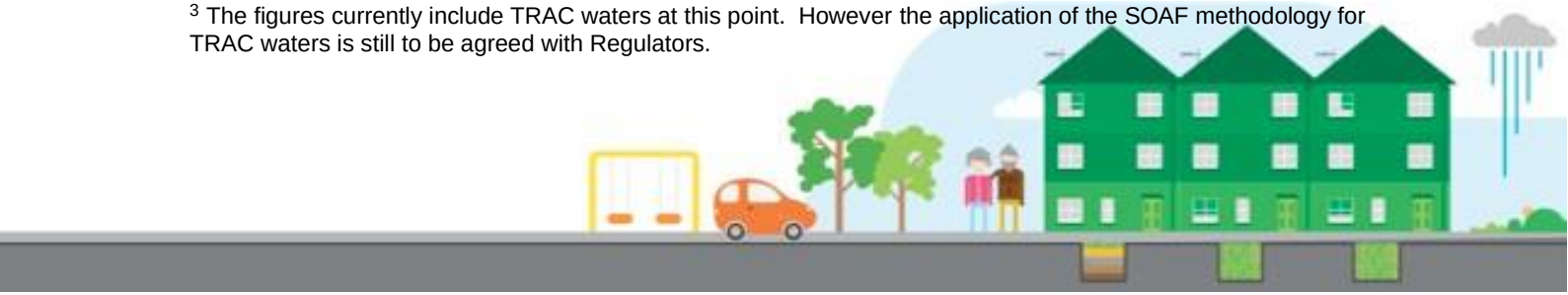
Table 4 – CSO spill frequency

The impact of SOs that have not been assessed yet been estimated for adopting the assumptions set out below for the purposes of estimating our initial programme for SO harm reduction:

- For CSOs operating more than 40 times per year on average and which have not had their impact assessed, the percentage with "no" or "very low" ecological impact will be calculated on a pro rata of the results for storm overflows which have already been assessed to estimate the impact of those that have not yet been assessed.
- For CSOs operating between 10 and 40 times per year and which have not yet been assessed, the percentage with "no" or "very low" ecological impact will be estimated as a slightly higher percentage of such sites. This will be estimated at 40% having "no" or "very low" ecological impact and 60% have "low" or greater impact.
- CSOs operating an average of 10 times per year or less will be assessed as having "no" or "very low" impact until their impact assessment has been completed. These sites will be screened later in AMP8 to check dilution of their flows (along with other parameters such as gradient) when they do spill against UPM criteria. Sites that fail this screening will have a full impact assessment carried out.

Based on these assumptions the impact of all SOs has been estimated and is shown in table 5 below.

[3] The figures currently include TRAC waters at this point. However the application of the SOAF methodology for TRAC waters is still to be agreed with Regulators.



Impact	%	No of Sites[4]
Severe +	18%	422
High/Very High	10%	240
Moderate	12%	282
Low	6%	127
No / Very low	54%	1233
Total		2304

Table 5 – Estimated SO ecological impact in 2023

As a result, we estimate that the long term investment programme will need to improve 1,070 SOs to have no or very low impact. We also plan to invest in the remaining sub-standard SOs that have no or very low impact to bring them up to a satisfactory standard in later AMP periods. We expect to continuously update these estimates as we complete our SO impact assessment programme.

6. AMP8 Investment Plans

AMP8 Maintenance Investment

As in AMP7, there will be maintenance investment to ensure that SOs meet their permit requirements[5]. Maintenance investment to maintain compliance with permit requirements is taken from DCWW's base maintenance allowance and not from the NEP or enhancement programmes.

The larger maintenance programmes are:

- Approximately £31m to restore performance at SO's that have previously been improved to limit the average number of annual discharges (usually near bathing or shellfish waters) but which have breached their agreed trigger points.
- Strategic investigations in the Afan catchment has identified c£41m to be invested on a number of SOs based on a detailed study.
- Approximately £70m in maintenance investment to restore flow pass forward at WWTWs and ensure storm tanks do not operate sooner than they should.
- Separately we will be undertaking maintenance investment on our pumping stations and sewer networks to ensure we deliver our pollution, flooding and compliance performance.

Overview of the AMP quality programme

The AMP8 quality investment programme for storm overflows will be at least 4 times larger than in AMP7 supported by an increased number of regulatory drivers.

Reducing ecological harm, increasing FPF at WwTW and also increasing WWTW storm tank capacity will see performance improved around 102[6], 31 and 45 SOs' respectively with a current estimated cost of £448[7]m (NEPV3). The largest component of this is £340m for reducing the impact of SOs. A further

[4] This is the figure for 2021 and includes network and pumping station SOs, WWTW and last in line storm tanks and EOs known to be acting as SOs. The list includes all SOs regardless of their permit status.
[5] Some SOs are expected to require a mix of quality and maintenance investment to ensure the meet their current permit requirements and are further enhanced to ensure they contribute to local water quality objectives.
[6] 100 of these will be in Wales of which 4 are currently expected to be unpermitted sites. The number of unpermitted sites in the programme will change as we complete their impact assessments in this AMP and they are prioritised alongside other SOs.
[7] This figure may alter slightly as adjustments to account for overheads and other on-costs are refined before submission of the draft business plan.

£41m has been included for assessing SO impact and increased monitoring of flows and discharges.

In addition to the progammes outlined above, investment has been included for preventing deterioration at one bathing water and improve 2 shellfish waters. The bathing water investment is the start of a multi-AMP programme to investigate and retrofit sustainable drainage (RainScape) in the Barry bathing water area – this will improve performance at a number of SOs in the local catchment although it is not possible to confirm the exact number at this point. Investigations into potential measures for improving bathing waters from sufficient or good to excellent have also been included in the plan. Shellfish water investment will be targeted at one sites (Treborth WWTW storm tank) and investigations at Llanant WWTW storm tanks and Queens Dock Swansea. £32m has been included in the plan for bathing and shellfish water investment in addition to the other funding identified above.

Details of each of these investment programmes and supporting maintenance is set out below.

Reducing harm from SOs

Based on the direction from the BRQTF and PR24 Forum Strategic Steer, the approach in Wales differs from England where the focus is on spill frequency. Here the target is to eliminate ecological harm and prevent adverse ecological impact of any SO. As described earlier the definition of adverse ecological impact is that they have no more than “no” or “very low” impact as defined in the 2016 SOAF methodology. A key component of any assessment is whether the discharges are meeting “the Urban Pollution Management Fundamental Intermittent standards” (UPM – FIS) and set out in the following guidance which forms the basis of our investment plan:

- User guide for assessing the impact of combined sewer overflows (Urban Pollution Manual V3, The Foundation for Water Research http://www.fwr.org/UPM3/)
- Water Discharge and Groundwater (from point source) Activity Permits (EPR 7.01, 2014)
- Storm Overflow Assessment Framework (SOAF, 2018)

Consequently, the process to be followed with be one of assessing the impact of the SO, prioritising investment at the site based on a combination of the severity of impact / sensitivity of the receiving water body and finally investing to deliver the improvements required to meet no or very low ecological impact.

Governance of this process will be a key supporting consideration. Thus, for investment in AMP8, the outcome of DCWW SOAF stage 2 programme will be utilized and aligned to ecological harm. As the AMP7 NEP investigation (U_INV2) is approved by NRW throughout the remainder of AMP7, an entry will be added onto the AMP8 NEP tracker aligned to the priority based on ecological harm and waterbody sensitivity in the relevant delivery timeframe.

It is envisaged that prior to draft determination in October 2023, a large number of AMP7 SOAF investigations will be approved for sign off and will follow the above process. This signoff process is key to agreeing which SOs are to be prioritised for investment in AMP8 and this process will need to be facilitated by both organisations to meet the draft business plan submission deadline.

In support of this process Natural Resources Wales (NRW) have issued a draft PR24 driver paper that requires assessment of and investment in storm overflows under a number of investigation, monitoring and improvement drivers as listed below in Table 6.

Driver description	Action
Storm overflow Classification (W_U_O_INV1)	Investigation to classify a storm overflow in accordance with NRW's storm overflow classification guidance where assessment of the asset has not previously been captured by other programmes
CSO improved classification - unsatisfactory (W_U_O_IMP1)	Action to implement improvements to overflows classified as Unsatisfactory
CSO improved classification - Substandard (W_U_O_IMP2)	Action to implement improvements to overflows classified as Substandard
CSO impact reduction (W_U_IMP4)	Outputs included under IMP1 and IMP2 drivers[8]
CSO river impact monitoring trial (W_U_O_MON1)	Enhanced monitoring at priority assets to meet evidence needs identified by the Better River Quality Taskforce evidence action plan.

Table 6 - NEP Storm discharge entries

These drivers should align with the BRQTF action plan and the timescales for delivery of improvements are to be agreed in that forum. They should also align with the PR24 Forum Strategic Steer and the specific steers from Welsh Ministers for investment in Wales. This latter steer recognizes the scale of the challenge and the need to improve the balance between the needs of customers and the environment.

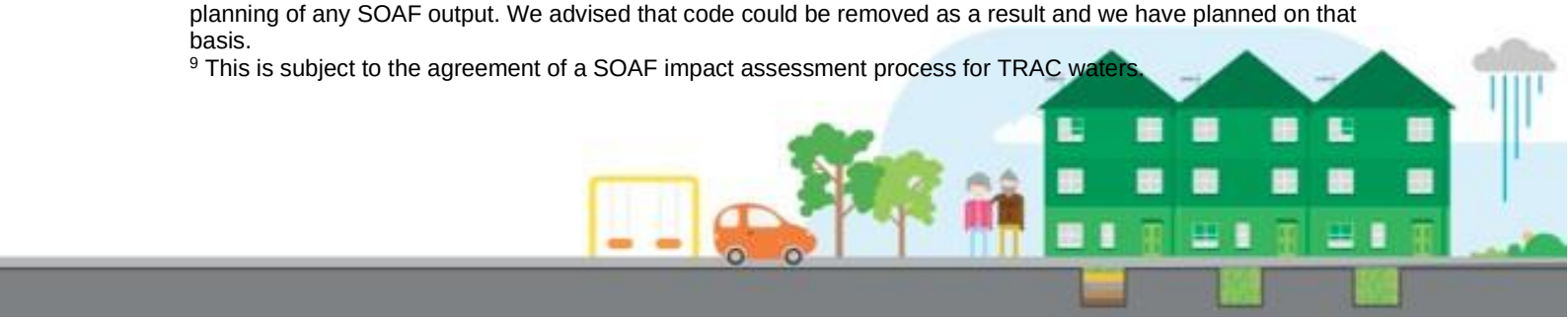
However there is good alignment between the objectives of delivering SOs classified as satisfactory and eliminating ecological harm over time with priority given to CSOs having the greatest impact in the most sensitive receiving waters. This will leave a number of sites that would be considered as substandard but not having ecological impact which will be the subject of investment much later in the long term programme.

Please note that DCWW will exclude assets under current assessment programmes where the improvement outcome is delivered in AMP7, and then classify all remaining riverine and TRAC[9] waterbody assets in AMP8. The methodology for water quality assessment will be as defined by NRW's driver paper and is detailed later, the data will be key to profiling the long-term delivery plan for discharges to 2050. However an illustration of our current estimate of the programme has been included below.

Other investment drivers – increasing WWTW storm tank capacity and flow pass forward

[8] Note the NEP draft driver paper for storm overflows included a W_U_IMP4 driver code to cover "a*ction to implement improvements at sites identified in PR19 under W_U_INV2 and the Storm Overflow Assessment Framework (SOAF) for UWWTR spill frequency reduction that are not progressing in AMP7 and have been agreed with NRW for inclusion in PR24 and AMP8 (2025-2029)".* We responded to the draft driver paper saying that DCWW is now aligning its investment journey to reduction of ecological harm (as per the Better River Quality Task Force action plan) based on the SOAF stage 2 data (environmental impact assessment) available through the AMP 7 SO investigations. Investment will be aligned to harm rather than spill numbers or cost benefit. As NRW have amended the SOAF process to include classification, the IMP1 and IMP2 codes are suitable for future planning of any SOAF output. We advised that code could be removed as a result and we have planned on that basis.

[9] This is subject to the agreement of a SOAF impact assessment process for TRAC waters.



Other investment drivers will also lead to impact reductions at SOs but the improvements delivered at these sites will not necessarily lead to the elimination of impact in a single step – e.g. they may need further investment.

The most significant investment area where this applies is likely to be measures to ensure WWTWs meet minimum treated flow and storm tank capacity requirements, both of which should deliver reduced impact from intermittent discharges at the affected WWTW or last in line overflows. These are shown below in Table 7 and supported by a significant increase in monitoring at WWTWs and spill monitoring on emergency overflows.

Driver description	Action
Increasing FPF Capacity at WwTW (W_U_IMP5)	Increasing Flow Passed Forward (FPF) flow at WwTW's that were identified in PR19 as having low permitted FPF / DWF (Dry Weather Flow) ratios and were subsequently deferred until PR24 with the written agreement of NRW
Increasing Storm Tank Capacity at WwTW (W_U_IMP6)	Increasing storm tank capacity to provide adequate settlement and detention at WwTWs that were identified in PR19 and were subsequently deferred until PR24 with the written agreement of NRW

Table 7 - NEPV3 Storm discharge entries

NEP drivers under full flow to treatment and increased storm storage were part of an adaptive plan set out originally in PR19. DCWW have carried out a rationalization of all FPF, storm storage and monitoring requirements to refine the qualifying schemes for PR24. There is some follow-on investment in FPF monitoring to ensure MCERT compliance of the AMP7 delivered monitoring obligations. These obligations were populated onto the NEPV1 in June 2022 following a workshop with NRW senior advisers for flow.

Other investment drivers – bathing and shellfish waters

In addition, there are measures to protect shellfish and bathing waters (including inland sites[10]). NRW have included drivers for these area as shown in table 8 below:

Driver description	Action
W_BW_IMP1/_INV1, W_BW_IMP2/_INV2	Investigations and schemes to implement the results of investigations into designated bathing waters that are "poor" or at risk of deteriorating to "poor" class.
W_BW_INV3/_IMP3	Investigations and schemes to implement investigations to lead to improving waters to Good or Excellent where there is evidence of customer support
W_BW_INV4/_IMP4	Investigations and schemes to implement investigations at non-designated bathing waters with a view to designate where there is evidence of customer support

[10] Note investment for the designation of inland bathing waters at DCWW's recreation sites are not expected to affect SOs.

W_BW_NDINV1/_NDIMP1	Investigations and schemes to prevent deterioration in class from the 2017 baseline
W_WFD_SHELL_INV1	Using the most recent classification available from FSA and the outcome of the Shellfish Investigation in AMP6&7, undertake investigations to identify assets that require improvement to allow the Shellfish Water to achieve a minimum of Class B.
W_WFD_SHELL_IMP1	Actions to implement improvements identified by W_WFD_SHELL_INV1 to ensure the Shellfish Water achieves a minimum of Class B.
W_WFD_SHELL_INV2	Using the most recent classification available from FSA and the outcome of the Shellfish Investigation in AMP6&7, undertake investigations to identify assets that require improvement that would result in harvesting beds achieving Guideline (defined as an average of 80% of the time or 8 years in 10 or 4 years in 5).
W_WFD_SHELL_IMP2	Actions to implement improvements identified by W_WFD_SHELL_INV2 to ensure in harvesting beds achieving Guideline (defined as an average of 80% of the time or 8 years in 10 or 4 years in 5). Such improvements should be for shellfish waters that are economically significant and sustainable.
W_WFD_SHELL_NDINV1	Using the deterioration assessment completed by NRW investigate those shellfish waters that are at risk from deterioration. This should include characterisation of discharges impacting the shellfish waters, options appraisal, and recommended actions.
W_WFD_SHELL_NDIMP1	Using the deterioration assessment completed by NRW implement actions to improve those shellfish waters that have deteriorated back to 2015 baseline using the outcome of AMP6&7 INV.
W_WFD_SHELL_MON1	Where FSA monitoring of shellfish waters has been suspended or stopped for operational reasons, monitor those shellfish waters to demonstrate any changes in shellfish quality since improvements have been put in place for water company discharges or to determine current status where measures are planned.
W_WFD_SHELL_INV3	Investigations to undertake catchment modelling of the most economically significant shellfish waters to provide information of catchment source apportionment and better understand the potential sources of outlying results of E Coli in shellfish flesh.
W_WFD_SHELL_INV4	Investigate the cost of improving water company discharges to meet the emerging EU requirements on virus controls for

	shellfish that may need to be met in order to facilitate export of shellfish and support the industry.

Table 8 – bathing and shellfish NEP improvement drivers

Wales has overwhelmingly high quality bathing waters which are essential to the Welsh economy and tourism sector as well as social health and wellbeing. The bathing water designations are in a relatively stable position with only one designated bathing water currently failing the regulations (from the 2022 classification and failure has been attributed primarily to a 3rd party owned asset) and none in the recent preceding years.

There has been an increase in designations of coastal waters in the South East and South West areas. DCWW will support these new designations through the development of detailed coastal models which will provide information on the risk of failure.

Jacksons Bay in Barry has seen deterioration of class in recent years and DCWW's NEP includes the first part of an adaptive plan to reverse this, manage impermeable area creep and adapt to the impacts of climate change on bathing water quality locally.

WG have set an ambition to begin a process to designate new inland bathing waters. DCWW are a key partner in the working group and currently supporting a trial in support of inland designations, however development of the detailed requirements for inland bathing waters are not yet sufficiently advanced for inclusion on PR24. Investment in the NEP is targeted at a number of key trial sites and DCWW visitor centers along with an obligation to develop suitable models and guidance for riverine designations in future.

DCWW will also carry out an assessment of bathing beaches with a high potential of achieving above the directive (Good & Excellent) classification for consideration in PR29.

For shellfish waters DCWW delivered substantial investment in AMP 6 under this driver, specifically in the Burry Inlet with post scheme analysis confirming the benefit carried out in AMP7. DCWW has well developed designs to deliver its AMP7 obligations in the Menai straight and a further site will be included in AMP8 at Treborth WWTW storm tanks. There will also be investment aimed at improving shellfish water quality at top end of the Loughor estuary.

7. Long term investment progamme and investment beyond AMP8

To support the BRQTF action plan and the PR24 Forum Strategic Steer, DCWW originally developed a plan to reduce the ecological impact of all its storm overflows to "no" or "very low" by 2050. However, recently a more ambitious plan to deliver this programme by 2040 has been agreed. To do this we will need significant investment in AMP8 compared to AMP7 and an even greater increase in AMP9 and 10.

Further investment to reduce the average spill frequency further between 2040 and 2050 bring SOs that may have no or very low impact but would be considered substandard (and potentially to deal with potential chronic environmental pollutants if supported by evidence) has been planned.

An estimate of the number of CSOs that will need to be improved in each AMP period is shown below

in Table 7 below with an illustration of the impact of accelerating the impact programme completion from 2050 to 2040.

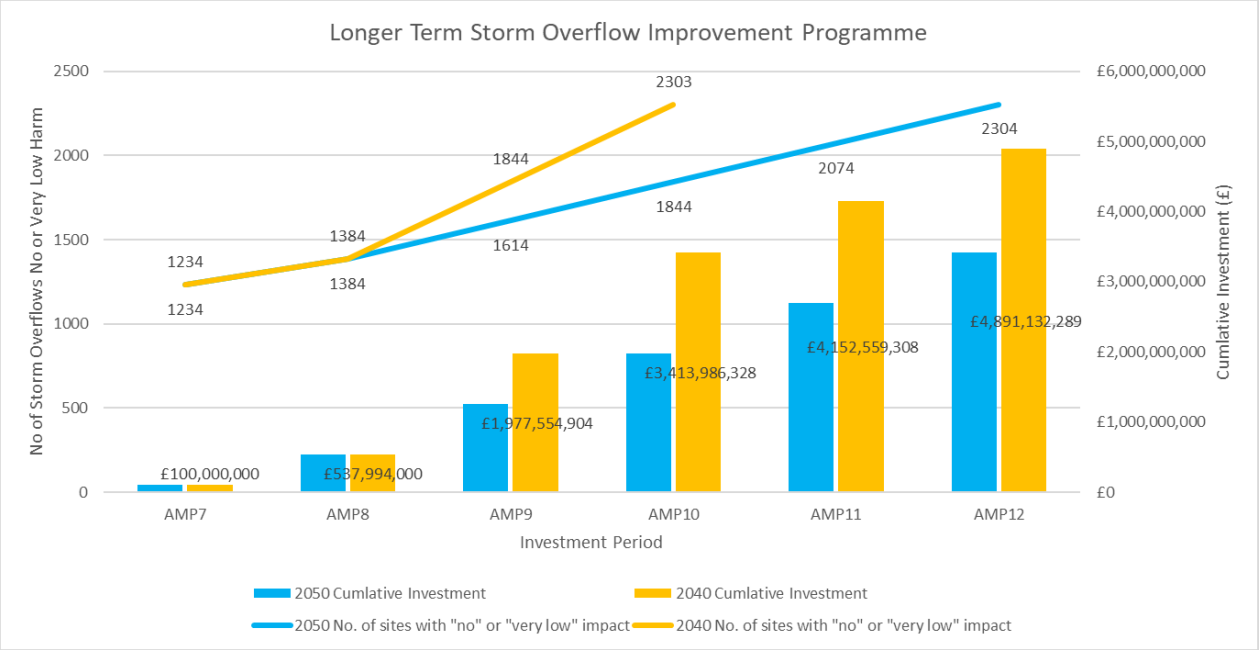


Figure 1 – Investment profile to 2050 showing the number of CSOs to be improved in each AMP period.

The investment profile between 2025 and 2040 shows a significant step change in the number of SOs DCWW expects to improve in AMP8 and then a further acceleration in AMP9 and 10. This investment profile change reflects the fact that there is significant investment planned for AMP8 to meet other environmental needs particularly in relation to reductions in phosphorus discharged to SAC rivers and WFD improvements. A significant level investment will be maintained through AMP11 and 12 but a lower rate to that for AMPs 9 and 10.

The total SO related investment to be included in the AMP8 business plan - £521m in quality and £142m in maintenance programmes - will be as large in real terms as any historic investment plan. However, it will be led by the best evidence we have ever had available and in the context of an NEP with 50% more environmental drivers than ever before.

Apart from the need to make the total AMP8 affordable and financeable, another important consideration is the scale and complexity of delivering such a large programme of work. In order to deliver such a big step change in investment our internal and supply chain resources will need the AMP8 period to build up its capacity. By adopting this approach, we will give the local supply chain time to ramp up and Welsh businesses will be able to benefit for the investment programme over the next 25 years.

A successful programme will also require innovation in delivery and regulation to ensure we can maximise the multi capital value of our investment through low carbon, nature-based solutions delivered through partnership approaches where possible. A rush to investment now would almost certainly lead DCWW to focus on grey infrastructure and high carbon approaches nor meet the direction of Welsh Ministers and the PR24 Forum.

8. Order of Investment

As set out earlier and described in figure 1 above our investment progamme to reduce the harm from SOs to “no” or “very low” impact is expected to continue until 2040. The order in which SOs are improved will be based on their priority with SOs with the greatest impact discharging to the most sensitive areas scheduled for investment as early in the programme as possible. SO’s with lower impact will be improved in successive AMP periods based on their level of impact.

The highest priority waters will be those locations where the water body is designated under the Habitats regulations or similar designation, within 1km of a bathing water[11] or shellfish water or the confirmed or probable reason for a water body not achieving good ecological status (RNAG).

Impact assessments are still underway and will be completed by the end of AMP8 with all high priority waters assessed by the end of 2027 unless they already operate on average 10 times per year or less. Consequently, SO investment is currently planned to be in the following order:

Investment Order	Storm Overflows meeting the criteria
1	Severe impact + RNAG + high priority
2	Severe impact + RNAG
3	Severe impact + high priority
4	Severe Impact
5	High impact + RNAG
6	High Impact + high priority
7	RNAG + high priority
8	High Impact
9	Moderate Impact + RNAG or high priority
10	Moderate Impact
11	Low Impact + RNAG or high priority
12	Low Impact

Table 9 – Investment Priority Order

Some of the groups listed above have very few SOs in the group. For example only 1 site has been identified as falling into the priority and we expect to deliver multiple improvements groups in AMP8.

SOs with completed impact assessments have already been allocated to the estimated AMP period in which they will be delivered and will be listed on NEPV5 that will be supplied separately from this report.

9. Storm overflows without / with incorrect permits

In 2009 DCWW wrote to EA Wales (the predecessor to NRW) confirming that we would work towards prioritized monitoring of storm overflows “through the increased use of telemetry to provide the widest possible coverage of overflows to support ongoing pollution reduction plans”.

This agreement led to DCWW’s initial investment in SO event duration monitoring (EDM) on coastal

[11] Impact assessment methodology for transitional and coastal waters has yet to finalised and this programme is based on the assumption that the process will be agreed at the national intermittents TAF working group in time for the assessments to be completed.

and shellfish sites in AMP5 and its continuation (and recognition in the NEP) through AMP6 leading to over 99.5% of all sites with monitoring and reporting. This widespread programme was enabled through the introduction of affordable battery powered, GSM modem linked level monitoring loggers which which became available for the first time at the time the programme started.

To support this installation DCWW surveyed all SOs to confirm location of the outfall, suitable telemetry installation and related regulatory permit details. This identified a number of SOs with permit anomalies to be resolved. Around 400 permits were found to be either duplicates or referenced SOs that did not exist. A number of SOs were also identified which were either permitted incorrectly as emergency overflows (EO), EOs acting as SOs due to changes to foul only networks making them partially combined or SOs that do not have permits associated with them.

DCWW has installed EDM monitoring on any overflow it believes to be acting in a storm irrespective of its permit status and this data is reported in our annual return.

In discussion with NRW during AMP6 it was agreed that DCWW would give up all duplicate permits or permits that could not be linked to an actual SO. SOs without permits would be permitted "As Is" with supporting information and proposals to improve the site if required to ensure they meet a "satisfactory" classification could be added later if required. A first batch of 72 SOs were submitted to NRW and permits for 70 of these have now been issued.

However, at the start of AMP7 and prior to the current increased scrutiny of SOs, it was agreed that this process should be reviewed in the light of the process agreed for the Storm Overflow Assessment Framework and that the impact of SOs should be assessed before submitting permit applications. EOs to be permitted as SOs were also more complex to deal with than previously thought. DCWW and NRW agreed to follow a more detailed process and this is currently underway with just over 200 sites on the programme for assessment.

DCWW is following the strategic steer from the PR24 Forum and planning its investment programme on the basis of impact (as described earlier) and not permit status. Consequently SO's without / incorrect permits will not be prioritized over sites with correct permits. However, as from a regulatory point of view, these are being treated as "new" discharges their impact assessment is in progress and it is expected to be completed this AMP with most completed this year. We will also ensure that the permit status is highlighted in any detailed programmeI. Note this does not meet the final version of the SO driver paper.

10. Storm overflow harm performance metric for PR24

Bespoke Impact Based Performance Commitment

In line with the direction from the BRQTF, a detailed alternative to Ofwat's CSO average spill frequency performance metric has been proposed for AMP8 which focuses on reducing the ecological harm of storm overflows as quickly as possible. The definition of this metric is the percentage of CSOs (including wastewater network, pumping station, emergency overflows operating as storm overflows and WWTW storm tank overflows) with "no" or "very low" ecological impact which will be calculated as a percentage to two decimal places as follows:

$$= \frac{\text{Total no. of storm overflows with } \textit{no} \text{ or } \textit{very low} \text{ ecological impact}}{\text{Total no. storm overflows}}$$

The detailed definition of this metric is available in DCWW's proposals to Ofwat including assumptions made and would allow us to provide Welsh Government and Regulators with a measure demonstrating progress towards meeting Welsh Government's policy.

Ofwat have replied to DCWW's proposal initially rejecting this proposed metric on a number of grounds including concerns about the overlap with their preferred metric (see below), the assumptions we have made in our initial estimates for the metric and measures to ensure we can monitor if we a maintain no or very low impact on receiving waters.

Common Spill Frequency Metric

Ofwat have recently issued a final consultation on their proposed common performance commitment which will be based on average discharge frequency with corrections to incentivize full EDM monitoring coverage. Although DCWW is planning to invest to eliminate the impact of its storm discharges an estimate of discharge frequency has been made and shown in figure 2 below and shows the original 2050 plan and the revised plan to eliminate harm by 2040 with provisional improvements beyond that point based on bring non-impacting substandard sites to a satisfactory standard and / or eliminating harm from other chronic pollutants supported by future research evidence.

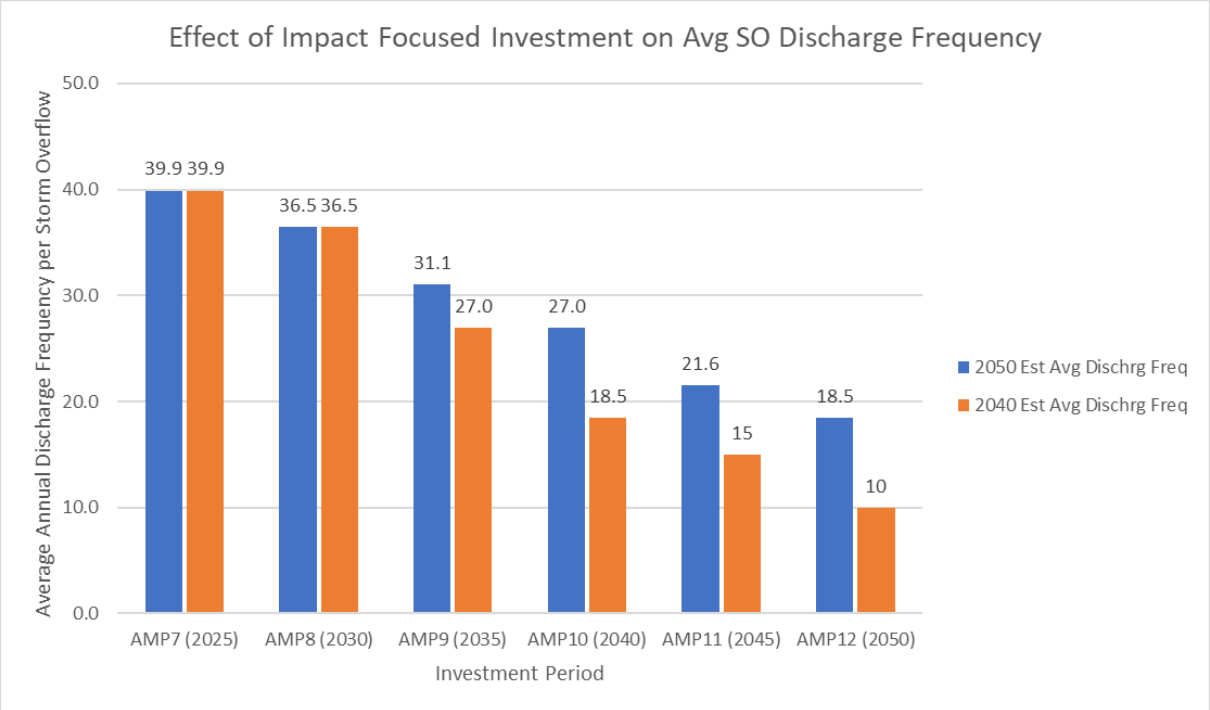


Figure 2 – estimated effect of the investment programme on average discharge frequency

SO Screening

The current guidance sets out the need for screening on the basis of amenity. The proposed revised guidance sets out the need for 6mm screening at all sites with the expectation that, where not present, 6mm screens will be installed when other improvements made unless it is technically infeasible to install a screen at the location.

11. Change Control

DCWW has developed its PR24 investment plan for storm discharges from a sample set of 253 complete SOAF stage 2 investigations. However as the impact assessment programme for high priority waters will only be completed for the end of 2027 and the full programme for all SOs by the end AMP8 it is expected that the numbers of SOs that meet the criteria for each group shown in Table 9 above will increase. This means that the named sites shown in the SO programme may have to be altered to allow sites having a greater impact to be scheduled for earlier investment according to the criteria set out above.

Similarly as actual improvement schemes are designed the opportunity to deliver additional SO projects with increased efficiency may be identified and these may be proposed for earlier investment even though if considered in isolation they would be improved at a later date. This is because by taking the opportunities to reduce the cost of individual invest projects the overall programme can be delivered quicker than would otherwise be the case.

In order to maintain proper transparency and governance of this process an initial programme of SO's to be improved has been included in the NEPV5 and changes to this list will be subject to change protocol and agreement with NRW before they proceed.

The water body sensitivity and outcome of ecological assessment will be the basis for inclusion over spill frequency, thus as the draft NEP SO programme tab has been drafted using the outcome of AMP7 SOAF programme (based on spill number as per PR19 guidance) a proficient change control process must be in place throughout AMP8 to ensure the highest impacting SO are targeted.

12. Final Determination

The investment proposed in this report, whether under maintenance or quality drivers is subject to final determination by Ofwat. If the funding is not agreed and included in customer bills DCWW will not be able deliver the ambitious programme set out above.

13. Conclusions and Recommendations

1. The long term objective of DCWW's investment plan is to eliminate the ecological impact of SOs. This objective is supported by the BRQTF and the strategic steer from the PR24 Forum which provides the underpinning direction to this proposal.

2. Investment on Storm Overflows should be prioritized on the basis of impact and priority of the receiving water body. Permit status should not be used to bring lower impacting ahead of higher impacting sites.

3. The NEPV5 includes all of the Storm Overflows with assessed impacts shown aligned to their assessment category and timeframe. Sites assessed as having no or very low impact will be allocated to AMPs 11 and 12 on the basis that they could be substandard and require improvement to satisfactory classification.

4. Changes in the programme of SOs to be improved should be subject to change as more impact assessments are completed. Governance and transparency of any changes will be agreed through change protocol with NRW.