Developing Spill Frequency Trigger Permits for Water and Sewerage Company Storm Overflows

Consultation

1.0 Introduction to the Consultation

The Environment Agency is seeking your comments on our proposal to develop a process to secure (through permit conditions) the performance of previously improved storm overflows discharging to coastal protected areas.

Storm overflows are located along the sewerage system and provide a mechanism to spill a combination of storm water and sewage waste water caused by exceedance of sewer capacity during heavy rainfall. These overflows can spill to stream, rivers or coastal areas.

The Environment Agency will introduce spill frequency trigger permits to storm overflows discharging to coastal protected areas that have already been improved through previous National Environment Programmes (NEP). The proposed new permit conditions will become operational no later than March 2020 and we will start permitting in Autumn 2016.

Spill frequency trigger permits will identify high risk storm overflows, associated with bathing or shellfish waters that are spilling more often than their design expectations. This will provide a trigger by which investigations (and investment if required) can be supported by regulatory measures.

The Environment Agency consulted on draft proposals to introduce spill frequency trigger permits in 2014. This current consultation has been informed by that previous consultation and builds on it.

The introduction of spill frequency permit conditions forms part of a package of work to be completed during the water industry investment period (2015 to 2020), for sewerage that includes the implementation of Event Duration Monitoring (EDM) of storm overflows, also secured through permits. EDM will allow the number of times and how long a storm overflow operates during a year or bathing season to be measured and quantified.

In this consultation we set out our proposals and ask specific questions to assist in developing the spill frequency trigger permitting approach. This consultation runs for 6 weeks and ends on 3rd May 2016. We are consulting with Water and Sewerage Companies (WaSCs) and other stakeholders within government and non-

governmental organisations. A list of stakeholders consulted is included in Appendix A.

Please respond to the questions raised in this document and any other points you would like to make by 3rd May 2016, to Philip Hulme at the Environment Agency. phil.hulme@environment-agency.gov.uk.

If you have any queries regarding this consultation please contact Keith Davis, Regulatory Development Manager, keith.davis@environment-agency.gov.uk or Philip Hulme, phil.hulme@environment-agency.gov.uk, Senior Advisor, Water Quality Regulatory Water Quality.

Thank you.

2.0 Background

2.1 Introduction

This paper describes the regulatory approach being developed in England to secure and protect from deterioration, the performance of storm overflows discharging to coastal protected areas.

There has been substantial capital investment around the coast to upgrade sewerage systems and reduce storm overflow spills. This has resulted in major improvements to bathing water quality over the last 20 years.

All these storm overflows have permits which protect the environment. We are consulting on our proposals to give additional regulatory control for those overflows which have already been upgraded to protect bathing and shellfish waters.

We expect improvements in storm overflow performance previously achieved through the NEP to be maintained. We expect WaSCs to periodically check on the actual performance of their storm overflows and sewerage systems against design horizon predictions made at the time of the improvement scheme permit application.

Our current regulatory approach which has facilitated previous improvements to be secured through permits on the basis of pass forward flow and retained volume may not always provide the necessary protection against potential deterioration due to such influences as climate change and growth in a catchment.

For high risk discharges associated with bathing and shellfish waters we are now introducing a regulatory spill frequency trigger permitting approach for EDM. Only where there is a significant shortfall between current performance and that expected in the design; investigating and remediating the performance of previously improved storm overflows.

***Q1**. Are we right to prioritise the triggering of action only on those storm overflows that are identified as operating outside their designs by a significant margin?*

We propose that the spill frequency trigger permit conditions described in this paper would not replace conditions currently in use. Permit conditions relating to pass forward flow and storage volume would remain on the permit alongside the new spill frequency trigger conditions.

2.2 Context

The introduction of spill frequency trigger permit conditions forms part of Environment Agency's Water Industry planning guidance ("*Water quality planning: identifying measures for the PR14 National Environment Programme - Operational instruction 403_12 Issued 04/11/2013"*)for the period 2015 to 2020.

This is a commitment, supported and expected by Defra.

The then Environment Minister (Richard Benyon) wrote to WaSC's Chief Executives in July 2013[1], where he requested that the vast majority of overflows in England should be monitored by 2020 and expressed the importance of having a mechanism to address storm overflows that spill too frequently:

"Increased monitoring is important but only one part of managing CSOs. Where frequency of discharge is too high or CSOs are otherwise unsatisfactory measures are needed to address them. I understand that the industry is developing a long term approach, a road map, setting out how it intends to address the challenges presented by CSOs. This may cover a range of issues but key amongst them must be how any high frequency discharges will be appropriately addressed."

The introduction of spill frequency permitting will help deliver this expectation along with further EDM of overflows which will allow the number of times and how long an overflow operates during a year or bathing season to be measured and quantified.

2.3 21st Century Drainage Programme

Realisation of spill frequency trigger permitting in England is a supporting measure to the work of the 21st Century Drainage Programme.

Water UK, on behalf of the WaSCs, set up the 21st Century Drainage Programme in 2015 to meet the challenges; drainage and sewerage systems face in protecting the environment, supporting economic growth, and the pressures of; new development, climate change, as well as an ageing infrastructure.

The programme will lead to improvements in the way we plan and deliver drainage and sewerage services as well as working to ensure we are compliant with regulatory requirements such as the Urban Waste Water Treatment Directive (UWWTD). The Programme Board is supported by all 4 UK Governments and leading regulatory bodies, together with environmental NGOs, and representatives of local authorities.

[1] https://www.gov.uk/government/publications/letter-from-richard-benyon-mp-to-water-and-sewerage-companies

The programme has the following objectives:

1. To identify and prioritise delivery of, evidence-based research and other work to support the development of resilient drainage and sewerage systems. Technical and regulatory matters will form part of the study.
2. To identify and deliver research to enable affordable and practicable control of discharges from drainage and sewerage systems. Explore longer term pressures that our systems face including those from the environment, growth, new development and climate change and be resilient to these pressures.
3. Communicate to customers the importance and benefits of sewerage and drainage.

The programme is being progressed as a collective endeavour involving WaSCs and regulatory body representatives. The focus is on developing initiatives that enable new technical, planning and regulatory options for consideration by Government. The most urgent priorities agreed will be reported by January 2017 to feed into water industry investment planning for the period 2020 to 2025 and support the development of the European water industry thinking on these issues.

There are two workstreams that spill frequency trigger permitting work is very relevant to and aligned with. These are the capacity planning and overflows workstreams.

The capacity planning workstream is looking at the development of indicators that can be used in sewerage planning to flag up potential capacity problems and mechanisms to promote actions, before impacting on environmental outcomes. A key aspect is communicating these measures between organisations (regulators, partners and customers) and securing them within a robust planning framework.

The overflows workstream is even more relevant to spill frequency trigger permitting and is concerned with developing and demonstrating that the UK's approach to storm overflows is robust, when judged against UWWTD requirements. It is developing a decision making framework by which storm overflow spill frequency performance as measured by EDM installations can be assessed and prioritised against risk of UWWTD non compliance. This workstream's terms of reference recognise the spill frequency trigger permitting approach as an important measure for coastal storm overflows, which will sit alongside the developing decision making framework.

3.0 The Proposed Approach

The vast majority of storm overflows in England will be monitored for spill frequency using EDM by 2020 including all those associated with bathing waters and shellfish waters. EDM enables the frequency and duration of operation of an overflow to be quantified. Spill frequency provides a convenient measure to assess current performance against that used to design an improvement scheme.

In addition to EDM for those overflows that have been improved since 1990 and will also be improved over the next 4 years to achieve spill frequency design standards for bathing or shellfish waters it is proposed to introduce further regulatory control to ensure the performance of those overflows is as designed and maintained into the future.

For these overflows we are intending to introduce into permits a spill frequency trigger condition. This condition will include a trigger value number of spills against which the measured spill performance is assessed. The trigger value will be based on the design spill standard used for the overflow (or group of overflows). The assessment period for shellfish waters will be annual and for bathing waters it will be the bathing season period.

If the number of measured spills exceeds the trigger value then the WaSC will be required to undertake an investigation to determine the cause of the high spill frequency. The requirement to undertake the investigation will be a permit requirement. The investigation will be completed within 3 months unless otherwise agreed in writing by the Environment Agency.

Depending on the result of the investigation, the Environment Agency may require remedial measures to be undertaken to ensure the design objectives are met.

Exceeding the trigger does not mean non-compliance with the permit. However, failure to undertake the investigation and necessary remedial works would.

The new permit conditions will become operational no later than March 2020 and we will start permitting in Autumn 2016.

In section 4 we outline the key principles behind the approach including how the trigger value will be set and the options for that trigger level.

4.0 Key Principles

4.1 Scale of Application

Between 1989 and 2020, approximately 1,500 coastal discharges, will have been improved to achieve bathing and shellfish water requirements by WaSCs in England and Wales to meet environmental needs through the NEP. This is approximately 10% of the total number of all storm overflows.

This spill frequency trigger permitting approach will only apply to those storm overflows that either have been or will be improved through the NEP over the period 1989 to 2020 (or are relied upon by those schemes as part of an overall catchment solution) to meet agreed spill frequency design standards in order to achieve the needs of bathing and or shellfish waters.

It will therefore only apply where a storm overflow has previously had a proven link to an environmental failure and has been improved or is part of a combined catchment solution.

***Q2**. Do you agree with our approach to focus on those discharges whose improved performance was relied upon through previous investment to deliver the environmental outcome?*

We believe that all NEP improvement schemes should continue to perform at the level (or better than) that which was secured at the time of scheme delivery.

4.2 Spill Frequency as a Measure of Performance

Spill frequency of overflows is a standard storm overflow performance measure that is recognised throughout the industry. When developing solutions to unsatisfactory coastal storm overflows. Spill frequency has also been the principal design standard. In some cases this has been through complex marine impact modelling to establish an acceptable storm overflow spill regime and in others (the majority of cases) surrogate spill frequency targets were used, such as 3 significant spills on average per bathing season for discharges to bathing waters or 10 significant spills on average per year for discharges to shellfish waters.

We therefore propose to focus the measure on spill frequency performance and implement this by referencing observed EDM spills against the number of spills predicted in the original design. By taking this approach we are considering the environment and are being outcome focused, as environmental need was assessed in the original design process.

***Q3**. Do you agree that this approach does consider protection of the environmental outcome?*

4.3 Focus on Asset Performance

The water industry is familiar with the concept of environmental need driving investigation and asset improvement through the NEP.

For the storm overflows we are considering in this paper, significant investigation and improvement has already (or is currently) taking place to match asset performance with environmental need (the investigation element of the original improvement scheme). The link between those asset's potential to impact on environmental quality was originally established through modelling and/or investigation. Measures were taken to secure improved performance to meet the environmental needs.

We propose to focus the performance measure on asset performance that was designed to secure the environmental need, rather than revisiting *"asset versus environmental need"* relationship. This simplifies the process and makes the requirements clearer for WaSCs and within the remit of their asset performance.

4.4 Preventing Deterioration

Our objective is to secure the performance of storm overflows, so maintaining the improvement realised by previous NEP investment on the environment into the future.

We believe that having a regulatory measure in place through the storm overflow's permit to discharge will provide WaSCs:

- with the evidence to drive proactive measures to prevent deterioration of storm overflows performance.

- with a trigger to drive investigations where storm overflow performance is apparently under delivering the expectations of its design.

- with a regulatory requirement to promote corrective actions if it is found that a storm overflow is not performing as the design expected.

4.5 Designing Improvements

For storm overflows affecting designated bathing waters, the design objective will usually be 3 significant spills per bathing season as an average, whilst for storm overflows affecting designated shellfish waters, the design objective will usually be 10 significant spills per annum as an average. Exceptions to this arise where:

i) There are a number of storm overflows impacting the same bathing water or shellfish water. In this case the spill frequency design objectives for individual overflows may be tighter than the above. This is because in these situations we

normally require the number of spills per bathing or shellfish season from the group of discharges to be no greater than 3 or 10 spills on average *in aggregation*.

ii) Marine impact modelling has secured an alternative solution with bespoke spill frequency design standards agreed with the Environment Agency.

4.6 Setting the Spill Frequency Trigger

Because we are looking to compare the number of spills in any one year against a designed average yearly or average seasonal spill we have two options:

- Collect sufficient years (at least 10 years) of spill data to derive an average number of spills

- Derive an allowable trigger number of spills that we would expect to only be exceeded by an unusually wet year.

Waiting say ten years to derive an average to know if a storm overflow is performing as expected is not a practical option, nor is setting the trigger at the average design figure and assessing against this each year, as it would be expected to fail one year in two and would trigger excessive number of investigations, diverting resources away from other work.

We are interested in determining those storm overflows that are operating well outside the expectations of the original design.

We are therefore considering two options for setting the trigger value:

1. **Maximum + 1 (MAX+1) number of spills**
   One spill greater than the highest number of significant spills predicted (in the improvement scheme design) in a:

   - ***single bathing season (bathing water storm overflows) or***
   - ***year (shellfish water storm overflows)***

   is used as the basis for a trigger "MAX+1".

   For example, if the highest number of significant spills in any one bathing season was 7 from the modelled design rainfall series, then the permit limit (trigger level) would be set at a level of, for example, 1 spill higher than this - namely 8.

   Post-scheme, if the recorded spill frequency in any one bathing season is greater than the trigger level, e.g. greater than 8 in the example given here, then further investigative action would be required.

This approach has the benefit that it is simple and would target investigations for those overflows that are potentially operating significantly outside their design. However this approach has limitations if one year within that (10-25 year) modelled design rainfall series time series was exceptionally wet, thus setting an extreme high trigger value which may not be protective of the average number of spills per season / year, or the environmental use.

2. **<u>90%ile number of spills</u>**

Set the trigger level at the 90%ile number of spills for the full set of design rainfall years. The method of moments (using an agreed discrete distribution) should be used to calculate the 90% from the predicted number of spills for each year/season in the series (in the improvement scheme design) in a:

- ***single bathing season (bathing water storm overflows) or***
- ***year (shellfish water storm overflows)***

is used as the basis for a trigger "90%ile"

This option would reduce the risk of the trigger level being influenced by an exceptionally wet year. However the assessment is more complicated than that for the MAX+1 option. The lower trigger level could also mean that resources are targeted inefficiently as overflows which are not operating significantly outside their design are investigated.

In selecting the appropriate option we need to consider the balance between the appropriate level of scrutiny and the resources required to undertake the assessments and investigations.

It is proposed that following the implementation of the spill frequency permitting approach we will review the trigger value again in 2025 following a period of use.

Further information on the technical methodology for setting the spill frequency triggers and the options is provided in Appendix B.

If modelled data is not available or not permitted to be used then the default spill frequency trigger values in below Table 1 shall apply.

Table 1 – Default Spill Frequency Trigger Options

Spill Frequency Design standard (as an average)	Default Spill Frequency Trigger Options	
	Max+1 Equivalent (99%ile)	90%ile
3 spills per bathing season	8 spills per bathing season	5 spills per bathing season
10 spills per year	18 spills per year	14 spills per year

Where the storm overflow impacts on both shellfish and bathing waters and has been improved (or was part of a catchment scheme) to achieve both drivers then both bathing season and shellfish yearly triggers will apply.

***Q4**. We would welcome your views on the two options: MAX+1 and 90%ile for setting the trigger value and what would be your preferred option?*

4.7 Climate Change

Representative rainfall is key to designing sewerage improvements. Prior to 2010 the Environment Agency required the use of the most recent Time Series Rainfall (TSR) record (typically 10 years) for developing sewerage improvement schemes. This approach was thought to be conservative by the industry and provide an adequate buffer (implicit allowance) for flow increases induced by climate change.

We now better understand climate change effects and expect allowance for climate change to be made within future designs. We have set this out in the Environment Agency's most recent Water Quality Planning Guidance *(Water quality planning: identifying measures for the PR14 National Environment Programme*). There is now more confidence in climate change predictions and WaSCs have established methods for including them in sewerage modelling work. Improvements to storm overflows in 2015 to 2020 period should take account of future predicted changes to rainfall using latest climate change predictions and methodologies.

4.8 Spill Counting

The standard way of counting and reporting modelled spills is using what is called the 12/24 hour block method to determine spill frequencies:

- Spill counting starts when the first discharge occurs.
- Any discharge(s) in the first 12 hour block is counted as 1 spill.

- Any discharge(s) in the next and subsequent 24 hour blocks are each counted as 1 additional spill per block.

- This counting continues until there is a 24 hour block with no discharge.

- For the next discharge after the 24 hour block with no discharge, the 12 hour and 24 hour block spill counting sequence begins again.

This same method is now being used for counting measured spills recorded from EDM installations, as well as for designing modelled improvements; providing opportunity for consistency between counting spills from both design and EDM measurement.

We recognise that prior to the introduction of this standard counting method in 2010 various methods may have been used, including the counting of all spill events.

The 12/24 hour counting method shall be applied for all reporting of EDM measured spills, this is a permit condition of EDM installations.

Designed spill counts for each year of the design rainfall series (where available from the model) if expressed as 12/24 counts shall be used to set the trigger number of spills in the permit.

However if any of the following apply:

- modelled designed spills for each year of the design rainfall series are not available
  or
- design spills for each year are available but not recorded in 12/24 counting format

then the default trigger number of spills as set out in Table 1 in section 4.6 shall apply.

***Q5**. Do you agree that we need consistency in counting spills, and if this is not available for design spill counts then catchment specific spill triggers should not be applied and Table 1 used as the default?*

4.9 Significant Spills

Volume is usually the measure used for design purposes to determine significant spills (significant spills are normally those of 50m^3 or greater, location of discharge and overflows that operate in aggregation are exceptions to this general rule).

The definition of significant spills has been useful for design purposes as it:

- Recognises that model tolerances do exist and thus modelled small volume spills which are unlikely to be real should not drive investment.

- Small volumes of spill (in most cases) are unlikely to have a significant impact on bathing or shellfish water quality.

- Volume was readily measured within the model and those spills of less than the 50m^3 value easily removed.

Through the NEP we are introducing and strengthening our support for event duration monitoring. Although we are not placing a requirement to measure the volume of the spill unless this is feasible and has been agreed locally between the WaSC and the Environment Agency, we will support the option through the NEP to measure volume of the spill, where this is justified such as assessing the likely impact of the discharge on a protected area.

Measurement of volume to inform spill frequency trigger permit assessment would be a justified reason to install volume measurement. Without spill volume measurement it will be difficult for a WaSC to demonstrate a spill is not significant and thus all spills recorded through the EDM installation should be counted as significant spills.

EDM data used to assess compliance with the spill frequency trigger permit shall not have any spills removed, based on the 12/24 hour courting method, unless an agreed spill significance volume criteria has been agreed with the Environment Agency for that specific storm overflow and reliable (and accepted as fit for purpose by the Environment Agency) measurement of the spill volume has been made. In the absence of agreed volume measurement then all spills should treated as significant and be input / extracted from the 12/24 hour counting method to assess against the spill frequency trigger value.

On the occasion where a spill frequency permit trigger level is crossed, then the initial stage of the investigation shall be to consider significance of spill. For example; a case could be made that some of the recorded spills were indeed below the significance criteria, by applying surrogate techniques such as duration of spill and spill pipe hydraulic capacity. The Environment Agency would be pleased to review the WaSCs proposals at a national level to agree standard approaches to retrospectively categorise insignificant spills at the investigation stage.

***Q6**. Do you agree that we need consistency in counting spills, and if volume measurement is not available then the default should be to include all measured spills in the 12/24 counting method to assess spill frequency trigger exceedance?*

4.10 Aggregations

Guidance on aggregations of discharges is set out in Annex 1.5 of the Environment Agency's *;"How to comply with your environmental permit - Additional guidance for: Water Discharge and Groundwater (from point source) Activity Permits (EPR 7.01)".* The need to aggregate together spills from storm overflows impacting on the same receiving water is intended to ensure that no location within the receiving water is impacted by more than the design spills per annum/season (on average), as different storm overflows will operate under differing rainfall conditions.

Where there is evidence to show that a group of storm overflows have had design improvements to meet an aggregated target, (or a storm overflow which might not have had NEP investment was relied upon by those schemes as part of an overall catchment solution) either, through using a surrogate spill frequency (eg. 3 significant spill per bathing season) standard or derived standards after designing through marine impact modelling, then an aggregated standard for that aggregate of storm overflows shall be used as the spill frequency trigger target.

This aggregated target should be:

- the bespoke trigger as derived from the marine impact modelling, or
- the bespoke trigger as determined from the model to achieve a surrogate spill frequency, say 3 spills per bathing season or
- the value from table 1 if the above are not available for significant 12/24 hr counted spills.

The permit through the operating techniques condition will list those storm overflows that operate in the agreed aggregation and require an aggregate spill frequency compliance annual return to the Environment Agency.

Where records are not available as to which storm overflows were part of the aggregation at NEP design, and agreement cannot be reached between the WaSC and the Environment Agency, then the storm overflows shall be dealt with as discrete discharges.

***Q7**. Where aggregation details are not available, then we propose to set trigger limits on discrete discharges. Do you consider this a practicable solution that balances risk to the environment with protection offered by getting spill frequency trigger permits implemented? Can you suggest a better alternative?*

4.11 Incomplete Datasets

Where a complete dataset for the period (year or bathing season) is not available from the EDM data, then the data should be extrapolated linearly to produce a dataset that covers the same length of time as the trigger limit represents.

Where the storm overflow operates in aggregation with other storm overflows, the combined spills should be assessed. However where there is missing data for any period for a specific overflow, this should not be reason to void any spill data from other storm overflows during that period. An aggregate spill frequency should be built up with the data that is available. No extrapolation will be required as long as there is a complete period in the aggregated spills data.

5.0 Implementation

The implementation of spill frequency trigger permitting set out in the paper shall be complete by 31st March 2020.

The next steps for implementing the approach:

- Responses received to consultation by 3rd May 2016
- Environment Agency respond to consultation 1st July 2016
- Agreement reached on permit conditions 1st September 2016
- By 1st October 2016, agree with WaSCs
    - Lists of historic and current storm overflows to be included.
    - A programme of implementing spill frequency permitting through 2016 to no later than March 2020.

As programme progresses we will agree:

- List of those storm overflows that operate in aggregation and named aggregation.
- An agreed spill frequency trigger level for each storm overflow or aggregation of.

Appendix A

List of Stakeholders Consulted

Water Company, Trade Body and Consumer Body	Government including Regulators	Non-Governmental Organisations
• Water UK • Northumbrian Water • United Utilities • Yorkshire Water • Severn Trent Water • Anglian Water • Thames Water • Wessex Water • Southern Water • South West Water • Dwr Cymru Welsh Water • Consumer Council for Water	• Ofwat • Defra • Centre for Environment Fisheries and Aquaculture Science • Natural Resources Wales • Food Standards Agency	• Surfers Against Sewage • Shellfish Association of Great Britain • Seafish • Marine Conservation Society

Appendix B

Technical Methodology for Determining Spill Frequency Trigger

B.1 Method Where Sewerage Modelling Data is Available

The sewerage modelling will give the number of spills **of any size** predicted for each of the 10 to 25 years of historic rainfall series. If 12/24 spill counting has not been applied or if non significant spills have not been removed (normally <50m3), then this method is not appropriate and the default spill trigger values as set out in Table 1 in section B.2 shall apply.

Where storm overflows operate in aggregation then the aggregated spill frequency shall be used as he trigger for the aggregated group. If this is not available then the approach of setting the trigger on a storm overflow by storm overflow basis shall apply.

The objective of this approach is to target only those discharges which fail to meet their design objectives by a significant margin. Two options for setting the trigger level are being considered:

1. Maximum + 1 (MAX+1) number of spills
   It is proposed that one spill greater than the highest number of significant spills predicted in a single bathing season or year is used as the basis for a trigger (MAX+1). For example, if the highest number of significant spills in any one bathing season was 7 from the modelled design rainfall series, then the permit limit (trigger level) would be set at a level of, for example, 1 spill higher than this - namely 8.

2. 90%ile number of spills
   Set the trigger level at the 90%ile number of spills for the full set of design rainfall years. The method of moments (using an agreed discrete distribution) should be used to calculate the 90% from the counted design number of spills for each year/season in the series.

For catchments where coastal impact modelling has been used to demonstrate bespoke spill frequency standards would not compromise achieving the bathing water or shellfish water objective and where sewer modelling records are available then this method still applies. Spill frequency details from the sewer model shall be used to inform setting of spill trigger of the aggregated group (where possible). The spill frequency trigger will be introduced to all those overflows (even those that were/are not NEP listed) in the catchment (where marine impact modelling has determined storm overflow improvements) that have potential to impact on the achievement of the bathing water or shellfish water design objective. This can

include overflows within the catchment that have not had capital spend, although their performance allocated in the catchment design is relied upon to protect the bathing water or shellfish water objective. Determination of an impact should be determined locally (between WaSCs and the Environment Agency) at scheme sign-off stage, considering as a minimum:

- Guidance on aggregations of discharges referenced in section 4.10
- Any WaSC assets contributing 5% of the; Faecal Indicator Organism (FIO) load (total seasonal / annual) during times when predicted impact is above the design standard of the Protected Area will require spill frequency trigger permits.
- Sensitivity analysis to determine storm overflows with an impact using the marine impact and associated sewer models and should be agreed locally with the Environment Agency at an early stage and as part of sign-off of that the catchment scheme that has been designed to meet the environmental objectives.
- All overflows that discharge direct into the coastal protected area, that spill equal to or more often than once per year on average)

If spill information is not available then the default spill trigger values as set out in Table 1 in section B.2 shall apply to individual storm overflows.

B.2 Method Where Sewerage Modelling Data is Not Available

Where the original sewerage modelling data used to design the scheme is not available, or the spill data is not consistent (12/24 hr counting not applied or significant spills not removed) then the following default trigger value options are proposed:

Table 1 – Default Spill Frequency Trigger Options

Spill Frequency Design standard (as an average)	Default Spill Frequency Trigger Options	
	Max+1 Equivalent (99%ile)	90%ile
3 spills per bathing season	8 spills per bathing season	5 spills per bathing season
10 spills per year	18 spills per year	14 spills per year

As the spill numbers are count data and the design standards are an average of 3 or an average of 10 then the spills numbers have been modelled assuming a Poisson distribution. From the distribution the 99%ile has been used provide an equivalent trigger for the MAX+1 options and the 90%ile has been used for the 90%ile trigger option.

Default spill frequency triggers can also be developed for more bespoke spill frequency design standards.

Once we have sufficient EDM data we can test if the Poisson distribution is appropriate. If not we can determine the appropriate limits and adjust the trigger limits as needed.

B.3 Introduction of the Spill Frequency Trigger Permitting Approach

The spill frequency trigger permit conditions would not replace conditions currently in use for example those relating to pass forward flow and storage volume but would be used as additional conditions.

We are seeking to minimise any permitting resource to implement spill frequency trigger permitting.

Where permitting action is being undertaken for other purposes, for example as part of an improvement scheme or through the introduction of EDM permit conditions, we would be looking to agree with each WaSC to introduce spill frequency trigger permit conditions at the same time.

Where the permit is not already programmed for other updates then the permit will need to be varied in a separate process. A detailed profile of permitting requirements will be agreed with each WaSC. Spill frequency trigger permitting actions as described within this consultation paper should be complete by 31st March 2020.

B.4 Exceeding the Spill Trigger level

- Post-scheme, if the recorded spill frequency in any one bathing season is greater than the trigger level, then further action will be required.

- Once the trigger level has been exceeded, then the discharger will be required to undertake an investigation to determine the cause of the high spill frequency. The requirement to undertake the investigation will be a permit requirement. The investigation will be completed within 3 months unless otherwise agreed in writing by the Environment Agency.

- Depending on the result of the investigation, the Environment Agency may require remedial measures to be undertaken to ensure the design objectives are met. The requirement to undertake any remedial work specified by the Environment Agency would be a requirement for that specific discharge, but the extent of remedial work may well extend beyond that of the specific discharge if overflows impact on the environmental use in aggregation.

- Appendix C of this document – “Developing Permit Conditions and Guidance on Spill Performance Investigations” provides the requirements for the investigations and subsequent actions.

Appendix C

Developing Permit Conditions and Guidance on Spill Performance Investigations

C.1 Introduction

Permit conditions will be developed between the Environment Agency and WaSCs, through existing technical liaison arrangements with the WaSCs. These standard permit conditions will define the; trigger, reporting and the actions to be taken if the recorded spill frequency exceeds the trigger value during any one recording period.

This appendix will be incorporated into Environment Agency guidance and be included into and form part of the Water Sector Guidance. *;"How to comply with your environmental permit - Additional guidance for: Water Discharge and Groundwater (from point source) Activity Permits (EPR 7.01)".*

The flow diagram (Figure 1) is an outline process that we seek views on. The process will be developed further through liaison with the WaSCs.

C.2 Circumstances under which an investigation might not be required

An investigation might not be required (subject to Environment Agency approval) under the following circumstances:

- An investigation has already been undertaken (in a previous year).
- The discharge has been identified as unsatisfactory and is included in the current WaSC investment programme for improvement.

C.3 Details of the Investigation

The objective of the investigation is to ascertain, as efficiently as possible, the principal cause(s) of the high spill frequency (or spill duration) recorded during the previous reporting period.

In order to minimise the effort and cost, the investigation can be undertaken in pre-defined stages, starting with those potential causes which are easily investigated, and moving through the various potential causes in order of difficulty until the prime causes(s) has been found.

At any stage, the WaSC can provide a report to the Environment Agency for approval, to propose the investigation be considered complete. Therefore, the investigation timetable may be phased, such that quick and simple investigations can be undertaken first.

The investigation report should provide a clear recommendation of subsequent actions required to secure future achievement of spill frequency triggers.

Below are listed the types of investigation that the WaSC should consider. The list is not considered to be exhaustive, and the WaSC should consider site specific requirements.

Step 1. Significant Spills Check. Check that all spills reported as occurring in the bathing season/shellfish season were actually significant spills (where information and agreed definition of "`significant" exists).

Step 2. Operational/Maintenance Problems Check. Check for blockages, pump failures, deterioration in pump capacity (drop tests), failures of RTC equipment, automatic inhibits, manual interventions. Where relevant (e.g. for discharges from STW storm tanks), check Flow to Full Treatment and/or storm tank emptying control and return rate.

Step 3. Rainfall Check. Check appropriate rainfall data over the reporting period to demonstrate whether or not rainfall was excessive compared to design rainfall and was a significant factor in the high spill frequency.

Step 4. Scheme Design Check. Check rainfall used for original scheme design, check historical sewer model verification report, check trade inputs, population figures, new connections, check known problems with sewerage model assumptions (e.g. storm tank emptying in a less efficient manner than modelled), check as built details compared to design upon which sewerage modelling based.

Step 5. Sewer Network Condition Check. Review / undertake CCTV survey to check, for example, for defects, siltation, infiltration. Check modelled sediment levels in sewers and storm tanks reflects reality. Check modelled infiltration reflects reality.

Step 6. Undertake sewer flow survey and model re-verification. The objective of this is to demonstrate whether or not the sewerage model used in the design of the scheme is sufficiently accurate.

The objective of the investigations is to ascertain with some degree of confidence the cause(s) of the high recorded spill frequency and provide an evidenced recommendation for next steps and time line. If the cause(s) is/are not identified by the agreed investigation programme, then further investigation may be required.

C.4 Subsequent Actions

Once the cause(s) of the high spill frequency is(are) established, the Environment Agency will review the WaSCs recommendations and determine whether any remedial action is required, or whether improvements need to be put forward for investment in the future. The WaSC would be required to undertake any reasonable remedial action to a timetable determined by the Environment Agency.

If the cause(s) is/are not identified by the agreed investigation programme, the Environment Agency may require remedial work to reduce the spill frequency without further investigation.

The Environment Agency will keep Ofwat informed of the following:

- Schemes which have significantly under-performed in comparison with their design standard as a result of problems over which the WaSC has some control.

- Any remedial work or further investment which is required, either as soon as reasonably practicable, or as part of a periodic review.

Figure 1: Flow diagram (outline) explaining action taken if spill frequency trigger exceeded

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Flow diagram explaining action taken if spill frequency trigger exceeded