

Drainage and Wastewater Management Plans (DWMPs)

Summary of the methodology for the Baseline Risk and Vulnerability Assessment (BRAVA) on:

**Good Ecological Status /
Good Ecological Potential**

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1. Introduction

1.1. Purpose

The purpose of this document is to provide a summary of the method for undertaking the Baseline Risk and Vulnerability Assessment (BRAVA) for the planning objective to **secure Good Ecological Status or Good Ecological Potential**.

The BRAVA is an important step in the development of Drainage and Wastewater Management Plans (DWMPs). It is an assessment of current and future risks for each of the planning objectives and is undertaken for the sewer catchments that were flagged during the Risk Based Catchment Screening (RBCS).

All Water and Sewerage Companies (WaSCs) were required to complete a BRAVA and report to Water UK on the following six common national planning objectives:

1. Risk of sewer flooding in a 1 in 50 year storm
2. Storm overflow performance
3. Risk of WTW compliance failure
4. Internal sewer flooding risk
5. Pollution risk
6. Sewer collapse risk

We developed methodologies for conducting these six BRAVAs in accordance with the Water UK guidance and completed the BRAVAs in December 2020. The methodologies and outputs are published on our website at: <https://www.southernwater.co.uk/dwmp/baseline-risk-and-vulnerability-assessment>

We identified that two additional 'bespoke' objectives would complement the six common national objectives and have included these in our DWMPs:

7. Annualised Flood Risk - which is the flood risk arising from sewers as a result of different severities of rainfall
8. Wastewater Treatment Works (WTW) Dry Weather Flow (DWF) Compliance – to assess our compliance with the Environment Agency (EA) permit relating to the DWF arriving at a wastewater treatment works.

We are working collaboratively with partner organisations in the development of our DWMP. Through this collaboration we identified six additional planning objectives that will help us to achieve the wider environmental outcomes that our customers expect and we want to achieve.

They are:

1. Secure nutrient neutrality
2. Achieve Good Ecological Status / Potential
3. Reduce groundwater pollution
4. Improve bathing water quality
5. Protect shellfish water quality
6. Improve surface water management

Further information on planning objectives for DWMPs can be found on our website: <https://www.southernwater.co.uk/dwmp/planning-objectives>.

1.2. Objective

The inclusion of a planning objective on securing Good Ecological Status (GES) or Good Ecological Potential (GEP) in our DWMPs is a significant step forward in safeguarding our water environment, and the habitats and species that depend on it, for future generations. Securing GES / GEP ultimately enables the protection of:

- the quality and ecological health of surface waterbodies such as streams, rivers, lakes and estuaries; and
- the quality of our environment to support recreation, tourism and water dependent economic activities.

Securing GES / GEP means we need to ensure any risks to the water quality in surface waterbodies arising from our drainage and wastewater systems is minimised. We recognise that we may not be able to apply risk management measures everywhere but this BRAVA is the first step in identifying where future investment may be needed to support the achievement of GES / GEP.

It is an opportunity for a major step forward in helping deliver the objectives and environmental outcomes of the Water Framework Directive (WFD), particularly with the delivery of catchment schemes. This risk assessment may provide useful information to support the development of the Environment Agency (EA) Water Industry National Environment Programme (WINEP), which is the mechanism through which environmental improvements by water companies are identified and funded.

The BRAVA assessment for GES / GEP will identify the potential sources of risks from our wastewater systems, and assess the likelihood and consequences of any risks, so actions can be identified in the DWMP investment plan to reduce and manage those risks.

The BRAVA will help to highlight where our wastewater systems could potentially contribute to:

- Increasing nitrate and phosphate loads in surface waterbodies including streams, rivers, lakes, estuaries and coastal waters
- An increase in the incidents of algal growth through eutrophication, and
- A reduction in the quality of the water in waterbodies.

Our risk assessment will cover all waterbodies identified by the EA under the WFD, but will focus on those where the reasons for not achieving GES / GEP are thought to be from wastewater operations.

By including this objective in our DWMP, we will identify where our wastewater operations may be one of the reasons for the waterbody not achieving GES / GEP, and assess solutions that would mitigate the risk.

1.3. Definitions

The WFD is the legislative basis for GES / GEP. The environmental objectives of the WFD are set out in Article 4 and relate to ensuring the continued protection of the condition of all water bodies, and the development of plans to deliver measures to improve failing water bodies to a good condition - or better. The EA is the competent authority under the Directive in England.

The WFD requires that member states “implement the necessary measures to prevent deterioration of the status of all water bodies...” (Article 4.1). All practicable action must be taken to prevent the deterioration in the status of all water bodies in England and Wales.

The permitting of a discharge into a water body may cause some localised deterioration. However, the deterioration from one status class to a lower one is not permitted.

GES is the target condition for all waterbodies. The ecological status of a stream, river, lake, estuary, lagoon or coastal water is an index of the quality of the water itself and the variety and quantity of plant and animal species it supports. It measures this against the status it should have if it were in a completely natural state and unaffected by human activity. There are five status classifications: High, Good, Moderate, Poor and Bad.

GEP applies to all artificial or heavily modified waterbodies (HMWBs). Most have been modified for flood protection, navigation, recreation or water storage. It is accepted that, through the physical modifications made, GES can never be achieved for the HMWBs so the target is to achieve GEP - the best ecological condition possible under these alternative uses and conditions.

Catchments are defined as an area of land from which all surface run-off flows through a series of streams, rivers and, possibly, lakes to a particular point in the watercourse such as a river confluence or an estuary.

1.4. Scope

There are many potential sources of risk that affect the status of waterbodies including from drainage and wastewater systems and other sources such as road and agricultural run-off. For this risk assessment we will focus on sources from the wastewater systems that we own and operate.

The scope for this first BRAVA on securing GES / GEP will focus on three key issues. These are:

- a) Assessing EA data on the reasons for waterbodies not achieving ‘good status’ that is attributed to our wastewater systems
- b) Identifying hydraulic links between our wastewater discharge points and waterbodies not achieving ‘good status’
- c) Assessing the level of risk as being not significant, moderately significant or highly significant based on the EA assessment ‘high’, ‘good’, ‘moderate’, ‘poor’ or ‘bad’.

The BRAVA will identify areas where our wastewater system may potentially negatively impact the water quality status of waterbodies in our region at the current time. We will then be able to investigate these further as part of the problem characterisation stage of the DWMP before identifying where future investment may be needed to improve our systems. The assessment in

this cycle mainly focuses on the current or baseline assessment and, as such, we have not assessed the impact of population growth and climate change.

1.5. Reporting Requirements

We are not required to report the BRAVA outcomes for our bespoke and additional planning objectives to Water UK. However, we will publish the results on our website for consideration by our customers and partner organisations.

2. Data Sources

The following provides a short description of the data that has been used and where it has been obtained from.

2.1. Water Framework Directive

River Waterbody Catchments (Cycle 2)

The WFD River Waterbody Catchments were defined for the implementation of the Water Framework Directive and are available as a spatial dataset. The most recent dataset is in its second cycle (Cycle 2) and is available from the EA's [Catchment Data Explorer website](#).

Each river waterbody catchment is linked to a unique river which has been given an identification number according to the WFD. This helps us to identify the link between the location of our discharges and the waterbodies defined under the WFD.

Classification Status (Cycle 2)

The WFD classification status dataset is also in its second cycle (Cycle 2) and is also available from the EA's Catchment Data Explorer website. It contains the classification status for waterbodies reported on between 2013 up to 2019. The Ecological Status / Potential is placed into five different score bands by the EA: High / Good / Moderate / Poor / Bad; with the best status for a waterbody as 'High' and the worst as 'Bad'.

Reasons for Not Achieving Good

This dataset is also in its second cycle (Cycle 2) and available from the EA's Catchment Data Explorer website. It contains the reasons for not achieving good status (RNAGS). It has been produced to support river basin improvements and it sets out the elements within the water body that has led to it having a classification status of less than 'Good' such as high ammonia levels or low dissolved oxygen that are not within the criteria to be classified as Good. Each classification element is given a score of either Good / Moderate / Poor / Bad in the same way the scores are given to waterbodies for GES / GEP. The dataset also includes the sectors it attributes as having responsibility for the scores, such as 'Wastewater Treatment' under the business sector. This dataset also provides the level of certainty for the contributing sector, by stating Confirmed / Suspected / Probable.

2.2. Wastewater Treatment Works and Sewer Overflow Locations

Our own GIS asset database details the geographical location of each of our Wastewater Treatment Works (WTW) outfalls and intermittent sewer overflows, and is the starting point for us to investigate where we may be impacting water quality in the surface waterbodies in our region.

2.3. Wastewater Treatment Works Tertiary Plant Capacity

We have installed tertiary treatment plants in a number of our WTW to remove inorganic compounds and substances that remain in the effluent after primary and secondary treatment, including phosphate and nitrate, to achieve a stringent water quality standard. The final effluent from a WTW with a tertiary plant is likely to have less impact to the environment when compared with WTW without a tertiary plant. We obtained tertiary plant data from AM410 – a database where we capture information about our works current and future capacity.

2.4. Water Industry National Environment Programme

The Water Industry National Environment Programme (WINEP) represents a set of actions that the EA have requested all 20 water (sewerage) companies operating in England to complete in order to contribute towards meeting their environmental obligations. In Asset Management Plan 6 (AMP6), 2015 – 2020, we delivered a number of schemes that reduced our impact on the environment. This data is used to identify issues which may have already been resolved.

In AMP7, 2020 – 2025, we are embarking on a number of WINEP schemes which will further reduce impacts from our wastewater systems to the environment. The information on AMP7 schemes will be used in the next stage of DWMP, the problem characterisation.

3. Method of Assessment

The following methodology has been developed and will be used for the BRAVA.

3.1. Process – Baseline 2020 Assessment

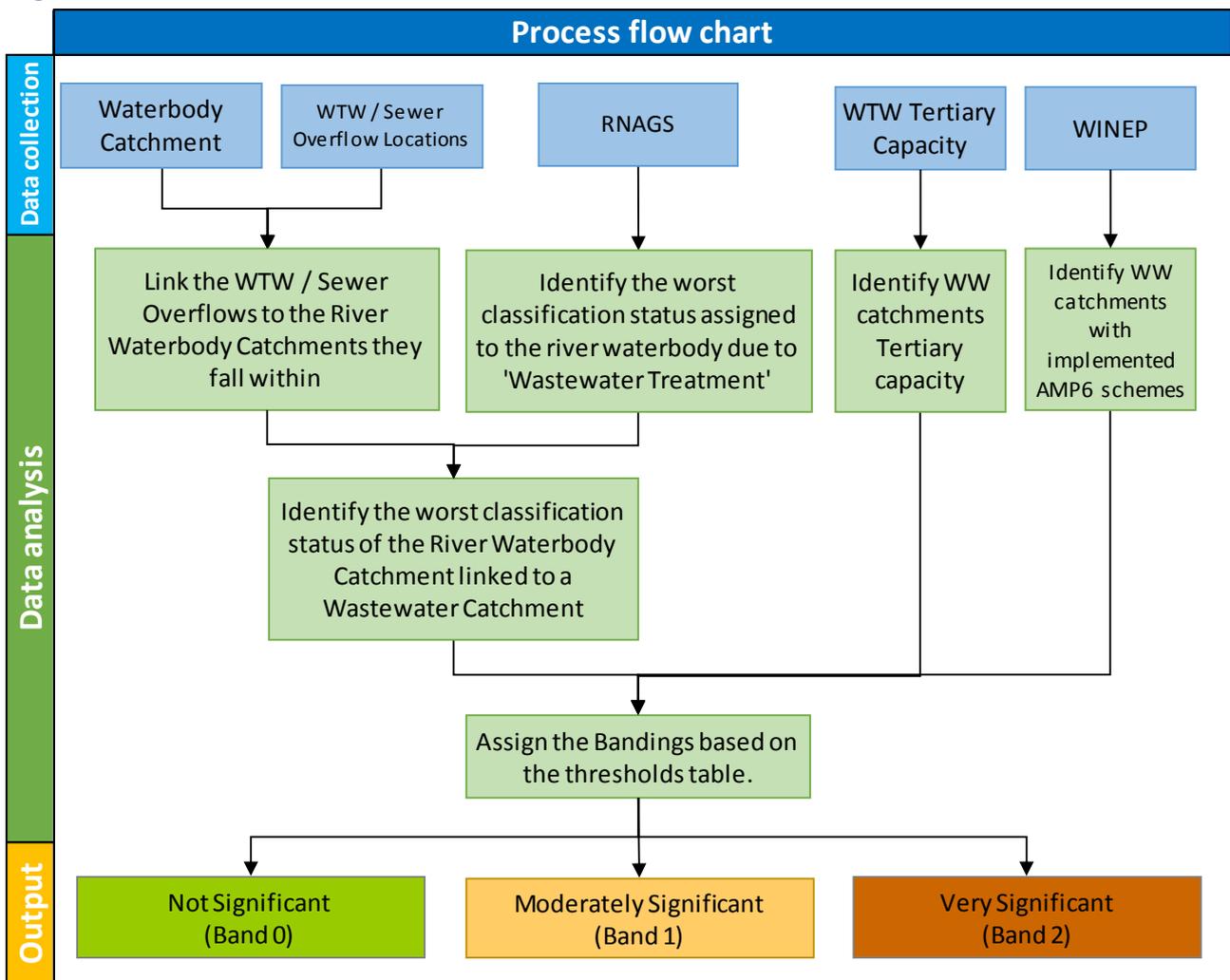
The baseline (2020) assessment uses data provided by the EA's RNAGS to identify waterbodies that have not achieved 'Good' status, where this has been attributed to 'Wastewater Treatment' and the level of certainty is noted as 'Confirmed'. The locations of our sewer catchments, WTWs and Sewer Overflows are mapped to the waterbody catchment they fall within to assess the risk each poses to water quality in the waterbody. Some of the sewer catchments cover and share multiple waterbody catchments.

The results are then assigned a band (0, 1 or 2) as set out in section 0. The wastewater catchment's banding score may then be reduced based on whether the WTW has spare tertiary capacity or an AMP6 WINEP scheme implemented, also set out in section 0.

The process developed for this assessment is shown in Figure 1. It includes details of the source of the information, how it is assessed and how the catchments are banded based on the results.

The assessment for future (2050) will not be undertaken for the first cycle of DWMP as this requires additional data and further development of a meaningful approach for forecasting the future risks. We will consider this further for cycle 2 of the DWMPs. For this cycle of DWMPs we have identified our storm overflows that could contribute to the risk, and the potential for an increased frequency of spill events by 2050. The water quality compliance planning objective assessed risk of water quality compliance due to population growth in the future, up to 2050. Both of these risk assessments will help us to understand where our discharges may put future pressure on water quality in rivers and the sea.

Figure 1 - Process flow chart for the 2020 baseline assessment



3.2. Thresholds and Bands

The outputs from the BRAVA on achieving GES / GEP are a risk score for each sewer catchment. These scores are assigned to one of three bands as specified by Water UK. We have assigned a



risk band to each of our wastewater systems/catchments. Band 0 (not significant) is where the WFD classification of the water body into which our system discharges is either Good or High. Band 1 (moderately significant) is where the waterbody is in moderate condition, and band 2 is where the WFD classification is Poor or Bad.

The assessment criteria (thresholds) and bands shown in the table below applies to the 2020 baseline assessment.

Assessment Criteria / Thresholds	Tertiary Treatment	WINEP	Bands	
Classification Status is Good or High	Reduce banding by one if theoretical capacity is greater than 80%	Reduce banding to 0 if phosphate were RNAGS and AMP6 WINEP scheme implemented	0	<i>Not Significant</i>
Classification Status is Moderate			1	<i>Moderately Significant</i>
Classification Status is Poor or Bad			2	<i>Very Significant</i>

The bands are revised based on two factors:

- WTW Tertiary Capacity – if the theoretical capacity is greater than 80%, the banding has been reduced by one. Note: the theoretical capacity assessment over-estimates the required capacity: in most cases 80% is used instead of 100%.
- WINEP – Reducing the banding to zero if phosphate is the reason for not achieving good and an AMP6 WINEP scheme has been implemented.