

# VALUING THE BENEFITS OF STORM DISCHARGE IMPROVEMENTS FOR USE IN COST-BENEFIT ANALYSIS

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## Introduction

The vision of the 21st Century Drainage Programme is to enable the UK water industry, in partnership with the UK's governments and regulators, to make plans now that will ensure the sustainability of our drainage infrastructure in the future.

The Programme recognises that storm overflows are an important part of our drainage system, providing protection to properties from flooding by alleviating surcharging of combined sewer systems that occurs in wet weather. However, they have the potential to impact on the receiving waters they discharge to, and can be sources of pollution if they are not designed and managed effectively.

To help manage the environmental, reputational and other risks from storm discharges, the Environment Agency and the water industry have collaborated to produce the Storm Overflow Assessment Framework (SOAF). This is intended to address overflows that are considered to operate at too high a frequency and cause a detrimental impact to the receiving water.

Stage 3 of the SOAF requires an economic assessment of the benefits of addressing high spilling overflows that cause an environmental impact, or any overflow in a drainage catchment greater than the Urban Wastewater Treatment Directive (UWWTD) threshold of 2,000 pe (population equivalent).

## Project Objectives

The objectives of the project were to:

- i. Identify the social, economic and environmental benefits of improving storm overflows;
- ii. Review international practices for valuing benefits associated with storm discharge improvements within a cost-benefit analysis (CBA) framework;
- iii. Develop a methodology to enable the marginal benefits of improvements to be valued; and
- iv. Provide a CBA framework so future investment decisions can be made.

## Development Approach

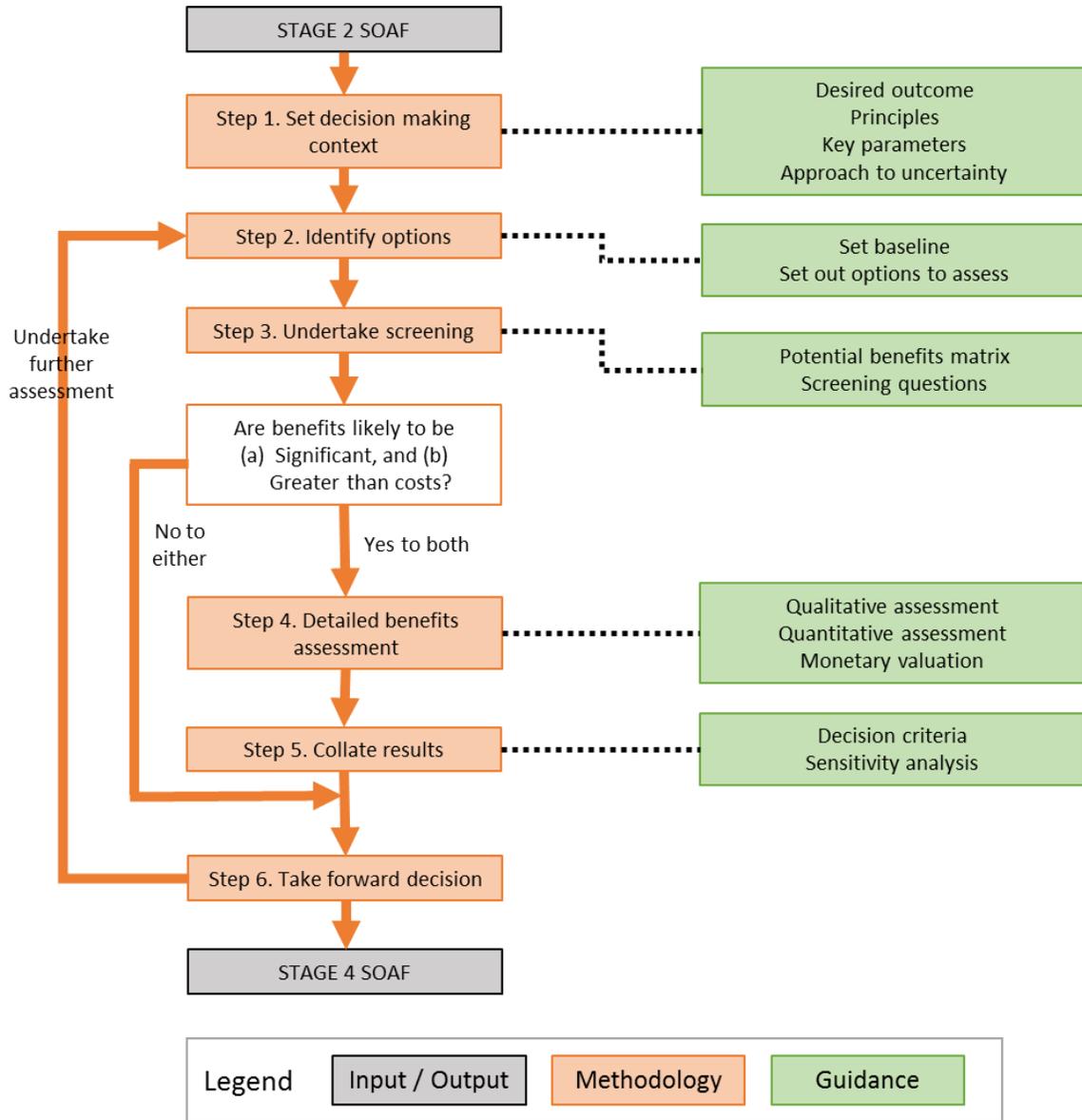
The key elements of the approach adopted in developing this project are as follows.

- i. Development of key principles related to benefits assessment in the context of storm overflows.
- ii. Identification of the range of direct and indirect benefits that may arise as a result of improvements to storm overflows, within a coherent framework.
- iii. Review of the relevant literature in relation to the benefits of storm overflow improvements.
- iv. Development of a framework that facilitates the robust, consistent and transparent assessment of the benefits associated with storm overflow improvements.
- v. Application of the framework to a number of case study sites, to test and illustrate the framework.
- vi. Reporting and dissemination.

## Framework

The framework developed for assessing the benefits of storm discharge improvements is shown in Figure 1 and is designed to support an approach based on CBA. The aim of the framework is to ensure consistency in and robustness of assessments whilst allowing flexibility and ensuring the level of effort is proportionate to the decision to be made.

**Figure 1 Overall framework**



The key 'input' to the framework is the output from Stage 2 of the SOAF. This confirms that there is clear driver/justification for intervention, i.e. the overflow has been identified as causing an environmental impact, or that it is above the 2,000 pe threshold.

A number of quantified or semi-quantified outputs from Stage 2 are expected, including:

- Number of spills;
- Details of aesthetic impact including amenity (e.g. litter) and public complaints (score and classification from no impact to severe); and *either*
- Details of invertebrate (biological) impact (score and classification from no impact to severe); *or*
- Water quality impact (based on dilution or modelled impact).

Stage 2 should also provide information about the watercourse itself and the surrounding environment close to the overflow. This information feeds directly into Stage 3 - the benefits assessment framework, each step of which is summarized below:

- Step 1. Set decision-making context

The purpose of this step is to ensure the decision to be made is clear, agreed and recorded. It should articulate the desired outcome of the intervention, and specify any constraints and key parameters (e.g. timeframe of the assessment).

- Step 2. Identify options

The purpose of this step is to ensure that the options to be assessed (including the baseline) are clear, agreed and recorded.

- Step 3. Undertake screening

The purpose of this step is (a) to ensure the assessment is focused on those options most likely to be cost-beneficial, and (b) to ensure assessed options focus on benefits of greatest significance. The screening process comprises a series of questions. These provide a means of determining whether or not a detailed assessment is needed and appropriate.

- What is the maximum length of improved watercourse?
- What is the maximum value of direct benefits per year?
- What is the maximum value of direct benefits over the assessment period?
- Are benefits significant?
- Are other benefits important?
- What is the approximate cost of each option?
- Are benefits potentially greater than costs?

Based on responses to these questions, the assessment should record whether benefits are likely to be (a) significant, and (b) greater than costs.

- Step 4. Detailed benefit assessment

The purpose of this step is to develop a detailed, robust and auditable assessment of the direct and indirect benefits of those options which have been carried forward from the screening

process. It involves firstly identifying the benefits to assess. The Practitioners' Guide facilitates a more detailed investigation and assessment of the direct and indirect benefits in each relevant benefit category, with a step-by-step summary of how to undertake an evaluation.

- Step 5. Collate results

The purpose of this step is to bring together and present the results of each option. There are a number of key steps to consider when collating the results of the assessment. These are:

- Aggregate benefits
- Incorporate costs of options
- Establish decision criteria
- Consider non-monetary information
- Uncertainty and sensitivity analysis

- Step 6. Take forward decision

The purpose of this step is to (a) refine and improve options to enhance their cost-benefit justification, and (b) to ensure the most economically efficient options are taken forward. The optimal approach (the best or most efficient option) is that for which the difference between benefits and costs is greatest.

The approach adopted in the framework is sufficiently flexible to be applicable to both an individual overflow and a group of overflows (as part of a catchment-wide programme). It is consistent with government guidance (HM Treasury, 2011), principles set out by the Environment Agency (EA, 2016), water industry approaches (UKWIR, 2010) and natural capital concepts (Natural Capital Coalition, undated).

The outputs of the project include a main report and a Practitioners' Guide, which is designed to support application of the framework that has been developed. The Guide includes a methodology and step-by-step framework (with a recommended approach in each step) that enables the direct and indirect benefits of improvements to storm overflows to be assessed and valued in a robust, consistent and transparent way. The Report and Guide have been written for asset managers, investment planners and others involved in identifying and assessing improvements to storm discharges.

## **Conclusions**

The key conclusions from this project are as follows.

- i. The assessment process and framework is only applicable to a subset of storm overflows. It only applies to those overflows that, based on application of stages 1 and 2 of the SOAF, cause an environmental impact, or to any overflow greater than the Urban Wastewater Treatment Directive (UWWTD) threshold of 2,000 pe.
- ii. The framework supporting the assessment process is based on a number of key principles and a clear methodology that enable the whole range of direct and indirect benefits of storm overflow improvements to be valued in a robust, consistent and transparent way.

- iii. For the subset of cases to which the assessment process and framework is applicable, a simple and straightforward screening stage enables users to quickly develop a view on whether benefits are likely to be (a) significant, and (b) greater than costs.
- iv. For those cases that get through the screening stage, the framework enables the benefits of storm overflow improvements to be explored and assessed in detail. This level of detail is likely to be necessary to support a case for investment that is robust and transparent.
- v. Application of the framework to a number of case studies suggests that the benefits of improvements can be significant, especially for options that involve upstream or distributed-type measures like SuDS. From the case studies assessed, options of this type are also most likely to be cost-beneficial.
- vi. Familiarity with the Practitioners' Guide and benefits appraisal process is necessary to generate robust and transparent evaluations. Experience from the case studies suggests that users gain greater confidence in applying the guidance as more assessments are completed.

## **Recommendations**

The main recommendations that arise from this project are as follows.

- i. In applying the framework, users should take the time necessary to familiarise themselves with the scheme to be assessed and with the assessment process, if the economic case to be built is to be robust.
- ii. To support this, the industry should consider a training programme to ensure the assessment process is understood, applied appropriately and used to generate robust results.
- iii. To create significant benefits, distributed solutions, upstream and downstream of overflows, are likely to be necessary. It is important to consider that these may need to be delivered over several investment planning periods, as the opportunities present themselves and work is undertaken in conjunction with other stakeholders.
- iv. The framework should be reviewed within a few years, so lessons can be learnt from its application. The assessment process embedded in the framework may also need to evolve over time, to reflect better information and evidence (e.g. around indirect benefits like health and around less tangible benefits like skills).
- v. The industry should consider a benefits evaluation programme to improve the number and quality of values available for monetisation as a direct result of 'drainage' interventions.

## **Benefits of the project**

The key benefits of the project are a consistent and agreed approach to identifying what level of investment is appropriate for storm overflow improvements, the types of benefits that materialise based on types of interventions and local context and a framework to help prioritise where and when this investment should best occur.

This will ultimately lead to more efficient use of resources and better outcomes for the water industry, the environment and society as a whole.

### **Acknowledgements**

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